FINAL REPORT
2019 Small Grants Program
Boulder County Parks & Open Space

PLANT INVENTORY: RED HILL STUDY AREA

Including portions of Heil Valley Ranch and Trevarton Open Space

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ABSTRACT

The objective of this project was to develop a better understanding of the plant species diversity of the Red Hill Study Area ('RHSA' or 'Red Hill'), part of the larger North Foothills Open Space, Boulder County, CO. The RHSA encompasses portions of Heil Valley Ranch and the Trevarton property. The Colorado Natural Heritage Program (CNHP) has designated Red Hill as a Potential Conservation Area (PCA) with the highest ranking (B1) of "Outstanding Biodiversity". In 2019, a season-long series of field surveys was conducted at RHSA. This approximately half section focus area—which includes the namesake Red Hill geologic feature—was assigned by Parks & Open Space staff for this study. Each field day or event consisted of a set of meandering transects covering a portion of this focus area, or in some cases, adjoining or nearby areas. A total of 350 species representing seventy families was identified. The locations of a number of infrequent to rare species were documented. These include: *Asclepias stenophylla ,Carex oreocharis*, *Claytonia rubra*, *Crepis atribarba*, *Helianthus rigidus*, *Lactuca ludoviciana*, *Linaria canadensis*, *Orobanche multiflora*, *Physaria belli*, *Triodanis leptocarpa* , and *Vicia ludoviciana.*

INTRODUCTION

The Red Hill Potential Conservation Area shown in Figure 1 (outer/larger, red-lined loop), is located north of the City of Boulder and south of Lyons along the west side of Highway 36 (roughly, across from the T-intersections with St. Vrain and Nelson Roads). Red Hill was one of three Potential Conservation Areas with outstanding biodiversity significance identified in the 400+ page CNHP report, Survey of Critical Biological Resources in Boulder, County, Colorado, 2007-2008 (CNHP, 2009, https://cnhp.colostate.edu/wp-

content/uploads/download/documents/2009/BoulderCoReportFINAL_6-26-2009.pdf)). This ten square-mile area is located within the foothills transition zone and bisected by the unique Front Range Hogback system [see maps on pp.49 & 124 of this report, plus detailed discussion pp.118-124]. The diverse geology of the area contributes to its botanical interest and includes primarily sandstones with smaller areas of limestone, claystone, and siltstone. Geologic formations present include Fountain, Lyons, Ingelside, Lykins, Morrison and Dakota (CNHP, 2009, p. 118). The perched or high valley grasslands—which support prairie dog colonies—have small areas of calcareous subsoils. Accordingly, the major plant community types—conifer woodlands, shrublands, and grasslands—are influenced by the underlying geologic bedrock (CNHP, 2009, p. 118). CNHP has reported occurrence records of five globally imperiled (G2/G1) plant community types and two globally vulnerable (G3) plant community types:

State Scientific Name	State Common Name	Global Rank	State Rank
Hesperostipa comata Colorado Front Range Herbaceous Vegetation	Great Plains Mixed Grass Prairie	G1G2	S1S2
Cercocarpus montanus / Hesperostipa comata Shrubland	Mixed Foothill Shrublands	G2	S2
Pinus ponderosa / Cercocarpus montanus / Andropogon gerardii Wooded Herbaceous Vegetation	Foothills Ponderosa Pine Scrub Woodlands	G2	S2?
Populus angustifolia / Salix irrorata Woodland	Foothills Riparian Woodland	G2	S2
Cercocarpus montanus / Hesperostipa neomexicana Shrubland	Foothills Shrubland	G2G3	S2S3

Cercocarpus montanus / Achnatherum scribneri Shrubland	Foothills Shrubland	G3	S3
Hesperostipa neomexicana Herbaceous Vegetation	-Great Plains Mixed Grass Prairie	G3	S3

The 740-acre Trevarton property (much of which is captured within the inner/smaller red-lined loop in Fig. 1) was acquired by BCPOS in 2017. That recent acquisition, plus the known biological significance of the greater area, is responsible for prioritizing a plant inventory study here in the 2019 Small Grants Program. The primary objective of this field study effort was to develop a list of the species present at Red Hill. The locations of species of interest, including those of Special Concern, were also to be documented. The results of this field study can be useful in a number of ways, including: A) developing a better, baseline floristic understanding or characterization of the area; B) identifying Species of Special Concern that should be monitored and/or afforded special protection; C) prioritizing and informing land stewardship activities (based on plant species identified, quality, rarity, life cycle, etc); D) informing recreational planning, including trail routes; E) identifying areas worthy of additional study.

