

OPEN SPACE ADVISORY COMMITTEE THURSDAY, APRIL 4, 2024 AGENDA

Thursday, April 4, 2024

5:30 PM

100 Third St. Castle Rock, CO 80104 Conference Rooms A&B Instructions for virtually joining the meeting can be found at: <u>https://www.douglas.co.us/board-county-</u> <u>commissioners/boards-commissions/open-space-</u> <u>advisory-committee/</u>

The purpose of the Douglas County Open Space Advisory Committee is to advise and make recommendations to the Douglas County Board of County Commissioners (Board) and municipal officials regarding disbursement of funds from the Parks, Trails, Historic Resources, Open Space Sales and Use Tax Fund, and to select open space land to be proposed for acquisition, maintenance, or preservation, to establish priorities, and to make recommendations to the Board on lands involving conservation easements acquired with such funds.

CALL TO ORDER – 5:30 PM

- I. Roll Call
- II. COSAC Disclosures
- III. Adoption of Agenda
- IV. Approval of Minutes February 17, 2024 March 7, 2024
- V. Administrative Announcements
 - a. Update on Assessment Tool for Capital Improvement Projects and Acquisitions – Micki Clark, Communiqué Consulting, LLC
 - b. Staff Activity Report Mary Ann Monzani, Open Space Program Coordinator
 - c. COSAC Regular Meeting Schedule 2024-2025 Mary Ann Monzani, Open Space Program Coordinator
 - d. COSAC Bylaws Mary Ann Monzani, Open Space Program Coordinator
 - e. Election of Officers
 - f. Other
- VI. Public comment (Provisions for additional public comment will be made as deemed appropriate by Chair)

NEW BUSINESS

VII.	Sandstone Ranch Natural Resource Inventory & Analysis – Jackie Sanderson Natural Resource Specialist	
VIII.	Leave No Trace Program – Lindsay Williams, Land Management Specialist/Ranger	
IX.	COSAC Discussion for the Good of the Order	

EXECUTIVE SESSION ADJOURN REGULAR MEETING

The Next Regular Meeting Will be Held on Thursday, May 2, 2024 @ 5:30 p.m.

OPEN SPACE ADVISORY COMMITTEE WORK SESSION SATURDAY, FEBRUARY 17, 2024 MINUTES

Call to Order

I. Roll Call

Jennifer Drybread, Committee Member – Present Jim Guerra, Committee Member – Present Patti Hostetler, Vice Chair – Present Brian O'Malley, Committee Member - Present Mike Parr, Committee Member – Excused Jay Sage, Chair – Present Kathie Shandro, Committee Member – Present Elizabeth Snow, Committee Member – Excused

II. Proposed Process for Capital Improvement Projects (CIP) and Acquisitions

Dan Dertz, Director of Open Space & Natural Resources, reviewed a proposed process map that outlined various steps needed for Open Space capital improvement projects and land acquisition being considered for approval by the Board of County Commissioners, (BOCC). Members of the County Open Space Advisory Committee, (COSAC) reviewed the process map asking questions and commenting on same.

III. Criteria Creation for CIP and Acquisitions

Ms. Micki Clark, Consultant, worked with members of COSAC to establish criteria for assessment and ranking of proposed land acquisitions and capital improvement projects. The work included:

- Review of a Douglas County map prepared for the work session that included various overlays such as zip codes
- Review of the Vision for Open Space map
- COSAC members made suggestions including notating the areas on the map that are currently going through the development process or already developed, and that Open Space staff provide their opinion on areas of value
- The concept of active pursuit of land acquisitions was discussed including that any such activity would need to be reviewed and approved by the BOCC

• COSAC developed a list of twenty criteria/attributes to help create a type of "score card" to rate any property proposed for acquisition: M. Clark will take all 20 criteria and condense it into a form that can be applied to any proposed property

IV. Strategy for a Fifteen-Year Plan

Mr. Dertz shared a presentation for the Open Space Strategy for a Fifteen-Year Plan. The plan included projected costs for salaries, fixed costs, on-going annual budget requests as well as one-time requests. Also reviewed were various Open Space projects that comprised the budget projections for the one-time budget requests. Member of COSAC asked questions and engaged in a collective discussion concerning various aspect of the presentation.

ADJOURN WORK SESSION

Motion to adjourn work session. RESULT: Approved MOVER: Hostetler SECONDER: Shandro AYES: Drybread, Guerra, Hostetler, O'Malley, Sage, Shandro EXCUSED: Parr, Snow

OPEN SPACE ADVISORY COMMITTEE REGULAR MEETING THURSDAY, MARCH 7, 2024 MINUTES

Call to Order

I. RECURRING ITEMS

ROLL CALL

Jennifer Drybread, Committee Member – Present Jim Guerra, Committee Member – Present Patti Hostetler, Vice Chair – Present Brian O'Malley, Committee Member - Excused Mike Parr, Committee Member – Excused Jay Sage, Chair – Present Kathie Shandro, Committee Member – Present Elizabeth Snow, Committee Member – Present

II. Disclosure for Items on the Agenda

None

III. Adoption of Amended Agenda

EXCUSED: O'Malley, Parr

RESULT: Approved MOVER: Shandro SECONDER: O'Malley AYES: Drybread, Guerra, Hostetler, Sage, Shandro, Snow EXCUSED: O'Malley, Parr

IV. Motion to Approve Minutes from February 1, 2024 RESULT: Approved MOVER: Hostetler SECONDER: Drybread AYES: Drybread, Guerra, O'Malley, Sage, Shandro, Snow

V. Public Comment

None.

VI. Administrative Announcements

Dan Dertz, Director of Open Space & Natural Resources reported on various items including:

• Work with our consultant to update the Vision for Open Space is continuing

• Progress on work toward the opening of Prairie Canyon Ranch for direct public access is continuing

Members of COSAC and Open Space staff engaged in a collective discussion concerning various aspects of the items reported.

NEW BUSINESS

I. Wildlife Monitoring Program – Dan Dertz, Director

Mr. Dan Dertz, Director of Open Space & Natural Resources, presented this item. Mr. Dertz explained that this program was introduced and proposed to the department by Tiffany McCauley, Land Management Specialist/Ranger. Ms. McCauley and other members of the Open Space team have been working in partnership with Douglas County's Public Affairs Department to share the wildlife footage captured from trail cameras that have been placed throughout various properties. This program will be able to showcase the wildlife found on our properties.

COSAC members were supportive of the program and are looking forward to seeing the footage on the County's social media platforms.

II. COSAC Strategic Initiative Final Draft Review – Mary Ann Monzani, Open Space Program Coordinator

Ms. Mary Ann Monzani, Open Space Program Coordinator, provided an overview of the work for the COSAC Strategic Initiative, (CSI), that has been performed by COSAC and members of staff over the last twelve months. The culmination of that work has resulted in the final version of the CSI proposed for approval by COSAC.

Members of COSAC and staff discussed various aspects of the CSI and agreed that the final version encompasses all the work accomplished within the last year. It was also discussed that the CSI exists as a living document to be referenced, as need be, at future COSAC meetings and that will be officially reviewed for any updates or revisions on an annual basis.

Motion to Approve the Final Draft of the COSAC Strategic Initiative

RESULT: Approved MOVER: Drybread SECONDER: Shandro AYES: Drybread, Guerra, O'Malley, Sage, Shandro, Snow EXCUSED: O'Malley, Parr

EXECUTIVE SESSION

COSAC entered executive session pursuant to C.R.S. § 24-6-402(4)(a),(b) and discussed the potential acquisition of specific real property in Douglas County for preservation as open

space. The discussion included the costs, benefits, and relative merits of potential property acquisitions, existing protections and encumbrances, limitations upon use, wildlife, natural resources, terrain, surrounding properties, and how the property relates to the objectives of COSAC and Douglas County. COSAC also received legal advice from an assistant county attorney regarding executive sessions and compliance with the Colorado Open Meetings Law.

Motion for COSAC to enter into an executive session.

RESULT: Approved MOVER: Shandro SECONDER: Drybread AYES: Drybread, Guerra, Hostetler, Sage, Shandro, Snow EXCUSED: O'Malley, Parr

ADJOURN REGULAR MEETING

After adjourning the executive session, COSAC members came back to the regular COSAC meeting. COSAC Chair, Jay Sage stated that COSAC was now finished with the executive session pursuant to C.R.S. § 24-6-402(4)(a),(b) for the purposes of discussing the potential acquisition of specific properties and legal advice, stated that no decisions were made in the executive session, and asked for a motion for adjournment.

Motion to adjourn the regular COSAC meeting.

RESULT: Approved MOVER: Drybread SECONDER: Hostetler AYES: Drybread, Guerra, Hostetler, Sage, Shandro, Snow EXCUSED: O'Malley, Parr

DOUGLAS COUNTY

Staff Activity Report

SUBJECT:	STAFF ACTIVITY REPORT
CC:	MARY ANN MONZANI, OPEN SPACE PROGRAM COORDINATOR
FROM:	DAN DERTZ, DIRECTOR OF OPEN SPACE AND NATURAL RESOURCES
то:	DOUGLAS COUNTY OPEN SPACE ADVISORY COMMISSION (COSAC)
DATE:	DECEMBER 1, 2023

SUMMARY

Attached is the Open Space Staff Activity Report. This report is being presented to COSAC for review as an informational item. All items will include a brief description of certain notable Open Space programing or operational activities. Included with this report are:

- Sandstone Ranch Cattle Donation
- Volunteer Program and Partnerships
- Douglas County & Colorado State Forest Service Partnership for Forest Health and Wildfire Risk Reduction
- Sterling Ranch "Intro to the Parks Night" and Open Space Participation
- Douglas County Open Space Response for the 2024 Pi Day Blizzard

Cheers & Steers for the Fair and Rodeo!...

The Board of County Commissioners has recently donated two cross-bred Red Angus steers to Douglas County 4-H participants for the 2024 Fair and Rodeo! The steers are part of the legacy herd from Sandstone Ranch and will be raised and shown by the 4-H participants, in partnership with Bob and Kristen Welch.

For more than 30 years, the owners of Sandstone Ranch had been breeding Limousine and Red Angus cattle for color, gentleness, mothering and feed efficiency. That tradition continues today with current Sandstone Ranch lessees, Bob and Kristen Welch. Now, these Douglas County genetics will be showcased at the Douglas County Fair through the 4-H program and its participants.

4-H participants involved in this program must develop and implement a rigorous diet, **training, and exercise program for the steers in preparation for the 'big' show at the Fair and Rodeo. Funds from the sale of these projects will go toward the participants'** future projects and post-secondary education goals. Other money raised at the Junior Livestock Sale at the Douglas County Fair goes toward scholarship programs for the participants. We wish both our recipients of the Sandstone Steers the best of luck as they prepare their projects for the Douglas County Fair this summer!



Volunteering and Partnerships.... A Winning Combination....

Open Space and Natural Resources has been working on building relationships/partnerships with other agencies, volunteer recruiting, and volunteer training with the Offero volunteer software.

Offero Volunteer Software

Training videos for the Offero software were created in partnership with IT and Public Affairs to be used to help train existing and new volunteers. The videos consist of How to Become a Volunteer, How to Sign Up for an Activity and How to Create a Site Visit. More videos are being worked on for Volunteer Leads and How and When to Sign Up for a Special Event.

Douglas Land Conservancy Partnership

On January 29th Open Space staff attended the Douglas Land Conservancy (DLC) volunteer orientation and presented the Douglas County Volunteer software, Offero. Two training videos were shown. Open Space staff will be **attending DLC's second** training orientation and recruiting event on February 20th where another training for the Offero software will be presented.



Jefferson County Volunteer Partnership

On Monday, February 12th, Open Space staff met with Wendy Riddle, Volunteer Services Specialist at Jefferson County Open Space along with Jeffco volunteers for a pop-up recruiting event. This was at South Valley Trailhead. It was a collaborative event that helped secure a stronger relationship. Open Space Staff **will be attending Jeffco's** Volunteer Recruiting Fairs on February 15th and 17th.



Volunteer Engagement

Douglas County Open Space and Natural Resources had planned a volunteer kickoff meeting to review 2023 volunteer accomplishments and 2024 goals along with Offero training on Saturday February 10. Unfortunately, the event was postponed, due to weather issues, and will be reschedule to a future date. Quarterly meetings are being held with our volunteers to promote engagement, discuss updates and volunteer needs and to consistently express our appreciation with our volunteer partners who are an extremely important part of the Open Space team and in caring for our properties and providing education to the community.

Douglas County and Colorado State Forest Service Working Together to Preserve our Open Spaces....

Open Space & Natural Resources along with the Colorado State Forest Service have maintained an ongoing partnership to help maintain the forest health and wildfire risk reduction for our Open Space properties. Dawson Butte Open Space was one of our properties that received forest maintenance services in 2023. The maintenance service project consisted of 215 total acres of Gambel Oak management. Approximately 183 acres of the project was retreatment of previously mitigated oak to maintain the effectiveness of past project work. Over 31 acres of new fuels treatment occurred near the trailhead and parking lot. The purpose of this treatment and retreatment was to reduce vegetation density/continuity for wildfire risk reduction, improve forest health in Ponderosa Pine forest types with heavy oak understory, and fuels reductions adjacent to neighboring properties to reduce fire hazard. The following photos are before and after treatment:





Sterling Ranch Gets Outdoors in Douglas County!

On the evening of Thursday, February 29th, residents of Sterling Ranch had the opportunity to learn about the recreational opportunities and natural resources available to visit and enjoy in Douglas County. Various agencies participated in their "Intro to the Parks Night" event. Those agencies included:

- Douglas County Open Space & Natural Resources
- Roxborough State Park
- Denver Water
- Denver Audubon Society
- Littleton Historical Society

Open Space staff had the opportunity to engage with residents about the various open space and parks properties, as well as historical sites and resources that are available to visit and enjoy. Below is a picture taken at the event:



Douglas County and Colorado State Forest Service Working Together to Preserve our Open Spaces....

Open Space & Natural Resources along with the Colorado State Forest Service (CSFS) have maintained an ongoing partnership to help sustain forest health and reduce wildfire risk on our Open Space properties and adjacent landowners. Sandstone Ranch was the first Open Space property to receive forest maintenance services as part of the annual forest management plan for 2024. The plan was written by the CSFS through an agreement with Douglas County. The treatment at Sandstone Ranch was completed this March. The area of treatment included a 32-acre shaded fuel-break along with removal of approximately 20 truck loads of downed and diseased logs. This ongoing collaborative effort between the CSFS and various Douglas County staff members from Open Space & Natural Resources, the Office of Emergency Management, and the Wildfire Mitigation team, have helped to support the established initiatives of the Douglas County Wildfire Action Collaborative.

Below is a picture of the completed forest maintenance activities performed at Sandstone Ranch this March:



Douglas County Open Space & Natural Resources Call-to-Action for the 2024 Pi Day Blizzard...

The Douglas County Open Space & Natural Resources Land Management/Ranger team helped to mitigate impacts to both Open Space properties as well as county-wide response efforts. Below is a summary of the activities and response from March 14th through March 17th. Great job team!

- Rangers put in over 100 hours of patrol and storm recovery services across the county
- Sandstone Ranch was a major focus of storm operations due to residents living on the property and cattle feeding operations. Without constant attention the property would have quickly become inaccessible. Other focus properties were Iron Horse and Lincoln Mountain, both with on property residents.
- Rangers assisted in county wide safety efforts for citizens to include assisting drivers that had been in accidents or whose vehicles had become stuck
- Rangers coordinated with DCSO Dispatch to keep county road status up to date and identified, especially for hazardous / dangerous conditions.
- Rangers patrolled all county owned open space to assist citizens with safety and security needs as even during, and soon after the storm, citizens accessed properties for snow related recreation



DOUGLAS COUNTY

COSAC Regular Meeting Schedule 2024-2025

SUBJECT:	COSAC REGULAR MEETING SCHEDULE 2024-2025
CC:	MARY ANN MONZANI, OPEN SPACE PROGRAM COORDINATOR
FROM:	DAN DERTZ, DIRECTOR OF OPEN SPACE AND NATURAL RESOURCES
то:	DOUGLAS COUNTY OPEN SPACE ADVISORY COMMISSION (COSAC)
DATE:	MARCH 27, 2024

SUMMARY

Below is the proposed COSAC regular meeting schedule for the remainder of 2024 through April, 2025. The proposed meeting dates will be reviewed and adopted with any recommended changes at the April 4, 2024 COSAC meeting.

- May 2, 2024
- June 6, 2024
- July 11, 2024
- August 1, 2024
- September 5, 2024
- October 10, 2024
- November 7, 2024
- December 5, 2024
- January 9, 2025
- February 6, 2025
- March 6, 2025
- April 3, 2025

Sandstone Ranch Natural Resource Inventory & Analysis 5-year Update - 2023 Douglas County Open Space Volunteer Naturalists Staff Report

	5-year Update – 2023 DC Volunteer Naturalists - Staff Report
SUBJECT:	Sandstone Ranch Natural Resource Inventory and Analysis
CC:	JACKIE SANDERSON, NATURAL RESOURCE SPECIALIST
FROM:	DAN DERTZ, DIRECTOR OF OPEN SPACE AND NATURAL RESOURCES
то:	DOUGLAS COUNTY OPEN SPACE ADVISORY COMMISSION (COSAC)
DATE:	March 7, 2024

SUMMARY & BACKGROUND

For the past 5 years, Douglas County volunteer naturalists have uncovered diversity and value of natural resources of the 2,038-acre Sandstone Ranch Open Space. Through scientific research, field surveys, partnerships with universities and various organizations, the gathered knowledge has brought respect for the variety of sensitive and diverse natural resources found at the ranch. Their findings are valuable for land management decisions and creating opportunities to teach and interpret resources for others. Some of the outcomes that are further explained in the document ...

- Astronomy became a big focus as Sandstone Ranch was recognized as one of the darkest night sky places along the Colorado Front Range. Novice astronomers bring telescopes to experience the celestial wonders and help to create programs for the public and the creation of an observatory.
- **Bird** sightings from surveys by volunteers have gathered a count of 168 species through all seasons of the years. Many birds rely on the varied natural habitats for nesting at Sandstone Ranch.
- Water and Aquatic Organisms Water is crucial for survival of living things. Many species that reside in the creeks wetland habitats of Sandstone ranch have been documented.
- **Plant** numbers have skyrocketed since volunteers and partner organizations have documented over 500 species of plants, including plants that are rare and vulnerable.
- Animals are abundant at Sandstone Ranch. Knowledgeable volunteers work with CSU and CC biology departments to net and livetrap bats and other small mammals, recording even unexpected species.
- **Geology** of Sandstone Ranch rocks, formations, and uplifts have been identified by geologists who volunteer to interpret the landscape on hikes and present programs throughout Douglas County.
- **Insects** found at the ranch are important as pollinators for plants and food sources for birds and other small animals. Continuous documentation of certain insects will help to indicate the health of ecosystems.

Research, land conservation ethics, and educational opportunities will continue as respectful explorations of Sandstone Ranch Open Space.

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Sandstone Ranch Open Space Natural Resource Inventory and Analysis

5-year Update -- 2023

Douglas County Open Space Volunteer Naturalists



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Sandstone Ranch Open Space Natural Resource Inventory and Analysis – 5-Year Update

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EXECUTIVE SUMMARY

Introduction

This document is a five-year update of the *Sandstone Ranch Open Space Natural Resource Inventory and Analysis* (SRNRIA) document, dated November 1, 2018. Additional information on natural resources has been added from surveys performed by Douglas County Open Space (DCOS) volunteers and from studies conducted by investigators from several academic and research institutions.

Purpose and Need

In 2018 Douglas County acquired the 2038-acre Sandstone Ranch. The SRNRIA document of 2018 established a basis for protecting and sustainably managing natural resources at the ranch. The goals of this document are to update information on natural resources to optimize recreational, education, and research opportunities at the ranch while protecting outstanding and sensitive natural resources at this unique open space property.

Methodology

Data collection methods varied among the diverse resources but were generally qualitative. Geologic and water resources information was drawn largely from existing studies at the ranch. For biological resources, inventories included the identification and location of species observed on Sandstone Ranch since the 2018 inventory document. Updated information on the status and location of sensitive or otherwise important species was also collected and analyzed to understand the effects, both positive and negative, of management operations. Comprehensive lists of natural resources occurring on the ranch are provided in appendices to this document.

Natural Resource Inventories

Sandstone Ranch affords visitors the opportunity to observe geologic units that span over one billion years of the earth's geologic history. The quarry area in Gove Canyon preserves Precambrian through Pennsylvanian-aged rocks and Tava Dike.

Attempts to fill gaps in biological inventories were partially successful. Surveys of fungi and lichens were planned but not completed. Denver Botanic Gardens (DBG) botanists, with the assistance of DCOS volunteer naturalists, conducted a season-long botanical survey. Currently, 564 species of vascular plants have been identified on the property. In addition, specimens of Bryophytes (non-vascular plants, mainly mosses and liverworts) were collected by guest bryologists and 39 species were identified. Field surveys identified 51 species of butterflies and moths at the ranch. Cumulative information from the 2018 document and subsequent surveys have documented the presence of 5 amphibian, 6 reptile, 169 bird, and 37 mammal species.

Ecological Overview

Geologic formations on Sandstone Ranch are significant landscape features that influence the types and distribution of living organisms. Erosion and chemical processes produce soils in which fungi, bacteria, plants, and animals interact to produce soils that support larger forms of life. Producers (green plants), consumers (animals), and decomposers (fungi and bacteria) are necessary to comprise a healthy ecosystem.

Relationships among species and habitats on Sandstone Ranch are complex. In general, the loss of a species or a group of species (e.g., insects) from an ecosystem can upset processes such as pollination or

food supply, thus impacting its health or limiting its resiliency—the ability to quickly repair and restore itself.

Astronomy

The topography of Sandstone Ranch permits some of the darkest skies between the light domes of Denver and Colorado Springs to exist. During the past five years, the Denver Astronomical Society (DAS) in cooperation with Douglas County Open Space (DCOS) and Douglas Land Conservancy (DLC) has provided telescopes and personnel for dark sky events. These events have allowed hundreds of people to observe lunar eclipses, meteor showers, distant galaxies, nebulae, the Milky Way and other astronomical objects and events.

A location has been selected and is under development as the Astronomical Education Center. Three large telescopes have been donated for use in the observatory planned for this facility.

Sensitive Resources

DCOS staff members and DCOS volunteer naturalists collaborated on a *Sandstone Ranch Sensitive Area Access Proposal* that helps to protect portions of the west side of Sandstone Ranch that are considered especially sensitive. The area is a substantial portion of the Chatfield Reservoir Mitigation Company (CRMC) Declaration of Restriction. The proposal, which was implemented in 2020, designates a rest period in the spring to protect breeding birds and other species and includes a number of other ongoing measures to protect sensitive resources while allowing compatible activities such as educational classes, research, and guided hikes.

Several plant and animal species found on the ranch are classified as S1 State Critically Imperiled, S2 State Imperiled, or S3 Vulnerable to Extirpation by Colorado Natural Heritage Program (CNHP) or State Wildlife Action Plan (SWAP) Tier 1 or Tier 2, and these species are in need of special protection.

The Gove Canyon/Perry Park area is one of only two locations along the Front Range where the lower Paleozoic rocks outcrop. In the quarry area in Gove Canyon, the Tava sandstone dike, "Great Unconformity" contact, and Paleosol outcrop warrant consideration of protection because they provide unique evidence of past geologic events in earth's history.

Management Operations

Over the past five years, Douglas County Open Space has developed regular communication between operation management projects and various natural resource experts. This strategy has been effective for implementing necessary management operations while protecting the many outstanding natural resources of Sandstone Ranch.

Operations projects including fire mitigation, controlled area access, ranching, weed control, and quarry development can affect the quality or distribution of natural resources, such as large mammal species and breeding birds. Potential conflicts between these operations activities and natural resources can be (and have been) minimized by cooperative actions such as adjusting the timing of project implementation, establishing trails that avoid sensitive areas, and adapting alternate management methods without adversely affecting management operations.

Future Activities: Recreation, Education, and Research

Recreational, educational, and research activities on the ranch have increased steadily since this open space was purchased in 2018. The public has taken advantage of trails, guided hikes, and star-gazing

evenings at Sandstone for recreational and educational purposes. Researchers including Denver Botanic Gardens, Colorado State University, Colorado College, and others have conducted botanical and wildlife projects on the ranch. The planned construction of an observatory and ongoing geologic, botanical, and wildlife tours is expected to increase the use of this unique site by Douglas County residents and other regional visitors. Comprehensive surveys to fill data gaps are planned for the 2024 field season and beyond.

INTRODUCTION

This document is a five-year update of the *Sandstone Ranch Open Space Natural Resource Inventory and Analysis* document, dated November 1, 2018. Since that date, Douglas County volunteer naturalists and investigators from various institutions, including the Denver Botanic Gardens, Colorado College, Colorado State University, Colorado Parks and Wildlife, and others have conducted a variety of surveys that have added considerable detail to our knowledge of the natural resources at this open space. The Douglas County volunteers and collaborators comprising the team of authors and contributors of this document are listed in **Appendix A**.

1.0 PURPOSE AND NEED

In 2018 Douglas County acquired the 2,038-acre Sandstone Ranch. Information was needed to support management planning and establish a basis for protecting and sustainably managing natural resources on the ranch while providing diverse opportunities for public use. The *Sandstone Ranch Natural Resource Inventory and Analysis* document produced in November 2018 provided baseline information relevant to management decision-making for this new open space property.

The general goals of natural resource characterization have been to optimize the recreational, educational, and research opportunities at the ranch while protecting the sensitive and outstanding natural resources at this unique open space. The past five years have provided opportunities to fill data gaps in the original inventory document, update species lists, and evaluate impacts of management operations at the ranch. Ongoing real-time inputs to management planning at the ranch have reduced potential conflicts between natural resource protection and necessary ranch operations.

2.0 APPROACH AND OBJECTIVES

As with the original inventory document, data collection focused on providing information to assist in the types of management decisions needed for planning and management of natural resources at Sandstone Ranch Open Space which include but are not limited to:

- Types of permitted activities such as hiking, cycling, horseback riding, etc.
- Scope and management of ranching operations for economic, educational, and other purposes
- Road and trail development considerations for the aforementioned activities
- Types of research activities that are required and what interpretations of natural resources might be needed for educational purposes
- Possible seasonal access in sensitive habitats (e.g., important bird habitat during spring and summer breeding seasons)
- Control of access points to the ranch from surrounding jurisdictions
- Management guidelines and restrictions for protecting sensitive species and habitats, legally protected species and species of concern, and unique or important landscape features (e.g., rock formations)
- Protection of open space values such as solitude and dark skies, which are rare in open spaces along the Front Range
- The locations, frequency, and types of fire mitigation actions necessary to protect natural resources and the human uses thereof on and adjacent to this open space property
- Establishing the baseline conditions that are to be used for ongoing natural resource monitoring and other management purposes.

2.1 General Approach

Given the presence of predominantly natural habitats and diversity of vegetation and wildlife species at the ranch, data on geologic formations and biological resources provide a necessary basis for management decision-making. Hydrologic conditions at the ranch are subject to specific management constraints.

Extensive and detailed data have been collected for some resources, depending on their relevance to management decisions. Data are summarized in tables and on figures in appendices to this document.

Sufficient data are available to identify and characterize important natural resources at the ranch. Continuing investigations by Douglas County volunteer naturalists and ongoing research by outside institutions will continue to add to an understanding of natural resources and their condition at this open space property.

2.2 Objectives

The principal objective of this document is to provide a comprehensive inventory of natural resources at Sandstone Ranch Open Space as of December 2023 that are relevant to management decision-making. A secondary objective is to evaluate actual and potential impacts of management operations in order to avoid or at least minimize adverse effects on natural resources.

3.0 METHODS

The following methods were employed for making and recording observations and conducting natural resource surveys and research during the five-year period from January 2019 through December 2023.

<u>Geology</u>: Throughout the duration of this project, volunteer geologists have studied the geologic features of Sandstone Ranch extensively during field visits along with performing a detailed review of previous geological research on the property and in other areas of the Colorado Front Range.

<u>Plants</u>: A major contribution to knowledge about the vascular plants on Sandstone Ranch was a seasonlong plant survey performed by Denver Botanic Gardens (DBG) botanists with assistance from DCOS volunteer naturalists. Methods used by DBG included field identification of species, collection of specimens of most species identified, DNA analysis for definitive identification and classification, and cataloguing herbarium specimens for addition to the Kathryn Kalmbach Herbarium of Vascular Plants at DBG. More recent plant survey work has been focused on specific habitats with sensitive plants, areas with a high diversity of species, or areas where new trails are in the planning stages. Some of this effort has been in conjunction with teaching native plant classes and leading native plant hikes. In addition, volunteer bryophyte specialists have completed short-term surveys of non-vascular plants, primarily mosses and liverworts.

<u>Invertebrates</u>: Colorado Parks and Wildlife (CPW) personnel surveyed aquatic invertebrates in riparian areas in support of development of the West Plum Creek Stream Management Plan and contributed greatly to the knowledge of species present in Sandstone Ranch's aquatic habitats. Volunteers with expertise in butterflies and moths performed several short-term surveys.

<u>Reptiles and Amphibians</u>: Standard observation and search methods were performed during the spring, summer, and fall seasons. Nocturnal call surveys and observations of active individuals were conducted for frogs and toads on wet nights in the spring (mostly in April). Diurnal surveys were conducted during the summer and fall in each terrestrial and aquatic habitat. Searches included overturning (and

replacing) rocks, logs, and other surface debris. The time, date, weather conditions, location, and any relevant behavior were recorded for each observation. No specimens were collected.

Periodic herpetology surveys confirmed the continued presence of all species identified during the initial 2018 natural resource inventory as well as new species.

<u>Birds</u>: Volunteer ornithologists observed and identified birds on Sandstone Ranch during driving and walking surveys in each of nine designated zones that were defined during the initial 2018 natural resource inventory. (See **Appendix H.** for the map of monitoring zones.) Surveys were conducted in early morning, daytime, and occasionally at night. Species identification and numbers were recorded using binoculars, spotting scopes, and diagnostic photos, as well as by sound/calls. Since the initial 2018 Sandstone Ranch bird surveys, year-round monitoring has been conducted from 2019-2023, allowing data to reflect spring and fall migration observations, resident species, etc. Foraging, courtship, nesting, fledging young, and other behaviors were also noted.

Mammals: Volunteer naturalists continued surveys of mammals at Sandstone Ranch Open Space by direct observations and analysis of tracks, scat and other evidence. However, site-wide surveys were not conducted on a consistent periodic basis. Nevertheless, these surveys confirmed the presence of all species identified during the 2018 Natural Resource Inventory, as well as identifying four new species. In addition, Colorado State University (CSU) and Colorado College (CC) have brought classes to Sandstone Ranch for educational experiences and field work practice for several years. Most of their class activities have been conducted in the protected west side of the property, meeting one of the prescribed uses of this area of Sandstone Ranch: taking advantage of this valuable protected area for education. The focus of the CC classes has been on development of individual student research projects using various methodologies. The projects spanned several natural resource disciplines--not restricted to mammalogy. The intent of the CSU classes has been to instruct students on procedures for live trapping small mammals and using mist nets and acoustic surveys for identifying bats. In addition to teaching students methodology for biological research and demonstrating the value of protecting sensitive habitat and natural resources, these classes have contributed to the overall knowledge of natural resources at Sandstone Ranch. Details about both of these continuing educational endeavors are provided in Section 6.4.5, Mammals.

<u>Astronomy</u>: Sightlines were taken at the intended location of the new astronomical observatory to ensure that the ridges that shield the area from the neighboring light domes would not block the telescopes from seeing the desired nighttime objects. Sky Quality Meter readings were taken to ascertain the official darkness of the sky. Now that it has been determined that this is an ideal location for this facility with a full enough view of the sky, representatives from the Denver Astronomical Society (DAS) will continue working with the county, which will construct telescope viewing pads and the observatory.

4.0 GEOLOGIC RESOURCES

Volunteer geologists have conducted extensive field investigations of the geologic features at Sandstone Ranch throughout this natural resource inventory and analysis project. In addition, a comprehensive review of previous geological research on the property and in other areas of the Colorado Front Range has provided important background information and has given us insight into how unique Sandstone Ranch geology is. These geologic features on the property present a wonderful opportunity for ongoing geology research as well as for education, including geology classes at all levels and educational hikes for the public. The following description of Sandstone Ranch geologic features is a summary of the knowledge that has been gained as a result of these efforts.

Sandstone Ranch reveals the geologic history of the Front Range of Colorado in rocks ranging in age from more than a billion years old to recent deposits of unconsolidated sediments. The resulting landscape of great red monoliths separated by broad expanses of green pastures is responsible for much of the beauty we see today at Sandstone Ranch. (See **Figures 4-1 and 4-2**.) The ranch's Gove Canyon is one of two locations along the front range where Paleozoic rocks are preserved and accessible.





Figure 4-1. Fountain Formation seen as hogbacks along the Front Range

Figure 4-2. Hoodoos in the valley

4.1 Previous Studies in the Sandstone Ranch Area

The geology of Sandstone Ranch has been studied, mapped and documented numerous times by U.S.G.S. for the statewide geologic map, by Colorado Geologic Survey (CGS) for state quadrangle maps, and by Colorado educational institutions. Numerous specific studies have been conducted on the lower Paleozoic units in Gove and Plum Creek (Star Canyon) area, with some measured stratigraphic sections published from Gove Canyon outcrops.

The most comprehensive geologic study of Sandstone Ranch is found in the CGS 2008 Open-File Report 08-17, "Geologic Map of the Larkspur Quadrangle, Douglas and El Paso Counties, Colorado." Geologist Robert Raynolds (Research Associate at the Denver Museum of Nature and Science) and DCOS volunteer geologist Pam Schulz visited Sandstone Ranch in October of 2018 and located a sandstone dike injected into the Pikes Peak granite west of the quarry. In 2020, Christine Siddoway of Colorado College identified this dike as the Tava sandstone. Her studies indicate it to be from the time of the Neoproterozoic (Cryogenian) period ~ 750 million years ago.

4.2 Sandstone Ranch Geology

4.2.1 Structural Setting

Sandstone Ranch is located along the western edge of a large structural basin known as the Denver Basin, which is essentially a downward sloping feature that extends from southeastern Wyoming and southwestern Nebraska down to the southern part of Colorado. The Denver Basin is bordered on the west by the Front Range uplift, the geologic feature that created our Rocky Mountains. The Rampart and Perry Park faults run primarily north-south on the west side of Sandstone Ranch separating the basin from the mountains.

4.2.2 Stratigraphy

The most prominent stratigraphic unit seen at Sandstone Ranch is the Fountain Formation, a red sandstone seen along the west side of the ranch as hogbacks near the mountain front and also as random cliffs and "hoodoos" along the central and eastern parts of the ranch. Rocks exposed at Sandstone Ranch that are older than the Fountain Formation can be seen in Gove and Plum Creek (Star Canyon) drainages. The oldest exposed rock unit is the mountain-forming Precambrian Pikes Peak Granite in the western portion of the canyons. This 1.2-billion-year-old granite is overlain by Paleozoic rocks which are tilted and moderately dip to the east. The Paleozoic rocks are exposed in the Gove Canyon quarry area, and canyon walls consist of Cambrian Sawatch sandstone, Ordovician Manitou limestone, Mississippian Williams Canyon limestone, and Pennsylvanian Fountain sandstone. It is like reading the geologic history in the pages of a book as you walk up sections out of the canyon. See **Appendix B.**, *Geology of Sandstone Ranch*, for detailed descriptions of the Paleozoic rocks.

A complete geologic section (i.e., one without any missing rock units) would tell the complete history of the area. However, at Sandstone Ranch there are many "chapters" missing. For instance, the contact between the Precambrian granite and the Cambrian sandstone on the western edge of the quarry, known as the "Great Unconformity," signifies the absence of approximately 570 million years of geologic information (i.e., the missing geologic units were either not deposited here, or have been eroded, or a combination of the two). (See **Figure 4-3**.)



Figure 4-3 The "Great Unconformity" contact

Numerous other formation contacts have been identified in Gove Canyon as unconformable, erosional, or faulted surfaces, e.g., an ochre-colored paleosol (weathered surface) seen in the quarry, which formed in desert conditions before Fountain Formation was deposited. (See **Figure 4-4.**)



Figure 4-4. Paleosol surface in the quarry area

4.3 Points of Geologic Interest

The best location for seeing the full geologic story of Sandstone Ranch is at the "Ranch Overlook." From this location, an observer can get a better grasp of how the Fountain Formation features relate to the mountain front. One can see geologic units that span over one billion years from the Precambrian granite forming the mountains to the west, up through Mesozoic sediments at Perry Park, and the Tertiary-aged volcanics on Dawson Butte. The quarry area in Gove Canyon is the best place to get up close to "the Great Unconformity," Tava Dike and Cambrian-Pennsylvanian aged rocks.

5.0 WATER RESOURCES

5.1 Introduction

Water is an important natural resource on Sandstone Ranch Open Space, as it is everywhere in Douglas County. Throughout this document, you will note references to water and how it affects other natural resources on the property. In order to provide some insight into the nature of water resources available at Sandstone Ranch, Scott McEldowney, Deputy Director Open Space and Natural Resources, provided the following background information.

There are three water sources on Sandstone Ranch: creek water, well water, and free flow water. Water availability from these sources is dependent on weather, hydrologic conditions, and legal restrictions.

5.2 Creek Water

Two creeks flow onto Sandstone Ranch. Gove Creek enters the southern edge of the property at R68W T10S S2 and meanders north, exiting the property at R68 T9S S25. West Plum Creek enters at the extreme western edge of the property (R68W T9S S34) and angles through the northwest corner of R68W T9S S35 before flowing off the property and onto the abutting land to the north, Haystack Ranch. Douglas County has senior (1869) water-rights on Gove Creek but none on West Plum Creek. Though Koontz ditch flows from Sandstone's portion of West Plum Creek across northern portions of the Ranch, water-rights associated with the ditch belong to Haystack Ranch.

The 1869 senior water-rights allow the County to remove water from Gove Creek, April-October. By law, 1/3 of the flow belongs to the County, the remaining 2/3 to Perry Park. The County's 1/3 is measured at the suspension bridge pond in R68W T10S S2 and, when taken, flows into Gove ditch. The ditch meanders from the pond across portions of R68W T10S S1 and S2 into R68W T9S S36 and S25. The County must use the water within 72 hours and only for beneficial purposes such as irrigation or grazing. Currently, taken water irrigates 65 acres. The County cannot store Gove Creek water; water not taken is water forfeited. In addition, a small amount of water flows into Gove ditch from a surface pond in R68W T10S S1. On many maps this section of Gove ditch is referred to as "unnamed ditch."

Perry Park will measure the 2/3 water-rights at a diversion channel to be built near Becky's Crossing and then reintroduce the diverted water back into Gove Creek. Although not owned by the County, this reintroduced water will flow through Sandstone maximizing Gove Creek volume.

The County has additional junior Gove Creek water-rights (1994) at Fazio head-gate and ditch, located just west of the main farm house in R68W T9S S36. The County exercises these water-rights when in-priority.

Monthly, Douglas County must measure and report to the State of Colorado, Division of Water Resources (DWR) all water pulled from Gove Creek.

5.3 Well Water

There are approximately 12 wells on the property completed into the Dawson Formation. One collapsed well, near Hwy 105, pulled from the Arapahoe Formation. Water discharge from these wells is limited to domestic, stock watering and irrigation use. On average, between 6 and 8 stock tanks can be found on the ranch. Livestock management randomly fills the tanks with well water. Not all tanks are in use at any given time.

5.4 Free Flow Water

In times of rain/snow, water will fall and might freely flow onto the property. This water can be stored. Aswam dam (R68W T9S S36) and two little ponds to the south of the dam have the potential to store water.

6.0 BIOLOGICAL RESOURCES

6.1 Aquatic Life

As noted in **Section 5.0**, water is an important natural resource on Sandstone Ranch Open Space, and it affects other natural resources throughout the property. One natural resource category of considerable interest is aquatic life, not only because it can provide insight into the health of the creeks and ponds themselves, but also because it is an indication of the health of the surrounding riparian habitats.

Biological diversity is generally high in aquatic habitats including streams, ponds, and historic ditches. One important measure of stream health is the presence and species composition of aquatic organisms. West Plum Creek and its tributaries are especially high in species richness, including several species that are considered imperiled in Colorado. (See the West Plum Creek Stream Management Plan (SMP)–under development, 2022 and 2023.) Although no regularly scheduled assessments of aquatic organisms have been conducted on Sandstone Ranch specifically for this natural resource inventory project, studies underway by Colorado Parks and Wildlife (CPW), Douglas County Division of Open Space and Natural Resources, and other agencies in support of the West Plum Creek Stream Management Plan have included Gove Creek and the stretch of West Plum Creek within Sandstone Ranch. These studies have contributed greatly to the knowledge of species present in Sandstone Ranch's aquatic habitats.

6.1.1 Survey in Support of the West Plum Creek Stream Management Plan (SMP)

In the summer of 2023, a fisheries crew working with Elizabeth Krone, NE Region Native Aquatics Lead Technician, and Boyd Wright, Native Aquatic Species Biologist, both from CPW's Department of Natural Resources (DNR), conducted a fisheries survey in the West Plum Creek watershed in order to accomplish two goals:

- Annual sampling of small native fish in order to track populations and trends,
- Baseline sampling in support of the West Plum Creek Stream Management Plan (SMP) development.

Although the survey included a much broader area of West Plum Creek and its tributaries, valuable information about aquatic organisms that are specifically found in Gove Creek and the segment of West Plum Creek on Sandstone Ranch was extracted from the field notes. During this survey, young-of-year and a few larger Brook Trout were observed at each site. However, a primary focus of the survey was macroinvertebrates, small aquatic organisms that are visible to the naked eye and live in the water, primarily as bottom dwellers. The extract from the field survey notes lists a number of species of aquatic organisms that were observed and identified including the following:

- Insects:
 - Mayflies (nine species from six families)
 - Craneflies (two species from two families)
 - Caddisflies (seven species from six families)
 - o Stoneflies (at least seven species from five families)
 - Biting midges (one species from one family)
 - Non-biting midges (seventeen species from one family)
 - Blackflies (two species from one family)
 - Horseflies (one species from one family)
 - Houseflies (one species from one family)
 - o Beetles: (four species from three families)

- Arachnids:
 - Mites (two species from two families)
- Worms: (at least 4 species from 4 families)
- Mollusks
 - o Clams (one species from one family)
 - Snails (one species from one family)

For more detailed information about these aquatic species, see **Appendix C.** for a table of extracts from the field survey notes specifically related to Sandstone Ranch, along with annotations about the organisms and family identification that were added by DCOS volunteer naturalists.

6.1.2 Educational Opportunities Presented by Aquatic Resources on Sandstone Ranch

Dr. Maybellene Gamboa (Colorado College Department of Organismal Biology & Ecology Assistant Professor) has been leading field sessions for her undergraduate Ecology Class at Sandstone Ranch since 2019. During these four-week sessions, students design and conduct short-term original research projects. Small teams of students have conducted several brief surveys of the aquatic organisms at Sandstone Ranch. (See **Figures 6-1 and 6-2**.) Their findings, although small in comparison, have proven to be consistent with those of CPW researchers and other professionals in the same areas of the property. More important, these field sessions are training college students how to do professional research in the future, and their invaluable experiences at Sandstone Ranch will be lifelong treasured memories.



Figure 6-1. Students conducting an aquatic macroinvertebrate survey



Figure 6-2. Discoveries from left to right: Mayfly Nymphs and Cased Caddis
Because of the diversity of aquatic species in creeks, ponds, and ditches on the property, Sandstone Ranch will continue to provide an ideal outdoor laboratory for groups of students from grade school through college. While the discoveries may be small, the learning opportunities are huge, and who knows when a new species might be found by a young student?

6.1.3 Other Sources of Information about Aquatic Life on Sandstone Ranch

Documentation of the aquatic life in Sandstone Ranch's aquatic habitats is an important resource for volunteer naturalists who lead hikes or teach classes on the property. In addition to the macroinvertebrate study reported in this document, amphibian inhabitants of aquatic habitats on Sandstone Ranch are discussed in **Section 6.4.2** and both vascular and non-vascular aquatic plants are covered in **Section 6.3**.

New discoveries are anticipated as future surveys are conducted for ongoing projects such as the West Plum Creek Stream Management Plan or researchers with expertise in related disciplines have time available to inventory and analyze the resources.

6.2 Fungi and Lichens

Fungi and lichens are important components of ecosystems at Sandstone Ranch; however, specific knowledge of these groups is currently insufficient to assess whether management operations would exert more than minor impacts on them. Brief descriptions of these ecologically important groups are provided below for information purposes.

6.2.1 Fungi

This group of organisms includes yeasts, molds, and mushrooms. These organisms comprise a kingdom of life equivalent to plants and animals. Fungi are widespread and important in ecosystems on Sandstone Ranch. Fungi perform several important ecological functions. More than 90 percent of plants in natural ecosystems depend on mycorrhizal fungi to form symbiotic relationships with roots that expedite the transfer of nourishment to plants. Some species perform the vitally important task of decomposing dead organic matter into simpler organic chemicals that can then be recycled as nutrients back into ecosystems.

With the exception of mushrooms (the fruiting bodies of soil fungi) species of fungi are generally inconspicuous. However, while many species of mushrooms are easily visible on the property and cannot be overlooked (**Figure 6-3**) no scientific survey of the species of mushrooms or other fungi on the property has been undertaken yet, due to the time constraints of mycologists who have indicated that they might become available in the future to pursue this research.



Figure 6-3. Mushrooms (giant puffballs) that can't be overlooked

6.2.2 Lichens

Many species of fungi form complicated associations with algae to form lichens, which are keystone components in terrestrial ecosystems. Where bare rock is exposed, lichens are the first organisms to become established. They break down rock and begin making soil in which plants can subsequently take root. Lichens serve as food sources for animals such as deer and rodents and provide nesting material for birds. Their services to humans include producing food, making medicines, digesting pollutants, and influencing the composition of the air we breathe. Though often overlooked, lichens encrust as much as

eight percent of the Earth's surface, an area larger than that covered by tropical rain forests (Sheldrake 2020).

Rocky outcrops are prominent landscape features at Sandstone Ranch. Many of these are covered with diverse assemblages of lichens. In addition, lichens are found growing in colonies on standing trees, downed tree trunks, and older buildings and fences, on the property. Lichen surveys have not yet been conducted but are anticipated for the future.

Dr. Erin Manzitto-Tripp, Professor, Department of Ecology & Evolutionary Biology and Curator of Botany, Museum of Natural History, University of Colorado, is currently working on a complete inventory of the lichens of Colorado, an endeavor that has never been done before. She also has two graduate students helping in the effort. She has expressed interest in conducting fieldwork and the required labwork and herbarium efforts to identify the lichens at Sandstone Ranch as part of the overall lichen inventory for Colorado, but she has indicated that modest funding would be needed to cover this work (Manzitto-Tripp, 2023, personal communication). She goes on to note, "Identifying lichens is unfortunately way more laborious than plants as we lack formal field guides, treatments, dichotomous keys, etc. Rather, we write them as we go. So in addition to dissecting and compound scope work (you have to see and measure spores, etc.), we have to do Thin Layer Chromatography on about 1/3 of all collections as well as DNA sequencing on about 10% of them to confirm identifications." DCOS has an opportunity to be part of this important statewide project. Conversations between Dr. Manzitto-Tripp and DCOS staff members will continue to see if a source of funding can be identified.

6.3 Plants

6.3.1 Vascular Plants

During the initial Sandstone Ranch survey of vascular plants in 2018, 345 individual plant species were identified by volunteer naturalists working in small teams or as participants in surveys sponsored by the Field Studies Committee of the Colorado Native Plant Society (CoNPS). Among them were a number of species that had not been officially recorded from Douglas County previously, including the marsh bellflower, a plant that was believed to have been extirpated from Colorado (Ackerfield 2015). Botanists from Colorado State University (CSU), Colorado Natural Heritage Program (CNHP), and Denver Botanic Gardens (DBG) made initial visits to the ranch to observe this plant species and some of the other uncommon plants that had been identified at Sandstone Ranch. Interest in plants on the property was high, since Sandstone Ranch had not been open for botanic research previously. After visiting the ranch, Melissa Islam, PhD, Associate Director of Biodiversity Research, DBG, submitted a Sandstone Ranch Botanical Survey Proposal to Douglas County Open Space in late 2018 to develop a more complete inventory of plants on Sandstone Ranch and collect specimens of plants for inclusion in DBG's Kathryn Kalmbach Herbarium. The project was valued at \$100,000, with DCOS contributing \$5000 and the remainder provided by DBG. The proposal was accepted, and the survey was scheduled for the spring and summer of 2019.

6.3.1.1 Sandstone Ranch 2019 Botanical Survey--DBG

<u>Goal</u>: In the Overview of the final report of DBG's *Sandstone Ranch 2019 Botanical Survey* (Alba and Wingate 2020), the authors reported that the goal for the survey was to support Douglas County's vision for the ranch's future, which included "an aim to balance historical and ecological preservation of the Ranch with public access and educational opportunities." The intent was to provide "relevant data about the botanical and ecological character of the property" without making any management recommendations.

<u>Process</u>: Under the guidance of Dr. Christina Alba and Dr. Janet Wingate, DBG field crews, with the assistance of DCOS volunteer naturalists, intensively sampled each of nine previously designated geographic zones on the ranch on 18 dates throughout the spring and late summer of 2019. The dates were selected to ensure that species were collected when the reproductive structures required for identification would be available. Each unique species was collected along with data about its location. In the final analysis of the project, additional collections made by Loraine Yeatts and DCOS volunteer naturalists in 2018 were included.

<u>Results</u>: At the end of the survey, a species list was generated with each species corroborated by specimens housed in the Kathryn Kalmbach Herbarium of Vascular Plants at DBG. In the final report (Alba and Wingate 2020), the DBG botanists noted that "Physical specimens are more valuable than observational lists because the specimen and its associated data are curated in perpetuity, to be verified by other researchers and used for future scientific and educational purposes.... As such, the collections serve the dual purposes of describing plant communities on the Ranch, while supporting the broader effort to document plant biodiversity in Colorado." In all 498 species were collected and documented on Sandstone Ranch during this survey, and the specimens in the herbarium are available for use by other researchers and members of the public.

6.3.1.2 Ongoing Plant Research

Following completion of the DBG plant study, volunteer naturalists have continued plant research on the property. However, due to time limitations, systematic weekly surveys have been discontinued. Instead, more recent plant survey work has been done in conjunction with other volunteer activities such as teaching Colorado Native Plant Master (NPM) classes for CSU Extension, leading field trips for the Colorado Native Plant Society (CoNPS), or leading plant hikes and naturalist hikes for the general public on the Sandstone Ranch property. Three of the newer plant discoveries on the property are trumpet gooseberry (*Ribes leptanthum*), golden smoke (*Corydalis aurea*), and marsh violet (*Viola palustris*). (See **Figures 6-4, 6-5**, and **6-6.**) Although these are not uncommon species in Colorado, they are uncommon at Sandstone Ranch, and they were welcome additions to the plant list.



Figure 6-4. Trumpet gooseberry Ribes leptanthum



Corydalis aurea



Figure 6-6. Marsh violet Viola palustris

In addition, some site-specific surveys have been conducted to assist with DCOS planning. The most recent of these was a survey conducted in mid-July 2023 on Gove Knob to locate areas with sensitive plants in order to help DCOS trail planners design routes that would not disturb them. During this survey, two species new to the ranch were identified: spider milkweed or antelope horns (*Asclepias asperula*) and roundtip twinpod (*Physaria vitulifera*). (See **Figures 6-7** and **6-8**.) Both of these species are unusual plants for Sandstone Ranch and have not been found elsewhere on the property. Of special concern is the roundtip twinpod, which is ranked as G3, Globally Vulnerable to Extirpation by the Natural Heritage Network, and S3, State Vulnerable to Extirpation in Colorado by the Colorado Natural Heritage Program (CNHP). Roundtip twinpod is endemic to the Front Range, and in the online *Colorado Rare Plant Guide* (Colorado Natural Heritage Program 2023), the threats to this plant are listed as urban development, non-motorized recreation, the encroachment of exotic species, grazing, and impacts from climate change.

Sandstone Ranch plant survey records have been maintained and updated as new species are observed. Currently, there are 564 species of vascular plants that have been identified on Sandstone Ranch. These plants are listed in **Appendix D.** along with an indication of the source of the records—naturalist survey observations, the DBG inventory, or both.



Figure 6-7. Antelope horns milkweed (Asclepias asperula)



Figure 6-8. Roundtip twinpod (*Physaria vitulifera*)

6.3.1.3 Noxious Weeds and Other Alien Plants

Although identifying alien (non-native) plants on the Sandstone Ranch property was not a primary focus of the 2018 botanical survey and has not been a primary focus of studies since then, volunteer naturalists continue to identify and record these plants as they encounter them along with native species. In the current records, of 564 species, 18% (100 species) have been determined to be aliens.

Based on the book *Noxious Weeds of Colorado* 14th Edition (Colorado Weed Management Association 2020), 23 of the alien plant species on Sandstone Ranch are considered noxious weeds in Colorado, plants that are disruptive to native vegetation and ecosystems. The Colorado State Department of Agriculture, in cooperation with County and Local governing bodies, enforces regulations controlling these plants. The plants are categorized into three lists of noxious weeds plus a watch list:

- List A: Species designated by the State Agriculture Commissioner for eradication on all county, state, federal and private lands.
- List B: Weed species whose continued spread should be stopped; county and local governing bodies will adopt noxious weed management plans that cover these plant species.
- List C: Plants that have been selected for recommended control methods; county and local governing bodies may require management of these species.
- Watch List: Non-native weeds whose impacts and distribution are not yet well understood.

Unfortunately, two of the alien plant species that have been identified at Sandstone Ranch are on List A: (plants that must be eradicated): orange hawkweed (*Hieracium aurantiacum*) and hairy willow-herb, (*Epilobium hirsutum*). (See **Figures 6-9** and **6-10**.)





Figure 6-9. Orange Hawkweed – List A Hieracium aurantiacum

Figure 6-10. Hairy Willow-herb – List A Epilobium hirsutum

All of the A, B, and C Listed noxious weeds that have been identified by volunteer naturalists at Sandstone Ranch are listed in **Table 6-1** along with two species that are on the Watch List.

Weed List	Scientific Name	Common Name(s)
А	Epilobium hirsutum	hairy willow-herb
А	Hieracium aurantiacum	orange hawkweed
В	Artemisia absinthium	absinth wormwood
В	Carduus nutans	musk thistle; nodding thistle
В	Centaurea diffusa	diffuse knapweed
В	Cirsium arvense	Canada thistle
В	Cirsium vulgare	bull thistle
В	Cynoglossum officinale	hound's tongue; gypsyflower
В	Elaeagnus angustifolia	Russian olive
В	Euphorbia virgata (E. esula – state weed list shows wrong species)	leafy spurge
В	Lepidium draba	hoary cress; white top
В	Linaria dalmatica	dalmatian toadflax
В	Linaria vulgaris	butter-and-eggs; yellow toadflax
В	Potentilla recta	sulfur cinquefoil
В	Saponaria officinalis	bouncing bet; soapwort
С	Arctium minus	common burdock
С	Bromus tectorum	cheatgrass; downy brome
С	Conium maculatum	poison hemlock
С	Convolvulus arvensis	field bindweed
С	Elymus repens	quackgrass
С	Erodium cicutarium	filaria; redstem stork's bill, filaree; crane's bill; heron's bill
С	Poa bulbosa	bulbous bluegrass
С	Verbascum thapsus	woolly mullein; common mullein
Watch List	Berteroa incana	hoary alyssum
Watch List	Phragmites australis	common reed

 Table 6-1. A, B, C and Watch List Noxious Weeds at Sandstone Ranch

Although control of noxious weeds on Sandstone Ranch property is primarily the responsibility of designated DCOS staff members, volunteers have also made a substantial impact. For four summer seasons, volunteer naturalists focused on the two A Listed species, and along with Jackie Sanderson, the DCOS Natural Resources Specialist, they physically removed all traces of the two species that they could find. Nevertheless, because of the characteristics of these plants, complete eradication is difficult, and continuing to focus attention on these species is warranted.

A much larger weed control project conducted by volunteers is the Douglas County Weed Warriors led by Brian O'Malley. Although this project is not restricted to Sandstone Ranch Open Space, this group of volunteers rotates through different Douglas County Open Spaces, focusing on removal of invasive weed species. The difference that they have made is clearly visible at Sandstone Ranch, as it is at other open spaces in the county.

6.3.1.4 Human Impact on Native Plants

All development of trails and other facilities on open space properties has some level of impact on both wildlife and native plants However, DCOS has included volunteer naturalists in discussions of development activities and has considered data regarding sensitive and uncommon plants in their planning activities, especially for locations of trails. These cooperative efforts have resulted in minimal impact to the most sensitive or uncommon plants at Sandstone Ranch. For future trail building activities, a potential consideration is avoiding leaving trail debris along the edges of trails. Not only is it unsightly for the public when they are using the trails, trail building debris also encourages growth of alien weeds and discourages native plant species.

The next step is ensuring that public use of the property also has minimal impact on all of the native wildflowers, shrubs, and trees that the public enjoys so much while recreating on the land. At this point, there are not many social trails at Sandstone Ranch and damage to native plant communities alongside trails is not a significant problem in most areas. However, with time and continued use of trails, off-trail shortcuts and other unauthorized off-trail activities can have a substantial negative impact. In addition, continued use of trails in extremely muddy conditions encourages hikers and other trail users to stray from the trails themselves and inadvertently widens trails. This not only damages the trails but the native plants that grow alongside them. Encouraging trail users to use good judgement and stay off trails when conditions are extremely muddy would be helpful. Plans under development for a *Leave No Trace* initiative on Douglas County Open Space properties will help to prevent negative impacts. A major goal of *Leave No Trace* philosophy is to "avoid or minimize impacts to natural area resources and help ensure a positive recreational experience for all visitors." This initiative will not only benefit members of the public who use the trails at Sandstone Ranch today, but also allow future generations to enjoy the unspoiled land at Sandstone Ranch for many years to come.

Unfortunately, some routine maintenance activities on the ranch property such as weed control and fire mitigation may have an unavoidable impact on native plants. However, volunteer naturalists working cooperatively with DCOS management and staff members to identify locations where there are species that are ranked by Colorado Natural Heritage Program (CNHP) as S1 State Critically Imperiled, S2 State Imperiled, or S3 Vulnerable to Extirpation can help to minimize damage to the most sensitive species on the property.

6.3.1.5 Plant-focused Educational Activities on the Property

Volunteer naturalists on this project who are also trained Colorado Native Plant Master (NPM) instructors have been offering Colorado State University Extension three-week NPM classes at Sandstone Ranch annually since 2019 with the exception of a one season break due to COVID restrictions. These well-received classes have focused the attention of both professional botanists and amateur plant enthusiasts on the diverse plant communities at Sandstone Ranch. In addition to plant hikes for the pubic offered by DCOS, there have been requests for plant hikes on the property from groups including the Colorado NPM program, the Colorado Native Plant Society (CoNPS), Douglas Land Conservancy (DLC), Denver Botanic Gardens (DBG), and Osher Lifelong Learning Institute (OLLI).

Information developed during this project is currently being used during general naturalist hikes and wildflower hikes for the public as well as other groups on Sandstone Ranch. Development of seasonal flower guide handouts for members of the public to use for their own wildflower treasure hunts is under consideration.

6.3.2 Non-Vascular Plants (Bryophytes)

Bryophytes are non-vascular plants having no true roots or vascular systems, unlike most of our more familiar native plants. They are generally small terrestrial plants preferring moist habitats, although some can survive in drier areas. The three types of bryophytes are mosses, liverworts, and hornworts. Because these plants reproduce by spores or asexual means, they have no showy flowers to attract us and are easy to overlook. However, bryophytes play important roles in ecosystems including reduction of erosion along streambanks, filtering and retention of water, absorption of pollutants, decomposition of organic matter, and several other contributions to soil health, In addition they provide habitat and food sources for insects and small invertebrates. At the global level, a recent year-long study determined that mosses make a major contribution to combatting climate change through carbon sequestration (Eldridge, et al. 2023).

In Colorado, over 400 species of mosses, 104 species of liverworts, and two species of hornworts have been documented so far. However, bryophytes have not yet been studied as extensively in the state as vascular plants. As a result, ongoing bryophyte research in new areas of Colorado is extremely important. In these areas where bryophytes have not been studied previously, state records of new species are being discovered and more information is being gathered about the habitat and range of existing species.

6.3.2.1 Spring 2018 Bryophyte Study

In the spring of 2018, Mo Ewing, a volunteer bryologist, conducted an initial bryophyte study in the Gove Creek riparian area, accompanied by a volunteer naturalist. During this short study, he collected specimens of 18 species of mosses. However, due to the complexity of identifying mosses in the laboratory, the results of the study were not available until 2019. Mo Ewing's work was a significant start, although just a beginning in identification of the many bryophytes on the property. (See **Appendix E.** for a list of all species that have currently been identified.) Among the species he collected are two mosses of conservation significance: Blytt's leafy moss (*Mnium blytii*), which is found primarily in western North America (**Figure 6-11**), and mountain broom moss (*Dicranum montanum*), which is found primarily in eastern North America (**Figure 6-12**). The Colorado Natural Heritage Program (CNHP) ranks and tracks both of these species as S1/S3 species, plants that are Imperiled or Vulnerable to Extirpation at the state level, and NatureServe ranks them as S2, Imperiled at the state level.



Figure 6-11. Blytt's leafy moss (*Mnium blyttii*) Photo Credit: Mo Ewing

Figure 12. Mountain broom moss (Dicranum montanum) Photo Credit: Mo Ewing

6.3.2.2 Spring 2023 Bryophyte Study

In the spring of 2023, two volunteer bryologists, Dr. Barbara Thiers and Stacey Anderson, along with a DCOS volunteer naturalist, conducted a short continuation of the bryophyte survey work begun by Mo Ewing. Unfortunately, due to unusually heavy rainfall, the water in Sandstone Ranch creeks was especially high, and in some areas, it was overflowing the banks. As a result, these researchers were not able to examine the stream banks adjacent to the water, where many bryophytes may thrive. They noted that they undoubtedly missed some bryophyte diversity. Nevertheless, in the Gove Creek and West Plum Creek riparian areas, they located several of the moss species that Mo Ewing had identified earlier and also collected specimens and identified 22 new species of mosses that had not previously been reported at Sandstone Ranch. See **Appendix E.** for a list of these species. In addition to mosses, they collected and identified two species of liverwort plants during this short bryophyte survey: lesser crestwort (*Lophocolea minor*), and flat-leaved scalewort (*Radula complanatea*). Liverworts have two primary growth forms, leafy and thalloid. Both of these species are considered to be the leafy form, which appears superficially like moss. These leafy forms have thin, leaf-like flaps on either side of their stems and may appear somewhat vinelike, while the less common thalloid liverworts have wide, flat, rubbery leaves.

6.3.2.3 Outcome, Additional Research Possibilities, and Educational Opportunities

One of the most significant outcomes of the 2023 bryophyte survey was identifying the need for a far more extensive study in the future to fully characterize the bryophyte flora of Sandstone Ranch. Sandstone Ranch offers undisturbed areas providing good habitat where many additional bryophyte species may be found. Unfortunately, there are few bryologists in Colorado, and since this would be a volunteer effort, it has not yet been accomplished. However, this is a future project we would like to pursue, contingent on availability of qualified researchers.

Due to easy accessibility to a fairly large number of bryophyte species, Sandstone Ranch offers a good location for college classes to conduct bryology fieldtrips or for graduate students to conduct research projects. In addition, once our volunteer naturalists and hike guides have been trained to identify some of the more common species of bryophytes, educational plant hikes for the general public may also include observing these interesting plants.

6.4 Animals

6.4.1 Invertebrates

Invertebrates perform a variety of important roles in the ecosystems at Sandstone Ranch. See **Section 7.0** for descriptions of some of these interrelationships. A few short-term surveys of specific types of invertebrates have been conducted by volunteer naturalists or skilled professionals. In addition, occasional observations of invertebrates have been recorded in conjunction with other activities. However, no in-depth studies of invertebrates have been conducted on the ranch specifically for this Natural Resource Inventory Project. Instead, focus has continued to be on studying natural resources on the property that are more likely to be involved in management decision making. This leaves an area for significant future research. Since no long-term studies of invertebrates have yet been conducted on the property, there is the potential for college classes or post graduate students to perform meaningful research and make a lasting contribution to knowledge about the biota of Sandstone Ranch.

6.4.1.1 Douglas-fir tussock moth

The first edition of the Sandstone Ranch Natural Resources Inventory included a discussion about the invasion of the Douglas-fir tussock moth (*Orgyia pseudotsugata*) and its highly visible and lasting effects on the forests of Sandstone Ranch. No significant outbreaks of the tussock moth have occurred since that time, although the long-lasting effects of the previous outbreak are still highly visible in some areas on the property. No specific studies of other insects that cause damage to native trees and plants or are harmful in other ways have been performed as part of this project. Future studies could be beneficial along with control measures when appropriate.

6.4.1.2 Aquatic Invertebrates

During a summer 2022 survey of aquatic organisms on Sandstone Ranch, researchers from CPW observed and recorded a number of aquatic insects and other invertebrates. See **Section 6.1** Aquatic Life and **Appendix C**. Annotated Aquatic Life Field Notes for details.

6.4.1.3 Butterflies and Moths

Other than casual observations, butterfly and moth surveys have been cursory since the 2018 Sandstone Ranch Open Space Natural Resource Inventory and Analysis began. See **Figure 6-13** for an example of an interesting moth caterpillar that was located during one of these surveys and **Figures 6-14** and **6-15** for two common species of butterflies.



Figure 6-13. Police Car Moth Caterpillar (Gnophaela vermiculata)

- In the original 2018 document, the Sandstone Ranch butterfly and moth list was started when several species of butterflies are mentioned in a summary of a one-day visit to the property by David Leatherman, former Colorado State Forest Service entomologist.
- On July 29, 2019, Pam Steinman, volunteer naturalist with Castlewood Canyon, conducted a 2hour educational butterfly hike at Sandstone. At that time, she provided a list of species of butterflies that were observed and identified during the hike.
- Sam Johnson, Bell Mead, and Robert Andrews observed, identified, and recorded butterfly and moth species at Sandstone Ranch on short visits in the spring, summer and fall of 2023.
- Volunteer naturalists studying plants also observe butterflies and moths frequently, although sometimes identifying these pollinators is more difficult than identifying the plants!
- Because of the nature of butterfly and moth species (seasonal development, movement, coexistence with plant and bird populations), continued observations throughout peak seasonal activity would be more effective than the short-term surveys that have already been conducted on Sandstone Ranch property and could be of great value in expanding the list of species at Sandstone Ranch. However, additional surveys would be dependent on availability of experts with time and willingness to volunteer.

Currently, the list of butterflies and moths that have been identified on Sandstone Ranch has grown to include 51 species. (See **Appendix F.**) However, these were observed during short visits to the property, and a longer, well-planned study extending through several seasons would undoubtedly double the list.



Figure 6-14. Northwestern Fritillary (Speyeria hesperis)



Figure 6-15. Echo Azure (Celastrina echo ssp. sidara)

6.4.1.4 Monarch Butterfly

A well-known species with a dwindling population, the Monarch Butterfly, has been observed on the Sandstone Ranch property in both larval and adult stages. The species is not common on the property but is found in known locations of milkweed plants. The Monarch Butterfly is a species of concern, currently listed as endangered by the International Union for the Conservation of Nature (IUCN). In 2020, the USFWS determined that endangered species protections for the Monarch Butterfly are "warranted" but are precluded by higher priority listing actions. As a result, a final decision is delayed, and the status is reviewed every year. It is hoped that the final USFWS decision to list Monarch Butterflies as threatened and endangered will be made in 2024, but until then, it is considered a "candidate species."