METHODS

Survey areas were primarily located within a roughly 300-acre focus area containing the namesake, 'Red Hill', along with some adjoining and nearby areas (See Fig.2, Overview). Again, this focus area was selected by BCPOS staff for its diverse geologic substrates and multiple vegetation communities found in a relatively small area within the larger PCA (See

Fig. 3). Approximately a third of the survey effort was carried out in areas to the east and south (Survey events 4, 6, 10, 11) in the broader Potential Conservation Area (See Figs. 4 & 5). Ten days of single-person inventory effort in the field were carried out from the end of April to the middle of September. A BCPOS staff person participated on September 11. For most event's/day's survey area, a set of roughly parallel, meandering routes was conducted to identify as many species of plants as possible. The meandering transects generally ran north-south/south-north, with east-west/west east routes used on a couple days (Events 5 & 9). The areas covered by each such event, are shown in Figures 3 -5. Narrative descriptions of the area surveyed in each event are provided at the end of Appendix 1.

On the 10th day of survey, two disjunct areas were covered. These are identified as Event 10 and Event 11. Event 10 included a loop that began and ended on the north side of the gridded (set of meandering transects) area. Event 11 was a brief survey of drainage areas and an abandoned roadway next to Hwy. 36 near the east entry gate north of St. Vrain Road. Only species not noted in Events 1-10 or that are relatively uncommon were recorded. In all other survey events, all species encountered were recorded. Throughout this survey effort, GPS locations of uncommon-to-rare plants—some of which are CNHP- tracked species (i.e., Species of Special Concern)—as well as other occurrences of interest, were recorded. GPS locations were largely determined with a Garmin GPSMAP 66st unit. For a few locations, a smart phone was utilized on location or, at a later date, approximate locations were determined using Google Maps on a desk top computer.

Figure 1. Red Hill Potential Conservation Area (Delineated w the outer or larger, solid red line loop. The RHSA is approximated by the inner, smaller, red-lined loop)