Nevertheless, identifying locations where milkweed grows on the property and ensuring it is protected from weed mitigation and other harmful activities is an action that could be taken to assist the struggling Monarch Butterfly population.

6.4.1.5 Colorado Hairstreak

The Colorado Hairstreak (*Hypaurotis crysalis*), designated as the state insect of Colorado in 1996, is a montane butterfly typically found in hills and canyons between 6500 and 9000 feet. (See **Figure 6-16**.) Sandstone Ranch provides the unique environment necessary for this butterfly due to the Colorado Hairstreak's specific range and its complete dependence upon Gambel oaks for its entire life cycle. Adults roost in Gambel oaks, feed on tree sap, and lay eggs there in late summer. The caterpillars emerge in the spring and eat young leaves. The entire lifecycle may take place within a several yard area around Gambel oaks.



Figure 6-16. Colorado Hairstreak (Hypaurotis crysalis) Colorado's state insect

6.4.2 Amphibians

Amphibians (frogs and salamanders) are cold-blooded and require wet or at least moist conditions to feed and reproduce. Five species (three frogs, one toad, and one salamander) have been observed in and near the following surface water locations on the ranch: Aswam Dam impoundment, Horse Barn Pond, West Plum Creek, Gove Creek, and in ditches and wells. It is likely that other amphibian species occur on the ranch but have not yet been observed. A list of species known or likely to occur in habitats on Sandstone Ranch is presented in **Appendix G.**

6.4.2.1 Amphibian species found at Sandstone Ranch

Barred Tiger Salamander (*Ambystoma mavortium*): This species, which is the state amphibian of Colorado, is common and widely distributed in Colorado where there is sufficient water for breeding Specimens have been found in in Gove Creek upstream of the hanging bridge impoundment in May 2023 (Curt Frankenfeld, pers. comm.). Dave Bornhoft, the former ranch foreman found individuals in water wells on the ranch (Jackie Sanderson, pers. comm.). Individuals are probably more widespread in suitable habitat on the ranch but seldom encountered because of their nocturnal activity and habit of hiding in burrows and under rocks when conditions at the surface are dry.

Northern Leopard Frog (*Lithobates pipiens*): Adults were observed in the ditch below Horse Barn Pond, and one was heard calling from the ephemeral pond immediately south of Horse Barn Pond. During spring surveys in 2023, individuals were heard calling and were observed in the impoundment behind Aswam Dam. The species is widely distributed in Colorado and ranges to above 11,000 feet (Hammerson 1982).

Formerly abundant, the species has disappeared from many sites because of reduced habitat and predation by the American Bullfrog. The species is listed as a Species of Concern by Colorado Department of Parks and Wildlife (CPW) because of its declining populations in Colorado. In Colorado's State Wildlife Action Plan (SWAP), CPW lists Northern Leopard Frogs as a Tier 1 Species of Greatest Conservation Need (CPW 2015). In addition, the Colorado Natural Heritage Program (CNHP) lists Northern Leopard Frogs as S3, State Ranked Vulnerable to Extirpation. (See **Figure 6-17**.)

American Bullfrog (*Lithobates catesbeianus*): Bullfrogs are abundant in the impoundment at Aswam Dam, in Horse Barn Pond, and in the ditch below Horse Barn Pond. This is an invasive species that displaces smaller and less aggressive species. Bullfrog tadpoles metamorphose earlier than leopard frogs, eat leopard adults and tadpoles, and may carry diseases such as chytrid fungus (Taylor 2011).

Woodhouse's Toad (*Anaxyrus woodhousii*): Individuals were observed in Ponderosa Pine habitat in the riparian area along North Gove Creek. This species is common and widely distributed in pasture, woodland, and canyon habitats in eastern Colorado up to about 7,000 feet (Taylor 2011).

Boreal Chorus Frog (*Pseudacris maculata*): This species occurs in riparian habitat along West Plum Creek, Gove Creek, and in ponds and irrigation ditches around the ranch. The species is common and widespread throughout Colorado up to 12,000 feet (Taylor 2011).



Figure 6-17. Northern Leopard Frog (Lithobates pipiens)

6.4.2.2 Summary of Legal Status

Colorado Parks and Wildlife lists the Northern Leopard Frog as a state Species of Concern (not a statutory category) and also lists it as a Tier 1 Species of Greatest Conservation Need in the SWAP. CPW lists the American Bullfrog (an invasive species) and Barred Tiger Salamander (larvae only) as Game Species. All other amphibians known or likely to occur on the ranch are listed as Nongame Species. None of these other species are classified as endangered or threatened in Colorado.

6.4.3 Reptiles

Reptiles (one turtle, one lizard, and four snake species) have been observed, and several more are likely to occur in the arid and seasonally cool climate at Sandstone Ranch. The six species found so far are common in Colorado. Reptiles are generally found in warmer habitats occurring at low elevations on the ranch, although some may range into forest areas in the upper reaches of Gove and West Plum Creek. More detailed information on reptile species observed or likely to occur on the ranch is presented in **Appendix G**.

6.4.3.1 Reptiles at Sandstone Ranch

Snapping Turtle (*Chelydra serpentina*): Individuals have been observed in the impoundment behind Aswam Dam and in Horse Barn Pond. The species is widespread and common in similar bodies of water throughout eastern Colorado.

Prairie Lizard (*Sceloporus consobrinus*): This species occurs on and near rocky outcrops and debris piles at widely scattered locations at lower elevations on the ranch.

Terrestrial Gartersnake (*Thamnophis elegans*): This species was observed in the impoundment behind Aswam Dam, around Horse Barn Pond, and in adjacent wetlands and ditches throughout the ranch. The species is especially common around water.

Smooth Green Snake (*Opeodrys vernalis*): Individuals have been observed in riparian areas along Gove Creek. This species probably occurs in similar habitat on East Plum Creek.

Both the **Bullsnake** (*Pituophis catenifer*) and the venomous **Prairie Rattlesnake** (*Crotalus viridis*) are widely distributed at lower elevations in drier habitats on the ranch. Individuals of both species were observed in Juniper Valley and other rocky habitats. See **Figure 6-18** for the head of a Bullsnake, which is distinctly different from that of a Prairie Rattlesnake.



Figure 6-18. Bullsnake (*Pituophis catenifer*) not to be confused with the Prairie Rattlesnake

6.4.3.2 Summary of Legal Status

None of the reptile species known or likely to occur at Sandstone Ranch are listed as endangered or threatened in Colorado by Colorado Parks and Wildlife. The Common Gartersnake is listed as a Species of Concern (not a statutory category). The Snapping Turtle and Prairie Rattlesnake are classified as Game Species. All other reptiles known or likely to occur at the ranch are listed as Nongame Species.

6.4.4 Birds

When the initial *Sandstone Ranch Open Space Natural Resource Inventory and Analysis* report was compiled in 2018, multiple volunteer naturalists were actively surveying nine established survey zones within the 2,038-acre property for birds. (See **Appendix H.** for a map of the zones.) However, from 2019 through 2023, far fewer volunteers naturalists were available, and the nine survey zones were covered less frequently. Nevertheless, the bird survey was continued as consistently as possible with the reduced number of volunteer naturalists.

In 2018, 127 species of birds were identified. This was a high number of species for one area, pointing to the great diversity of relatively undisturbed habitat on Sandstone Ranch. From 2019 through 2023 the number of avian species that has been observed on the property has increased to 168. See **Appendix H.** for a table showing the complete listing of the birds that have been identified by zone.

In order to make the information about bird species that have been observed on Sandstone Ranch available to the public, a trifold bird list was created for interested visitors. This pamphlet engages visitors of all ages while enhancing their awareness of the diversity of birds on the property. In addition, the checklist format creates a way for them to record their own on-site observations over multiple trips to the property, either alone or with family members and friends. A copy of the pamphlet is available in **Appendix I.**

To provide an educational experience for both beginning and more experienced birders, volunteer naturalists led birding field trips on Sandstone Ranch for Denver Audubon and Denver Field Ornithologists. In addition, DCOS volunteers hosted individual biologists on visits to the property, and their skilled observations helped increase knowledge about the avian species as well as rounding out the database of bird observations over the past 5 years.

At the request of Douglas County Division of Open Space and Natural Resources, volunteer naturalists developed several reports including the following:

- Impact Study of Group Foot Travel on Bird Habitat in the EM5 Chatfield Off-Site Mitigation Areas of Sandstone Ranch
- Ovenbird Information, in Reference to 2023 Planned Wildfire Mitigation in Sandstone Ranch on Gove/Plum Divide Road

In addition, volunteer naturalists collaborated with Douglas County Division of Open Space and Natural Resources staff members to create a *Sandstone Ranch Sensitive Area Access Proposal*. This proposal designated the EM5 Chatfield Off-Site Mitigation Areas for seasonal closure (April 15-June 30), to prevent disruption of lifecycles for birds, other wildlife, and plants. The closure period has been in effect since 2021, and survey data has shown that this management decision has helped stabilize the essential courtship, breeding, and birthing cycles for birds and other wildlife.

6.4.4.1 West Side, Limited Access Area

On the west side of the Sandstone Ranch property, bird species and population sizes were stable from 2018 through 2023, due primarily to the closure period and limited public access with the exception of carefully planned activities, research, and educational classes throughout the year. Evidence of nesting and breeding increased, largely due to consistent volunteer naturalist visitation and familiarity with the area and its inhabitants. The only noticeable decline in avian activity was each summer from 2021 through 2023, when parts of Gove Creek, downstream from the Club Med area, went dry. (See **Section 5.0** for an explanation of the water rights and other factors that affect water availability on the property.)

For bird populations and other wildlife to remain stable in the west side designated sensitive zones, ongoing preservation efforts are essential. These would include continuing the seasonal access and closure periods, limiting access to planned studies and educational activities, restricting the ranch's cattle from the riparian areas, and routing future trails far enough from riparian areas to avoid disruption. The public will experience optimal enjoyment of this area in the future if the wildlife and other natural elements remain intact. See **Figures 6-19** and **6-20** for examples of bird species the public might have the opportunity to observe on guided hikes in the west side, limited access area.





Figure 6-19. Red-naped Sapsucker

Figure 6-20. Red-breasted Nuthatch

6.4.4.2 East Side, Public Access Area

In September of 2020, an 11-mile trail network was opened to the public on the east side of the property. Bird species diversity appears to remain consistent since that time. However, overall number of birds is lower by about 10%. This minimal decrease is due to careful trail planning, large areas of habitat away from trails, and the continued quiet environment that is essential for both the success of avian species and human enjoyment. As expected, since the east side opened to the public, there are fewer birds near the trails, due to the presence of hikers, dogs, bicycles, and horseback riders. Nevertheless, there is still ample habitat for birds that inhabit or pass through this east side area for foraging, protection from predators, and breeding. See **Figures 6-21** and **6-22** for examples of bird species the public might have the opportunity to observe in the east side, public access area.





Figure 6-21. Cedar Waxwing on mountain mahogany

Figure 6-22. Yellow-rumped Warbler, subspecies Audubon's Warbler

From 2018 through 2020, the Aswam Dam area, the only substantial pond habitat on the ranch, hosted a surprising diversity of birds. Water levels in the Aswam Dam area went down to near zero from 2021 through early 2023, and the diversity and numbers of birds decreased dramatically. However, water levels recovered late spring/early summer 2023 in the Aswam pond due to heavy rains and "free-river" ditch flows. (See **Section 5.0** for an explanation of the water rights and other factors that affect water availability on the property.)

This was especially true of resident and migratory waterfowl, wading birds, and shorebirds. Also, there was a diminishing number of land birds that feed on aquatic insects as well as raptors that prey on those birds. Most avian species formally seen in this area began to seek their water source and associated habitat elsewhere. See **Figure 6-23** for an example of a raptor, the Bald Eagle, that has been identified in this area and that observant bird watchers may be privileged to see. Note that both breeding populations (not found on Sandstone Ranch) and non-breeding populations of the Bald Eagle are tracked by the Colorado Natural Heritage Program (CNHP) as S3, vulnerable to extirpation in Colorado, and the 2015 revision of the State Wildlife Action Plan (SWAP) lists them as Conservation Level Tier 2. See **Section 9.0** for more information about sensitive bird species on the Sandstone Ranch property.

6.4.4.3 Summary

The high number of avian species remaining on Sandstone Ranch is primarily due to two factors:

- <u>Diverse habitat</u>: Pastureland and prairie, rich riparian zones, steep forested foothills, and rimrock/juniper all host resident and migrating birds that require these habitats.
- <u>Relatively undisturbed open space</u>: The effective layout of the trail network, stay-on-the-trail signage, and limiting the west side to guided access have resulted in most birds and other wildlife remaining. Careful planning, responsible management practices, and receptiveness to



the data and observations provided by volunteer naturalists have paid off and are resulting in maximum enjoyment of nature in the peace and quiet of Sandstone Ranch Open Space.

Figure 23. Bald Eagle juvenile at daybreak

6.4.5 Mammals

The volunteer naturalist team continued informal surveys of mammals at Sandstone Ranch Open Space. Although site-wide surveys were not conducted on a consistent periodic basis, these surveys confirmed that all mammalian species identified during the 2018 initial inventory are still present on the property. In addition, two somewhat unexpected but significant new species were noted as a result of this effort:

- American Mink (Neogale vison)
- Western Spotted Skunk (Spilogale gracilis).

These species were found as skeletal remains and were identified by Colorado College professor Dr. Maybellene Gamboa by analyzing the skull shape and measurements.

Additional valuable information about mammals and other species on Sandstone Ranch has been contributed by field work conducted in conjunction with two university classes from Colorado State University (CSU) and Colorado College (CC) on the property. Instructors of both of these courses found the fieldwork experiences valuable and anticipate continuing them in the future.

6.4.5.1 Colorado State University Course

Dr. Tanya Dewey (CSU Biology Department Assistant Professor) brought a summer undergraduate course in Small Mammals to Sandstone in 2019, 2021, 2022, and 2023. The course provides the students with hands-on learning opportunities in setting traps for small mammals as well as setting mist nets for bats and performing acoustic surveys. Students learn the habitats of key small mammals along with trapping procedures and how to handle the animals to measure, weigh, and assess their overall health. The students also learn how and where to set mist nets to capture bats and how to attach small radio transmitters to track the movements of bats. While Dr. Dewey and her graduate assistants have the special training and experience to handle the bats, this class is the first encounter for most students with bats, and they learn the special care required to handle them to protect both the bats and the students. For images from recent CSU classes at Sandstone, see **Figures 6-24** and **6-25**.



Figure 6-24. CSU students at Sandstone Ranch



Figure 6-25. Learning bat research techniques

Animals captured during the CSU class using trap lines, mist netting, and acoustic bat survey efforts (augmented by Sandstone Ranch volunteer naturalists) have added four new species to the mammal list for the property. These included Long-legged Myotis (*Myotis volans*) and Western Long-eared Myotis (*Myotis evotis*) and two additional species of special note:

• Olive-backed Pocket Mouse (*Perognathus fasciatus*). This pocket mouse is listed on several state and national lists as a species of concern: Colorado's State Wildlife Action Plan (SWAP) Tier 1 Priority, State Status SC, NatureServe Global Status Rank G4, and CNHP/NatureServe State Status Rank S3. See **Figure 6-26**.



Figure 6-26. Olive-backed Pocket Mouse (Perognathus fasciatus)

• Townsend's Big-eared Bat (*Corynorhinus townsendii pallescens*). This bat is listed on several state and national lists as a species of concern: Colorado's State Wildlife Action Plan (SWAP) Tier 1 Priority, State Status SC, USFS Sensitive Species, BLM Sensitive Species, NatureServe Global Status Rank G4, and CNHP/NatureServe State Status Rank S4. See **Figure 6-27.**



Figure 6-27. Townsend's Big-eared Bat (Corynorhinus townsendii pallescens)

Dr. Dewey's classes also provided valuable information about the health and life of many Sandstone Ranch mammals. All animals captured appeared to be in good health with no apparent disease. The bat species susceptible to white-nose disease are checked for the disease and the disease has not been found at Sandstone Ranch to date. Many of the female rodents and bats captured showed signs of lactation, meaning that they were actively caring for young at the time that they were captured. Lactation indicates that Sandstone Ranch is a breeding area for many species, including several species of special concern.

6.4.5.2 Colorado College Course

Dr. Maybellene Gamboa (Colorado College Department of Organismal Biology & Ecology Assistant Professor) brought her undergraduate Ecology Class to Sandstone in 2019, 2021, 2022, and 2023. The class is taught in most spring and fall terms and is designed to introduce the students to analysis of distributions, abundances, and interrelationships of organisms. The field class at Sandstone gives the students an opportunity to design and conduct a study as well as analyze data collected. (See **Figures 6-28** and **6-29**.) The studies are generally small and are limited to about 4 weeks of effort, but have provided some interesting insights to Sandstone wildlife, plants, and insects.



Figure 6-28. Colorado College students in the field

Dr. Gamboa divides her class into smaller groups of 2-4 students and each group creates and performs a scientific study on the property. While constrained by time and resources, the projects must adhere to scientific principles and a reasonable research approach. Over the years, students have chosen to look at mammalian scat, soil composition, plant diversity, macro invertebrates in the streams, reptiles and amphibians, Gambel oak galls and what insects cause them, and many other projects. Each group is required to create a report and present it to Douglas County Open Space staff and volunteers. These reports provide a valuable, high-level view of the property and have spawned ideas for larger studies. Results of these studies are available to the County.



Figure 6-29. Colorado College students studying at Sandstone Ranch

7.0 ECOLOGICAL OVERVIEW

Geologic formations on Sandstone Ranch are significant environmental landscape features that influence the types and distribution of living organisms. The topography of the landscape such as the steepness of the terrain and the solar aspect of a hillside (south facing vs. north facing) influences the character of the habitat. Microclimates often develop on the irregular surfaces of rock outcrops. Erosion and chemical breakdown of rocks by lichens generate the physical component of different soil types that support different **habitats**. Plants, animals, fungi, and bacteria interact under varying moisture conditions to enrich the soil with organic materials that provide the bases for diverse **ecosystems** on the ranch. Plant species growing on these soils support herbivorous animals that in turn provide food for carnivores in the **food webs** of ecosystems

Definitions:

Habitat: the natural home or environment of an animal, plant, or other organism.

Ecosystem: a biological community of interacting organisms and their physical environment.

Food web: represents feeding relationships within a community. A complete food web includes producers (plants), consumers (animals), and decomposers (bacteria and fungi).

Because all living organisms eventually die, the organisms that decompose dead material (mainly fungi and bacteria) are critical components of all ecosystems, cycling organic materials back into the soil. **Figure 7-1** illustrates the interconnections among functional components of a generalized forest ecosystem such as occurs on the west side of Sandstone Ranch. The major functional categories of living organisms--**producers** (green plants), **consumers** (animals) and **decomposers** (scavengers and chemical decomposers such as fungi and bacteria)--are all necessary for balanced ecosystem function. Aquatic ecosystems, grasslands, and other ecosystems at Sandstone Ranch are composed of the same three functional categories but differ in the species comprising each category.



Food Web of a Forest Ecosystem

Figure 7–1. Generalized food web of a forest ecosystem.

In addition to their role in food webs, plants, animals, and other life forms provide a variety of important ecological functions. Plant roots and the networks of fungi stabilize the soil and retard erosion. Trees and shrubs provide structural habitat that is essential for shade, nest sites for birds, and food and shelter for mammals, insects and other invertebrates. Insects and hummingbirds pollinate flowering plants, while rodents and many bird species help with seed dispersal. Predators such as bobcats, mountain lions, and hawks control the abundance of plant-eaters including rodents, rabbits, and large species such as deer and elk. Although much of the ranch continues to be used for ranching operations, large areas of natural and lightly disturbed habitats support rich and diverse combinations of all forms of life.

Terrestrial habitats within the boundaries of Sandstone Ranch Open Space range from forested areas along upper reaches of West Plum Creek and Gove Creek to juniper woodland, prairie, and riparian habitat at lower elevations in the central and eastern parts of the ranch. These habitats are largely intact and contiguous with similar habitats on adjacent land supporting ranching and dispersed residential development to the north, south, and east and the extensive forest area in Pike National Forest to the west. The mosaic of predominantly natural areas interspersed with more intensely managed areas, such as hayfields, pastures, and ditches, creates ecologically important corridors and edge habitats (transition zones).

Two perennial streams, Gove Creek and West Plum Creek, are naturally occurring permanent water sources. These waterways, in addition to the Aswam Dam Impoundment and Horse Barn Pond (AKA Snake Pond in the 2018 inventory document), provide limited but important aquatic habitat and riparian habitat supporting diverse assemblages of plants. These in turn provide complex structural habitats for nesting birds; supply food for herbivorous insects, birds, and mammals; and host sensitive plant species.

Ecosystems on Sandstone Ranch are dynamic both in composition and function. Some animals migrate annually to adjacent ecosystems, while many bird species migrate great distances to warmer climates during the winter and return to the ranch to nest and produce young during late spring and summer.

Relationships among species in ecosystems are extremely complex. In general, heathy ecosystems maintain a balance between producers, consumers, and decomposers; however, when key species are missing from an ecosystem, its functional relationships are impaired. The loss of species reduces diversity and limits the ecosystem's resiliency—the ability of an ecosystem to quickly repair and restore itself.

As noted in this section, all of the natural resources described elsewhere in this document work together, playing essential roles in keeping the ecosystems on the ranch healthy. No one natural resource can be negatively affected through human actions without affecting other natural resources and the ecosystems themselves in important ways.

8.0 DARK SKY: ASTRONOMY

8.1 Dark Sky Background

The western segment of Sandstone Ranch has exceptionally dark skies for a location that straddles the line between Denver and Colorado Springs, two metropolitan areas that each emit an overwhelming volume of light pollution. The reason for this is that there are ridges to the south and north that naturally shield this segment from that light. In addition, properties that are immediately adjacent to Sandstone Ranch's western segment are not lighted, those being adjacent ranches and US Forest Service property. On nights when the moon is a small crescent or has already set, and the cloud cover is zero or negligible, the Sky Quality Readings (SQM), which are taken with a device which measures the number of photons reaching its receiver, is at least 21.5. These readings are the minimum for a property to be considered for designation as a Dark Sky Place by the International Dark Sky Association (IDA), and Douglas County Open Space has applied for this portion of Sandstone Ranch to be designated as such.

8.2 Proactive Efforts to Retain the Dark Sky

The fact that such a dark sky still exists in such close proximity to the major metropolitan areas of Denver and Colorado Springs is a rare and fortunate occurrence. There is no guarantee that it will stay this way without proactive effort. The lighting on the property is undergoing review by Douglas County Open Space employee Johnny Mulligan, to be replaced with light fixtures and bulbs/elements that comply with IDA lighting standards. Lighting on adjacent property currently poses low/no risk to increasing light pollution. Concerns do exist about increased light coming from areas such as the expansion of Castle Rock and a new neighborhood going in adjacent to the intersection of Perry Park Road and Tomah Road.

8.3 Initial Star Viewing Events

Over the past few years, work has been in process to develop interest in having star viewing events at Sandstone Ranch, and in setting the stage for an eventual astronomical observatory to be located there. A few hundred people have attended a couple dozen events at Sandstone Ranch during that period of time to observe the stars, galaxies, Milky Way, and other nighttime objects, most of which cannot be seen at their home locations due to light pollution. They've come to conduct astrophotography, capturing images of objects that are hundreds or even millions of light years from Earth. They've come to watch a meteor shower, and they've even come to hike under the light of a full moon.

8.4 Telescope Donations and Development of the Gathering House

Three sizeable telescopes have been donated to Sandstone Ranch by astronomers who want them to be used for public education: a 12.5" Schmidt-Cassegrain style telescope, a 14" Schmidt-Cassegrain telescope, and a 14" Newtonian telescope. A member of the Denver Astronomical Society (DAS), Katherine Bond, designed a model of a possible observatory and presented it along with floor plan and elevation drawings as an example of what a Sandstone Ranch observatory could look like.

The location known as the Gathering House, which is intended to become the Astronomical Education Center, has had some preliminary work done. Ramps to make it ADA accessible have been installed, and a large patio that extends outward on two sides of it has been poured with the intent of hosting events there, to include stargazing events and social events. Further modification of that location is due to continue in the near future, in partnership with input from members of the DAS who will provide specifications for power and IT connectivity between locations in the Gathering House and the personal telescopes that will be located outdoors from time to time. This plan includes linking at least one outdoor telescope to one outdoor high-resolution display and one or more indoor displays to permit guests (particularly ADA guests who are unlikely to be able to look through an eyepiece) to see what is being viewed through that telescope. It also includes having high-speed internet connectivity so that some events can be live-streamed, and an all-sky meteor detector can be tied into a meteor reporting network, contributing live reports to a scientific database.

Future plans include reaching a Memorandum of Understanding (MOU) between Denver County Open Space and the Denver Astronomical Society for the placement of concrete viewing pads with power for future star parties, and the planning and construction of the observatory.

8.5 Volunteer Support and Training

Recruitment and training of volunteers, preferably among Douglas County citizens who are amateur astronomers to augment the DAS volunteers, would culminate in a series of programs designed to educate the public about all aspects of the night sky as it shifts throughout the calendar year, with the movement of the constellations and the planets.

The primary intent for developing an observatory at Sandstone Ranch is to provide a suitable facility to house high quality telescopes that can be utilized to educate Douglas County residents and visitors about astronomy and share the wonders of the pristine dark skies that Sandstone Ranch has to offer. Participating DAS members further intend to provide technical knowledge and advice in the planning and construction of the building, providing guidance on the installation requirements for the telescopes, overseeing the installation of the telescopes, performing the testing before the telescopes go into operation, and providing recommendations for ongoing maintenance of the telescopes.

The secondary intent is to create a training program that will ensure that all telescope operators, consisting of members of the Denver Astronomical Society and Open Space volunteers/staff members, receive adequate and consistent training on the safe and appropriate use of the telescopes for the benefit of the visiting public.

8.6 Potential Future Programs for the Public

Future programs that would be facilitated by astronomers from the DAS and volunteer amateurs from Douglas County would include subjects such as the following:

- Beginning Astronomy: How to Learn the Night Sky
- The Moon, Its Phases, and How It Affects and Supports Life on Earth
- The Constellations, and Why They Change Throughout the Year
- The Planets of our Solar System, and the Observable Moons of the Giant Planets
- Light Pollution, and How It Affects Humans and Animals
- Our Sun, and How to Safely Observe It
- Meteor Showers: What Causes Them & How To Watch Them
- Astrophotography

Figure 8-1 shows a handful of DAS amateur astronomers setting up their telescopes in preparation for a night of viewing at Sandstone Ranch. Pictured are two telescope setups and a device called a BinoCrane, which holds a heavy pair of binoculars in a manner that permits the user to manage them with ease. We anticipate many more events like this in the new Astronomical Education Center.

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Figure 8-1. Preparing for a night of sky viewing at Sandstone Ranch. Photo credit – DAS member Leon Roybal

8.7 Ultimate Goal

Our ultimate goal is to establish and maintain a partnership between the Denver Astronomical Society and Douglas County Open Space that ensures that this observatory becomes a much used and desirable destination for astrophiles in Douglas County and beyond. There will not be a financial benefit to DAS; our only goal is to provide opportunities for the appreciation of our vast universe and to inspire the next generation of astronomers, astrophysicists, and aerospace engineers.

Plans also include reaching out to potential cost-sharing partners within the aerospace industry and professional academia, both of which have deep roots in the Front Range community. Many members of the DAS have connections with people who work in these companies and institutions.

9.0 SENSITIVE RESOURCES

9.1 Sandstone Ranch Sensitive Area Access Proposal

In 2019, DCOS staff members and DCOS volunteer naturalists collaborated on a *Sandstone Ranch Sensitive Area Access Proposal* (DCOS 2019) for portions of the west side of Sandstone Ranch that are considered especially sensitive. A copy of the proposal, which was approved for implementation in 2020, is provided in **Appendix K**. The area under consideration is a substantial portion of the Chatfield Reservoir Mitigation Company (CRMC) Declaration of Restriction and covers Club Med (including South Club Med and South Gove Creek), Gove Plum Divide, and West Plum Creek, as shown in **Figure 9-1**, a map extracted from the report. The purpose of the proposal was to explore ways to do the following:

- Support wildlife and their habitat while also providing appropriate public access.
- Conserve natural values and minimize disturbance to wildlife populations through multiple approaches including:
 - Thoughtful trail alignment
 - Consideration of seasonal rest periods
 - o Signage
 - o Habitat improvements
 - o Compliance with legal protections
- Prevent disruption to life cycles and minimize disturbance to sensitive vegetation.

This area encompasses five ecosystems, Montane Forest, Montane Shrubland, Grassland, Riparian, and Pinyon/Juniper Woodland, each of which supports different species of plants and animals and habitat types. This diversity plus the area's remoteness and high-quality habitats make it worthy of some special management considerations. The proposal notes numerous considerations related to avian, mammalian, and plant species that are uncommon to rare on the property as well as management strategies that are recommended to protect them. A map was created for this proposal showing some of the locations where sensitive bird species have been found, and these species could also be found in similar habitats on the property. (See **Figure 9-2**.) The earlier Sandstone Ranch Open Space Natural Resource Inventory and Analysis (DCOS 2018) included a map showing areas where there are sensitive plant species, some of which are found exclusively in this area of the ranch property.

Solutions to protect these sensitive habitats and species are detailed in **Appendix K.** Among others, they include the following:

- Implement seasonal rest periods in the designated sensitive areas from mid-April to June 30th in order to protect avian breeding activities and other wildlife.
- During the rest period, limit access to official use and guided activities only.
- Consider restricting dog access.
- Consider different access requirements to national forest trails inside the sensitive areas.
- Promote education and Leave No Trace ethics.
- Enforce stay the trail and other rules and regulations.
- Plan hiking trails on established ranch roads and trails where possible
- Remain adaptable and responsive to monitoring data.



Figure 9-1. Sandstone Ranch Sensitive Areas



Figure 9-2. Sandstone Ranch Bird Survey Map showing some of the locations where sensitive species have been found

The trail south of the Club Med parking area enters the ranch's most undisturbed habitat. See **Figure 9-3** for a map of this area. It's the farthest away from any roads or other trails and contains the highest concentration of breeding bird species on the ranch. It's also a safety concern area, due to the deadfall of Tussock Moth infested trees in proximity of the trail. The proposal recommends that this area remains a guided-access-only trail at all times.



Figure 9-3. Extremely sensitive area south of Club Med

9.2 Sensitive Geologic Features

Geologic features are not usually considered a sensitive resource. However, they could be considered a unique natural resource or rare occurrence deserving preservation for future geologic studies and educational tours. At Sandstone Ranch, the following are unique natural geologic features and discussion regarding preservation is warranted:

- Gove Canyon/Perry Park area is one of two locations along the Front Range where the lower Paleozoic rocks outcrop.
- Tava sandstone dike (west of quarry in Gove Canyon)
- Great Unconformity contact (west of quarry in Gove Canyon)
- Paleosol outcrop (rock exposure in northern quarry wall).

9.3 Sensitive Amphibian Species

The Northern Leopard Frog (*Lithobates pipiens*) is listed as a Species of Concern by Colorado Parks and Wildlife (CPW) because of its declining populations in Colorado. In Colorado's State Wildlife Action Plan (SWAP), CPW lists Northern Leopard Frogs as a Tier 1 Species of Greatest Conservation Need (CPW 2015). In addition, the Colorado Natural Heritage Program (CNHP) lists Northern Leopard Frogs as S3, State Ranked Vulnerable to Extirpation. CPW has published a fact sheet and habitat scorecard for the Northern Leopard Frog (SWAP Tier 1) and the closely related Plains Leopard Frog (SWAP Tier 2), which is not known to occur in Douglas County. This CPW document includes management recommendations for improving habitat for both of these species. However, at this time there is no legal requirement to do so. Nevertheless, it is good practice to be aware of the status and avoid unnecessarily damaging habitat of these wetland dependent species. Some , but not all, of the best habitat for the Northern Leopard Frog on Sandstone Ranch is within the sensitive area described in the *Sandstone Ranch Sensitive Area Access Proposal* discussed in **Section 9.1**, which is relatively well protected.

9.4 Sensitive Mammalian Species

The Preble's Meadow Jumping Mouse (*Zapus hudsonius preblei*) is classified as a threatened species and listed by the U.S. Fish and Wildlife Service. It is also protected by the State of Colorado. Forest and woodland edges with dense vegetation along cold streams is the preferred habitat. Gove Creek and West Plum Creek areas are considered critical habitat for the species. These areas are also within the sensitive area described in **Section 9.1**.

The Olive-backed Pocket Mouse (*Perognathus fasciatus*) is listed on several state and national lists as a species of concern: Colorado's State Wildlife Action Plan Tier 1 Priority, State Status SC, NatureServe Global Status Rank G4, and CNHP/NatureServe State Status Rank S3. This mouse was identified in the Gove Plum Divide area, part of the sensitive area described in **Section 9.1**.

The Townsend's Big-eared Bat (*Corynorhinus townsendii pallescens*) was captured in a mist net in the West Plum Creek area, part of the sensitive area described in **Section 9.1**. This bat is listed on several state and national lists as a species of concern: Colorado's State Wildlife Action Plan Tier 1 Priority, State Status SC, USFS Sensitive Species, BLM Sensitive Species, NatureServe Global Status Rank G4, and CNHP/NatureServe State Status Rank S4
9.5 Sensitive Vascular and Non-Vascular Plant Species

Several plant species that were considered sensitive in the 2018 Sandstone Ranch Natural Resource Inventory are no longer on the sensitive list, not because the distribution or the status has changed, but because of how a sensitive species is being defined currently. In the 2018 document, plants were considered sensitive when described as extirpated from Colorado or "Uncommon" in *Flora of Colorado* (Ackerfield 2015). In the new edition of *Flora of Colorado* (Ackerfield 2022), the "Uncommon" designation has been dropped. Plants in this document are only classified as sensitive if they are tracked as S1, State Critically Imperiled; S2, State Imperiled, or S3, State Vulnerable to Extirpation by the Colorado Natural Heritage Program (CNHP). Note that this does not include some species that may be found nowhere else in Douglas County. See **Table 9-1** for a list of the most sensitive plant species on Sandstone Ranch according to CNHP. The sensitive species map for plants has not yet been updated according to the new classification guidelines, but many of the most sensitive plants on the property are found in the area covered by the sensitive area described in **Section 9.1**.

Family -	Family -			
Scientific Name	Name	Common Name(s)	Scientific Name	Status per CNHP
				G3/S3 - Globally
				and State
		Roundtip Twinpod;		Vulnerable to
BRASSICACEAE	Mustard	Fiddleleaf Twinpod	Physaria vitulifera	Extirpation
				S1 - State
				Critically
CAMPANULACEAE	Bellflower	marsh bellflower	Campanula aparinoides	Imperiled
				S2 - State
CISTACEAE	Rockrose	hoary frostweed	Crocanthemum bicknellii	Imperiled
				S2 - State
CYPERACEAE	Sedge	Sprengel's sedge	Carex sprengelii	imperiled
		American black		S2 - State
GROSSULARIACEAE	Gooseberry	currant	Ribes americanum	imperiled
		Blue Ridge		S3/S4 - State
SMILACACEAE	Catbrier	carrionflower	Smilax lasioneura	Watch List
				S2 - State
VIOLACEAE	Violet	Selkirk's violet	Viola selkirkii	Imperiled
	Non-			
	vascular,			S1/S3 –
	no			Imperiled or
	common			Vulnerable to
DICRANACEAE	name	mountain broom moss	Dicranum montanum	Extirpation
	Non-			
	vascular,			S1/S3 –
	no			Imperiled or
	common			Vulnerable to
MNIACEAE	name	Blytt's leafy moss	Minium blytii	Extirpation

Table 9-1. Sensitive plant species at Sandstone Ranch

9.6 Quiet and Solitude

The quiet environment of much of Sandstone Ranch, along with its natural character, provides safe spaces for birds and other wildlife and opportunities for visitors to experience solitude. Prohibition of activities such as non-essential motor vehicle use and hunting helps to preserve the naturally quiet and undisturbed character of ranch ecosystems, particularly in sensitive habitats on the west side of the ranch. Along with unwelcome noise, the act of hunting requires off trail use of the land, and these factors together can adversely affect the distribution, feeding behavior, and reproductive behavior of wildlife species including elk, mule deer, black bear, and others and could have cascading negative effects on ecosystem dynamics. Such effects could also diminish wildlife viewing and educational opportunities for the public.

9.7 Dark Sky

The western segment of Sandstone Ranch has exceptionally dark skies for a location between Denver and Colorado Springs, two metropolitan areas that each emit enormous amounts of light pollution. This unique situation makes the ranch property an ideal location for an astronomy facility that allows area residents to view planets and their moons, galaxies, comets, and other celestial objects. The facility will allow hosting of astronomical events such as meteor showers and lunar eclipses that would otherwise be difficult or impossible to view from other Front Range locations. However, there is no guarantee that the sky will stay dark without proactive effort. Dark sky is truly a sensitive resource.

10.0 MANAGEMENT OPERATIONS

Since 2018, Douglas County Open Space leadership has implemented several operations at Sandstone Ranch Open Space for the purposes of protecting the natural resources of Sandstone Ranch while initiating management operation activities (e.g., fire mitigation to protect Sandstone Ranch and the surrounding residential communities, weed control, and ranching). During the same five-year period, DCOS volunteers and investigators from outside institutions have continued to conduct investigations of the property's natural resources. Observations of actual and potential effects of operations on natural resources during these last five years have provided important, site-specific information regarding actual and potential impacts of management operations on natural resources.

A goal of management operations at Sandstone Ranch Open Space is to maintain its usability for purposes of recreation, education, and research while protecting its valuable natural resources. It is noteworthy that communication between operations managers and natural resource specialists in order to achieve both management and conservation goals has evolved over the past few years. These cooperative interactions have developed into an effective strategy for implementing management activities and facilitating public use of this open space while protecting and enhancing the use of its many outstanding natural resources.

10.1 Fire Mitigation

Fire is a natural occurring phenomenon that can have long-term positive and negative effects on natural ecosystems. Wildfire mitigation actions are necessary to provide resilience against widespread wildfires that could destroy large areas of habitat and manmade structures and put human life at risk. Because fire mitigation involves habitat modification, including tree trimming and removal and clearing of Gambel oak understory, it can produce both positive and negative effects. The type and magnitude of the resulting effects depend on methods used, season, and the resource impacted. In some instances, this includes sensitive habitats.

Tree clearing can open the understory and allow for native species of herbaceous plants (including wildflowers) to grow and bloom. Conversely, depending on methodology and location, it can also result in proliferation of weed species. If conducted during spring and summer, it can destroy habitat for breeding mammals and ground-nesting birds. Recent involvement of natural resource experts in the timing of fire mitigation activities (e.g., seasonal closures, avoidance of fire mitigation activities for sensitive species such as the Ovenbird) has greatly reduced the potential for adverse impacts on these sensitive resources. Continued involvement of both plant and animal resource specialists in fire mitigation planning can optimize the protection of living biological resources without negatively impacting this vital management operation.

10.2 Area Access

The east area of the ranch is accessible to the public by a network of trails for recreational purposes, such as hiking, biking, and horseback riding. Although these activities are limited to the trail system, in all public open spaces, there are occurrences of hikers, bicycles, and horses venturing off-trail and dogs allowed to be off-leash. These occurrences are a primary threat to plants and animals in a public open space, and factors that will cause wildlife to leave the area. Reduced use of habitats by birds and large mammals in the vicinity of trails is expected and has been observed at the ranch. Actions such as the Leave No Trace initiative would increase public awareness, and its accompanying signage would result in a reduction of off-trail and off-leash occurrences.

The west side of the ranch is a unique property with riparian areas, old-growth tracts, managed forest tracks, open meadows, abundant native plants and bird species, and several sensitive plants, birds, and mammals. In this area, permitted activities for the public include guided hikes, classes, seminars, research, natural resource monitoring and similar activities. This approach could be a model for the sensitive EM-5 areas that Douglas County Open Space has agreed to preserve. Use of the west side has continued to grow for these approved activities. There are also plans for additional trails reaching further into the foothills from the public area on the east side of the ranch. Continued involvement of plant and wildlife specialists in consideration of trail locations can help to avoid undue impact on the natural resources of the protected west side.

10.3 Seasonal Closure

Management operations staff members collaborated with volunteers to create a seasonal closure period in the EM5 Chatfield Off-Site Mitigation Areas, from April 15-June 30, to prevent disruption of lifecycles for birds, other wildlife, and plants. Continuing these seasonal restrictions will preserve the most sensitive habitats on the ranch.

10.4 Ranching

Ranching operations such as pastures and hay production are conducted at various discrete locations consistent with past uses. Ranching provides educational opportunities at the ranch and uses water resources that have been previously allocated. Ranching activities require the use of roads, storage facilities, and more; however, these have only minor effects on natural resources. Ditches provide limited seasonal habitat, primarily for amphibians and birds. In addition, the ditch area near the Horse Barn provides critical habitat for a Colorado Natural Heritage Program (CNHP) S1 Critically Imperiled plant, marsh bellflower (*Campanula aparinoides*). Barns and storage areas provide limited nesting areas for a few bird species.

Cattle can have negative effects on sensitive plants and animal species in riparian areas. Actions such as restricting cattle from all riparian areas would have positive effects on these sensitive habitats and would benefit birds, amphibians (including the Northern Leopard Frog, which is rated SWAP Tier 1 Species of Greatest Conservation Need), and uncommon plant species.

10.5 Weed Control

Douglas County Open Space personnel follow state and county guidelines in controlling weeds on Sandstone Ranch. Weed control helps to protect native species and in turn supports birds and other animal species that are dependent on native plants. Activities such as the application of herbicides could affect sensitive natural habitats adjacent to weed patches by inadvertently killing native plants. In areas where there are plant species that are listed as Imperiled or Vulnerable to Extirpation, careful selective spot spraying or mechanical control methods can ensure protection of these sensitive species. In addition, in areas where the diversity of wildflowers is essential for native plant classes, wildflower hikes, and public enjoyment, spot spraying or mechanical methods of weed control can ensure these activities can continue. Collaboration of plant experts with personnel planning herbicide applications could alter the time and location of application and help to avoid or reduce ecological effects without adversely affecting weed control operations.

10.6 Quarry Development

Expansion of the quarry or additional road and trail construction, particularly at and near the quarry site, could affect unique geologic features. (See **Section 9.0**) Preservation activities could include maintaining vertical exposure of rock faces exposed and ensuring safe access for future geologic studies and educational tours.

11.0 FUTURE RESEARCH, EDUCATION, AND RECREATION ACTIVITIES

A key observation that DCOS volunteer naturalists have made over the past six years is that Douglas County Open Space management and other staff members have engaged in comprehensive and forward-looking planning activities in developing this 2038-acre property and continue to do so. Their expertise, careful planning, and receptiveness to input from volunteers and other visitors has helped facilitate management planning that takes into consideration multiple viewpoints. Volunteer naturalists participating in this Sandstone Ranch Natural Resource Inventory and Analysis project appreciate having a voice and will continue providing information and input as requested.

11.1 Support of Trail Development and Use of Trails by the Public

Volunteer naturalists will support development of trails that provide access for public recreational use in ways that protect sensitive resources by doing the following things:

- Mapping locations of known sensitive resources to provide trail planners with knowledge about sensitive areas to avoid. These maps may also be of assistance in planning fire mitigation and weed control projects.
- Coordinating with DCOS management and staff members to do surveys of plants and other potentially sensitive resources in specific areas where trail development is under consideration when requested.
- Supporting Stay on the Trail and Leave No Trace initiatives.
- Assisting with development of educational trail signs that make hiking more enjoyable.
- Developing educational handouts regarding natural resources.

11.2 Geology—Future Activities

Research

- Future geologic studies of the lower Paleozoic and Precambrian rocks of Gove and Star Canyon are warranted.
 - There are conflicts in designation of the exposed Paleozoic formations in Gove Canyon when comparing the various published reports. Future studies, including geologic mapping, age dating, and fossil identification, would help in assigning the appropriate stratigraphic nomenclature to the outcrops.
 - With the recent recognition of the Tava sandstone dike in the granite of Gove Canyon, future studies could bring a better understanding to this unique feature.
 - Most of the exposed geologic contacts which separate distinct geologic units in the canyon have been described to be unconformable, suggesting future geologic mapping be performed to better understand the geologic history of the area. (See Section 4.2.2 for an explanation of the "Great Unconformity.")
- These studies could be conducted by the volunteer team of geologists in partnership with an educational institution. This unique area should also be made available for educational geologic tours, geology field classes and field work by educational institutions.

Education

- Seasonal guided educational geologic field trips of Sandstone Ranch for the public will be offered with the assistance of Douglas County Open Space and Douglas Land Conservancy.
- The geologic team is in the planning stages of developing and placing interpretive signs describing the unique geologic features.
 - o Tava Dike
 - o Great Unconformity contact
 - o Lower Paleozoic and Paleosol in the quarry
 - Panoramic geologic view from the Ranch Overlook south of Horse Barn.

11.3 Aquatic Life—Future Activities

Research

- Volunteer naturalists will take advantage of aquatic organism surveys conducted by Colorado Parks and Wildlife (CPW), Douglas County Division of Open Space and Natural Resources, and other agencies in support of the West Plum Creek Stream Management Plan (SMP) to expand existing knowledge about aquatic life on Sandstone Ranch.
- Volunteer naturalists will encourage aquatic life research efforts by university classes holding field training on Sandstone Ranch or individual students in pursuit of advanced degrees.

Education

- College classes such as the Colorado College undergraduate Ecology Class that has held field sessions at Sandstone Ranch led by Dr. Maybellene Gamboa (Colorado College Department of Organismal Biology & Ecology Assistant Professor) may include studying aquatic life on Sandstone Ranch.
- Field experiences in collecting and identifying aquatic invertebrates could be offered to groups from grade school age through adults.
- Identification handouts specifically for species of invertebrates found at Sandstone Ranch could be developed as more definitive knowledge becomes available.

11.4 Fungi and Lichens—Future Activities

Research

- Volunteer naturalists will continue communications with mycologists who have expressed an interest in conducting surveys of fungi on Sandstone Ranch.
- Volunteer naturalists and DCOS staff will continue communications with Dr. Erin Manzitto-Tripp, Professor, Department of Ecology & Evolutionary Biology and Curator of Botany, Museum of Natural History, University of Colorado, who has expressed interest in conducting lichen surveys at Sandstone Ranch and collecting and identifying specimens as part of the first-ever statewide survey of Colorado lichens. However, availability of funding is a limiting factor. See Section 6.2.2 for details.
- Volunteer naturalists will encourage fungi and lichen research efforts by university classes holding field training on Sandstone Ranch or individual students in pursuit of advanced degrees.

Education

- College classes such as the Colorado College undergraduate Ecology Class that has held field sessions at Sandstone Ranch led by Dr. Maybellene Gamboa (Colorado College Department of Organismal Biology & Ecology Assistant Professor) may include studying fungi or lichens on Sandstone Ranch.
- Guided hikes or classes for the public focused on fungi or lichens may be offered once surveys of species on the property have been conducted.

11.5 Plants—Future Activities

Research

- Ongoing surveys of vascular plants will focus on developing maps of sensitive species, including S1 Critically Imperiled, S2 Imperiled, and S3 Vulnerable to Extirpation plants.
- Additional surveys of vascular plants in specific locations will be undertaken when requested where planning is underway for development of trails or other facilities.
- Identification of new species of vascular plants will continue in conjunction with other planned botanical activities on the property including classes and guided hikes.
- Additional surveys of non-vascular plants (Bryophytes) may be undertaken as specialists have time available to continue identifying locations and species to add to existing lists.
- Special attention will be focused on tracking locations of less commonly encountered noxious weeds that are on the Colorado Department of Agriculture A list. Volunteer naturalists are also engaged in regularly removing these plants from the property.
- Volunteer naturalists are considering identifying species of plants that are not currently in Colorado herbariums from Douglas County, and if this project is undertaken, we will request permission to collect specimens and submit them.

Education

- Volunteer naturalists who are trained Colorado Native Plant Master (NPM) instructors will continue offering Colorado NPM 3-week training classes, a Colorado State University Extension program.
- Educational plant hikes may be provided for groups from organizations such as the Douglas Land Conservancy (DLC), Colorado NPM program, Colorado Native Plant Society (CoNPS), Denver Botanic Gardens (DBG), and Osher Lifelong Learning Institute (OLLI).
- Information developed during this project could be used to support hikes for the public focused on native vascular plants or non-vascular plants as well as general naturalist hikes.
- Seasonal flower guide handouts may be developed for use by the general public.

11.6 Invertebrates—Future Activities

Research

- Surveys of terrestrial invertebrates could be conducted as time is available from volunteers with expertise in specific invertebrate types.
- Additional butterfly surveys will be conducted as time is available from volunteers with relevant expertise. Experts who helped develop the current butterfly and moth list for Sandstone Ranch

have expressed a desire to return across different seasons to allow observation of a broader range of species.

• In order to assess and potentially protect Monarch Butterfly habitat, areas where milkweed species that are essential to the Monarch lifecycle ae growing could be identified and mapped.

Education

• Knowledge about terrestrial invertebrates that has been gained through this project's survey efforts will be used to support educational activities such as naturalist training classes and hikes for the public.

11.7 Reptiles and Amphibians—Future Activities

Research

• Reptile and amphibian survey work will continue on a seasonal basis.

Education

• Knowledge about reptiles and amphibians that has been gained through this project's survey efforts will be used to support educational activities such as naturalist training classes and hikes for the public.

11.8 Birds—Future Activities

Research

- Bird survey work will continue on a weekly basis.
 - Data will be gathered zone-by-zone for consistency and ease in comparing results over time.
 - Additional volunteers may be engaged in data collection, with individual volunteers assigned responsibility for specific zones.
- Analysis of changes in population diversity and density will be a focus over the next five years.
- Data related to locations of sensitive bird habitat will be shared with DCOS management personnel in support of making management decisions.

Education

- Bird survey data could be used in naturalist training classes.
- Introductory birding classes may include field trips on Sandstone Ranch property and could be focused on a zone-by-zone view.

Recreation

- Bird watching is a popular national pastime, and it will be encouraged as a wonderful ongoing use of the Sandstone Ranch property in ways that do not impact sensitive species.
- Bird hikes for the public will be offered and could include hikes designed to engage youth and children, since these would be experiences that could help the next generation develop interest in conservation as a whole.
- The tri-fold bird list will be offered to the public to enhance individual bird watching experiences.

11.9 Mammals—Future Activities

Research

- Trail cameras could be used by DCOS staff members for research about movement of mammals on Sandstone Ranch property.
- Volunteer naturalists will encourage mammalian research efforts by university classes holding field training on Sandstone Ranch or individual students in pursuit of advanced degrees.

Education

- Two colleges have ongoing arrangements to conduct classes on Sandstone Ranch property that include studies of mammalian species, and additional use of the property for college-level instruction is encouraged. Volunteer naturalists function as guides and assist with these classes.
 - Dr. Maybellene Gamboa (Colorado College Department of Organismal Biology & Ecology Assistant Professor) brings her undergraduate Ecology Class to Sandstone Ranch for field sessions where students learn to design and conduct research projects. These classes may include studying mammalian species and their sign (e.g., tracks and scat) or any other ecology related topic.
 - Dr. Tanya Dewey (CSU Biology Department Assistant Professor) brings her summer undergraduate course in Small Mammals to Sandstone. The course provides hands-on learning opportunities in setting traps for small mammals as well as setting mist nets for bats.
- Knowledge about mammals that has been gained through this project's survey efforts could be used to support educational activities such as naturalist training classes and hikes for the public.

11.10 Astronomy—Future Activities

The Astronomy project has important research, education, and recreational aspects. The project is new and planning and developmental activities are underway. See **Section 10.0** for a complete description of ongoing and future activities.

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The DCOS volunteer naturalists participating in this project would like to thank the Douglas County Open Space management and staff members for their careful planning, development, and management of the 2038-acre Sandstone Ranch Open Space that has opened it up for recreational and educational use by the public while continuing to consider ways to protect and preserve the unique and sensitive natural resources on this special property.

We would like to especially thank Jackie Sanderson, Natural Resource Specialist for Douglas County Division of Open Space and Natural Resources, for her continuing guidance throughout this entire project, for sharing her knowledge and expertise, for coordinating field surveys and visits to the property by invited guest experts, and for facilitating access to the ranch for the volunteer naturalists engaged in this project.

In addition, we wish to thank the many individuals who provided advice, took the time to visit Sandstone Ranch, and contributed to our understanding of natural resources on the property by sharing their expertise in specific disciplines. Here are just a few areas where they assisted us with this project:

- Assistance with geology during this project:
 - Pam Schulz and Brad Morrison for their previous support with geologic research.
 - Robert Raynolds and Christine Siddoway for their site visits and geologic contributions.
 - Douglas County volunteer geology team: Rik Williams, Sandy Stavnes, Thomas Loucks, and Scott Gaffri for their geologic contributions.
- Assistance with helping volunteer naturalists understand the water resources at Sandstone Ranch:
 - Scott McEldowney, Deputy Director Open Space and Natural Resources.
- Assistance with aquatic life research during this project:
 - The fisheries crew working with Elizabeth Krone, NE Region Native Aquatics Lead Technician, and Boyd Wright, Native Aquatic Species Biologist, both from CPW's Department of Natural Resources (DNR), who conducted a fisheries survey in the West Plum Creek watershed and shared their results.
- Assistance with butterfly research during this project:
 - David Leatherman, former Colorado State Forest Service entomologist, who initiated the butterfly list during a one-day visit to the property in 2018.
 - Pam Steinman, volunteer naturalist with Castlewood Canyon, who conducted an educational butterfly hike at Sandstone and provided a list of species of butterflies in July 2019.
 - Sam Johnson, Bell Mead, and Robert Andrews who observed, identified, and recorded butterfly and moth species on visits in the spring, summer and fall of 2023.
- Assistance with vascular plant research and promoting native plants:
 - Botanists from Denver Botanic Gardens who participated in the 2019 Denver Botanic
 Gardens Botanic Survey and provided ongoing assistance with plant identification including

Dr. Melissa Islam, Dr. Christina Alba, Dr. Janet Wingate, Loraine Yeatts, and field crews who accompanied them on their survey visits to the property.

- Brian O'Malley and the Douglas County Weed Warriors who not only demonstrated what individuals can do to help control noxious weeds and inspired others to do so but also helped to focus attention on the value of native plants on our open spaces. Note that the difference that they have made is clearly visible at Sandstone Ranch, as it is at other open spaces in the county.
- Assistance with non-vascular (bryophyte) plant research:
 - Mo Ewing, a volunteer bryologist who conducted the first bryophyte study on the property in 2018 and contributed lab work for identification in 2019.
 - Stacey Anderson and Dr. Barbara M. Thiers, who conducted bryophyte survey work in 2023. Dr. Thiers is Instructor, University of Colorado Museum and Field Studies Program Research Adjunct; Denver Botanic Garden Director Emerita; Honorary Curator, William and Lynda Steere Herbarium of The New York Botanical Garden; and Editor, Index Herbariorum.
- Assistance with the Astronomy Project:
 - Katherine Bond, a Denver Astronomical Society (DAS) member, who designed and built a model of a possible observatory for Sandstone Ranch. She also provided basic architectural drawings of the layout and elevation view.
 - Joseph Pineda, a DAS member whose technical expertise has been and will be put to use on the construction of the observatory and installation of telescopes.
 - Michael Rymer, an employee of the International Dark Sky Association, who donated his time to spend with team members on Sandstone Ranch one day to assist them in planning.
- Bringing colleges classes to do field studies on the property, which contributed to knowledge of plants and animals on Sandstone Ranch:
 - Dr. Maybellene Gamboa, Colorado College Department of Organismal Biology and Ecology Assistant Professor.
 - o Dr. Tanya Dewey, Colorado State University Biology Department Assistant Professor.
- Photography for this document:
 - Note that all photos in this document were taken by members of the DCOS volunteer naturalist team who worked on this project unless credited individually to the following other photographers: Mo Ewing, Leon Roybal, Michael Seal.
 - Photos from DCOS volunteer naturalist team members were taken by Curt Frankenfeld, Scott Gaffri, Barbara Harbach, Dan Stringer, and Elizabeth Taylor.

APPENDIX A

VOLUNTEERS ON THE SANDSTONE RANCH NATURAL RESOURCE INVENTORY AND ANALYSIS 5-YEAR UPDATE TEAM

Volunteers on the Sandstone Ranch Natural Resource Inventory and Analysis 5-Year Update Team

From 2019 through 2023, a team of DCOS volunteers continued the research that was started in 2018 and documented in the original *Sandstone Ranch Open Space Natural Resource Inventory and Analysis (2018)*.

Name	Areas of Expertise
Curt Frankenfeld	plants, birds, mammals
Scott Gaffri	geology
Barb Harbach	plants
Heather Koch	plants
Dena McClung	astronomy
Doug Reagan	ecology, amphibians, and reptiles
Dan Stringer	birds
Elizabeth Taylor	plants, mammals

Table A-1. DCOS Volunteers Currently Involved with the Project and Areas of Expertise

Jackie Sanderson, Natural Resource Specialist for Douglas County's Division of Open Space and Natural Resources, deserves special recognition. Jackie has coordinated this project since its inception, and without her support, none of this work would have been accomplished.

The following individuals conducted research during the five years following the 2018 initial inventory and participated in preparation of this report:

- <u>Curt Frankenfeld</u> has a B.S. and an M.A. in Mathematics, both with emphasis in statistics. His background is varied with contributions to education, biology, wildlife, solar physics, human performance measurement, and modeling and simulation. He is an Audubon Master Birder and a volunteer naturalist for Douglas County Open Space, Douglas Land Conservancy (DLC), and Denver Audubon. He is the current board president of Denver Audubon.
- Scott Gaffri holds a B.S. in Forestry and an B.A. in geology. He is a Certified Professional Geologist with over 35 years' experience in mineral exploration and environmental geology. Scott is a volunteer with Douglas County Open Space, Douglas Land Conservancy (DLC), and Colorado Parks and Wildlife.
- 3. <u>Barbara Harbach</u> is a volunteer naturalist for Douglas Land Conservancy (DLC) and Douglas County Open Space. She studied science in college, obtained a degree in commercial art, and worked for 25 years in that field. Now retired, she assists in monitoring plants and wildlife at Sandstone Ranch.
- 4. <u>Heather Koch</u> was dual-careered. Trained as a cell biologist (M.S.), she instructed in the junior college system. She then changed focus to accounting and retired as a CPA from Arco Oil and Gas. Her volunteer work included the CSU Master Gardener Program and the Jefferson County Diagnostic Clinic. She has also taught in the Native Plant Master Program.

- 5. <u>Dena McClung</u> is a retired FAA air traffic controller, who worked mostly in towers. Her interest in astronomy began in her early years, viewing stars and the Milky Way with her father. She joined the Denver Astronomical Society (DAS) in 2008, and began volunteering there in 2011. In 2019 she was introduced to Sandstone Ranch and started bringing astronomers to regular star parties. She's been the president of the DAS for the past three years.
- 6. <u>Doug Reagan</u> is a professional ecologist who has conducted ecological assessment, mitigation, and restoration projects for governments and private industries in more than a dozen countries. Projects varied from ecological impact surveys of river basins in West Africa and Papua New Guinea to national park planning in the Philippines. Doug holds a B.A. and M.S. in Biology and a Ph.D. in Zoology (ecology). He is certified in Environmental Dispute Resolution by the National Center for Environmental Conflict Resolution.
- 7. <u>Dan Stringer</u> is a Colorado native and Douglas County resident. He is an avid birder with 438 species identified in Colorado to date. He has led field trips and bird counts for Denver Field Ornithologists, Colorado Field Ornithologists, and The Audubon Society. He also conducts yearly surveys in Southeast Colorado for the US Government's Breeding Bird Atlas. Dan has completed 6 years of zone-specific surveys at Sandstone, documenting 168 species on the ranch to date.
- 8. <u>Elizabeth Taylor</u> has a B.S. in zoology and an M.S. in wildlife management and completed post graduate work in technical communication. She has been a university instructor in both disciplines, a wildlife researcher for the USFWS through the Cooperative Wildlife Research Unit program, and a technical communication department manager in the defense and telecommunications industries. Currently she is a volunteer naturalist for Douglas County Open Space, Douglas Land Conservancy (DLC), and Colorado Native Plant Society and teaches in the CSU Extension Native Plant Master program. She is a retired member of the DLC Board of Directors.

In addition to DCOS volunteers currently working on this project, we would like to acknowledge the contributions of the following DCOS volunteer naturalists who supported the initial *2018 Sandstone Ranch Open Space Natural Resource Inventory and Analysis* report or provided other project support:

- Cathy Fisher
- Brad Morrison
- Evelyn Paret
- Pam Schulz
- Harriet Stratton

APPENDIX B

GEOLOGY OF SANDSTONE RANCH OPEN SPACE

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Geology of Sandstone Ranch Open Space

9605 S. Perry Park Road, Larkspur, CO 80118

Geologic Setting

The 2,038-acre Sandstone Ranch is located along the western edge of the Denver Basin. The Denver Basin is bordered on the west by Front Range uplift. The primary faults separating the basin from the Pre-Cambrian granitic mountains are the north-south Rampart Range fault and Perry Park splay fault. In Gove Creek, lower Paleozoic rocks were preserved, probably because they were not elevated and deeply eroded during the (Ancestral Rockies) Pennsylvanian uplift. The most prominent rocks on Sandstone Ranch are of the reddish colored Fountain Formation forming hogbacks and hoodoos on the edge of the Front Range and throughout the valley.

Fountain 280-320 MYA (Pennsylvanian/ Lower Permian) Various shades of red colored sandstone, siltstone, shale and conglomerates; 2000 ft thick; Red color from iron oxides; Sandstone weathers irregularly, forming hoodoos and hogbacks; Shale and siltstone layers form recessed shelves; Alluvial fan deposits from erosion of Ancestral Rockies (300MA); Cross bedding; Brachiopods, crinoids, and gastropods fossils in the limestone and shale. Fountain [Ancient soil (Paleosol) on lower contact in quarry) Williams Canyon ~ 355 MYA (Mississippian) Thinly laminated mudstones, and gray, red, and purple dolomites; 44 feet thick; Shallow marine environment with conodont fossils. Manitou Limestone 444-488 MYA (Lower Ordovician) Reddish purple to grey limestone calcium carbonate (CaCo3), dolomite calcium and magnesium carbonate [Ca(MgCO3)], and shale; 130 ft thick; Contains fossils including conodonts, cystoid stems, brachiopods, and trilobites, indicative of a warm, shallow Williams Canyon water environment such as lagoon or reefs and sandy beaches. Manitou Sawatch Sandstone 530 MYA (Cambrian) White, light gray and red sandstone with greenish glauconite near the top; 80 feet thick; Forms low hogback ridges; An ancient Sawatch shoreline (oxygen rich environment) becoming more marine transgressing sea (sea level rise); Contains mollusks, brachiopods and trilobite fossils. Pikes Peak (Great Unconformity - Erosional gap of +/- 570 million years between Sawatch and Pikes Peak granite) Pikes Peak Granite 1.1 BYA (Pre-Cambrian) Resistant, red, pink, and greenish-gray, coarse-grained granite intrusion composed chiefly of quartz, feldspar, and hornblende with CGS OF-15-10 minor amounts of biotite. Liquid magma pushed up from the earth's

mantle and cooled about 2-3 miles below the surface.



CGS OF-15-10









Cenozoic Qa Channel and floodplain alluvium **Qt** Terrace alluvium one Qsw Sheetwash Qf Alluvial fan deposit **Qp** Older alluvium Qc Colluvium TKd Dawson formation Mesozoic Kp Pierre shale Kn Niobrara formation Kd Dakota sandstone TrPI Lykins formation Paleozoic Ply Lyons sandstone **PPf** Fountain formation and Glen Eyrie Mwc Williams Canyon **Om** Manitou formation **Cs** Sawatch sandstone **Pre-Cambrian** Ypp Pikes Peak granite

CGS OF-08-17

DOUGLAS

COUNTY



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- CGS OF -08-17 Geologic Map of Larkspur Quadrangle
- CGS OF-15-10 Geology of Douglas County
- Pam Schulz, Misc. internal Douglas County reports
- Brad Morrison, Misc. internal Sandstone reports



Working together to promote and protect

Douglas County's open spaces

APPENDIX C

ANNOTATED AQUATIC LIFE FIELD NOTES

A fisheries crew working with Elizabeth Krone, NE Region Native Aquatics Lead Technician, and Boyd Wright, Native Aquatic Species Biologist, both from CPW's Department of Natural Resources (DNR), conducted a fisheries survey in the West Plum Creek watershed and shared their results. Although the survey included a much broader area of West Plum Creek and its tributaries, valuable information about aquatic organisms that are specifically found in Gove Creek and the segment of West Plum Creek on Sandstone Ranch was extracted from the field notes. The extract from the field survey notes lists a number of species of aquatic organisms that were observed, and the list that follows was annotated with additional taxonomic information.