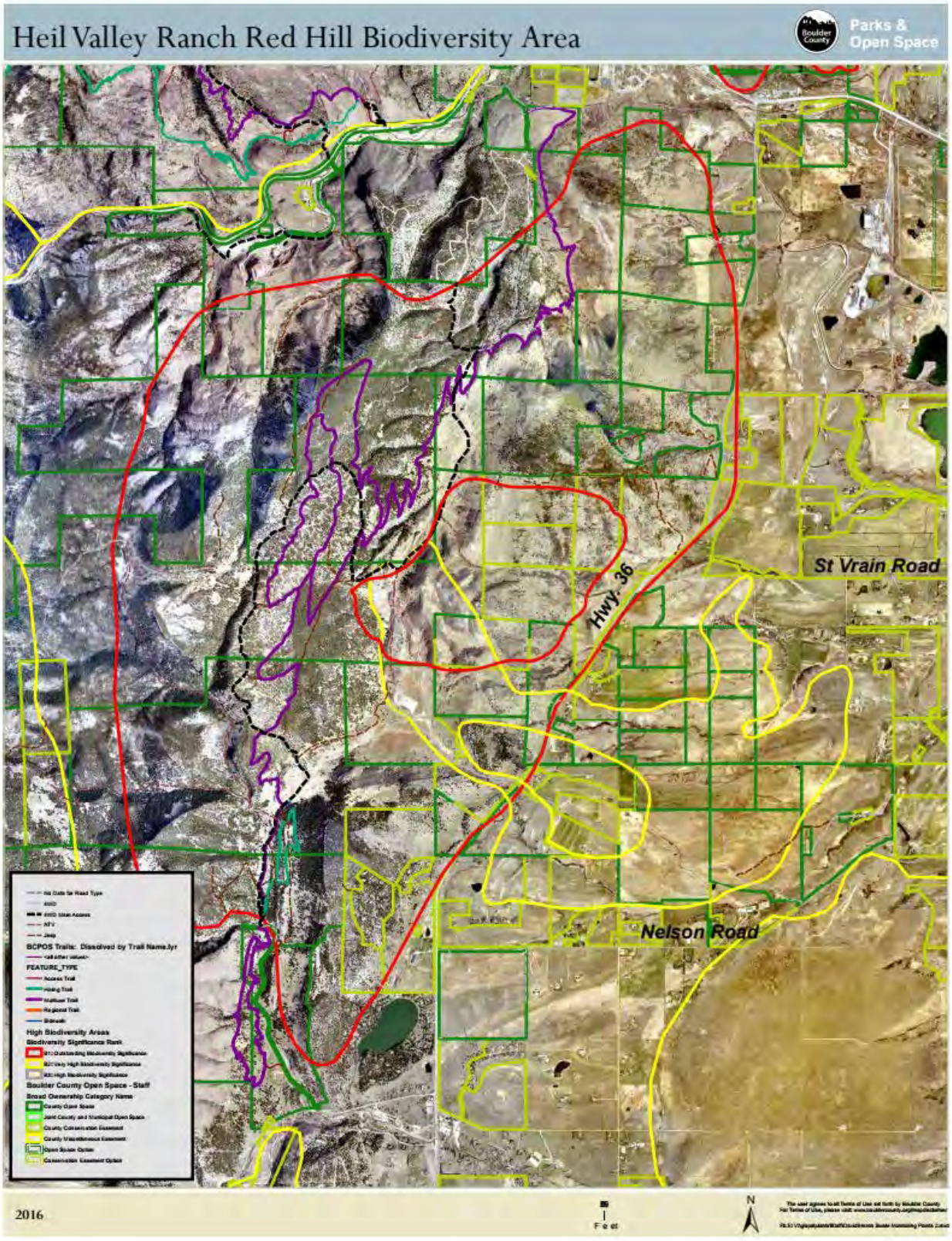

Figure 2. Overview of survey events. Survey areas were primarily located within a roughly 300-acre focus area containing the namesake Red Hill along with some adjoining and nearby areas.