ANNOTATED AQUATIC LIFE FIELD NOTES--GOVE CREEK AND WEST PLUM CREEK

Location	Date	Field Identification	Definition or name	Family
West Plum Creek	6/15/2022	Ameletus	A genus of mayfly	Ameletidae
Gove Creek	6/15/2022	Ameletus	A genus of mayfly	Ameletidae
Gove Creek	6/15/2022	Baetis tricaudatus	A species of small minnow mayfly	Baetidae
Gove Creek	6/15/2022	Diphetor hageni	Hagen's small minnow mayfly	Baetidae
			A species of humpless casemaker	
Gove Creek	6/15/2022	Micrasema bactro	caddisfly	Brachycentridae
West Plum Creek	6/15/2022	Capniidae	A family of small winter stoneflies	Capniidae
			Sub-family of family of biting flies	
			commonly known as no-see-ums,	
West Plum Creek	6/15/2022	Ceratopogoninae	or biting midges	Ceratopogonidae
			Sub-family of family of biting flies	
			commonly known as no-see-ums,	
Gove Creek	6/15/2022	Ceratopogoninae	or biting midges	Ceratopogonidae
West Plum Creek	6/15/2022	Brillia	A genus of non-biting midges	Chironomidae
Gove Creek	6/15/2022	Brillia	A genus of non-biting midges	Chironomidae
West Plum Creek	6/15/2022	Corynoneura	A genus of non-biting midges	Chironomidae
Gove Creek	6/15/2022	Corynoneura	A genus of non-biting midges	Chironomidae
		Cricotopus/		
West Plum Creek	6/15/2022	Orthocladius	A genus of non-biting midges	Chironomidae
		Cricotopus/		
Gove Creek	6/15/2022	Orthocladius	A genus of non-biting midges	Chironomidae
Gove Creek	6/15/2022	Diamesa	A genus of non-biting midges	Chironomidae
West Plum Creek	6/15/2022	Eukiefferiella	A genus of non-biting midges	Chironomidae
Gove Creek	6/15/2022	Eukiefferiella	A genus of non-biting midges	Chironomidae
West Plum Creek	6/15/2022	Heterotrissocladius	A genus of non-biting midges	Chironomidae
Gove Creek	6/15/2022	Macropelopia	A genus of non-biting midges	Chironomidae
		Micropsectra/		
West Plum Creek	6/15/2022	Tanytarsus	A genus of non-biting midges	Chironomidae
		Micropsectra/		
Gove Creek	6/15/2022	Tanytarsus	A genus of non-biting midges	Chironomidae
West Plum Creek	6/15/2022	Pagastia	A genus of non-biting midges	Chironomidae
Gove Creek	6/15/2022	Pagastia	A genus of non-biting midges	Chironomidae
West Plum Creek	6/15/2022	Parametriocnemus	A genus of non-biting midges	Chironomidae
Gove Creek	6/15/2022	Parametriocnemus	A genus of non-biting midges	Chironomidae
West Plum Creek	6/15/2022	Parochlus	A genus of non-biting midges	Chironomidae
West Plum Creek	6/15/2022	Polypedilum	A genus of non-biting midges	Chironomidae
Gove Creek	6/15/2022	Polypedilum	A genus of non-biting midges	Chironomidae
West Plum Creek	6/15/2022	Pseudodiamesa	A genus of non-biting midges	Chironomidae
Gove Creek	6/15/2022	Pseudodiamesa	A genus of non-biting midges	Chironomidae
West Plum Creek	6/15/2022	Rheocricotopus	A genus of non-biting midges	Chironomidae
Gove Creek	6/15/2022	Rheocricotopus	A genus of non-biting midges	Chironomidae
Gove Creek	6/15/2022	Synorthocladius	A genus of non-biting midges	Chironomidae
		Thienemannimyia		
West Plum Creek	6/15/2022	group	A genus of non-biting midges	Chironomidae

ANNOTATED AQUATIC LIFE FIELD NOTES--GOVE CREEK AND WEST PLUM CREEK

Location	Date	Field Identification	Definition or name	Family
		Thienemannimyia		
Gove Creek	6/15/2022	group	A genus of non-biting midges	Chironomidae
West Plum Creek	6/15/2022	Tvetenia	A genus of non-biting midges	Chironomidae
Gove Creek	6/15/2022	Chloroperlidae	Family of green stoneflies	Chloroperlidae
Gove Creek	6/15/2022	Suwallia	A genus of green stoneflies	Chloroperlidae
Gove Creek	6/15/2022	Sweltsa	A genus of green stoneflies	Chloroperlidae
West Plum Creek	6/15/2022	Dugesia	A genus of flatworms	Dugesiidae
			A genus of predatory diving	
West Plum Creek	6/15/2022	Agabus	aquatic beetles	Dytiscidae
		Heterlimnius		
Gove Creek	6/15/2022	corpulentus	A species of riffle beetle	Elmidae
Gove Creek	6/15/2022	Zaitzevia parvula	A species of riffle beetle	Elmidae
			A family of microdrile oligochaeta	
			known as pot worms or white	
Gove Creek	6/15/2022	Enchytraeidae	worms	Enchytraeidae
Gove Creek	6/15/2022	Serratella	A genus of spiny crawler mayflies	Ephemerellidae
Gove Creek	6/15/2022	Drunella grandis	A species of spiny crawler mayfly	Ephemerellidae
Gove Creek	6/15/2022	Cinygmula	Genus of flatheaded mayflies	Heptageniidae
Gove Creek	6/15/2022	Epeorus longimanus	A species of flat-headed mayflies	Heptageniidae
Gove Creek	6/15/2022	Ochthebius	A genus of minute moss beetles	Hydraenidae
Gove Creek	6/15/2022	Parapsyche	A genus of netspinning caddisflies	Hydropsychidae
Gove Creek	6/15/2022	Hygrobates	A genus of mites	Hygrobatidae
Gove Creek	6/15/2022	Lepidostoma	A genus of bizarre caddisflies	Lepidostomatidae
Gove Creek	6/15/2022	Paraleptophlebia	A genus of mayflies	Leptophlebiidae
West Plum Creek	6/15/2022	Hesperophylax	A genus of northern caddisflies	Limnephilidae
Gove Creek	6/15/2022	Hexatoma	A genus of crane fly	Limoniidae
West Plum Creek	6/15/2022	Lumbricidae	A family of earthworms	Lumbricidae
Gove Creek	6/15/2022	Lumbricidae	A family of earthworms	Lumbricidae
West Plum Creek	6/15/2022	Lispoides aequifrons	A species of house flies	Muscidae
		Tubificidae w/o hair		
		chaetae. Note that		
		this family is now		
West Plum Creek	6/15/2022	part of Naididae	A family of sludge worms	Naididae
		Tubificidae w/o hair		
		chaetae. Note that		
		this family is now		
Gove Creek	6/15/2022	part of Naididae	A family of sludge worms	Naididae
Gove Creek	6/15/2022	Malenka	A genus of spring stoneflies	Nemouridae
West Plum Creek	6/15/2022	Podmosta/Prostoia	A genus of spring stoneflies	Nemouridae
			Common forestfly, a species of	
Gove Creek	6/15/2022	Zapada cinctipes	spring stonefly	Nemouridae
Gove Creek	6/15/2022	Dicranota	Genus of hairy-eyed crane flies	Pediciidae

ANNOTATED AQUATIC LIFE FIELD NOTES--GOVE CREEK AND WEST PLUM CREEK

Location	Date	Field Identification	Definition or name	Family
			Sickly spring fly; a species of	
Gove Creek	6/15/2022	Kogotus modestus	predatory stone fly	Perlodidae
			Genus of small freshwater snails;	
Gove Creek	6/15/2022	Gyraulus	ram's horn	Planorbidae
			A genus of caddisflies; green rock	
Gove Creek	6/15/2022	Rhyacophila brunnea	worms	Rhyacophilidae
			A genus of caddisflies; green rock	
Gove Creek	6/15/2022	Rhyacophila sibirica	worms	Rhyacophilidae
West Plum Creek	6/15/2022	Prosimulium	a genus of black flies	Simuliidae
West Plum Creek	6/15/2022	Simulium	A genus of black flies	Simuliidae
Gove Creek	6/15/2022	Simulium	A genus of black flies	Simuliidae
		Siphlonurus	A species of primitive minnow	
West Plum Creek	6/15/2022	occidentalis	mayfly	Siphlonurida
			A genus of very small freshwater	
Gove Creek	6/15/2022	Pisidium	clams (pill clams)	Sphaeriidae
Gove Creek	6/15/2022	Tabanus	A genus of biting horseflies	Tabanidae
Gove Creek	6/15/2022	Neophylax splendens	Species of caddisflies	Thremmatidae
Gove Creek	6/15/2022	Torrenticola	A genus of arachnids, a mite	Torrenticolidae
Gove Creek	6/15/2022	Nematoda	Round worms	Unknown

APPENDIX D

VASCULAR PLANTS OF SANDSTONE RANCH

During the first four years of this project, volunteer naturalists used Jennifer Ackerfield's *Flora of Colorado*, First Edition (Ackerfield 2015) as the authority for plant identification. However, a second edition of *Flora of Colorado* was published in 2022 that includes a number of scientific name and classification changes (Ackerfield 2022). As a result, the list of Sandstone Ranch plants that is provided in **Appendix D** has been updated to be consistent with the current *Flora* guidelines. Older names from the 2015 edition appear in the list in parentheses.

		-		-			
Alien or	Family -	Family - Common	Scientific Name		2018	2019	Post
Native	(Ed. 1 in paren.)	(Ed. 1 - paren.)	(Ed. 1 in paren.)	Common Name(s)	(Vol)	(DBG)	2019
Native	ALISMATACEAE	Water-plantain	Alisma triviale	northern water-plantain	Х	×	
Native	AMARANTHACEAE	Pigweed	Amaranthus powellii	Powell's amaranth		Х	
	AMARANTHACEAE	Pigweed	Bassia scoparia				
Alien	(CHENOPODIACEAE)	(Goosefoot)	(Kochia scoparia)	burning bush; Mexican fireweed	Х	×	
	AMARANTHACEAE	Pigweed	Blitum capitatum				
Alien	(CHENOPODIACEAE)	(Goosefoot)	(Chenopodium capitatum)	blite goosefoot; strawberry blite			Х
	AMARANTHACEAE	Pigweed	Chenopodiastrum simplex	nettle-leaved goosefoot; maple-leaf			
Native	(CHENOPODIACEAE)	(Goosefoot)	(Chenopodium simplex)	goosefoot		×	
	AMARANTHACEAE	Pigweed					
Alien	(CHENOPODIACEAE)	(Goosefoot)	Chenopodium album	lambsquarters	Х		
	AMARANTHACEAE	Pigweed					
Native	(CHENOPODIACEAE)	(Goosefoot)	Chenopodium atrovirens	pinyon goosefoot		×	
	AMARANTHACEAE	Pigweed	Chenopodium berlandieri Moq.				
Native	(CHENOPODIACEAE)	(Goosefoot)	var. <i>zschackii</i>	Zschack's goosefoot		×	
	AMARANTHACEAE	Pigweed					
Native	(CHENOPODIACEAE)	(Goosefoot)	Chenopodium fremontii	Fremont's goosefoot		×	
	AMARANTHACEAE	Pigweed					
Native	(CHENOPODIACEAE)	(Goosefoot)	Chenopodium hians	Hians goosefoot		×	
	AMARYLLIDACEAE	Amaryllis					
Native	(ALLIACEAE)	(Onion)	Allium cernuum	nodding onion	×	×	
	AMARYLLIDACEAE	Amaryllis					
Native	(ALLIACEAE)	(Onion)	Allium textile	textile onion; sand onion; plains onion	Х	×	
Native	ANACARDIACEAE	Cashew or Sumac	Rhus glabra	smooth sumac	Х	Х	
				skunkbush sumac; three-leaf sumac;			
Native	ANACARDIACEAE	Cashew or Sumac	Rhus trilobata	lemonade bush	Х	×	
Native	ANACARDIACEAE	Cashew or Sumac	Toxicodendron rydbergii	western poison ivy	Х	Х	
Native	APIACEAE	Carrot	Cicuta maculata	spotted water hemlock	Х	Х	
Alien C	APIACEAE	Carrot	Conium maculatum	poison hemlock	Х		
Native	APIACEAE	Carrot	Harbouria trachypleura	whiskbroom parsley	Х		
Native	APIACEAE	Carrot	Heracleum maximum	common cowparsnip	Х	Х	
Native	APIACEAE	Carrot	Ligusticum porteri	osha; wild lovage; Porter's lovage	Х	×	
				salt-and-pepper; northern Idaho			
Native	APIACEAE	Carrot	Lomatium orientale	biscuitroot	Х	×	
			D-2				

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Alien o	r Family -	Family - Common	Scientific Name		2018	2019	Post
Native	(Ed. 1 in paren.)	(Ed. 1 - paren.)	(Ed. 1 in paren.)	Common Name(s)	(Vol)	(DBG)	2019
Native	APIACEAE	Carrot	Musineon divaricatum	leafy wildparsley	Х		
Native	APIACEAE	Carrot	Osmorhiza berteroi	sweet-cicely	Х	Х	
Native	APIACEAE	Carrot	Sanicula marilandica	Maryland sanicula; snakeroot		Х	
Native	APOCYNACEAE	Dogbane	Apocynum androsaemifolium	spreading dogbane	×	×	
Native	APOCYNACEAE	Dogbane	Asclepias asperula	antelope horns			×
Native	APOCYNACEAE	Dogbane	Asclepias speciosa	showy milkweed; common milkweed	×	×	
Native	APOCYNACEAE	Dogbane	Asclepias tuberosa	butterfly milkweed	×	×	
Native	APOCYNACEAE	Dogbane	Asclepias viridiflora	green comet milkweed	×	×	
Native	ARACEAE	Arum	Lemna minor	common duckweed	×	×	
Native	ARALIACEAE	Ginseng	Aralia nudicaulis	wild sarsparilla	×	×	
	ASPARAGACEAE	Asparagus					
Native	(AGAVACEAE)	(Agave)	Leucocrinum montanum	common sand lily; starlily	×	×	
	ASPARAGACEAE	Asparagus					
Native	(AGAVACEAE)	(Agave)	Yucca glauca	Great Plains yucca; soapweed	×	×	
	ASPARAGACEAE	Asparagus	Maianthemum racemosum ssp.	large false Solomon's seal; claspleaf			
Native	(RUSCACEAE)	(Butcher's Broom)	amplexicaule	Solomon plume	×		
	ASPARAGACEAE	Asparagus					
Native	(RUSCACEAE)	(Butcher's Broom)	Maianthemum stellatum	false Solomon's seal	×	×	
Native	ASTERACEAE	Sunflower	Achillea millefolium	common yarrow	×	×	
		2000 g an 3			>	^	
ואמרואב					<	< >	
Native	ASIERACEAE	suntlower	Agoseris glauca	pale agoseris		×	
Native	ASTERACEAE	Sunflower	Ambrosia artemisiifolia	common ragweed		×	
Native	ASTERACEAE	Sunflower	Ambrosia psilostachya	western ragweed; Cuman ragweed	Х	X	
Native	ASTERACEAE	Sunflower	Antennaria anaphaloides	pearly pussy-toes		Х	
Native	ASTERACEAE	Sunflower	Antennaria parvifolia	small-leaf pussy-toes; dwarf pussy-toes	Х	Х	
Native	ASTERACEAE	Sunflower	Antennaria rosea	rosy pussy-toes; pink pussy-toes	Х		
- Alien C	ASTERACEAE	Sunflower	Arctium minus	common burdock	Х	Х	
Native	ASTERACEAE	Sunflower	Arnica cordifolia	heartleaf arnica	×		
Native	ASTERACEAE	Sunflower	Arnica fulgens	foothill arnica; meadow arnica	×	×	
Alien B	ASTERACEAE	Sunflower	Artemisia absinthium	absinthe wormwood		Х	
Alien	ASTERACEAE	Sunflower	Artemisia biennis	biennial sagewort		×	

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Alien or	Family -	Family - Common	Scientific Name		2018	2019	Post
Native	(Ed. 1 in paren.)	(Ed. 1 - paren.)	(Ed. 1 in paren.)	Common Name(s)	(Vol)	(DBG)	2019
			Artemisia campestris var.				
Native	ASTERACEAE	Sunflower	pacifica	field sagewort	×	×	
Native	ASTERACEAE	Sunflower	Artemisia dracunculis	tarragon; dragon sagewort		×	
				prairie sagewort; fringed sagebrush;			
Native	ASTERACEAE	Sunflower	Artemisia frigida	wormwood	×	Х	
				Louisiana sagewort; white sagebrush;			
Native	ASTERACEAE	Sunflower	Artemisia ludoviciana	Mexican sagebrush; Louisiana wormwood	×	X	
Alien	ASTERACEAE	Sunflower	Bidens cernua	nodding beggar-ticks	×		
Alien	ASTERACEAE	Sunflower	Bidens frondosa	devil's beggar-ticks		×	
Native	ASTERACEAE	Sunflower	Bidens tripartita	straw-stem beggar-ticks	×	×	
Native	ASTERACEAE	Sunflower	Brickellia grandiflora	tasselflower brickellbush	×	×	
Alien B	ASTERACEAE	Sunflower	Carduus nutans	musk thistle; nodding thistle	×	×	
Alien B	ASTERACEAE	Sunflower	Centaurea diffusa	diffuse knapweed	×	×	
Native	ASTERACEAE	Sunflower	Chaenactis douglasii	dustymaiden	×		
Alien B	ASTERACEAE	Sunflower	Cirsium arvense	Canada thistle	×	×	
Native	ASTERACEAE	Sunflower	Cirsium canescens	prairie thistle	×	×	
Native	ASTERACEAE	Sunflower	Cirsium cf. flodmanii	Flodman's thistle	×		
Alien B	ASTERACEAE	Sunflower	Cirsium vulgare	bull thistle		Х	
Native	ASTERACEAE	Sunflower	Crepis occidentalis	largeflower hawk's beard	×	×	
Native	ASTERACEAE	Sunflower	Cyclachaena xanthifolia	giant sumpweed		×	
			Ericameria nauseosa var.				
Native	ASTERACEAE	Sunflower	graveolens	rubber rabbitbrush	×	X	
Native	ASTERACEAE	Sunflower	Erigeron acris	bitter fleabane		Х	
			Erigeron canadensis				
Alien	ASTERACEAE	Sunflower	(Conyza canadensis)	horseweed; mare's tail	×	X	
Native	ASTERACEAE	Sunflower	Erigeron canus	hoary fleabane; hoary daisy	×	Х	
Native	ASTERACEAE	Sunflower	Erigeron divergens	spreading fleabane; spreading daisy	×	Х	
				trailing fleabane; trailing daisy; whiplash			
Native	ASTERACEAE	Sunflower	Erigeron flagellaris	daisy	×	×	
Native	ASTERACEAE	Sunflower	Erigeron speciosus	Aspen fleabane; Aspen daisy		×	
Native	ASTERACEAE	Sunflower	Erigeron strigosus	prairie fleabane		×	
Native	ASTERACEAE	Sunflower	Erigeron subtrinervis	threenerve fleabane; threenerve daisy		×	
			D-4				

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Alien or	Family -	Family - Common	Scientific Name		2018	2019	Post
Native	(Ed. 1 in paren.)	(Ed. 1 - paren.)	(Ed. 1 in paren.)	Common Name(s)	(Vol)	(DBG)	2019
				running fleabane; running daisy; sprawling			
Native	ASTERACEAE	Sunflower	Erigeron tracyi	daisy	×		
Native	ASTERACEAE	Sunflower	Eutrochium maculatum	spotted JoePye weed		Х	
Native	ASTERACEAE	Sunflower	Grindelia hirsutula	hirsute gumweed		Х	
Native	ASTERACEAE	Sunflower	Grindelia squarrosa	curlycup gumweed	Х		
Native	ASTERACEAE	Sunflower	Gutierrezia sarothrae	broom snakeweed	×	×	
Native	ASTERACEAE	Sunflower	Helenium autumnale	mountain sneezeweed	×		
Native	ASTERACEAE	Sunflower	Helianthus annuus	common sunflower	Х	Х	
Native	ASTERACEAE	Sunflower	Helianthus nuttallii	Nuttall's sunflower	×	×	
Native	ASTERACEAE	Sunflower	Helianthus pumilus	little sunflower; bush sunflower	Х	Х	
Native	ASTERACEAE	Sunflower	Heliomeris multiflora	showy goldeneye	Х	Х	
Native	ASTERACEAE	Sunflower	Heterotheca foliosa	foliose false goldenaster		Х	
Native	ASTERACEAE	Sunflower	Heterotheca villosa	hairy false goldenaster; golden aster	Х	Х	
Native	ASTERACEAE	Sunflower	Hieracium albiflorum	white hawkweed			×
Alien A	ASTERACEAE	Sunflower	Hieracium aurantiacum	orange hawkweed		×	
Native	ASTERACEAE	Sunflower	Hieracium fendleri	yellow hawkweed	×	×	
			Hymenopappus filifolius var.	fineleaf hymenopappus; threadleaf			
Native	ASTERACEAE	Sunflower	cinereus	sunflower; Columbia cutleaf	×	X	
			Hymenothrix dissecta				
Native	ASTERACEAE	Sunflower	(Bahia dissecta)	cutleaf			×
Native	ASTERACEAE	Sunflower	Lactuca biennis	tall blue lettuce		Х	
Native	ASTERACEAE	Sunflower	Lactuca canadensis	Canada lettuce		Х	
Alien	ASTERACEAE	Sunflower	Lactuca serriola	prickly lettuce	×	Х	
Native	ASTERACEAE	Sunflower	Liatris punctata	dotted blazing star; gay-feather	×	Х	
Native	ASTERACEAE	Sunflower	Lygodesmia juncea	rush skeletonweed; rush skeleton plant	X	Х	
Alien	ASTERACEAE	Sunflower	Matricaria discoidea	pineapple weed	х		
				sharppoint prairie-dandelion; wavyleaf			
Native	ASTERACEAE	Sunflower	Nothocalais cuspidata	false dandelion	×		
Native	ASTERACEAE	Sunflower	Packera fendleri	Fendler's ragwort; Fendler's senecio	х	Х	
			Packera thurberi				
Native	ASTERACEAE	Sunflower	(Packera tridenticulata)	threetooth ragwort	×	×	
				Macoun's cudweed; clammy rabbit			
Native	ASTERACEAE	Sunflower	Pseudognaphalium macounii	tobacco; Macoun's everlasting		×	
			D-5				

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Alien or	Family -	Family - Common	Scientific Name		2018	2019	Post
Native	(Ed. 1 in paren.)	(Ed. 1 - paren.)	(Ed. 1 in paren.)	Common Name(s)	(Vol)	(DBG)	2019
Native	ASTERACEAE	Sunflower	Pseudognaphalium stramineum	winged cudweed; cotton batting cudweed		×	
Native	ASTERACEAE	Sunflower	Ratibida columnifera	prairie coneflower	×		
			Rudbeckia hirta var.				
Native	ASTERACEAE	Sunflower	pulcherrima	black-eyed Susan	Х		
Native	ASTERACEAE	Sunflower	Rudbeckia laciniata var. ampla	cutleaf coneflower	Х	Х	
Alien	ASTERACEAE	Sunflower	Scorzonera laciniata	cutleaf vipergrass; false salsify	Х	Х	
Native	ASTERACEAE	Sunflower	Senecio eremophilus var. kingii	cut-leaved groundsel		×	
				lamb's tongue ragwort; gauge plant; early			
Native	ASTERACEAE	Sunflower	Senecio integerrimus	spring senecio	×	×	
				narrow-leaved butterweed; broom			
Native	ASTERACEAE	Sunflower	Senecio spartioides	groundsel	Х	×	
			Solidago altissima				
Native	ASTERACEAE	Sunflower	(Solidago canadensis)	Late goldenrod		×	
Native	ASTERACEAE	Sunflower	Solidago missouriensis	Missouri goldenrod		Х	
			Solidago rigida ssp. humilis				
Native	ASTERACEAE	Sunflower	(Solidago rigida var. humilis)	stiff goldenrod		×	
Native	ASTERACEAE	Sunflower	Solidago speciosa var. pallida	showy goldenrod		Х	
Alien	ASTERACEAE	Sunflower	Sonchus asper	spiny sow-thistle		Х	
Native	ASTERACEAE	Sunflower	Symphyotrichum falcatum	white prairie aster		Х	
			Symphyotrichum foliaceum var.				
Native	ASTERACEAE	Sunflower	parryi	Parrys aster; leafy aster		×	
			Symphyotrichum laeve var.				
Native	ASTERACEAE	Sunflower	geyeri	smooth blue aster		×	
			Symphyotrichum lanceolatum				
Native	ASTERACEAE	Sunflower	ssp. <i>hesperium</i>	western lined aster	Х	×	
Native	ASTERACEAE	Sunflower	Symphyotrichum porteri	smooth white aster		Х	
Native	ASTERACEAE	Sunflower	Symphyotrichum spathulatum	western mountain aster		Х	
Alien	ASTERACEAE	Sunflower	Taraxacum officinale	common dandelion	×	×	
Native	ASTERACEAE	Sunflower	Tetraneuris acaulis	stemless four-nerve daisy; perky Sue	Х	Х	
Native	ASTERACEAE	Sunflower	Townsendia hookeri	Hooker's Easter daisy	×		

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Alien oi	r Family -	Family - Common	Scientific Name		2018	2019	Post
Native	(Ed. 1 in paren.)	(Ed. 1 - paren.)	(Ed. 1 in paren.)	Common Name(s)	(IoV)	(DBG)	2019
Alien	ASTERACEAE	Sunflower	Tragopogon dubius	western salsify, goat's beard; yellow salsify; oyster plant	×	×	
01:00 00	A CTED A CEAE	flor	Transford a second of the	محصط ماللمصط مطمله منطبا مصادد لمصط	>		
		Surflower		ineauow saisiry, uyster piant, guat s bearu	<	>	
Alien	ASIEKACEAE	suntiower	Xantnium Strumarium	common cocklebur		×	
	ATHYRIACEAE	Lady-Fern	Athyrium filix-femina var.				
Native	(DRYOPTERIDACEAE)	(Wood Fern)	californicum	common lady-fern		×	
				Oregon-grape; creeping barberry; holly			
Native	BERBERIDACEAE	Barberry	Berberis repens	grape	×	×	
Native	BETULACEAE	Birch	Alnus incana	thinleaf alder	×	×	
Native	BETULACEAE	Birch	Betula glandulosa	dwarf birch		×	
Native	BETULACEAE	Birch	Betula occidentalis	water birch	×	×	
Native	BETULACEAE	Birch	Corylus cornuta	beaked hazelnut	×	×	
Alien	BORAGINACEAE	Borage	Asperugo procumbens	catchweed; madwort	×	×	
Alien B	BORAGINACEAE	Borage	Cynoglossum officinale	gypsyflower; hound's tongue	×	×	
Native	BORAGINACEAE	Borage	Hackelia floribunda	many flower stickseed: false forget-me-not	×	×	
Alien	BORAGINACEAE	Borage	Lappula occidentalis	western stickseed	×	×	
				plains stoneseed; narrow-leaf puccoon;			
Native	BORAGINACEAE	Borage	Lithospermum incisum	fringed puccoon	×	×	
				southwestern stoneseed; many-flowered			
Native	BORAGINACEAE	Borage	Lithospermum multiflorum	puccoon	×	×	
			Lithospermum occidentale				
<u> </u>			(Onosmodium bejariense				
Native	BORAGINACEAE	Borage	var. occidentale)	western marbleseed	×		
_ Native	BORAGINACEAE	Borage	Mertensia ciliata	streamside bluebells; tall chiming bells	×	×	
				prairie bluebells; chiming bells; lance leaf			
Native	BORAGINACEAE	Borage	Mertensia lanceolata	chiming bells; foothills mertensia	×	×	
Native	BORAGINACEAE	Borage	Oreocarya virgata	miner's candle	×	×	
				pale madwort; pale alyssum; European			
Alien	BRASSICACEAE	Mustard	Alyssum alyssoides	madwort			×
Alien	BRASSICACEAE	Mustard	Alyssum desertorum	desert madwort		×	

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Alien or	Family -	Family - Common	Scientific Name		2018	2019	Post
Native	(Ed. 1 in paren.)	(Ed. 1 - paren.)	(Ed. 1 in paren.)	Common Name(s)	(Vol)	(DBG)	2019
				alyssum; small-flowered alyssum; yellow			
Alien	BRASSICACEAE	Mustard	Alyssum simplex	alyssum; European madwort	×	×	
				American yellow-rocket; wintercress; St.			
Alien	BRASSICACEAE	Mustard	Barbarea orthoceras	Barbara weed	Х	×	
Alien	BRASSICACEAE	Mustard	Barbarea vulgaris	yellow-rocket		Х	
Alien							
Wait List	BRASSICACEAE	Mustard	Berteroa incana	hoary alyssum	×	×	
Native	BRASSICACEAE	Mustard	Boechera fendleri	Fendler's rockcress		×	
Native	BRASSICACEAE	Mustard	Boechera lignifera	desert rockcress	×		
Native	BRASSICACEAE	Mustard	Boechera stricta	Drummond's rockcress	×	×	
Alien	BRASSICACEAE	Mustard	Camelina microcarpa	littlepod false flax	Х	Х	
Alien	BRASSICACEAE	Mustard	Capsella bursa-pastoris	shepherd's purse	Х	×	
Alien	BRASSICACEAE	Mustard	Chorispora tenella	blue mustard; crossflower	Х	Х	
Native	BRASSICACEAE	Mustard	Descurainia pinnata	pinnate tansy		Х	
Alien	BRASSICACEAE	Mustard	Descurainia sophia	flixweed; herb-Sophia; tansy mustard	Х	Х	
Native	BRASSICACEAE	Mustard	Draba nemorosa	woodland draba		Х	
Native	BRASSICACEAE	Mustard	Draba reptans	Carolina draba		×	
Native	BRASSICACEAE	Mustard	Erysimum capitatum	sand dune wallflower	×	×	
Alien	BRASSICACEAE	Mustard	Lepidium densiflorum	common pepperweed	×	×	
Alien B	BRASSICACEAE	Mustard	Lepidium draba	whitetop; hoary cress			×
, Native	BRASSICACEAE	Mustard	Nasturtium officinale	watercress		×	
Native	BRASSICACEAE	Mustard	Noccaea fendleri ssp. glauca	alpine pennycress; mountain candytuft	Х	Х	
Native	BRASSICACEAE	Mustard	Physaria montana	mountain bladderpod	Х	Х	
Native	BRASSICACEAE	Mustard	Physaria vitulifera	fiddleleaf twinpod			×
Native	BRASSICACEAE	Mustard	Rorippa alpina	alpine yellow-cress		Х	
. Native	BRASSICACEAE	Mustard	Rorippa palustris	bog yellow-cress	Х	Х	
Native	BRASSICACEAE	Mustard	Rorippa sphaerocarpa	roundfruit yellow-cress		×	
				tall tumblemustard; Jim Hill mustard; tall			
Alien	BRASSICACEAE	Mustard	Sisymbrium altissimum	hedge mustard	×	×	
Alien	BRASSICACEAE	Mustard	Thlaspi arvense	field pennycress	×	×	
Native	BRASSICACEAE	Mustard	Turritis glabra	tower rockcress; tower mustard	×	×	

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Alien or	Family -	Family - Common	Scientific Name		2018	2019	Post
Native	(Ed. 1 in paren.)	(Ed. 1 - paren.)	(Ed. 1 in paren.)	Common Name(s)	(IoV)	(DBG)	2019
				nylon hedgehog cactus; green hedgehog			
Native	CACTACEAE	Cactus	Echinocereus viridiflorus	cactus; hen and chicks	×	×	
			Escobaria missouriensis ,				
			(Pelecyphora missouriensis;				
Native	CACTACEAE	Cactus	Coryphantha missouriensis)	Missouri foxtail cactus; beehive	×		
			Escobaria vivipara				
Native	CACTACEAE	Cactus	(Coryphantha vivipara)	pincushion; beehive; nipple cactus	×	×	
Native	CACTACEAE	Cactus	Opuntia polyacantha	plains pricklypear; hunger cactus	Х	×	
				western prickly pear; prairie rose prickly			
Native	CACTACEAE	Cactus	Opuntiamacrorhiza	pear; tuberous-root prickly pear	×	×	
				marsh bellflower;			
Native	CAMPANULACEAE	Bellflower	Campanula aparinoides	bedstraw beliflower	×	×	
				bluebells of Scotland; common harebell;			
Native	CAMPANULACEAE	Bellflower	Campanula rotundifolia	beliflower	×	×	
Native	CAMPANULACEAE	Bellflower	Triodanis perfoliata	clasping Venus' looking glass		×	
			Humulus neomexicanus				
			(Humulus lupulus var.				
Native	CANNABACEAE	Hemp	neomexicanus)	New Mexican hop	×	×	
Native	CAPRIFOLIACEAE	Honeysuckle	Lonicera involucrata	black twinberry	Х	×	
Native	CAPRIFOLIACEAE	Honeysuckle	Symphoricarpos albus	white snowberry; common snowberry	Х	×	
Native	CAPRIFOLIACEAE	Honeysuckle	Symphoricarpos occidentalis	wolfberry; western snowberry	×	×	
Native	CAPRIFOLIACEAE	Honeysuckle	Symphoricarpos rotundifolius	mountain snowberry		×	
Native	CARYOPHYLLACEAE	Pink	Cerastium arvense ssp. strictum	prairie mouse-ear; mouse-ear chickweed	×	×	
Native	CARYOPHYLLACEAE	Pink	Cerastium brachypodum	shortstalk chickweed	×		
			Cerastium fontanum ssp.				
Alien	CARYOPHYLLACEAE	Pink	vulgare	common mouse-ear		×	
Alien	CARYOPHYLLACEAE	Pink	Dianthus armeria	Deptford pink	Х	×	
Native	CARYOPHYLLACEAE	Pink	Eremogone fendleri	Fendler's sandwort		×	
Alien	CARYOPHYLLACEAE	Pink	Holosteum umbellatum	common jagged chickweed		×	
Native	CARYOPHYLLACEAE	Pink	Paronychia sessiliflora	creeping nailwort		×	
Alien B	CARYOPHYLLACEAE	Pink	Saponaria officinalis	bouncing bet; soapwort	Х	×	
Native	CARYOPHYLLACEAE	Pink	Silene antirrhina	sleepy catchfly		×	
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Alien or	Family -	Family - Common	Scientific Name		2018	2019	Post
Native	(Ed. 1 in paren.)	(Ed. 1 - paren.)	(Ed. 1 in paren.)	Common Name(s)	(Vol)	(DBG)	2019
Native	CARYOPHYLLACEAE	Pink	Silene drummondii	Drummond's catchfly	Х	Х	
Native	CARYOPHYLLACEAE	Pink	Silene noctiflora	night-flowering catchfly		Х	
Native	CARYOPHYLLACEAE	Pink	Stellaria longifolia	long-leaved starwort		×	
Native	CARYOPHYLLACEAE	Pink	Stellaria longipes	long-stalked starwort		×	
Native	CERATOPHYLLACEAE	Hornwort	Ceratophyllum demersum	coon's tail; hornwort	×		
			Crocanthemum bicknellii				
Native	CISTACEAE	Rockrose	(Helianthemum bicknellii)	hoary frostweed		×	
Native	COMMELINACEAE	Spiderwort	Tradescantia occidentalis	prairie spiderwort	Х	Х	
Alien C	CONVOLVULACEAE	Morning-Glory	Convolvulus arvensis	field bindweed	Х	Х	
Native	CORNACEAE	Dogwood	Cornus sericea	redosier dogwood	×	×	
Native	CRASSULACEAE	Stonecrop	Sedum lanceolatum	spearleaf stonecrop; yellow stonecrop	×	×	
			Juniperus communis var.				
Native	CUPRESSACEAE	Cypress	depressa	common juniper	Х	×	
Native	CUPRESSACEAE	Cypress	Juniperus scopulorum	Rocky Mountain juniper	Х	Х	
Native	CYPERACEAE	Sedge	Carex aquatilis	water sedge		×	
Native	CYPERACEAE	Sedge	Carex brevior	short-beaked sedge		×	
Native	CYPERACEAE	Sedge	Carex canescens	gray sedge		×	
Native	CYPERACEAE	Sedge	Carex deweyana	Dewey's sedge		×	
Native	CYPERACEAE	Sedge	Carex disperma	soft-leaved sedge		Х	
Native	CYPERACEAE	Sedge	Carex duriuscula	needleleaf sedge	×	×	
Native	CYPERACEAE	Sedge	Carex geophila	ground-loving sedge		Х	
Native	CYPERACEAE	Sedge	Carex inops	sun sedge	х	×	
Native	CYPERACEAE	Sedge	Carex microptera	small-winged sedge		Х	
Native	CYPERACEAE	Sedge	Carex nebrascensis	Nebraska sedge	Х	Х	
Native	CYPERACEAE	Sedge	Carex occidentalis	western sedge		×	
Native	CYPERACEAE	Sedge	Carex pellita	woolly sedge		×	
Native	CYPERACEAE	Sedge	Carex praegracilis	clustered field sedge		×	
Native	CYPERACEAE	Sedge	Carex scoparia	broom sedge		×	
Native	CYPERACEAE	Sedge	Carex siccata	dry sedge		Х	
Native	CYPERACEAE	Sedge	Carex sprengelii	Sprengel's sedge		×	
Native	CYPERACEAE	Sedge	Carex utriculata	beaked sedge		×	
Native	CYPERACEAE	Sedge	Eleocharis palustris	common spikerush		×	

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Alien or	Family -	Family - Common	Scientific Name		2018	2019	Post
Native	(Ed. 1 in paren.)	(Ed. 1 - paren.)	(Ed. 1 in paren.)	Common Name(s)	(Vol)	(DBG)	2019
			Schoenoplectus				
Native	CYPERACEAE	Sedge	tabernaemontani	softstem bulrush		Х	
Native	CYPERACEAE	Sedge	Scirpus microcarpus	panicled bulrush	Х	Х	
Native	CYPERACEAE	Sedge	Scirpus pallidus	cloaked bulrush		х	
	CYSTOPTERIDACEAE	Bladder Fern					
Native	(DRYOPTERIDACEAE)	(Wood Fern)	Cystopteris fragilis	brittle fern		×	
Native	DRYOPTERIDACEAE	Wood Fern	Dryopteris filix-mas	male fern		Х	
Alien B	ELAEAGNACEAE	Oleaster	Elaeagnus angustifolia	Russian Olive	Х	Х	
Native	EQUISETACEAE	Horsetail	Equisetum arvense	field horsetail	×	×	
Native	EQUISETACEAE	Horsetail	Equisetum hyemale ssp. affine	scouring-rush horsetail	Х	×	
Native	EQUISETACEAE	Horsetail	Equisetum laevigatum	smooth horsetail	×	×	
			Equisetum variegatum ssp.				
Native	EQUISETACEAE	Horsetail	variegatum	variegated scouring rush		×	
Native	ERICACEAE	Heath	Arctostaphylos uva-ursi	kinnikinnick; bearberry	Х	Х	
Native	ERICACEAE	Heath	Monotropa hypopithys	pinesap	Х		
Native	ERICACEAE	Heath	Pterospora andromedea	pinedrops	Х	Х	
Native	ERICACEAE	Heath	Pyrola asarifolia	pink wintergreen	Х	Х	
			Euphorbia glyptosperma			:	
Native	EUPHORBIACEAE	Spurge	(Chamaesyce glyptosperma)	ribseed sandmat		×	
			Euphorbia serpillifolia				
Native	EUPHORBIACEAE	Spurge	(Chamaesyce serpyllifolia)	thymeleaf sandmat		×	
			Euphorbia virgata				
Alien B	EUPHORBIACEAE	Spurge	(Euphorbia esula)	leafy spurge	Х	Х	
Native	FABACEAE	Реа	Amorpha fruticosa	false indigo	Х		
Native	FABACEAE	Pea	Astragalus agrestis	purple milkvetch; field milkvetch;	Х	Х	
Native	FABACEAE	Pea	Astragalus canadensis	Canadian milkvetch		Х	
Alien	FABACEAE	Pea	Astragalus cicer	chickpea milkvetch		Х	
Native	FABACEAE	Pea	Astragalus crassicarpus	groundplum	Х	Х	
Native	FABACEAE	Pea	Astragalus drummondii	Drummond's milkvetch	Х	Х	
				flexible milkvetch; limber vetch; wiry			
Native	FABACEAE	Pea	Astragalus flexuosus	milkvetch		×	
Native	FABACEAE	Pea	Astragalus parryi	Parry's milkvetch	Х	Х	
			D-11				

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Alien or	Family -	Family - Common	Scientific Name		2018	2019	Post
Native	(Ed. 1 in paren.)	(Ed. 1 - paren.)	(Ed. 1 in paren.)	Common Name(s)	(Nol)	(DBG)	2019
Native	FABACEAE	Реа	Astragalus shortianus	Short's milkvetch	×	×	
			Dalea candida var. oligophylla				
Native	FABACEAE	Pea	(Dalea candida var. olgophylla)	white prairie clover		×	
Native	FABACEAE	Реа	Dalea purpurea	purple prairie clover	×	×	
Native	FABACEAE	Реа	Glycyrrhiza lepidota	wild licorice; American licorice	×	×	
			Lathyrus lanszwertii				
			(Lathyrus lanszwertii var.				
Native	FABACEAE	Pea	laetivirens)	aspen pea	Х	Х	
Native	FABACEAE	Pea	Lupinus argenteus	silvery lupine	х	Х	
Alien	FABACEAE	Реа	Medicago lupulina	black medick	Х	Х	
Alien	FABACEAE	Реа	Medicago sativa	alfalfa	×	×	
Alien	FABACEAE	Реа	Melilotus albus	white sweet clover		Х	
Alien	FABACEAE	Pea	Melilotus officinalis	yellow sweet clover	×	×	
				purple locoweed; Lambert loco; Colorado			
Native	FABACEAE	Pea	Oxytropis lambertii	loco	Х	Х	
				Nuttall's oxytrope; southwestern			
Native	FABACEAE	Реа	Oxytropis multiceps	locoweed		×	
Native	FABACEAE	Pea	Oxytropis sericea	white locoweed	х		
Native	FABACEAE	Реа	Robinia neomexicana	New Mexico locust		Х	
Native	FABACEAE	Реа	Thermopsis rhombifolia	goldenbanner	Х	Х	
Alien	FABACEAE	Реа	Trifolium hybridum	alsike clover		Х	
Alien	FABACEAE	Реа	Trifolium pratense	red clover	Х	Х	
Alien	FABACEAE	Реа	Trifolium repens	white clover	Х	Х	
Native	FABACEAE	Реа	Vicia americana	American vetch	х	Х	
Native	FAGACEAE	Beech	Quercus gambelii	Gambel oak	Х	Х	
Native	GENTIANACEAE	Gentian	Frasera speciosa	elkweed; green gentian; monument plant	×	×	
Native	GENTIANACEAE	Gentian	Gentiana bigelovii	Bigelow's gentian	×	×	
				filaria; redstem stork's bill, filaree; crane's			
Alien C	GERANIACEAE	Geranium	Erodium cicutarium	bill; heron's bill	×	×	
				Rocky Mountain geranium; pineywoods			
Native	GERANIACEAE	Geranium	Geranium caespitosum	geranium; wild geranium	×	×	
			D-12				

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Alien or	Family -	Family - Common	Scientific Name		2018	2019	Post
Native	(Ed. 1 in paren.)	(Ed. 1 - paren.)	(Ed. 1 in paren.)	Common Name(s)	(Vol)	(DBG)	2019
Native	GERANIACEAE	Geranium	Geranium richardsonii	Richardson's geranium; white geranium	Х	Х	
Native	GROSSULARIACEAE	Gooseberry	Ribes americanum	American black currant		Х	
Native	GROSSULARIACEAE	Gooseberry	Ribes aureum	golden currant	Х	Х	
Native	GROSSULARIACEAE	Gooseberry	Ribes cereum	wax currant	×	×	
Native	GROSSULARIACEAE	Gooseberry	Ribes inerme	whitestem gooseberry	×	×	
Native	GROSSULARIACEAE	Gooseberry	Ribes leptanthum	trumpet gooseberry			×
Native	HYDRANGEACEAE	Hydrangea	Jamesia americana	fivepetal cliffbush; waxflower		Х	
Native	HYDROPHYLLACEAE	Waterleaf	Ellisia nyctelea	Aunt Lucy		Х	
Native	НҮДКОРНУЦАСЕАЕ	Waterleaf	Hydrophyllum fendleri	Fendler's waterleaf	Х	Х	
Native	НҮДКОРНУЦАСЕАЕ	Waterleaf	Phacelia hastata	silverleaf phacelia		Х	
Native	HYDROPHYLLACEAE	Waterleaf	Phacelia heterophylla	wand phacelia; scorpion weed	Х	Х	
Native	IRIDACEAE	Iris	Iris missouriensis	Rocky Mountain iris	Х		
Native	IRIDACEAE	Iris	Sisyrinchium montanum	Rocky Mountain blue-eyed grass		Х	
Native	JUNCACEAE	Rush	Juncus arcticus var. balticus	Arctic rush	Х	Х	
Native	JUNCACEAE	Rush	Juncus bufonius	toad rush		Х	
Alien	JUNCACEAE	Rush	Juncus compressus	roundfruit rush		Х	
Native	JUNCACEAE	Rush	Juncus dudleyi	Dudley's rush		Х	
Alien	JUNCACEAE	Rush	Juncus effusus	common rush		Х	
			Juncus ensifolius				
			(Juncus ensifolius var.				
Native	JUNCACEAE	Rush	montanus)	swordleaf rush	×	Х	
Native	JUNCACEAE	Rush	Juncus interior	inland rush	Х	Х	
Native	JUNCACEAE	Rush	Juncus longistylis	longstyle rush		Х	
Native	JUNCACEAE	Rush	Juncus nodosus	knotted rush		Х	
Native	JUNCACEAE	Rush	Juncus torreyi	Torrey's rush		Х	
Native	JUNCACEAE	Rush	Luzula comosa	Pacific woodrush		Х	
. Native	JUNCACEAE	Rush	Luzula parviflora	small-flowered woodrush		Х	
Native	LAMIACEAE	Mint	Dracocephalum parviflorum	American dragonhead		Х	
Alien	LAMIACEAE	Mint	Galeopsis bifida	splitlip hempnettle		Х	
Native	LAMIACEAE	Mint	Hedeoma hispida	rough false pennyroyal		×	
Native	LAMIACEAE	Mint	Lycopus americanus	American water horehound	Х	Х	
Native	LAMIACEAE	Mint	Mentha arvensis	wild mint	×	×	

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Native	(Ed. 1 in paren.)	(Ed. 1 - paren.)	(Ed. 1 in paren.)	Common Name(s)	(107)	(DBG)	2019
			Monarda fistulosa var.				
Native	LAMIACEAE	Mint	menthifolia	wild bergamot; beebalm; horsemint	×	×	
Native	LAMIACEAE	Mint	Monarda pectinata	plains beebalm		×	
Alien	LAMIACEAE	Mint	Nepeta cataria	catnip	Х	×	
Native	LAMIACEAE	Mint	Prunella vulgaris	heal-all; selfheal	Х	Х	
Native	LAMIACEAE	Mint	Scutellaria brittonii	Britton's skullcap	×	×	
Native	LAMIACEAE	Mint	Scutellaria galericulata	marsh skullcap	×	×	
			Stachys pilosa				
Native	LAMIACEAE	Mint	(Stachys palustris var. pilosa)	hairy hedge-nettle; marsh betony	Х	×	
Native	LILIACEAE	Lily	Calochortus gunnisonii	Gunnison's mariposa lily; sego lily	Х	Х	
Native	LILIACEAE	Lily	Prosartes trachycarpa	rough-fruited fairy bells	Х	Х	
Native	LILIACEAE	Lily	Streptopus amplexifolius	claspleaf twisted stalk	Х	Х	
Native	LINACEAE	Flax	Linum lewisii	Lewis flax	Х	Х	
Alien	LINACEAE	Flax	Linum perenne	perennial flax; blue flax	×		
Native	LOASACEAE	Stickleaf	Mentzelia multicaulis	manystem blazingstar			×
Native	LOASACEAE	Stickleaf	Mentzelia multiflora	Adonis blazingstar	×		
Native	LOASACEAE	Stickleaf	Mentzelia speciosa	jeweled blazingstar	×	×	
Alien	MALVACEAE	Mallow	Malva neglecta	common mallow; cheeseweed	×	×	
				scarlet globemallow; copper mallow;			
Native	MALVACEAE	Mallow	Sphaeralcea coccinea	cowboy's delight	×	×	
			Toxicoscordion paniculatum				
Native	MELANTHIACEAE	False hellebore	(Zigadenus paniculatus)	foothill death camus	Х	×	
				Rocky Mountain springbeauty, spring			
Native	MONTIACEAE	Miner's Lettuce	Claytonia rosea	beauty	Х	×	
Native	MONTIACEAE	Miner's Lettuce	Montia chamissoi	water miner's lettuce		×	
				sunbright; prairie fameflower; Rocky			
			Phemeranthus confertiflorus	Mountain fameflower; small prairie			
Native	MONTIACEAE	Miner's Lettuce	(Phemeranthus parviflorus)	rockpink; Rocky Mountain rockpink	Х	×	
Native	NYCTAGINACEAE	Four-O'clock	Mirabilis hirsuta	hairy four o'clock		×	
Native	NYCTAGINACEAE	Four-O'clock	Mirabilis linearis	narrowleaf four o'clock; umbrellawort	Х	×	
Native	NYCTAGINACEAE	Four-O'clock	Mirabilis multiflora	Colorado four o'clock		×	
Native	NYCTAGINACEAE	Four-O'clock	Mirabilis nyctaginea	heartleaf four o'clock; umbrellawort	Х	×	
Native	ONAGRACEAE	Evening Primrose	Circaea alpina	small enchanter's nightshade	X	×	
			D-14				

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Allen or	Family -	Family - Common	Scientific Name		2018	5019	Post
Native	(Ed. 1 in paren.)	(Ed. 1 - paren.)	(Ed. 1 in paren.)	Common Name(s)	(IoV)	(DBG)	2019
Native	ONAGRACEAE	Evening Primrose	Epilobium ciliatum	American willow-herb	×	×	
Alien A	ONAGRACEAE	Evening Primrose	Epilobium hirsutum	hairy willow-herb		Х	
			Gayophytum diffusum ssp.				
Native	ONAGRACEAE	Evening Primrose	parviflorum	diffuse groundsmoke		×	
Native	ONAGRACEAE	Evening Primrose	Oenothera cespitosa	tufted evening primrose	×	×	
				crownleaf evening primrose; cutleaf			
Native	ONAGRACEAE	Evening Primrose	Oenothera coronopifolia	evening primrose	×	×	
Native	ONAGRACEAE	Evening Primrose	Oenothera flava	yellow evening primrose		×	
Native	ONAGRACEAE	Evening Primrose	Oenothera serrulata	yellow sundrops; dainty sundrops	Х		
Native	ONAGRACEAE	Evening Primrose	Oenothera suffrutescens	scarlet beeblossom; scarlet gaura;		×	
Native	ONAGRACEAE	Evening Primrose	Oenothera villosa	hairy evening primrose	×	×	
Native	ORCHIDACEAE	Orchid	Corallorhiza maculata	spotted coralroot	×	×	
Native	ORCHIDACEAE	Orchid	Corallorhiza wisteriana	spring coralroot	×	×	
Native	ORCHIDACEAE	Orchid	Goodyera oblongifolia	western rattlesnake plantain orchid	×	×	
Native	ORCHIDACEAE	Orchid	Platanthera aquilonis	northern green orchid	×	×	
Native	ORCHIDACEAE	Orchid	Platanthera purpurascens	purple-petal bog orchid		×	
			Aphyllon fasciculatum				
Native	OROBANCHACEAE	Broomrape	(Orobanche fasciculata)	clustered broomrape	×		
				wholeleaf Indian paintbrush; orange/red			
Native	OROBANCHACEAE	Broomrape	Castilleja integra	paintbrush	×	×	
Native	OROBANCHACEAE	Broomrape	Castilleja miniata	red Indian paintbrush		х	
Native	OROBANCHACEAE	Broomrape	Castilleja sessiliflora	downy paintedcup; plains paintbrush			Х
Native	OROBANCHACEAE	Broomrape	Orthocarpus luteus	yellow owl's clover		х	
			Pedicularis canadensis				
			(Pedicularis canadensis var.				
Native	OROBANCHACEAE	Broomrape	fluviatilis)	Canadian lousewort; wood betony	×	×	
Native	OXALIDACEAE	Wood-sorrel	Oxalis dillenii	slender yellow wood-sorrel		×	
Alien	OXALIDACEAE	Wood-sorrel	Oxalis stricta	yellow wood-sorrel	Х		
Native	PAPAVERACEAE	Рорру	Argemone polyanthemos	crested prickly-poppy	×	×	
	PAPAVERACEAE	Poppy		golden corydalis; golden smoke; scrambled			
Native	(FUMARIACEAE)	(Fumitory)	Corydalis aurea	eggs			×
Native	PINACEAE	Pine	Pinus edulis	pinyon pine	×	×	
Native	PINACEAE	Pine	Pinus flexilis	limber pine; Rocky Mountain white pine	×		
			D-15				

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Alien or	· Family -	Family - Common	Scientific Name		2018	2019	Post
Native	(Ed. 1 in paren.)	(Ed. 1 - paren.)	(Ed. 1 in paren.)	Common Name(s)	(Vol)	(DBG)	2019
			Pinus ponderosa var.				
Native	PINACEAE	Pine	scopulorum	ponderosa pine	×	×	
Native	PINACEAE	Pine	Pseudotsuga menziesii	Douglas-fir	×	×	
Native	PLANTAGINACEAE	Plantain	Collinsia parviflora	maiden blue-eyed Mary	Х	Х	
Native	PLANTAGINACEAE	Plantain	Gratiola neglecta	clammy hedgehyssop		Х	
Alien B	PLANTAGINACEAE	Plantain	Linaria vulgaris	butter-and-eggs; yellow toadflax	Х	х	
			Nuttallanthus canadensis				
Native	PLANTAGINACEAE	Plantain	(Linaria canadensis var. texana)	blue toadflax	×	×	
				broad-beard penstemon; narrow-leaved			
Native	PLANTAGINACEAE	Plantain	Penstemon angustifolius	penstemon			Х
Native	PLANTAGINACEAE	Plantain	Penstemon gracilis	lilac penstemon		Х	
				sidebells penstemon; one-sided			
				penstemon; orchid penstemon; orchid			
Native	PLANTAGINACEAE	Plantain	Penstemon secundiflorus	beard tongue	Х	×	
				Front Range beardtongue; bluemist			
Native	PLANTAGINACEAE	Plantain	Penstemon virens	penstemon	Х	X	
			Penstemon virgatus var. asa-	oneside penstemon; upright blue			
Native	PLANTAGINACEAE	Plantain	grayi	beardtongue; tall penstemon	Х	Х	
Alien	PLANTAGINACEAE	Plantain	Plantago lanceolata	narrowleaf plantain		Х	
Alien	PLANTAGINACEAE	Plantain	Plantago major	common plantain	Х	Х	
Native	PLANTAGINACEAE	Plantain	Plantago patagonica	woolly plantain	Х	Х	
Native	PLANTAGINACEAE	Plantain	Veronica americana	American speedwell	Х	Х	
Native	PLANTAGINACEAE	Plantain	Veronica anagallis-aquatica	water speedwell	Х	Х	
			Veronica peregrina var.				
Native	PLANTAGINACEAE	Plantain	xalapensis	purslane speedwell		×	
			Veronica serpyllifolia var.				
Native	PLANTAGINACEAE	Plantain	humifusa	thyme-leaf speedwell	Х	×	
Alien	POACEAE	Grass	Agropyron cristatum	crested wheatgrass	Х	Х	
Alien	POACEAE	Grass	Agrostis gigantea	redtop bentgrass		Х	
Native	POACEAE	Grass	Agrostis scabra	tickle grass		×	
Native	POACEAE	Grass	Alopecurus aequalis	short-awn foxtail		Х	
Alien	POACEAE	Grass	Alopecurus pratensis	meadow foxtail		Х	
			D-16				

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Alien or	Family -	Family - Common	Scientific Name		2018	2019	Post
Native	(Ed. 1 in paren.)	(Ed. 1 - paren.)	(Ed. 1 in paren.)	Common Name(s)	(Vol)	(DBG)	2019
Native	POACEAE	Grass	Andropogon gerardii	big bluestem		×	
Native	POACEAE	Grass	Aristida purpurea	purple three-awn	Х	Х	
Native	POACEAE	Grass	Beckmannia syzigachne	American sloughgrass		×	
Native	POACEAE	Grass	Bouteloua curtipendula	sideoats grama		Х	
Native	POACEAE	Grass	Bouteloua gracilis	blue grama	Х	Х	
Native	POACEAE	Grass	Bouteloua hirsuta	hairy grama	Х		
Native	POACEAE	Grass	Bouteloua simplex	matted grama		×	
			Bromus carinatus				
			(Bromus carinatus var.				
Native	POACEAE	Grass	marginatus)	California brome		×	
Alien	POACEAE	Grass	Bromus inermis	smooth brome	×	×	
Alien	POACEAE	Grass	Bromus japonicus	Japanese brome	Х	×	
Native	POACEAE	Grass	Bromus richardsonii	fringed brome		×	
Alien C	POACEAE	Grass	Bromus tectorum	cheatgrass; downy brome	Х	×	
Native	POACEAE	Grass	Buchloe dactyloides	buffalograss	×	×	
Native	POACEAE	Grass	Calamagrostis canadensis	bluejoint		×	
Native	POACEAE	Grass	Calamagrostis stricta	slimstem reedgrass		Х	
Native	POACEAE	Grass	Calamovilfa longifolia	prairie sandreed		×	
Native	POACEAE	Grass	Cinna latifolia	drooping woodreed	Х	×	
Alien	POACEAE	Grass	Dactylis glomerata	orchardgrass	Х	Х	
Native	POACEAE	Grass	Danthonia spicata	poverty oatgrass		×	
Native	POACEAE	Grass	Dichanthelium linearifolium	slimleaf panicgrass		×	
			Echinochloa muricata var.				
Alien	POACEAE	Grass	microstachya	rough barnyard grass		×	
Native	POACEAE	Grass	Elymus albicans	Montana wheatgrass		×	
Native	POACEAE	Grass	Elymus canadensis	Canada wildrye	Х	Х	
Native	POACEAE	Grass	Elymus elymoides	squirreltail; bottlebrush		×	
Native	POACEAE	Grass	Elymus glaucus	blue wildrye		Х	
Native	POACEAE	Grass	Elymus lanceolatus	thickspike wheatgrass		×	
Alien C	POACEAE	Grass	Elymus repens	quack grass		×	
Native	POACEAE	Grass	Elymus trachycaulus	slender wheatgrass		×	
Alien	POACEAE	Grass	Eragrostis cilianensis	stinkgrass		×	
Native	POACEAE	Grass	Eragrostis pectinacea	tufted lovegrass		×	
			D-17				

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			-				
Alien or	Family -	Family - Common	Scientific Name		2018	2019	Post
Native	(Ed. 1 in paren.)	(Ed. 1 - paren.)	(Ed. 1 in paren.)	Common Name(s)	(Vol)	(DBG)	2019
			Eriocoma hymenoides				
Native	POACEAE	Grass	(Achnatherum hymenoides)	Indian ricegrass	Х	×	
			Eriocoma nelsonii				
Native	POACEAE	Grass	(Achnatherum nelsonii)	Nelson's needlegrass		×	
			Eriocoma robusta				
Native	POACEAE	Grass	(Achnatherum robustum)	sleepygrass		×	
			Eriocoma scribneri				
Native	POACEAE	Grass	(Achnatherum scribneri)	Scribner's needlegrass		×	
			Festuca octoflora				
Native	POACEAE	Grass	(Vulpia octoflora)	sixweeks fescue	Х	×	
Native	POACEAE	Grass	Festuca trachyphylla	hard fescue		Х	
Native	POACEAE	Grass	Glyceria elata	tall mannagrass	Х	Х	
Native	POACEAE	Grass	Glyceria grandis	American mannagrass		Х	
Native	POACEAE	Grass	Glyceria striata	fowl mannagrass		×	
Native	POACEAE	Grass	Hesperostipa comata	needle and thread grass	×	×	
Native	POACEAE	Grass	Hesperostipa spartea	porcupinegrass		×	
Native	POACEAE	Grass	Hordeum jubatum	foxtail barley		Х	
Native	POACEAE	Grass	Koeleria macrantha	junegrass; prairie junegrass	Х	Х	
			Lolium arundinaceum				
Alien	POACEAE	Grass	(Schedonorus arundinaceus)	tall fescue		×	
			Lolium pratense				
Alien	POACEAE	Grass	(Schedonorus pratensis)	meadow fescue		×	
Native	POACEAE	Grass	Muhlenbergia asperifolia	scratchgrass	Х		
Native	POACEAE	Grass	Muhlenbergia minutissima	annual muhly		×	
Native	POACEAE	Grass	Muhlenbergia montana	mountain muhly		×	
Native	POACEAE	Grass	Muhlenbergia paniculata	tumblegrass		×	
Native	POACEAE	Grass	Muhlenbergia racemosa	marsh muhly		×	
Native	POACEAE	Grass	Muhlenbergia wrightii	spike muhly		Х	
Native	POACEAE	Grass	Nassella viridula	green needlegrass	Х	×	
Native	POACEAE	Grass	Oryzopsis asperifolia	roughleaf ricegrass		×	
Native	POACEAE	Grass	Panicum capillare	witchgrass		×	
Native	POACEAE	Grass	Pascopyrum smithii	western wheatgrass	Х	Х	
Native	POACEAE	Grass	Phalaris arundinacea	reed canary grass		Х	
			D-18				

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Alien or	Family -	Family - Common	Scientific Name		2018	2019	Post
INDLIVE		l'int - haiell'				(pan)	6T07
Native	POACEAE	Grass	Phleum pratense	Timothy	×	×	
Alien							
Wait List	POACEAE	Grass	Phragmites australis	common reed		×	
			Piptatheropsis micrantha				
Native	POACEAE	Grass	(Piptatherum micranthum)	littleseed ricegrass		×	
Alien	POACEAE	Grass	Poa annua	annual bluegrass		×	
Alien C	POACEAE	Grass	Poa bulbosa	bulbous bluegrass		х	
Alien	POACEAE	Grass	Poa compressa	Canada bluegrass	Х	Х	
Native	POACEAE	Grass	Poa fendleriana	muttongrass		×	
Native	POACEAE	Grass	Poa palustris	fowl bluegrass		×	
Alien	POACEAE	Grass	Poa pratensis	Kentucky bluegrass	×	×	
Native	POACEAE	Grass	Poa secunda	Sandberg bluegrass		×	
Native	POACEAE	Grass	Poa secunda ssp. juncifolia	Sandberg bluegrass		×	
Alien	POACEAE	Grass	Polypogon monspeliensis	annual rabbitsfoot grass		×	
Alien	POACEAE	Grass	Psathyrostachys juncea	Russian wildrye		×	
Native	POACEAE	Grass	Pseudoroegneria spicata	bluebunch		×	
Native	POACEAE	Grass	Schizachyrium scoparium	little bluestem		×	
Native	POACEAE	Grass	Sporobolus cryptandrus	sand dropseed		×	
Native	POACEAE	Grass	Sporobolus heterolepsis	prairie dropseed		Х	
Alien	POACEAE	Grass	Thinopyrum intermedium	intermediate wheatgrass		×	
			Torreyochloa pallida var.				
Native	POACEAE	Grass	pauciflora	pale false mannagrass		Х	
				sticky gilia; pinnate-leaf gilia; sticky cheat			
Native	POLEMONIACEAE	Phlox	Aliciella pinnatifida	gilly flower	×		
Native	POLEMONIACEAE	Phlox	Collomia linearis	tiny trumpet	×	Х	
Native	POLEMONIACEAE	Phlox	Gilia ophthalmoides	eyed gilia		Х	
Native	POLEMONIACEAE	Phlox	Ipomopsis aggregata	skyrocket; scarlet gilia	Х	Х	
Native	POLEMONIACEAE	Phlox	Microsteris gracilis	slender phlox; microsteris; microster	×	х	
Native	POLYGONACEAE	Buckwheat	Eriogonum alatum	winged buckwheat	×	Х	
Native	POLYGONACEAE	Buckwheat	Eriogonum effusum	spreading buckwheat	×	Х	
			Eriogonum umbellatum var.				
Native	POLYGONACEAE	Buckwheat	umbellatum	Sulphur flower; sulphur-flower buckwheat	×	×	
			D-19				

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Alien or	Family -	Family - Common	Scientific Name		2018	2019	Post
Native	(Ed. 1 in paren.)	(Ed. 1 - paren.)	(Ed. 1 in paren.)	Common Name(s)	(IoV)	(DBG)	2019
Alien	POLYGONACEAE	Buckwheat	Fallopia convolvulus	black bindweed	×	×	
Alien	POLYGONACEAE	Buckwheat	Persicaria lapathifolia	pale smartweed	Х	×	
				lady's thumb; spotted lady's thumb			
Alien	POLYGONACEAE	Buckwheat	Persicaria maculosa	smartweed		×	
Alien	POLYGONACEAE	Buckwheat	Polygonum aviculare	prostrate knotweed		×	
Native	POLYGONACEAE	Buckwheat	Polygonum douglasii	Douglas' knotweed		×	
Native	POLYGONACEAE	Buckwheat	Polygonum ramosissimum	bushy knotweed		×	
Native	POLYGONACEAE	Buckwheat	Polygonum sawatchense	Sawatch knotweed		×	
Alien	POLYGONACEAE	Buckwheat	Rumex acetosella	sheep sorrel	×	×	
Alien	POLYGONACEAE	Buckwheat	Rumex crispus	curly dock	×	×	
				willow dock; willow-leaved dock; Mexican			
Native	POLYGONACEAE	Buckwheat	Rumex triangulivalvis	dock	×	×	
Native	POLYPODIACEAE	True Fern	Polypodium saximontanum	Rocky Mountain polypody	Х		
Alien	PORTULACACEAE	Purslane	Portulaca oleracea	common purslane; little hogweed	×	×	
Native	POTAMOGETONACEAE	Pondweed	Potamogeton nodosus	longleaf pondweed		×	
Native	PRIMULACEAE	Primrose	Androsace occidentalis	western rockjasmine		×	
				pygmyflower rockjasmine; northern fairy			
Native	PRIMULACEAE	Primrose	Androsace septentrionalis	candelabra	×	×	
			Primula pauciflora				
Native	PRIMULACEAE	Primrose	(Dodecatheon pulchellum)	darkthroat shooting star	×	×	
	PRIMULACEAE	Primrose					
Native	(MYRSINACEAE)	(Myrsine)	Lysimachia ciliata	fringed loosestrife		×	
				Columbian monkshood (both blue &			
Native	RANUNCULACEAE	Buttercup	Aconitum columbianum	white)	×	×	
Native	RANUNCULACEAE	Buttercup	Actaea rubra	red baneberry	×		
			Anemonastrum canadense				
Native	RANUNCULACEAE	Buttercup	(Anemone canadensis)	Canadian anemone	×		
Native	RANUNCULACEAE	Buttercup	Anemone cylindrica	candle anemone; thimbleweed	×	х	
Native	RANUNCULACEAE	Buttercup	Aquilegia coerulea	Colorado blue columbine	Х		
Native	RANUNCULACEAE	Buttercup	Clematis columbiana	rock clematis	Х		
Native	RANUNCULACEAE	Buttercup	Clematis hirsutissima	sugar bowls	х	Х	
Native	RANUNCULACEAE	Buttercup	Clematis ligusticifolia	western white virgin's bower	Х	Х	
			D-20				

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Allen or	Family -	Family - Common	Scientific Name		2102	5019	POST
Native	(Ed. 1 in paren.)	(Ed. 1 - paren.)	(Ed. 1 in paren.)	Common Name(s)	(IoV)	(DBG)	2019
Native	RANUNCULACEAE	Buttercup	Delphinium nuttallianum	Nuttall's two-lobe larkspur	×	X	
			Pulsatilla nuttalliana				
			(Anemone patens var.				
Native	RANUNCULACEAE	Buttercup	multifida)	Nuttall's pasque flower	×		
Native	RANUNCULACEAE	Buttercup	Ranunculus abortivus	littleleaf buttercup		Х	
			Ranunculus aquatilis var.				
Native	RANUNCULACEAE	Buttercup	diffusus	water crowfoot	×	×	
Native	RANUNCULACEAE	Buttercup	Ranunculus macounii	Macoun's buttercup		×	
			Ranunculus sceleratus var.				
Native	RANUNCULACEAE	Buttercup	multifidus	blister buttercup		×	
Native	RANUNCULACEAE	Buttercup	Thalictrum dasycarpum	purple meadowrue		×	
Native	RANUNCULACEAE	Buttercup	Thalictrum fendleri	Fendler's meadowrue	×	×	
Native	RHAMNACEAE	Buckthorn	Ceanothus fendleri	Fendler's ceanothus; buckbrush	×	×	
Native	RHAMNACEAE	Buckthorn	Ceanothus herbaceous	New Jersey tea; red root	×	×	
Native	RHAMNACEAE	Buckthorn	Ceanothus velutinus	tobacco-brush; sticky laurel		×	
Native	ROSACEAE	Rose	Agrimonia striata	roadside agrimony	×	×	
Native	ROSACEAE	Rose	Amelanchier alnifolia	western serviceberry; saskatoon berry	×	×	
				birchleaf mountain mahogany; alderleaf			
Native	ROSACEAE	Rose	Cercocarpus montanus	mountain mahogany	×	×	
			Crataegus sp. (C. succulenta				
			not found in Colorado; 3 species				
			broken out. Unclear which is				
			found at SS.) (<i>Crataegus</i>				
Native	ROSACEAE	Rose	succulenta)	Rocky Mountain hawthorne	×	×	
			Drymocallis arguta				
Native	ROSACEAE	Rose	(Potentilla arguta)	tall cinquefoil; creamy cinquefoil	×	×	
			Drymocallis fissa				
Native	ROSACEAE	Rose	(Potentilla fissa)	bigflower cinquefoil; leafy potentilla	×	×	
Native	ROSACEAE	Rose	Fragaria vesca	woodland strawberry	×	Х	
Native	ROSACEAE	Rose	Fragaria virginiana	mountain strawherry: Virginia strawherry		×	
Native	ROSACEAE	Rose	Geum aleppicum	vellow avens	×	×	
Native	ROSACEAE	Rose	Geum macrophvllum	large-leaved avens: bur avens	×	×	
			D-21			:	