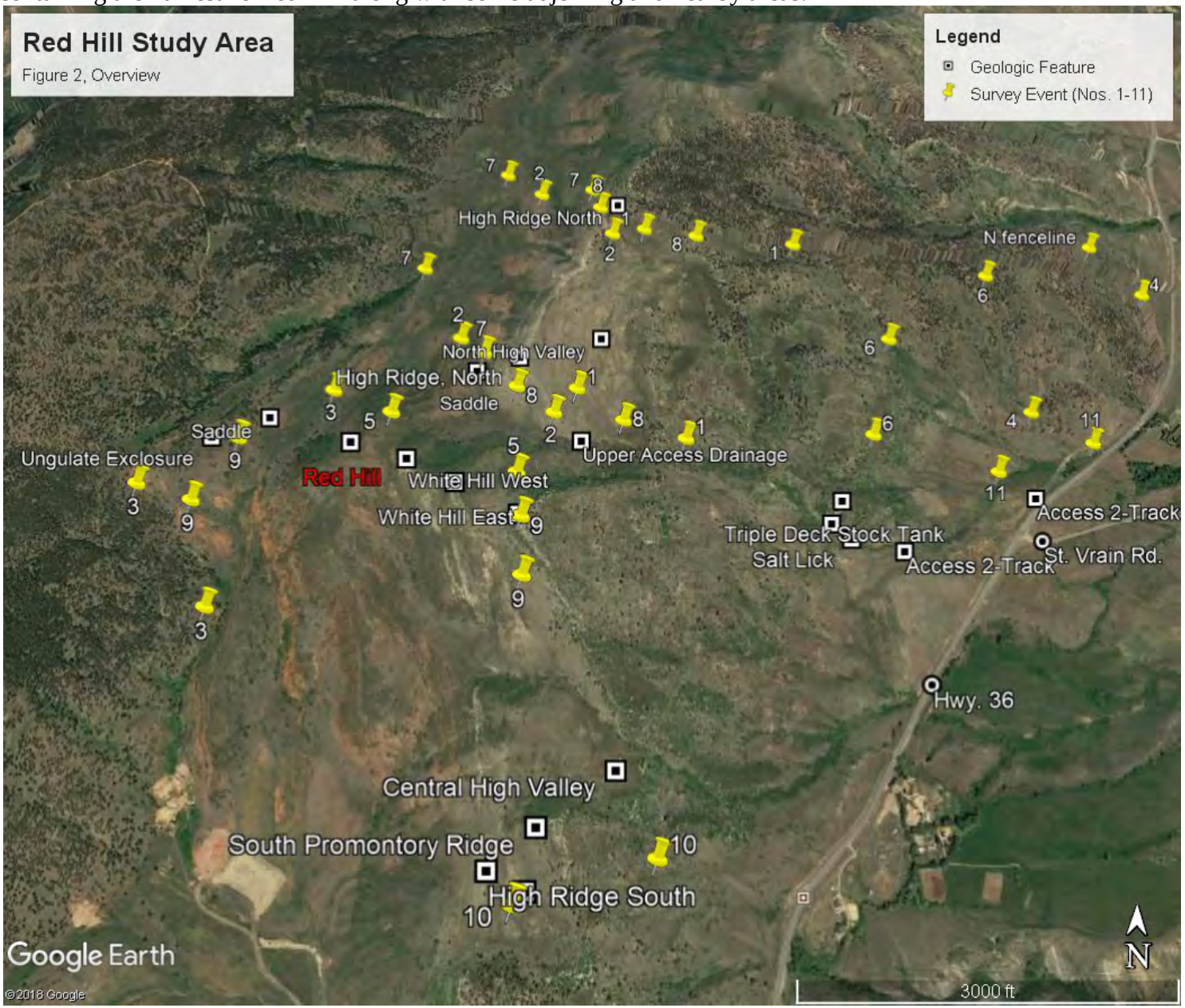

Figure 3. Survey events 1**,** 2, 3, 5, 7, 8, and 9. Areas were selected for their diverse geologic substrates and multiple vegetation communities found within a relatively small area within the larger PCA.

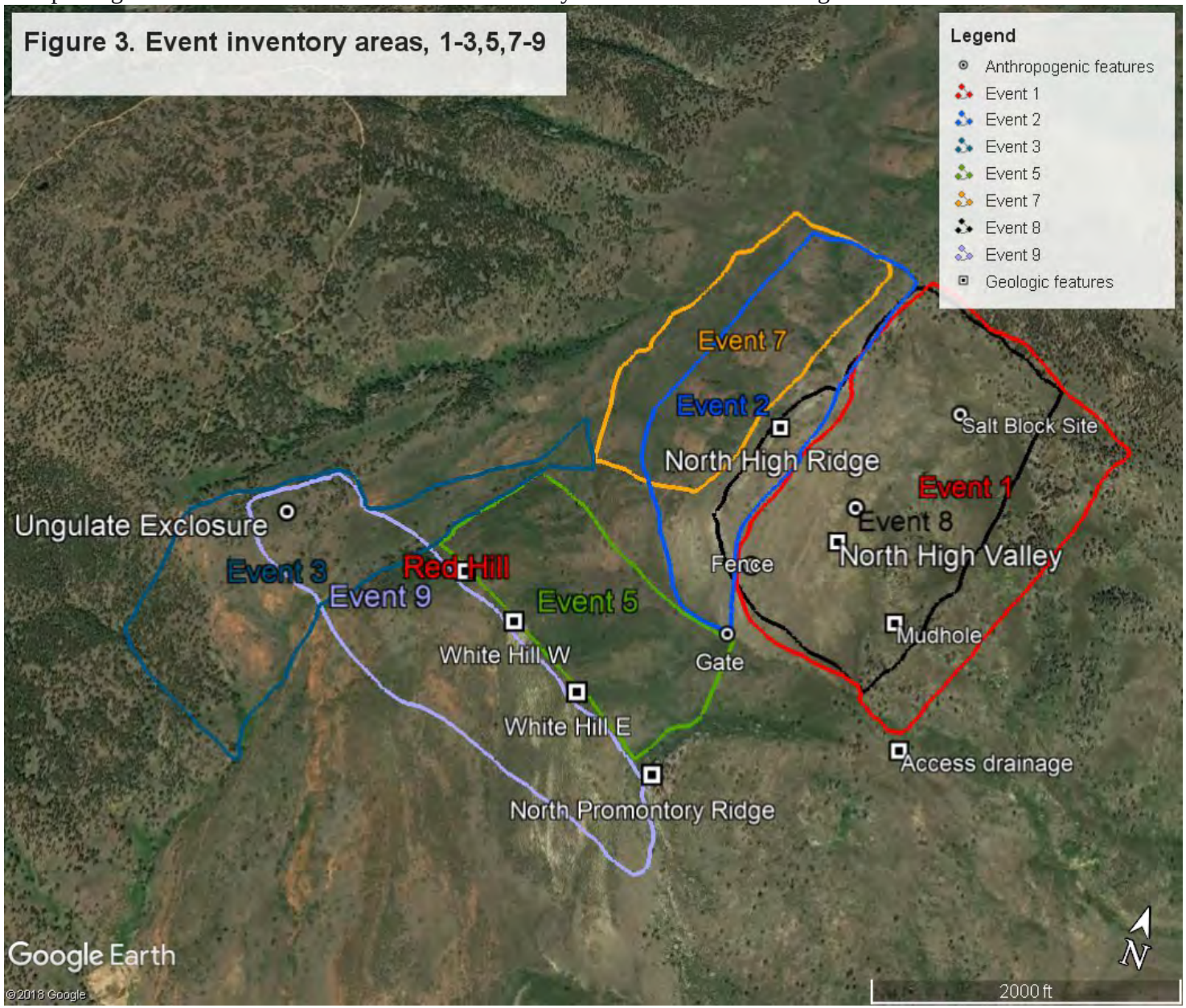

Figure 4. Survey events 4, 6, and 11. Approximately one third of the survey effort was carried out to the east and south of the broader PCA.

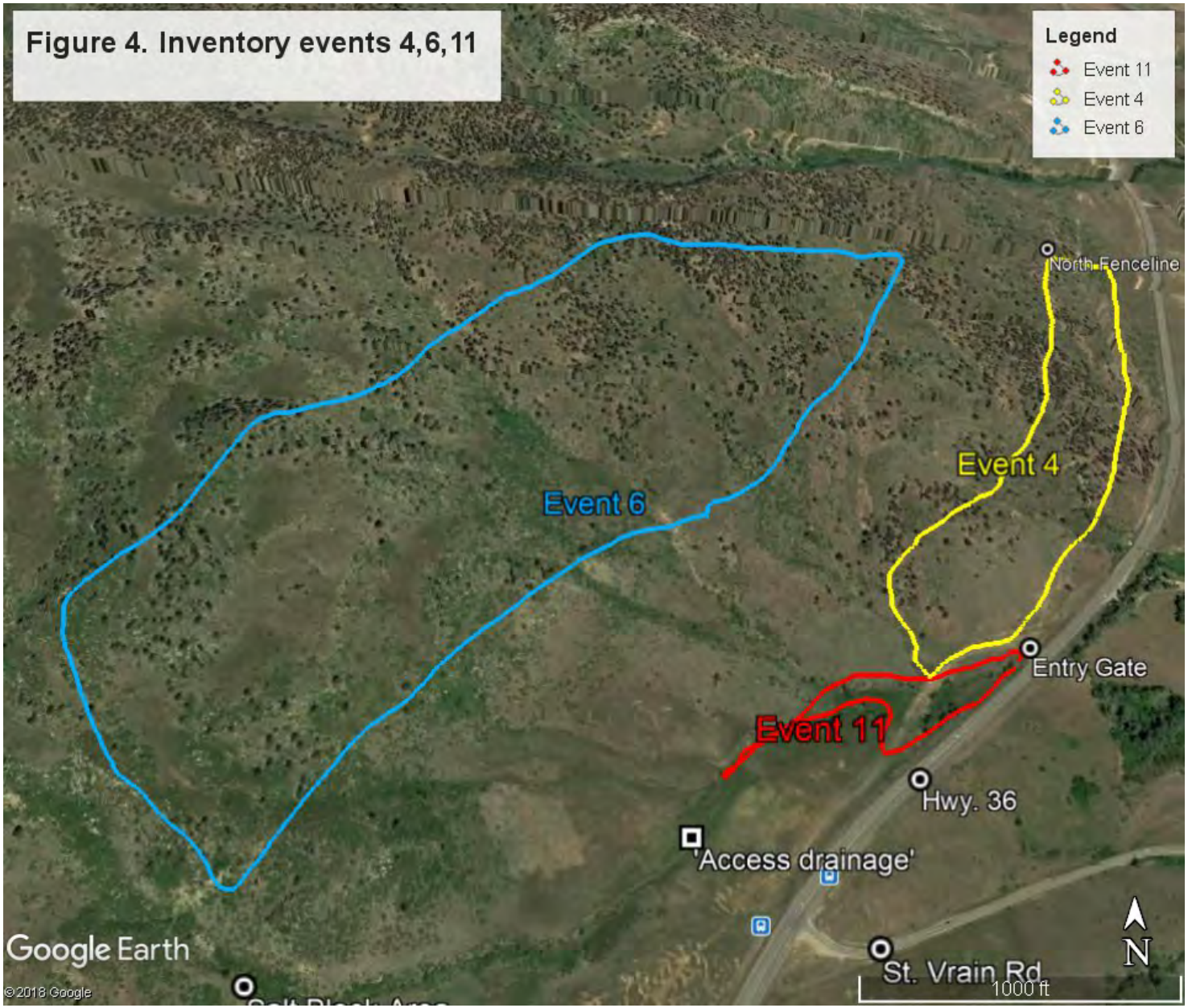

Figure 5. Survey event 10, conducted in a grid and in a loop.

RESULTS

A total of 350 species representing seventy families was identified. Thus, this relatively small area has roughly 23% of the 1,538 species documented in Boulder County in 1995 (Weber, W. 1995. Checklist of Vascular Plants, Boulder County, Colorado). The locations of a number of uncommon species were documented. Native species for which there are only a few herbarium accessions from Boulder County—or none at all—include: *Carex oreocharis* (4), *Claytonia rubra* (1), *Crepis atribarba* (1), *Helianthus rigidus* (3), *Lactuca ludoviciana* (4), *Linaria canadensis* (2), *Orobanche multiflora* (0), *Triodanis leptocarpa* (4), and *Vicia ludoviciana* (4). Many of the *Claytonia* locations had dozens or hundreds of plants. One local endemic, *Physaria belli, was* documented at a number of locations . This survey documented the following species tracked by the CNHP (i.e., Species of Special Concern): *Asclepias stenophylla*, *Carex oreocharis,Claytonia rubra*, *Physaria belli*, and *Triodanis leptocarpa*. Species that are typically infrequent, but found here in abundance or in large colonies are *Rhus glabra*, *Celtis reticulata*, and *Helianthus rigidus ssp. Subrhomboideus.*Complete survey products of this project are detailed in the Appendices, namely:

Appendix 1	Plant species list
Appendix 2	A. Location and abundance details for species of interest [internal version]
	B. Summary version of the preceding, lacking GPS coordinates [public and internal versions]
Appendix 3	Images: plant occurrences of interest

DISCUSSION

GENERAL OBSERVATIONS

As previously indicated by the Colorado Natural Heritage Program's county-wide survey (CNHP, 2009) and supported by BOCO POS staff choice of this site as a priority topic for the 2019 Small Grant Program, the Red Hill Study Area is of high, botanical significance. The value of this protected area is significantly boosted by the large expanses of protected lands in all directions.

The number of species found in this study—approximately 350—is fairly similar to that of other comparable, protected areas (Table 1). For example, in recent years, this author has found similar levels of species richness at other sites along the Northern Front Range (acreages vary from 160 to 1225)

However, the number of native species of interest at Red Hill, including Species of Special Concern and notable occurrences (large numbers or area of coverage of infrequent species), number 17, whereas at the other sites listed, such number in the zero to three range. In fact, at

Table 1. Species richness comparison, other protected areas

Site	County	No. of Species	No. species of interest	Surveyed acreage	Effort (days)
Colp Parcel	Boulder	270	3	160	5
Lindsay-Zaharias	Boulder	214	2	~160	~4
Crescent Meadows[+]	Boulder	363	3	685	3
Hildebrand Ranch	Jefferson	379	3	1000	10
Pattridge Park	Jefferson	252	0	425	5
Hidden Mesa	Douglas	343	2	1225	5

[+]Eldorado Canyon SP.

Red Hill, they number greater than those found at all the other sites in the table above—COMBINED). [Note however, that the intensity of the survey effort (in 'person-days') at these other sites averaged lower than that of the current study]

NATIVE PLANTS OF INTEREST

Some 17 plants or occurrences of interest were documented (See Appdx. 2). For many of these species, the northern Colorado Front Range represents the edge of their range. Accordingly, in most cases their Conservation Status is globally 'secure' (G5) or 'apparently secure' (G4). However, it also turns out than in most cases their state conservation status has not been assessed ('SNR').

Species of Special Concern

Slimleaf milkweed (*Asclepias stenophylla*, G4-5,S2) is primarily a central Great Plains species. It has been documented with herbarium accession from only about eight, Front Range and plains counties in Colorado. The Front Range populations are apparently disjunct. At Red Hill it

was only found on the dominant, east-facing slope adjacent to Highway 36. Typically, single plants were encountered, usually in full sun to partial shade and on heavily vegetated cobble fields. At a couple of occurrences, more than a dozen plants were found. The majority of plants seen did not flower; fewer produced fruit.

Grassy-slope sedge (*Carex oreocharis,* G3S2) is found in Arizona, Colorado, Wyoming, and New Mexico, apparently in five disjunct population areas. It is found in a number of Front Range counties from the NM to the WY border. However, there are but four herbarium accessions from Boulder Co and only eleven secured statewide. At Red Hill it was encountered at only one location—the lower portion of the north end of the west facing slope of 'North High Ridge'.

Redstem spring beauty (*Claytonia rubra*, G5S1) is found in Boulder, Jefferson, and Douglas counties—the southeast extreme of its range. Other disjunct populations are found in WY, MT, and SD. It is more widely and contiguously distributed in most western states to the west of the continental divide (See eFloras.org). Thus, globally, it's conservation status is secure (G5), but it is rare (S1) in Colorado with very few herbarium accessions. At Red Hill however, it is abundant with thousands of plants observed this past season. It was always found in shaded areas, under ponderosa pine or a various of shrub species, in a variety of aspects (N, S, E, &W-facing slopes).

Front Range twinpod *(Physaria belli*) is the only local endemic seen at Red Hill. It is found in the outer edge of the Front Range in Larimer, Boulder, and Jefferson counties. On certain

substrates (exposed sedimentary bedrock), however, it can be found somewhat reliably and is relatively common at Red Hill. Overall then, both it's global and state conservation status is set in the 2-3 range. It was found at a number of locations, mostly on the flanks of Red Hill and White Hill and the upper side slopes of the 'access drainage', generally in somewhat open areas or in partial shade amongst shrubs or sometimes, pines.

Slimpod Venus' looking-glass, (*Triodanis leptocarpa*, G5?S1) is an annual plant found in most of the Great Plains states. It is treated as rare or a Species of Special Concern in Colorado, Iowa, Minnesota, and Wyoming. Larimer, Boulder, and Jefferson counties represent a disjunct population area at the central, southwest extreme of it's range (From MT to TX to IN). There are very few herbarium specimens procured from Colorado—4 from Boulder Co. and 8 statewide. It was found at one location along the 'access drainage' about 250 meters upslope from the (former) salt block area. As a small plant largely no longer in bloom when discovered, the population size at this location was difficult to discern.

Other species of interest

A few dozen specimens of **slender hawk's-beard**, *Crepis attribarba* have been collected in Colorado, but only one from Boulder Co. Several plants were found on the north flank of Red Hill among mountain mahogany. It is primarily a west slope species, with Douglas to Larimer counties representing the eastern extreme of its Colorado range. It is found in many western states from western NE to southern NV to WA.

Slimleaf panicgrass, *Dichanthelium linearifolium*, was found in cracks and crevices in exposed bedrock, especially in both the North and South 'Promontory Ridge' geologic features. [A more common species, few-flowered panicgrass (*Dichanthelium oligosanthes*) is also present at Red Hill, sometimes found in the same crevice with *A. linearifolium*. It is also frequently found around the edges of largely embedded boulders and cobbles.] There are nearly three dozen herbarium specimens of *D. linearifolium* collected in Colorado, the majority of them from Boulder Co. This species is found across much of eastern and central USA, with CO, NM, and WY representing the western extreme of its range. Most of these populations appear to be disjunct from those to the east.

Stiff sunflower, *Helianthus rigidus ssp. subrhomboidea* (also, *H. pauciflorus ssp subrhomboidea*), is relatively infrequent in the Northern Front Range. It's native range includes most of the plains states. In Colorado, it is found along the Front Range and in southwestern counties. There are very few collections from Colorado—15 statewide, three from Boulder Co. At Red Hill, it was found in a few places, all on the east and west facing slopes of North High Ridge. Two large colonies were found on the east slope. One of these was the largest in this investigator's experience.

Biennial lettuce, *Lactuca ludoviciana*, is found in the northern Front Range and plains of Colorado. Boulder and Jefferson counties represent the SW extreme of its native range. Otherwise, it is widespread in much of the Great Plains. It has been collected only about 20 times in Colorado, with 4 herbarium accessions from Boulder Co. A few plants were found at one location in the 'access drainage'.

Blue toadflax, *Linaria canadense* (Also *Nuttallanthus texanus*) is found in Colorado Front counties. (This investigator has also seen it in Baca Co.) There are few collections from Colorado—only 20 statewide and 2 from Boulder Co. This annual plant is found in many states from Florida to Washington. Typically found in poorly vegetated areas, it was found at a few places on the dominant, east facing slope at Red Hill (largely within 100 m of the 'access drainage'.

Many-flowered broomrape, *Orobanche multiflora* (G5S?), is not a tracked species, but there are only 36 herbarium specimens collected from Colorado—none from Boulder Co. Only three specimens were seen at Red Hill—at the southeast flank of Red Hill and at a location between Red Hill and the ungulate exclosure at the far west side of the study area. It is also found in KS, MO, NM, UT, and WY.

Louisiana vetch, *Vicia ludoviciana*, is found in southern states from Florida to California (although rare in the more eastern states). Boulder, Larimer, & Jefferson Co. populations are at the north extreme of its range—along with northern California. There are only four herbarium accessions form Boulder Co. It was prevalent in largely open to partially shaded areas on the lower portion of the dominant, east facing slope, north of St. Vrain Road.

[The following infrequent species listed in Appendix 2, are not further developed here: *Achnatherum scribneri, Hedeoma hispida, Linum pratense, Rhus glabra*]

WEEDS

Weed infestations at Red Hill are relatively low and generally unremarkable. However, some annuals, such cheatgrass species (*Anisantha tectorum, Bromus japonicu*s) and prickly lettuce(*Lactuca serriola*) are widespread and often abundant. The most common biennial species are common mullein (*Thapsus arvensis*), poison hemlock (*Conium maculatum*), and catnip (*Nepeta cataria*). The most common perennial, nonnative species was white horehound (*Marubium vulare*); but individual infestations are relatively small and isolated and thus, not easily managed. The only List A noxious weed species encountered was Mediterranean sage (*Salvia aethiopsis*). The most serious infestation of this species was in the vicinity of the series of three 'triple-decker' small stock/wildlife-tanks on the north side of the 'access drainage'. The other location only had a few rosettes (which were dug up), with no indication of any plants going or having gone to seed (GPS coordinates for both locations provided in Appdx. 2).

The following areas merit attention:

1. The lower, western slope of the 'North High Ridge', especially the middle portion, north-south wise, is the largest area with a high level of weed infestation. This area is adjacent (to the east) to the two-track that passes along the saddle just west of Red Hill and then heads northward. Main species of interest are musk thistle (*Carduus nutans*), common mullein, catnip, Canada thistle (*Cirsium arvensis*) and cheatgrass. In some areas (especially the north and south ends of this lower slope, these weeds of interest tend to be concentrated in small patches of shrubs.)

2. The triple-decker stock tank vicinity has white horehound and Mediterranean sage, along with a number of minor weeds. Given the overflowing water and wildlife traffic, this area deserves ongoing monitoring.

3. Single occurrences of sweetbriar rose (Rosa eglanteria) and bouncingbets (Saponaria officinalis) for Events 1-10 were found in open areas at the north end of the “North High Valley’. GPS coordinates are provided in Appendix 2.

4. The draina ge running south from the west foot of Red Hill (the drainage starts at the saddle that the two track crosses east-west on) has scattered areas of poison hemlock and Canada thistle.

5. The meadow at the top of the ‘access drainage’ has poison hemlock growing in isolated shrub patches. (This is between North High Ridge (to the north) and White Hill (to the south).

CHEATGRASS CONTROL WITH INDAZIFLAM: CONSIDERATIONS CONCERNING NATIVE PLANTS

With the recent registration of Esplanade (Bayer) for use in non-rangeland, vegetated non-crop areas, there’s has been a dramatic increase in the use of this pre-emergent herbicide in western states for the control of cheatgrass specis and other annual, cool season grasses. The active ingredient, indaziflam, has the potential to inhibit any seed germinating at the top of the soil profile. Some species, however, are not susceptible. For example, the herbicide label includes a listing of tolerant native grasses. Experience to date has shown that some potential targets are not controlled. These include redstem filaree (*Erodium cicutarium*), western salsify (*Tragopogon dubius*), and false salsify (*Podospermum laciniatum*) (personal commuication,

Derek Sebastian, 2019). Boulder County POS experience indicates that woolly plantain (*Plantago patagonica*) is tolerant (personal communication, Therese Glowacki, 2019).

Note that