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Alien or	Family -	Family - Common	Scientific Name		2018	6102	Post
Native	(Ed. 1 in paren.)	(Ed. 1 - paren.)	(Ed. 1 in paren.)	Common Name(s)	(Vol)	(DBG)	2019
Native	ROSACEAE	Rose	Geum rivale	purple avens; water avens	×		
No.itol	BOCACEAE			old man's whiskers, prairie smoke, purple	>		
INALIVE	RUSALEAE	козе		avens	<		
			Holodiscus discolor var.				
			dumosus (3 var. in Colorado;				
			confirm this one)				
Native	ROSACEAE	Rose	(Holodiscus dumosus)	rockspirea; mountain spray	×	×	
Native	ROSACEAE	Rose	Physocarpus monogynus	mountain ninebark	Х	Х	
Native	ROSACEAE	Rose	Potentilla hippiana	woolly cinquefoil; silver cinquefoil	Х	Х	
Native	ROSACEAE	Rose	Potentilla norvegica	Norwegian cinquefoil	Х	Х	
Native	ROSACEAE	Rose	Potentilla pensylvanica	Pennsylvania cinquefoil	×		
Alien B	ROSACEAE	Rose	Potentilla recta	sulphur cinquefoil		×	
Native	ROSACEAE	Rose	Prunus americana	wild plum	×	×	
Native	ROSACEAE	Rose	Prunus pensylvanica	pin cherry	×	×	
			Prunus virginiana var.				
Native	ROSACEAE	Rose	melanocarpa	chokecherry; black chokecherry	×	Х	
Native	ROSACEAE	Rose	Rosa arkansana	prairie rose	Х	Х	
			Rosa woodsii				
			(<i>Rosa blanda</i> this is a distinct				
Native	ROSACEAE	Rose	species not in CO)	Woods' rose	Х	Х	
Native	ROSACEAE	Rose	Rubus deliciosus	delicious raspberry; Boulder raspberry	Х	Х	
Native	ROSACEAE	Rose	Rubus idaeus var. strigosus	red raspberry	Х	Х	
Native	ROSACEAE	Rose	Rubus parviflorus	thimbleberry	Х		
Native	ROSACEAE	Rose	Sorbus scopulina	mountain ash	Х	Х	
Alien	RUBIACEAE	Madder	Galium aparine	stickywilly; cleavers	Х	Х	
Native	RUBIACEAE	Madder	Galium bifolium	twinleaf bedstraw		Х	
Native	RUBIACEAE	Madder	Galium boreale	northern bedstraw	Х		
Native	RUBIACEAE	Madder	Galium trifidum	threepetal bedstraw	Х		
Native	RUBIACEAE	Madder	Galium triflorum	fragrant bedstraw	×	х	
Native	SALICACEAE	Willow	Populus angustifolia	narrowleaf cottonwood	×	×	
			Populus deltoides ssp.				
Native	SALICACEAE	Willow	monilifera	plains cottonwood	×	×	
Native	SALICACEAE	Willow	Populus X acuminata	lanceleaf cottonwood		×	
			D-22				

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			, ,				
Alien or	Family -	Family - Common	Scientific Name		2018	2019	Post
Native	(Ed. 1 in paren.)	(Ed. 1 - paren.)	(Ed. 1 in paren.)	Common Name(s)	(Vol)	(DBG)	2019
Native	SALICACEAE	Willow	Salix amygdaloides	peach-leaf willow	X	×	
Native	SALICACEAE	Willow	Salix bebbiana	Bebb willow	Х	Х	
Native	SALICACEAE	Willow	Salix exigua	coyote willow	×	×	
Alien	SALICACEAE	Willow	Salix fragilis	crack willow	×	×	
Native	SALICACEAE	Willow	Salix irrorata	bluestem willow	Х	Х	
Native	SALICACEAE	Willow	Salix lasiandra	Pacific willow	×		
			Salix lutea				
Native	SALICACEAE	Willow	(Salix eriocephala)	yellow willow; strapleaf willow	Х	×	
Native	SALICACEAE	Willow	Salix monticola	mountain willow		Х	
Native	SANTALACEAE	Sandalwood	Comandra umbellata	pale bastard toadflax; star toadflax	Х	Х	
Native	SAPINDACEAE	Soapberry	Acer glabrum	Rocky Mountain maple	×	×	
Native	SAXIFRAGACEAE	Saxifrage	Heuchera parvifolia	common alumroot; coral bells	Х	Х	
Native	SCROPHULARIACEAE	Flgwort	Limosella aquatica	water mudwort		×	
Native	SCROPHULARIACEAE	Figwort	Scrophularia lanceolata	lanceleaf figwort; bunny in the grass	×	×	
Alien C	SCROPHULARIACEAE	Figwort	Verbascum thapsus	woolly mullein; common mullein	×	×	
Native	SMILACACEAE	Catbrier	Smilax lasioneura	Blue Ridge carrionflower	Х	×	
Native	SOLANACEAE	Potato or Nightshade	Physalis fendleri	Fendler's ground cherry		×	
			Physalis hederifolia (Physalis hederifolia var				
Native	SOLANACEAE	Potato or Nightshade	comata)	ivy-leaf ground cherry		×	
Native	SOLANACEAE	Potato or Nightshade	Physalis heterophylla	clammy ground cherry	Х		
Native	SOLANACEAE	Potato or Nightshade	Physalis hispida	prairie ground cherry	Х		
Native	SOLANACEAE	Potato or Nightshade	Physalis virginiana	Virginia ground cherry		×	
Alien	SOLANACEAE	Potato or Nightshade	Solanum styleanum (Solanum physalifolium)	hairy nightshade		×	
Native	SOLANACEAE	Potato or Nightshade	Solanum triflorum	cutleaf nightshade		×	
Native	SOLANACEAE	Cattail	Sparganium emersum	emergent bur-reed		×	
Native	TYPHACEAE	Cattail	Typha latifolia	broadleaf cattail	X	Х	
			D-23				

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Alien or	Family -	Family - Common	Scientific Name		2018	2019	Post
Native	(Ed. 1 in paren.)	(Ed. 1 - paren.)	(Ed. 1 in paren.)	Common Name(s)	(Vol)	(DBG)	2019
Native	URTICACEAE	Nettle	Urtica dioica ssp. gracilis	stinging nettle; California nettle	Х	Х	
				prostrate vervain; bigbract verbena;			
Alien	VERBENACEAE	Vervain	Verbena bracteata	bracted vervain	×	×	
Native	VERBENACEAE	Vervain	Verbena hastata	swamp verbena; blue vervain	Х	Х	
Native	VIOLACEAE	Violet	Viola canadensis	Canadian white violet	×	х	
Native	VIOLACEAE	Violet	Viola nuttallii	Nuttall's violet	×	х	
Native	VIOLACEAE	Violet	Viola palustris	marsh violet			×
Native	VIOLACEAE	Violet	Viola selkirkii	Selkirk's violet	Х	Х	
Native	VIOLACEAE	Violet	Viola sororia	bog violet		х	
Native	VITACEAE	Grape	Vitis riparia	river bank grape	Х		

APPENDIX E NON-VASCULAR PLANTS (BRYOPHYTES) OF SANDSTONE RANCH

Date	Species	Family	Common Names	Area Where Collected	Collectors and Associates
MOS	SES				
					Stacey Anderson, Barbara Thiers,
2023	Amblystegium serpens	Amblystegiaceae	creeping feather moss; ano moss	Gove Creek riparian area	Barb Harbach
	Amblystegium serpens				
2018	var. juratzkanum	Amblystegiaceae	creeping feather moss; ano moss	Gove Creek riparian area	Bayard "Mo" Ewing
2018	Drepanocladus aduncus	Amblystegiaceae	Kneiff's hook moss	Gove Creek riparian area	Bayard "Mo" Ewing
			willow feather moss; tangled thread		
2018	Hygroamblystegium varium	Amblystegiaceae	moss	Gove Creek riparian area	Bayard "Mo" Ewing
			claw brook moss; hygrohypnum		
2018	Hygrohypnum ochraceum	Amblystegiaceae	moss	Gove Creek riparian area	Bayard "Mo" Ewing
			Smith's brook moss; Smith's boat		
2018	Hygrohypnum smithii	Amblystegiaceae	moss	Gove Creek riparian area	Bayard "Mo" Ewing
			bud-headed groove moss; little		Stacey Anderson, Barbara Thiers,
2023	Aulacomnium androgynum	Aulacomniaceae	groove moss	West Plum Creek riparian area	Barb Harbach
2018	Brachythecium erythrorrhizon	Brachytheciaceae	taiga mat moss; taiga ragged moss	Gove Creek riparian area	Bayard "Mo" Ewing
2023	Brachythecium erythrorrhizon	Brachytheciaceae	taiga mat moss; taiga ragged moss	Gove Creek riparian area	Stacey Anderson, Barbara Thiers, Barb Harbach
			waterside feather moss; river		
2018	Brachythecium rivulare	Brachytheciaceae	ragged moss	Gove Creek riparian area	Bayard "Mo" Ewing
2023	Brachythecium sp.	Brachytheciaceae	ragged moss	Unknown riparian area	Barbara Thiers
					Stacey Anderson, Barbara Thiers,
2023	Eurhynchiastrum pulchellum	Brachytheciaceae	elegant beaked moss	Gove Creek riparian area	Barb Harbach
DSA			Steerecleus moss; dark beaked		
2018	Rhynchostegium serrulatum	Brachytheciaceae	moss	Gove Creek riparian area	Bayard "Mo" Ewing
gend	Sciuro-hypnum oedipodium		short-leaved ragged moss: cedar		
^{#2023}	(Bracythecium oedipodium)	Brachytheciaceae	moss	Unknown riparian area	Barbara Thiers
acke			Syed's thread moss; Syed's bryum		Stacey Anderson, Barbara Thiers,
2023	Rosulabryum laevifilum	Bryaceae	moss	West Plum Creek riparian area	Barb Harbach
pril			mountain broom moss; montane		
2018	Dicranum montanum	Dicranaceae	dicranum moss	Gove Creek riparian area	Bayard "Mo" Ewing
024			fragile fork moss; fragile broom		Stacey Anderson, Barbara Thiers,
2023	Dicranum tauricum	Dicranaceae	moss	Gove Creek riparian area	Barb Harbach
2018	Ceratodon purpureus	Ditrichaceae	fire moss; redshank	Gove Creek riparian area	Bayard "Mo" Ewing

Bryophytes of Sandstone Ranch Open Space

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Date	Species	Family	Common Names	Area Where Collected	Collectors and Associates
					Stacey Anderson, Barbara Thiers,
2023	Ceratodon purpureus	Ditrichaceae	fire moss; redshank	Gove Creek riparian area	Barb Harbach
			steppe mouse-moss; sieve-toothed		
2023	Coscinodon calyptratus	Grimmiaceae	big calyptra moss	Unknown riparian area	Barbara Thiers
			grimmia dry rock moss; north		Stacey Anderson, Barbara Thiers,
2023	Grimmia longirostris	Grimmiaceae	grimmia; long-beaked grimmia	West Plum Creek riparian area	Barb Harbach
					Stacey Anderson, Barbara Thiers,
2023	Grimmia sessitana	Grimmiaceae	alpine grimmia	West Plum Creek riparian area	Barb Harbach
	Schistidium ambiguum				
2023	(Schistidium apocarcum)	Grimmiaceae	common beard moss	Unknown riparian area	Barbara Thiers
			ciliate hoarmoss; ciliate Hedwig's		Stacey Anderson, Barbara Thiers,
2023	Hedwigia ciliata	Hedwigiaceae	moss	West Plum Creek riparian area	Barb Harbach
			many-flowered leskea; many-		Stacey Anderson, Barbara Thiers,
2023	Pylaisia polyantha	Hypnaceae	flowered pylaisia moss	Gove Creek riparian area	Barb Harbach
	Lescuraea arizonae				Stacey Anderson, Barbara Thiers,
2023	(Pseudoleskeella arizonae)	Leskeaceae	Arizona lescuraea moss	Gove Creek riparian area	Barb Harbach
2023	Pseudoleskeella sp.	Leskeaceae	lescuraea moss	Unknown riparian area	Barbara Thiers
2018	Mnium blyttii	Mniaceae	Blytt's leafy moss	Gove Creek riparian area	Bayard "Mo" Ewing
	Plagiomnium cuspidatum		woodsy thyme moss; woodsy leafy		Stacey Anderson, Barbara Thiers,
2023	(Orthomnion cuspidatum)	Mniaceae	moss	Gove Creek riparian area	Barb Harbach
	Plagiomnium ellipticum		marsh thyme moss; marsh leafy		Stacey Anderson, Barbara Thiers,
2023	(Orthomnion ellipticum)	Mniaceae	moss	Gove Creek riparian area	Barb Harbach
C			alpine thyme moss ; intermediate		
054	Plagiomnium medium		plagiomnium moss; alpine leafy		
2018	(Orthomnion medium)	Mniaceae	moss	Gove Creek riparian area	Bayard "Mo" Ewing
gen			alpine thyme moss ; intermediate		
da F	Plagiomnium medium		plagiomnium moss; alpine leafy		Stacey Anderson, Barbara Thiers,
<u>8</u> 2023	(Orthomnion medium)	Mniaceae	moss	Gove Creek riparian area	Barb Harbach
ot -					Stacey Anderson, Barbara Thiers,
<u></u> 2023	Orthotrichum alpestre	Orthotrichaceae	alpine bristle moss	Gove Creek riparian area	Barb Harbach
2018	Orthotrichum hallii	Orthotrichaceae	Hall's orthotrichum moss	Gove Creek riparian area	Bayard "Mo" Ewing
5 2023	Orthotrichum hallii	Orthotrichaceae	Hall's orthotrichum moss	Gove Creek riparian area	Stacey Anderson, Barbara Thiers, Barb Harbach

Bryophytes of Sandstone Ranch Open Space

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Date	Species	Family	Common Names	Area Where Collected	Collectors and Associates
2018	Orthotrichum pumilum	Orthotrichaceae	low bristle moss; dwarf bristle moss	Gove Creek riparian area	Bayard "Mo" Ewing
2023	Orthotrichum rupestre	Orthotrichaceae	rock bristle moss	Unknown riparian area	Barbara Thiers
2018	Isopterygiopsis pulchella	Plagiotheciaceae	neat silk moss	Gove Creek riparian area	Bayard "Mo" Ewing
			22000 accid+coma 2/avaulo2		Stacey Anderson, Barbara Thiers,
2023	Atrichum selwynii	Polytrichaceae		Gove Creek riparian area	Barb Harbach
2018	Barbula convoluta	Pottiaceae	lesser bird's claw beard moss;	Gove Creek riparian area	Bayard "Mo" Ewing
			bird's-claw beard-moss; prickly		
2018	Barbula unguiculata	Pottiaceae	beard moss	Gove Creek riparian area	Bayard "Mo" Ewing
2018	Syntrichia ruralis	Pottiaceae	twisted moss; star moss	Gove Creek riparian area	Bayard "Mo" Ewing
2023	Pterigynandrum filiforme	Pterigynandraceae	capillary wing moss	Unknown riparian area	Barbara Thiers
	Roaldia revoluta (Hypnum		revolute hypnum moss; revolute		Stacey Anderson, Barbara Thiers,
2023	revolutum)	Pylaisiaceae	plait moss	West Plum Creek riparian area	Barb Harbach
LIVEF	WORTS				
2023	Chiloscyphus minor	Lophocoleaceae	lesser crestwort	Unknown riparian area	Barbara Thiers
2023	Radula complanata	Radulaceae	flat-leaved scalewort	Unknown riparian area	Barbara Thiers

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APPENDIX F

BUTTERFLIES AND MOTHS OF SANDSTONE RANCH

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Family Scientific Name	Family Common Name	Subfamily	Scientific Name	Common Name	Observer
BUTTERFLIES					
Hesperiidae	Skippers	Hesperiinae	Amblyscirtes vialis	Common Roadside-Skipper	Sam Johnson
Hesperiidae	Skippers	Pyrginae	Burnsius communis	Common Checkered Skipper	Sam Johnson
Hesperiidae	Skippers	Pyrginae	Erynnis telemachus	Rocky Mountain Duskywing	Robert Andrews
					Sam Johnson
Hesperiidae	Skippers	Hesperiinae	Euphyes vestris	Dun Skipper	Robert Andrews
Hesperiidae	Skippers	Hesperiinae	Lon taxiles	Taxiles Skipper	Sam Johnson
Hesperiidae	Skippers	Pyrginae	Pholisora catullus	Common Sootywing	Robert Andrews
Hesperiidae	Skippers	Heteropterinae	Piruna pirus	Russet Skipperling	Robert Andrews
		Dolyammations	Calactrina acho cco cidara	Echo Azure	
Lycaenidae	Gossamer-wing	Polyommatinae	Cupido amyntula	WesternTailed-Blue	Robert Andrews
Lvcaenidae	Gossamer-wing	Polvommatinae	Euphilotes ancilla	Rockv Mountain Dotted Blue	Pam Steinman
Lycaenidae	Gossamer-wing	Polyommatinae	Glaucopsyche lygdamus	Silvery Blue	Pam Steinman
Lycaenidae	Gossamer-wing	Polyommatinae	Plebejus icarioides	Boisduval's Blue	Sam Johnson
Lycaenidae	Gossamer-wing	Theclinae	Callophrys affinis	Western Green Hairstreak	Sam Johnson
Lycaenidae	Gossamer-wing	Theclinae	Callophrys gryneus	Juniper Hairstreak	Sam Johnson
Lycaenidae	Gossamer-wing	Theclinae	Hypaurotis crysalus	Colorado Hairstreak	Dan Stringer
Lycaenidae	Gossamer-wing	Theclinae	Strymon melinus	Gray Hairstreak	Sam Johnson
Nymphalidae	Brush-footed	Satyrinae	Cercyonis pegala	Common Wood-Nymph	Sam Johnson
Nymphalidae	Brush-footed	Nymphalinae	Chlosyne gorgone	Gorgone Checkerspot	Pam Steinman
			Coenonympha tullia		
Nymphalidae	Brush-footed	Satyrinae	ssp.ochracea	Common (Ochre) Ringlet	Sam Johnson
Nymphalidae	Brush-footed	Danainae	Danaus plexippus	Monarch	Pam Steinman
S Nymphalidae	Brush-footed	Nymphalinae	Euphydryas chalcedona	Variable Checkerspot	Pam Steinman
Nymphalidae	Brush-footed	Heliconiinae	Euptoieta claudia	Variegated Fritillary	Sam Johnson
cket					Pam Steinman
- Ár					Sam Johnson
Nymphalidae	Brush-footed	Limenitidinae	Limenitis weidermeyerii	Weidemeyer's Admiral	Robert Andrews
Nymphalidae	Brush-footed	Nymphalinae	Nymphalis antiopa	Mourning Cloak	Sam Johnson
Nymphalidae	Brush-footed	Nymphalinae	Phyciodes cocyta	Northern Crescent	Sam Johnson
Nymphalidae	Brush-footed	Nymphalinae	Phyciodes pulchella	Field Crescent	Sam Johnson
Nymphalidae	Brush-footed	Nymphalinae	Polygonia satyrus	Satyr Comma	Robert Andrews

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Family Scientific Name	Family Common Name	Subfamily	Scientific Name	Common Name	Observer
					Pam Steinman
Nymphalidae	Brush-footed	Heliconiinae	Speyeria aphrodite	Aphrodite Fritillary	Robert Andrews
Nymphalidae	Brush-footed	Heliconiinae	Speyeria hesperis	Northwestern Fritillary	Robert Andrews
Nymphalidae	Brush-footed	Nymphalinae	Vanessa atalanta	Red Admiral	Sam Johnson
	-	<u>.</u>			Sam Johnson
Nymphalidae	Brush-tooted	Nympnalinae	Vanessa caraui	Painted Lady	Kobert Andrews
					Pam Steinman
Papilionidae	Parnassians, Swallowtails	Papilioninae	Papilioeurymedon	Pale Swallowtail	Robert Andrews
					Pam Steinman
Papilionidae	Parnassians, Swallowtails	Papilioninae	Papilio multicaudata	Two-tailed Swallowtail	Robert Andrews
Papilionidae	Parnassians, Swallowtails	Papilioninae	Papilio polyxenes	Black Swallowtail	Pam Steinman
					Pam Steinman
					Sam Johnson
Papilionidae	Parnassians, Swallowtails	Papilioninae	Papilio rutulus	Western Tiger Swallowtail	Robert Andrews
Papilionidae	Parnassians, Swallowtails	Parnassiinae	Parnassius mintheus	Rocky Mountain Parnassian	Pam Steinman
					Pam Steinman
Pieridae	Whites, Sulphurs	Coliadinae	Colias eurytheme	Orange Sulphur	Sam Johnson
					Pam Steinman
Pieridae	Whites, Sulphurs	Coliadinae	Colias philodice	Clouded Sulphur	Sam Johnson
Pieridae	Whites, Sulphurs	Pierinae	Euchloe ausonides	Large Marble	Pam Steinman
					Pam Steinman
d Pieridae	Whites, Sulphurs	Coliadinae	Nathalis iole	Dainty Sulphur	Sam Johnson
SAL					Pam Steinman
Pieridae	Whites, Sulphurs	Pierinae	Pieris rapae	Cabbage White	Sam Johnson
Pieridae	Whites, Sulphurs	Pierinae	Pontia occidentalis	Western White	Robert Andrews
a Pa					Pam Steinman
Pieridae	Whites, Sulphurs	Pierinae	Pontia protodice	Checkered White	Sam Johnson
MOTHS					
Scrambidae	Crambid Snout Moths	Pyraustinae	Loxostege cereralis	Alfalfa Webworm	Sam Johnson
Erebidae	Erebid Moths	Arctiinae	Gnophaela vermiculata	Police Car Moth	Barb Harbach
A Erebidae	Erebid Moths	Arctiinae	Virbia fragilis	Fragile Virbia	Sam Johnson
Erebidae	Erebid Moths	Lymantriinae	Orgyia pseudotsugata	Douglas-fir Tussock Moth	Several Volunteers
Geometridae	Geometer Moths	Ennominae	Hesperumia suphuraria	Sulphur Moth	Sam Johnson

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Family Scientific Name	Family Common Name	Subfamily	Scientific Name	Common Name	Observer
Geometridae	Geometer Moths	Ennominae	Lomographa vestaliata	White Spring Moth	Sam Johnson
Geometridae	Geometer Moths	Sterrhinae	Scopula junctaria	Simple Wave	Sam Johnson
Sphingidae	Hawk Moths	Macroglossinae	Hyles lineata	White-lined Sphinx	Curt Frankenfeld

APPENDIX G

AMPHIBIANS AND REPTILES OF SANDSTONE RANCH

Amphibians (Class: Amphibia) and reptiles (Class: Reptilia) occurring in Colorado are coldblooded. As such, they generally occur in warmer habitats at lower elevations on Sandstone Ranch. None of the amphibian or reptile species known or likely to occur at Sandstone Ranch Open Space are listed as threatened or endangered. Species known or likely to occur in habitats at Sandstone Ranch are presented in this Appendix.

Amphibians and Reptiles at				
Sandstone Ranch				
As of November 2023				
		*	*	Observed
AMPHIBIANS		Known	Likely	Sandstone
Barred Tiger Salamander	Ambystoma mavortium	Х		X
Plains Spadefoot	Spea bombifrons	X		
Great Plains Toad	Anaxyrus cognatus		X	
Woodhouse's Toad	Anaxyrus woodhousii	X		Х
Boreal Chorus Frog	Pseudacris maculata	Х		Х
American Bullfrog	Lithobates catesbeianus	Х		Х
Northern Leopard Frog	Lithobates pipiens	X		Х
REPTILES				
Snapping Turtle	Chelydra serpentina	Х		X
Painted Turtle	Chrysemys picta	Х		
Spiny Softshell	Apalone spinifera		X	
Common Lesser Earless Lizard	Holbrookia maculata		Х	
Hernandez's Short-horned Lizard	Phrynosoma hernandesi	Х		
Prairie Lizard/Fence Lizard	Sceloporus consobrinus	Х		Х
Six-lined Racerunner	Aspidoscelis sexlineata	X		
Many-lined Skink	Plestiodon multivirgatus		X	
Plains Hognose Snake	Heterodon nasicus	X		
Milksnake	Lampropeltis triangulum	X		
Smooth Green Snake	Opheodrys vernalis	X		Х
Northern Watersnake	Nerodia sipedon		X	
Bullsnake/Gophersnake	Pituophis catenifer	Х		Х
Plains Black-headed Snake	Tantilla nigriceps	X		
Terrestrial Gartersnake	Thamnophis elegans	X		Х
Plains Gartersnake	Thamnophis radix	X		
Common/Red-sided Garter Snake	Thamnophis sirtalis		X	
Lined Snake	Tropidoclonion lineatum	Х		
Prairie Rattlesnake	Crotalus viridis	X		Х

* known or likely to occur in Douglas County (Young 2011) based on

observation and available habitat

APPENDIX H. BIRDS OF SANDSTONE RANCH

The list of Birds of Sandstone shows the bird species that have been observed on nine established survey zones at Sandstone Ranch during weekly surveys performed over the six years from 2018 through December 2023. The survey zones are shown on the map below.



SPECIES	CLUB MED	GOVE KNOB	GOVE PLUM DIVIDE	JUNIPER VALLEY	NORTH GOVE CREEK	NORTH GRASSLANDS	SANDSTONE CENTRAL	SOUTH ROAD	WEST PLUM CREEK
Cackling Goose						Х			
Canada Goose					X	Х	х	×	×
Blue-winged Teal						Х			
Northern Shoveler						Х			
Gadwall					X	Х		×	
American Wigeon						Х			
Mallard	Х				Х	Х		×	
Green-winged Teal						×			
Ring-necked Duck						×			
Bufflehead						Х			
Common Merganser						Х		×	
Ruddy Duck						×			
Ring-necked Pheasant						Х			
Wild Turkey	×		×	×	×	×	×	×	×
Rock Pigeon				×	Х	Х	×	×	
Eurasian Collared-Dove				×	X	Х	×	×	
Mourning Dove	Х		×	х	Х	Х	х	×	×
Common Nighthawk								×	
Common Poorwill	Х							×	
White-throated Swift								х	
Black-chinned Hummingbird	Х		×		X	Х			×
Broad-tailed Hummingbird	Х		×	х	X	Х	х	×	×
Rufous Hummingbird							х		
Calliope Hummingbird							х		×
Sora								×	
Sandhill Crane						×			
Killdeer					×	×		×	
Marbled Godwit						×			
Long-billed Dowitcher						×			
Wilson's Snipe						×			
Spotted Sandpiper					×	×		×	
Solitary Sandpiper						×			

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SPECIES	CLUB MED	GOVE KNOB	GOVE PLUM DIVIDE	JUNIPER VALLEY	NORTH GOVE CREEK	NORTH GRASSLANDS	SANDSTONE CENTRAL	SOUTH ROAD	WEST PLUM CREEK
Lesser Yellowlegs						×			
Willet						×			
Greater Yellowlegs						×			
Ring-billed Gull					х		×		
Double-crested Cormorant						×			
American White Pelican						×			
Great Blue Heron					×	×	×	×	×
Snowy Egret						×			
Turkey Vulture	×	×		×	×	×	×	×	×
Bald Eagle				×				×	
Northern Harrier				×	х	×		×	
Sharp-Shinned Hawk	×		×	×	×	×	×	×	×
Cooper's Hawk	×		×		×	×	×	×	×
Northern Goshawk	×								
Broad-winged Hawk							×		
Swainson's Hawk						×			
Red-tailed Hawk	Х	Х	×	Х	Х	×	×	×	×
Rough-legged Hawk						×			
Golden Eagle	×	х	×	×	×	×	×	×	×
Great Horned Owl	Х		×		х	×		×	×
Northern Saw-whet Owl	Х								
Belted Kingfisher	Х				Х	×		×	×
Red-headed Woodpecker					×				
Red-naped Sapsucker					Х	×			
Downy Woodpecker	Х		×	Х	Х	×	×	×	×
Hairy Woodpecker	Х		×		Х	×		×	×
American Three-toed Woodpecker	Х								
Northern Flicker	Х	Х	×	Х	Х	×	×	×	×
American Kestrel				Х	Х	×	×	×	×
Peregrine Falcon						×	×		
Prairie Falcon				х		×	×	×	
Olive-sided Flycatcher	×		×		×	×	×		×

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SPECIES	CLUB MED	GOVE KNOB	GOVE PLUM DIVIDE	JUNIPER VALLEY	NORTH GOVE CREEK	NORTH GRASSLANDS	SANDSTONE CENTRAL	SOUTH ROAD	WEST PLUM CREEK
Western Wood-Pewee	×		×	×	×	Х	×	×	×
Hammond's Flycatcher	×		×		×				×
Gray Flycatcher						Х			
Dusky Flycatcher	Х		×	×	Х	Х			×
Cordilleran Flycatcher	×		×		×	×		х	×
Eastern Phoebe						Х			
Say's Phoebe	×		×	×	×	×	×	×	×
Western Kingbird				×	×	×	×	×	×
Eastern Kingbird				×		×			
Loggerhead Shrike			×	×		×	×	×	×
Northern Shrike						Х	×		×
Cassin's Vireo					×				×
Plumbeous Vireo	Х		×		Х	Х	×		×
Warbling Vireo	Х		×		Х		×		×
Canada Jay	Х								
Steller's Jay	×	×	×	х	×	×	×	Х	×
Blue Jay			×		X	Х	×		×
Woodhouse's Scrub-Jay	X		×	х	X	Х	×	х	×
Clark's Nutcracker							×		
Black-billed Magpie	Х		×	х	Х	Х	×	Х	×
American Crow		×	×	×	×	×	×	х	×
Common Raven	×		×	х	×	×	×	х	×
Horned Lark						×	×		
Tree Swallow	×		×	х	×	×	×	Х	×
Violet-green Swallow			×		X	Х	×	х	×
Northern Rough-winged Swallow					×	×		Х	
Bank Swallow						Х			
Cliff Swallow				х	X	Х	×	х	
Barn Swallow			×		X	Х	×	х	
Black-capped Chickadee	×		×	х	×	×	×	х	×
Mountain Chickadee	×	×	×		×	×		Х	×
Bushtit	×		×	×	×				×

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SPECIES	CLUB MED	GOVE KNOB	GOVE PLUM DIVIDE	JUNIPER VALLEY	NORTH GOVE CREEK	NORTH GRASSLANDS	SANDSTONE CENTRAL	SOUTH ROAD	WEST PLUM CREEK
Red-breasted Nuthatch	×		×	×	×	Х	×	х	×
White-breasted Nuthatch	×	Х	×	×	×	×	×	×	×
Pygmy Nuthatch	×		×	×	×			×	×
Brown Creeper	×		×		×	×			×
Rock Wren					×	Х	×	Х	
Canyon Wren									
House Wren	Х		×	×	×	Х		х	×
Blue-gray Gnatcatcher				×	×	Х		Х	×
Golden-crowned Kinglet	Х				X				
Ruby-crowned Kinglet	Х		×		×				×
Eastern Bluebird					×	Х			
Western Bluebird	×	Х	×	×	×	Х	×	Х	×
Mountain Bluebird			×	х	×	Х	×	Х	×
Townsend's Solitaire	Х		×	х	×	Х	×	Х	×
Swainson's Thrush								Х	
Hermit Thrush	Х		×		×				х
American Robin	Х	х	×	х	×	х	×	Х	х
Gray Catbird	Х				×	Х	×		×
Sage Thrasher				х		Х			
European Starling	Х			х	×	х	×	Х	×
Cedar Waxwing			×	х	×	х			х
Bohemian Waxwing					×				
House Sparrow			×						
American Pipit						х		Х	
Evening Grosbeak	Х		×	х	×				
Gray-crowned Rosy Finch								Х	
Black Rosy Finch								Х	
House Finch	Х		×	Х	×	Х	×	Х	х
Cassin's Finch	Х		×		×	Х	×	Х	
Red Crossbill	X		×	×	×			Х	×
Pine Siskin	×		×		×	×	×	×	×
Lesser Goldfinch	×		×	х	×	×	×	×	×

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SPECIES	CLUB MED	GOVE KNOB	GOVE PLUM DIVIDE	JUNIPER VALLEY	NORTH GOVE CREEK	NORTH GRASSLANDS	SANDSTONE CENTRAL	SOUTH ROAD	WEST PLUM CREEK
American Goldfinch	×		×	×	Х	×	×	×	×
Green-tailed Towhee	Х		×	×	×	×			×
Spotted Towhee	Х		×	×	X	×	×	×	×
American Tree Sparrow			×	×		×			×
Chipping Sparrow	Х		×	×	×	×	×	×	×
Clay-colored Sparrow					×	×		×	
Brewer's Sparrow						×			
Vesper Sparrow			×	×	Х	×	×	×	×
Lark Sparrow			×	×	×	×	×	×	×
Lark Bunting				×		×		×	
Savannah Sparrow					×	×			
Grasshopper Sparrow						×			
Song Sparrow	×		×		×	×		×	×
Lincoln's Sparrow	Х				Х	×		×	×
White-crowned Sparrow	Х		×		X	×			×
Dark-eyed Junco	Х	Х	×	Х	Х	×	х	×	×
Yellow-breasted Chat					X	×			×
Yellow-headed Blackbird						×			
Western Meadowlark			×	×	×	×	×	×	×
Bullock's Oriole					Х	×		×	×
Red-winged Blackbird				×	X	×	×	×	×
Brown-headed Cowbird	Х				X	×	×	×	×
Brewer's Blackbird				×	×	×	×	×	×
Common Grackle			×		Х	×		×	
Ovenbird	Х		×		X				×
Black-and-White Warbler	Х								
Orange-crowned Warbler					×	×		×	
Virginia's Warbler	Х		×		×	×			×
MacGillivray's Warbler	Х				×				×
Common Yellowthroat					×				×
American Redstart						×			
Yellow Warbler	×		×	×	×	×	×	×	×

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SPECIES	CLUB MED	GOVE KNOB	GOVE PLUM DIVIDE	JUNIPER VALLEY	NORTH GOVE CREEK	NORTH GRASSLANDS	SANDSTONE CENTRAL	SOUTH ROAD	WEST PLUM CREEK
Chestnut-sided Warbler					×				
Yellow-rumped Warbler	Х		×	×	×	×		×	×
Townsend's Warbler					×				
Wilson's Warbler	Х		×	×	×				×
Western Tanager	Х		×		х	×	×	×	×
Rose-breasted Grosbeak					×				
Black-headed Grosbeak	Х		×	×	×	×	×	×	×
Blue Grosbeak						×			×
Lazuli Bunting	Х		×	х	х	×		×	×
Indigo Bunting						×			

APPENDIX I

BIRDS OF SANDSTONE RANCH BROCHURE

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Starlings European Starling Pipits; and Waxwings American Pipit Bohemian Waxwing	
European Starling Pipits; and Waxwings American Pipit Bohemian Waxwing	
Pipits; and Waxwings American Pipit Bohemian Waxwing	
American Pipit Bohemian Waxwing	
Bohemian Waxwing	
Cedar Waxwing	
Finches	
Evening Grosbeak	
Gray-crowned Kosy-Finch	
Black Kosy-Finch	
House Finch	
Cassin's Finch	
Red Crossbill	
Pine Siskin	
Lesser Goldfinch	
American Goldfinch	
<u>Sparrows; and Towhees</u>	
Green-tailed Towhee	
Spotted Towhee	
American Tree Sparrow	
Chipping Sparrow	
Clay-colored Sparrow	
Brewer's Sparrow	
Lark Sparrow	
Lark Bunting	
Grasshopper Sparrow	
Dark-eyed Junco	
White-crowned Sparrow	
Vesper Sparrow	
Savannah Sparrow	
Song Sparrow	
Lincoln's Sparrow	
Chats and Blackbirds	
OYellow-breasted Chat	
wyellow-headed Blackbird	
covrestern Ivleadowiark Puilliock's Oriola	
a Red-winged Blackbird	
Brown-headed Cowbird	
g Brewer's Blackbird	
រ ផ្ទំCommon Grackle	
Wood Warblers	
<u>d</u> Ovenbird	
A Black-and-White Warbler	
SOrange-crowned Warbler	
5 ¥Virginia's Warbler	
MacGillivray's Warbler	
Common Yellowthroat	
Yellow Warbler	
Chestnut-sided Warbler	

LOCATION													
SPECIES	Yellow-rumped Warbler	Townsend's Warbler	Wilson's Warbler	Cardinals; Tanagers and Allies	Western Tanager	Rose-breasted Grosbeak	Blue Grosbeak	Black-headed Grosbeak	Lazuli Bunting	Indigo Bunting	Old World Sparrow	House Sparrows	

Birds of Sandstone Ranch Open Space

sandstone Ranch Open Space features diverse ecosystems including grasslands, pinon-juniper woodland, montane shrublands and forests, and two rreeks which form riparian habitat. Year around and summer residents are numerous and varied due to this great diversity of habitat. Douglas County acquired the Ranch in January 2018. For purposes of surveying the natural resources available, the ranch was divided into nine survey zones (see map below). Volunteer naturalists began to survey the Open Space in March 2018.

This checklist contains 167 species of birds compiled from the collected data of this on-going survey. Sandstone Ranch



Birds of Sandstone Ranch

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Douglas County Open Space





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	Ceanes; Lapwings; and Plovers		Gray Flycatcher		Eastern Bluebird	
Ø MildeerCordilleran FlycatcherMountain BluebirdSahobipers; Phalaropes; and GullsCordilleran FlycatcherMountain BluebirdSahobipers; Phalaropes; and GullsEastern PhoebeMountain BluebirdSahobipers; Phalaropes; and GullsEastern PhoebeMountain BluebirdSahobipers; Phalaropes; and GullsEastern PhoebeMountain BluebirdSolude-blied GodwitEastern RingbirdMountain BluebirdMountain BluebirdSolude-blied DowitcherMountain BluebirdMountain BluebirdMountain BluebirdSolude-blied SandpiperSolude-blied SandpiperMountain BluebirdMountain BluebirdSoluteny SandpiperSolude-blied SandpiperMountain BluebirdMountain BluebirdSoluteny SandpiperMountain BluebirdMountain BluebirdMountain BluebirdSoluteny SandpiperMountain BluebirdMountain BluebirdMountain BluebirdSoluteny SandpiperMountain BluebirdMountain BluebirdMountain BluebirdSoluteny S	ក្ល គ្មីSandhill Crane		Dusky Flycatcher		Western Bluebird	
Sandpipers; Phalaropes; and GullsEastern PhoebeTownsend's SolitaireAmarbled GodwitSay's PhoebeSay's PhoebeEastern KingbirdSolurg-billed DowitcherMestern KingbirdMercian RobinMercian RobinSolurg-billed DowitcherMercian SolitaireMercian RobinMercian RobinSoluted SandpiperSoluted SandpiperMercian RobinMercian RobinSoluted SandpiperSoluted SandpiperMercian SolitaireMercian RobinSoluted SandpiperLoggerhead ShrikeMorchern ShrikeSage ThrasherLesser YellowlegsNorthern ShrikeSage ThrasherMercian Robin	S - Killdeer		Cordilleran Flycatcher		Mountain Bluebird	
A Marbled GodwitSay's PhoebeSwainson's ThrushD SLong-billed DowitcherNestern KingbirdHermit ThrushD SLong-billed DowitcherMercian RobinD StrikeMercian RobinS potted SandpiperSotted SandpiperS olitary SandpiperLoggerhead ShrikeS olitary SandpiperNorthern ShrikeLesser YellowlegsSage Thrasher	<u>្ត ទ័ឌ៌ndpipers; Phalaropes; and Gulls</u>		Eastern Phoebe		Townsend's Solitaire	
DescendencieWestern KingbirdHermit ThrushR Wilson's SnipeEastern KingbirdAmerican RobinS PWIlson's SnipeSpotted SandpiperAmerican RobinS Sotted SandpiperSotted SandpiperMockingbirds; and ThrashersS Soltary SandpiperLoggerhead ShrikeGray CatbirdLesser YellowlegsNorthern ShrikeSage Thrasher	🖗 🕂 Marbled Godwit		Say's Phoebe		Swainson's Thrush	
⁸ ⁴ Wilson's Snipe ⁸ ⁴ Wilson's Snipe ⁸ Spotted Sandpiper ¹ Loggerhead Shrike ¹ Lesser Yellowlegs	🕂 👌 Long-billed Dowitcher		Western Kingbird		Hermit Thrush	
Spotted Sandpiper Shrikes Mockingbirds; and Thrashers Solitary Sandpiper Loggerhead Shrike Cable of Catbird Cable of Catbird Lesser Yellowlegs Northern Shrike Sage Thrasher Cable of Catbird	8 R Wilson's Snipe		Eastern Kingbird		American Robin	
Solitary Sandpiper Loggerhead Shrike Easy Catbird Lesser Yellowlegs Northern Shrike Sage Thrasher	Spotted Sandpiper		<u>Shrikes</u>		Mockingbirds; and Thrashers	
Lesser Yellowlegs Sage Thrasher	Solitary Sandpiper		Loggerhead Shrike		Gray Catbird	
	Lesser Yellowlegs		Northern Shrike		Sage Thrasher	
APPENDIX J

MAMMALS OF SANDSTONE RANCH

Colorado Natural Heritage Program (CNHP) Rankings

- S1 State Ranked Critically Imperiled
- S2 State Ranked Imperiled
- S3 State Ranked Vulnerable to Extirpation
- S4 State Ranked Apparently Secure
- S5 State Ranked Demonstrably Widespread, Abundant, and Secure

Colorado State Wildlife Action Plan (SWAP) 2015

Tier 1 - Species of Greatest Conservation Need (Highest Conservation Priority) Tier 2 – Species of Greatest Conservation Need

Srown Bat Eptexicus fuscus Vespertilionidae Bats, Evening Chiroptera (Bats) x x x x a x mot visually indicated p indicated	Lassification Crder Sandstone Centr North Grassland South Road South Road South Road Club Med	Family Common Name Classific	Family Scientific Name	Scientific Name	nmon Name(s)
Bat Losiurus cinereus Vespertilionidae Bats, Evening Chiroptera (Bats) x x x x coustic s Bat Losiurus cinereus Vespertilionidae Bats, Evening Chiroptera (Bats) x x x x Acoustic s Flying not Cub Med) x x x x x x Acoustic s Flying not Flying not Flying not Flying not Flying not Flying not Icom Motis Losiurus cinereus Vespertilionidae Bats, Evening Chiroptera (Bats) x <td>roptera (Bats) x x x x</td> <td>lats, Evening Chiroptera</td> <td>Vespertilionidae B</td> <td>Eptesicus fuscus</td> <td>wn Bat Ep</td>	roptera (Bats) x x x x	lats, Evening Chiroptera	Vespertilionidae B	Eptesicus fuscus	wn Bat Ep
Bat Lasiurus cinereus Vespertilionidae Bats, Evening Chiroptera (Bats) x x x x Acoustic s Bat Lasiurus cinereus Vespertilionidae Bats, Evening Chiroptera (Bats) x x x x Acoustic s Bat Lasiurus cinereus Vespertilionidae Bats, Evening Chiroptera (Bats) x x x x Acoustic s Siown Bat Myotis lucifugus Vespertilionidae Bats, Evening Chiroptera (Bats) x x x x Acoustic si Siown Bat Myotis lucifugus Vespertilionidae Bats, Evening Chiroptera (Bats) x x x x x x x apture (V Siown Myotis Myotis lucifugus Vespertilionidae Bats, Evening Chiroptera (Bats) x					
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/ Bat Lasiurus cinereus Vespertilionidae Bats, Evening Chiroptera (Bats) x <					
/ Bat Lasiurus cinereus Vespertilionidae Bats, Evening Chiroptera (Bats) x x x x x h Acoustic si flying not- Persence Persence Persence Species. C. Capture (V flying not- Persence Persence Species. C. Capture (V Creek). SI Brown Bat / Myotis lucfugus Vespertilionidae Bats, Evening Chiroptera (Bats) x x x A Acoustic si Brown Myotis Myotis lucfugus Vespertilionidae Bats, Evening Chiroptera (Bats) x x x x Acoustic si Brown Myotis Myotis lucfugus Vespertilionidae Bats, Evening Chiroptera (Bats) x x x x Acoustic si Brown Myotis Myotis lucfugus Vespertilionidae Bats, Evening Chiroptera (Bats) x x x x Acoustic si Brown Myotis Myotis lucfugus Vespertilionidae Bats, Evening Chiroptera (Bats) x x x x Acoustic si Brown Myotis Myotis volans					
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Brown Myotis not visually hot visually not visually hot not spe not visually hot not spe <td>roptera (Bats) x x x x x</td> <td>lats, Evening Chiropters</td> <td>Vespertilionidae B</td> <td>Myotis lucifugus</td> <td>Brown Bat / M</td>	roptera (Bats) x x x x x	lats, Evening Chiropters	Vespertilionidae B	Myotis lucifugus	Brown Bat / M
legged Myotis volans Myotis volans Indicated p Indicated p legged Myotis volans Vespertitionidae Bats, Evening Chiroptera (Bats) X X X CSU mist n					Brown Myotis
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Tier 1; G3 C Iegged Myotis volans Vespertilionidae Bats, Evening Chiroptera (Bats) x CSU mist n Plum Creel					
Iegged Myotis volans Vespertilionidae Bats, Evening Chiroptera (Bats) × × Cl mist n Plum Creel Plum Creel Plum Creel Plum Creel Plum Creel Plum Creel					
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Plum Creek	roptera (Bats) x	lats, Evening Chiropters	Vespertilionidae B	Myotis volans	legged Myotis M
ern Long- <i>Myotis evotis</i> Vespertilionidae Bats, Evening Chiroptera (Bats) x CSU mist n Myotie	roptera (Bats) x	sats, Evening Chiroptera	Vespertilionidae B	Myotis evotis	ern Long- M

Mammals of Sandstone Ranch

J-2

Notes	Acoustic signature; bats flying	not visually identified; guano	indicated presence of bats	but not species. CNHP S3/S4	Watchlisted	Acoustic signature; bats flying	not visually identified; guano	indicated presence of bats	but not species. CSU mist net	capture (Club Med). Female	and young found in Gove	Barn Silo.	CSU mist net capture (West	Plum Creek). SWAP Tier 1;	CNHP S2	Sightings, Tree scratchings,	Scat, Bedding areas,	TracksO9O8:O10	Sightings, Scat, Tracks		Sightings, Tracks, Scat,	Kittens	Sightings, Scat, Bedding	areas, Tracks, Antler sheds		
Gove Knob																х			х				х			
North Gove Creek																×			×				×			
bəM dulƏ	×					×										×			×		×		×			
əbivi Q mul q əvoƏ																×					×		×			
West Plum Creek													×			×			×		×		×			
bsoafh Road	×					х										х			х		х		Х			
North Grassland Dr.																×					×		×			
lertne D enot sbne2																х					×		х			
Juniper Valley																×			×		×		×			
Order Classification	Chiroptera (Bats)					Chiroptera (Bats)							Chiroptera (Bats)			Carnivora (Meat-	eaters)		Carnivora (Meat-	eaters)	Carnivora (Meat-	eaters)	Artiodactyla	(Even-toed	Hooved Animals)	
Family Common Name	Bats, Evening					Bats, Evening							Bats, Evening			Bears			Cats		Cats		Deer			
Family Scientific Name	Vespertilionidae					Vespertilionidae							Vespertilionidae			Ursidae			Felidae		Felidae		Cervidae			
Scientific Name	Lasionycteris	noctivagans				Myotis ciliolabrum							Corynorhinus	townsendii		Ursus americanus			Lynx rufus		Puma concolor		Cervus elaphus			
Common Name(s)	Silver-haired Bat					Western Small-	footed Myotis						Townsend's Big-	eared Bat		Black Bear		сс	Béocat	Age	Nontain Lion	a Pao	転蔭, Wapiti	- Apı <u>ge 1</u>	ril 4, 20 47 of 1	024 182

Mammals of Sandstone Ranch

J-3

Ranch
Sandstone
Mammals of

Notes	Sightings, Scat, Bedding	areas, Tracks, Hair, Antler	sheds	Sightings, Tracks, Scat, Pups		Sightings, Scat, Tracks		DC protected, wetlands.	SWAP TIER 1; CNHP S1;	PROTECTED SPECIES, Both	Federally & State	Threatened	Sightings, Scat, Tracks.	Caught in CSU class Traps	(Gove-Plum divide).	Caught in CSU class traps	(Gove-Plum divide).	SWAP Tier 1, CNHP S3	Sightings, Tunneling, Dirt	mounds		
Gove Knob	×			×									×									
North Gove Creek	×			×		×		×					×									
bəM dul D	×			×		×		×					×									
əbivi Q mul q əvoə	×			×									×			×						
West Plum Creek	×							×					×									
beost dtuo2	×			×									×						×			
North Grassland Dr.	×			×									×						×			
lartnə D ənot sbns2	×			×									×						×			
γəllεV rəqinul	×			×									×						×			
Order Classification	Artiodactyla	(Even-toed	Hooved Animals)	Carnivora (Meat	eaters)	Carnivora (Meat	eaters)	Rodentia	(Rodents:	Gnawing	Mammals)		Rodentia	(Rodents:	Gnawing Mammals)	Rodentia	(Rodents:	Gnawing Mammals)	Rodentia	(Rodents:	Gnawing Mammals)	
Family Common Name	Deer			Dogs		Dogs		Jumping Mice &	Jerboas				Mice, Rats, &	Voles; Native		Mice, Rats, &	Voles; Native		Mice, Rats, &	Voles; Native		
Family Scientific Name	Cervidae			Canidae		Canidae		Dipodidae					Cricetidae			Heteromyidae			Cricetidae			
Scientific Name	Odocoileus	hemionus		Canis latrans		Vulpes vulpes		Zapus hudsonius	preblei				Peromyscus	maniculatus		Perognathus	fasciatus		Microtus	pennsylvanicus		
Common Name(s)	Mule Deer / Deer			Coyote		Red Fox		Preble's Meadow	Jumping Mouse)			Deer Mouse			Ogve-backed	pěcket mouse	Agenda	Meadow Vole	ket - Pa	April 4	, 2024 of 182

Ranch
Sandstone
Mammals of (

Notes	Scat, Tracks, Sightings	Tunneling, Dirt mounds	Sighting	Sightings, Scat, Tracks	Sightings, Scat, Tracks, Kittens
Gove Knob	×				×
North Gove Creek	×				×
b9M dulC	×				×
əbivi D mul 9 əvoð	×				×
West Plum Creek	×		×		×
bsoЯ dtuo2	×	×		×	×
North Grassland Dr.	×	×		×	×
Sandstone Central	×	×		×	×
yəllev yalley	×	×			×
Order Classification	Rodentia (Rodents: Gnawing Mammals)	Rodentia (Rodents: Gnawing Mammals)	Rodentia (Rodents: Gnawing Mammals)	Lagomorpha (Pika, Rabbits, & Hares)	Lagomorpha (Pika, Rabbits, & Hares)
Family Common Name	Mice, Rats, & Voles; Native	Pocket Gophers	Porcupines, New World	Rabbits & Hares	Rabbits & Hares
Family Scientific Name	Cricetidae	Geomyidae	Erethizontidae	Leporidae	Leporidae
Scientific Name	Varies	Thomomys talpoides	Erethizon dorsatum	Sylvilagus audubonii	Sylvilagus nuttallii
Common Name(s)	Similar mouse species including but not limited to: Western Harvest Mouse, Brush Mouse, Northern Rock Mouse, Northern Grasshopper Mouse, Etc.	Northern Pocket Gopher	North American Porcupine	Dਊsert Cottontail/ ପ୍ରୈttontail କ	က္စီountain ငိုလ်ttontail/ စာရီttall's ငွစ်ttontail/ ငိုလ်ttontail

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Common Name(s)	Scientific Name	Family Scientific Name	Family Common Name	Order Classification	Juniper Valley	lartone Central	North Grassland Dr.	South Road			North Gove Creek	Gove Knob	Notes
Northern Raccoon	Procyon lotor	Procyonidae	Raccoons	Carnivora (Meat-		×		×					Tracks, Sightings
				eating									
				Predators)									
Mexican Woodrat	Neotoma	Muridae	Rats & Mice	Rodentia					^	~ ~			Sightings, Nest. Caught in
	mexicana			(Rodents:									CSU class traps (Gove Plum
				Gnawing Mammals)									Divide).
Muskrat	Ondatra	Muridae	Rats & Mice	Rodentia			×						Sightings
	zibethicus			(Rodents:									
				Gnawing									
				Mammals)									
Striped Skunk	Mephitis mephitis	Mephitidae	Skunks	Carnivora (Meat- eaters)					^	~	×		Sightings
Western Spotted	Spilogale gracilis	Mephitidae	Skunks	Carnivora (Meat-						Ê			Identified by skull and partial
Skunk				eaters)									skeletal remains
Abert's Squirrel	Sciurus aberti	Sciuridae	Squirrels	Rodentia			×		×	^	×		Sightings; SWAP Tier 2
C				(Rodents:									
OSA				Gnawing									
AC 1				Mammals)		_			_				
Fax Squirrel	Sciurus niger	Sciuridae	Squirrels	Rodentia					~ ~	<u>~</u>	×	×	Sightings
la I				(Kodents:									
Pack				Gnawing									
et -				Mammals)					_				
🗜 🚭 st Chipmunk	Neotamias	Sciuridae	Squirrels	Rodentia					×			×	Sightings
il 4,∷	minimus			(Rodents:									
2024 f 18				Gnawing									
4				Mammals)									

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Common Name(s)	Scientific Name	Family Scientific Name	Family Common Name	Order Classification	Juniper Valley	Sandstone Central	North Grassland Dr.	sourn Koad West Plum Creek	ebivid mulq evoe	b9M dulጋ	North Gove Creek	doné Knob če če če če če če če če če če če če če	
Pine Squirrel/	Tamiasciurus	Sciuridae	Sauirrels	Rodentia	r	;		× ×) ×) ×		x Sightings, Middens	
Chickaree /Red	hudsonicus		-	(Rodents:))	
Squirrel				Gnawing Mammale)									
Rock Sauirrel	Spermophilus	Sciuridae	Sauirrels	Rodentia	×	×	×	×	×	×	×	Sightings	
	variegatus			(Rodents:								5	
)			Gnawing									
				Mammals)									
Thirteen-lined	Spermophilus	Sciuridae	Squirrels	Rodentia			×					Sightings	
Ground Squirrel	tridecemlineatus			(Rodents:									
				Gnawing									
				Mammals)									
Long-tailed	Mustela frenata	Mustelidae	Weasels	Carnivora (Meat-			×					Sightings	
Weasel				eaters)									
American Mink	Neogale vison	Mustelidae	Weasels	Carnivora (Meat-				×				Identified by skull and p	artial
				eaters)			_					skeletal remains	

APPENDIX K

SENSITIVE AREA ACCESS PROPOSAL

In 2019, DCOS staff members and DCOS volunteer naturalists collaborated on a *Sandstone Ranch Sensitive Area Access Proposal* (DCOS 2019) for portions of the west side of Sandstone Ranch that are considered especially sensitive. The proposal was approved for implementation in 2020, and the information that it contains is still relevant today. A copy of the proposal is provided in this appendix. The area under consideration is a substantial portion of the Chatfield Reservoir Mitigation Company (CRMC) Declaration of Restriction and includes Club Med (including South Club Med and South Gove Creek), Gove Plum Divide, and West Plum Creek.



1

PURPOSE

To explore ways to...

- Support wildlife and their habitat while also providing appropriate public access
- Conserve natural values and minimize disturbance to wildlife populations through multiple approaches including:
 - Thoughtful trail alignment
 - Consideration of seasonal rest periods
 - Signage
 - Habitat improvements
 - Compliance with legal protections
- Prevent disruption to life cycles and minimize disturbance to sensitive vegetation



WHAT IS HABITAT?

- Habitat consists of:
 - Food
 - Water
 - Shelter
 - Space
 - Juxtaposition...how the habitats are situated
- Sandstone Ranch is rich in habitat component diversity.
- Habitat needs are different for each species.
- Habitat edge is a desirable trait as it puts two or more habitat types within reach.









CHATFIELD RESERVOIR MITIGATION COMPANY (CRMC) DECLARATION OF RESTRICTION AND MAP

- The CRMC declaration of restriction would cover approximately 90 acres of sensitive riparian area.
- CRMC would pay \$6 M for the declaration to be placed on sensitive areas.
- With the declaration of restriction, CRMC would have access to the property to complete environmental studies and surveys.
- This would allow CRMC to reach their goal of acquiring mitigation credits for the expansion of the Chatfield Reservoir.





- Protect the richest wildlife habitat and sensitive plants on the ranch.
- Maintain wildlife populations & minimize disruptions to life cycles.
- Plan around resting, breeding, gestation, and rearing/fledging times.
- Comply with declaration of restrictions.
- Facilitate quality of experience for public access.
- Provide access for monitoring and research.
- Evaluate the impacts of public access.



WILDLIFE AND PLANTS OF **INTEREST**

- Wildlife
 - Elk

• Plants

- Mule deer
- Black bear
- Wild Turkey
- PMJM
- Avian species
- Imperiled and sensitive native species





BEAR AND DEER RANGES

- Dates of Interest
- Mule Deer
 - Rut Late October > Early December
 - Fawning Late May > Early June
- Black Bear
 - Rut Late May > Late June
 - Birthing January/February
 - Hyperphagia August > October
 - Hibernation November > May

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SANDSTONE RANCH WILDLIFE RANGES

• Turkey

• Elk

Dates of Interest

- Breeding & Courtship Mid/Late April > Late May
- Nesting > May
- Hatching > Early/Mid June



Sandstone Parcel Boundary

Black Bear Summer Concentration

Mule Deer and Mountain Lion Overall Range

Figure 5

AVIAN SPECIES

MANAGEMENT CONSIDERATIONS

- Uncommon to rare species
- Birds of Prey (Raptors)
- Migrating birds
 - Stopover resting and feeding sites
- Ground nesting birds
 - Limit ground disturbing activities
- Cavity nesting birds
 - Retain snags
- Consideration of feeding sources
 - Understory that harbors food sources
- Minimize secondary impacts from methods of pest control



AVIAN SPECIES SENSITIVE SPECIES SURVEY

American Kestrel

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American Three-toed Woodpecker Common Poorwill Cooper's Hawk Golden Eagle Great-horned Owl MacGillivray's Warbler Mountain Bluebird Northern Pygmy Owl Northern Saw-whet Owl Ovenbird Peregrine Falcon Prairie Falcon Red-naped Sapsucker Red-tailed Hawk Rock Wren Sharp-shinned Hawk Western Bluebird White-throated Swift Higher Sensitivity Higher Sensitivity Lower Sensitivity Higher Sensitivity Higher Sensitivity Lower Sensitivity Lower Sensitivity Higher Sensitivity Higher Sensitivity Higher Sensitivity Higher Sensitivity Lower Sensitivity Higher Sensitivity Lower Sensitivity Lower Sensitivity Lower Sensitivity Lower Sensitivity Lower Sensitivity Lower Sensitivity



PLANT MANAGEMENT CONSIDERATIONS

- Monitor locations of rich plant diversity
- Protect imperiled and sensitive native species
- Consider importance of trail location
- Provide public education





- Off trail use
- Creation of social trails
- Habitat fragmentation
- Disruption of wildlife space
- Noise exposure to wildlife
- Dogs presence, harassment, and waste
- Horses
- Biking
- Any access into sensitive areas will result in some level of impact.



SOLUTIONS FOR SENSITIVE AREAS

Seasonal resting periods in the WPC/GPD and Club Med locations Mid-April to June 30th.

- Protect nesting, breeding, and fledging bird activities.
- During rest periods, limit access to official use and guided activities only.
- Protect wildlife in secluded areas.
- In WPC/GPD and Club Med areas, consider restricting dog access due to their greater disturbance to wildlife.
- Consider different access requirements to national forest trails inside the sensitive areas.



ADDITIONAL SOLUTIONS

- Interpretive signage; promote education and leave no trace ethics.
- Balance recreational opportunities with strategies to minimize impacts at critical times in the richest ecosystems and habitats.
- Utilize a phased approach to provide public access.
- Enforce stay the trail and other rules and regulations.
- Plan hiking trails on established ranch roads and trails where possible.
- Improve wildlife habitats.
- Remain adaptable and responsive to monitoring data



IMPROVEMENTS TO WILDLIFE HABITAT

- Habitats can be improved to increase wildlife usage and minimize disturbance. Methods include:
 - Forest management
 - Consider transitioning some areas of non-native plants back to native grasses and forbs.
 - Riparian assessments and improvements
 - Weed management
 - Shrub plots/ food plots/ mast plantings
 - Screening to reduce visual/auditory impacts
 - Improvement of breeding habitat for birds



- Provide only guided access at all times
- Highest concentration of sensitive breeding bird species on the ranch
- Ranch's most remote, pristine habitat
- Safety concern for deadfall of tussock moth trees.







WPC/GPD

- Seasonal resting period crucial between April 15th to June 30th
- Valuable riparian area in WPC
- Important spring life cycle area for plants and wildlife
- Sensitive birds species nesting
- Additional benefits of this rest period include... (Next Slide)













Dark Sky Over Sandstone Ranch During the Perseid Meteor Shower

Sandstone Ranch Open Space is a special place to visit, whether in the daytime for a casual hike, an educational class, a mountain bike adventure, or a horseback ride or in the evening to enjoy the night sky from the Astronomical Education Center, which is currently under development.

This unprocessed photo taken by Michael Seal on August 13, 2023 during the Perseid Meteor Shower captures a portrait of Jupiter and a meteor crossing the sky above Sandstone Ranch. The photo demonstrates how many stars are visible to the naked eye above the property and highlights the reason why the Dark Sky designation is so important for Astronomy research and public enjoyment at Sandstone Ranch.

Leave No Trace Program COSAC Agenda Item

SUBJECT:	Leave No Trace Program on Open Space Properties
CC:	Kirk Inderbitzen, Ranger Supervisor Scott McEldowney, Asst. Director of Open Space and Natural Resources
FROM:	Lindsay Williams, Land Management Specialist/Ranger
THROUGH:	Dan Dertz, Director of Open Space and Natural Resources
то:	County Open Space Advisory Committee
DATE:	March 7, 2024

<u>SUMMARY</u>

Staff is seeking a recommendation from the County Open Space Advisory Committee (COSAC) on a partnership with Leave No Trace (LNT). The purpose of the partnership would be to implement and promote an educational outreach program based upon the seven (7) principles established by LNT. The LNT principles are nationally recognized and align with open space rules and regulations. Having a nationally recognized set of principles should make it simple for visitors of open space properties to understand our rules and values. The seven (7) principles of Leave No Trace are as follows:

- Plan ahead and prepare
- Travel on durable surfaces
- Dispose of waste properly
- Leave what you find
- Minimize campfire impacts
- Respect wildlife
- Be considerate of others

Being a partner with LNT may also provide a motivational opportunity to staff, volunteers, visitors, and the community by pursuing LNT Gold Standards on our properties and with our programs. Staff have researched and visited multiple Gold Standard sites in the surrounding area to include Roxborough State Park and the City of Colorado Springs. These sites are locally and national recognized as being pristine places for people to visit.

BACKGROUND

As a land ethic LNT helps instill a better understanding and appreciation of open space and natural resources (Goal OS 5 of the 2030 PTOS Master Plan). Leave No Trace helps promote positive behavior from open space users, encouraging people to stay on trail, pick up trash and dog waste, and more (Goal OS 3 of the 2030 PTOS Master Plan). These behaviors align with our regulations that staff already enforces, allowing staff more opportunities to educate users when making contact. LNT also adheres to the Sales and Use Tax by educating open space users as to why it is

important to protect and maintain trails, open spaces, wildlife habitat, and historic resources. Hosting LNT workshops provides staff the opportunity to educate school groups and volunteers getting the next generation interested in the outdoors. Striving for and accomplishing LNT Gold Standard will further promote the awareness and importance of stewarding our open spaces, keeping them healthy and sustainable for the future.

In addition, our pursuit of Gold Standard will create a cohesion between land managers in the county, as Roxborough and Castlewood Canyon State Parks have this designation. As a larger picture this also corresponds to the Colorado Tourism Office's Care for Colorado Leave No Trace Principles campaign. With consistent messaging and education from multiple agencies, visitors of Douglas County open space will be equipped with the knowledge needed to be prepared to recreate sustainably and responsibly.

Below is a list which shows LNT Gold Standard sites in other local jurisdictions:

- Roxborough State Park
- Castlewood Canyon State Park
- City of Colorado Springs (16 open spaces designated)
- Jefferson County (27 open spaces designated)
- Highline State Park
- McInnis Canyon and Dominguez-Escalante National Conservation Areas
- Waterton Canyon
- Barr Lake State Park

Below is a table with the estimated cost of pursuing the Gold Standard Designation:

Leave No Trace Membership	\$1,000
Level 2 instructor course for 2 staff	\$1,050 per
Level 1 instructor course for 3 staff	\$25-\$185 per
Gold Standard application fee	\$200
Signage	Included in regular sign
	maintenance
Time to train staff and volunteers (2 hours planning, 1 hour	\$25-\$50/class
presentation/class)	
Time for workshops (1 hour planning, 30 min presentation/class)	\$25-\$50/class

COSAC RECOMMENDATION

Staff is requesting a recommendation to either move forward with joining LNT or abandoning these efforts. If COSAC recommends moving forward with the program, staff plans to use funds that are already allocated towards operations and maintenance.

LEAVE NO TRACE



WHAT IS LEAVE NO TRACE?

- Started in 1987 as a program within federal land agencies
- In 1994 Leave No Trace, Inc. was developed
- In 2007 they started to partner with other land agencies





THE 7 PRINCIPLES

Principle one: Plan ahead and be prepared
Principle two: Walk and Camp on durable surfaces
Principle three: Dispose of waste properly
Principle four: Leave what you find
Principle five: Minimize campfire impacts
Principle six: Respect wildlife
Principle seven: Be considerate to others

PRINCIPLE ONE

Plan ahead and be prepared/Know before you go

- Have what you need
- Have a backup plan
- Know the regulations
- Visit in small groups



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PRINCIPLE TWO

Walk and camp on durable surfaces/Stick to the trails and camp overnight right

- Know your durable surfaces
 - Rock, gravel, dry grass, or snow/ice
- Use existing trails
- Stay on trail





PRINCIPLE THREE

Dispose of waste properly/Trash your trash

- Pack it in and pack it out
- Pack out food scraps
- Pick up dog poop and pack it out





PRINCIPLE FOUR

Leave what you find

- Don't pick up rocks
- Don't carve into trees
- Don't pick flowers
- Be respectful of artifacts and fossils
- Leave only footprints and take only photos





PRINCIPLE FIVE

Minimize campfire impacts/Be careful with fire

- Keep fires small
- Use established rings, fire pans, or mound fires
- Burn all wood and coals
- Completely extinguish the fire



PRINCIPLE SIX

Respect wildlife

- Observe wildlife from a distance
- Never feed wildlife
- Store food properly
- Control pets
- Don't pick up wildlife



PRINCIPLE SEVEN

Be considerate to others/Share our trails and manage your pet

- Know when to yield to other users
- Respect other visitors
- Avoid loud noises like speakers






GOLD STANDARD AND ITS

MARCE Esignation recognizes public lands implementing the highest standard of onsite Leave No Trace Programs

- Staff and volunteers will receive training
- Implement Leave No Trace skills and ethics into programs, outreach, and education
- Gold Standard will bolster our partnership with other land managers in the county
- Leave No Trace promotes the awareness and importance of stewarding our open spaces
- Leave No Trace encourages positive behaviors of visitors that align with our rules and regulations

WHERE TO GET MORE INFORMATION

- LNT.org
- There is a 45-minute free online training

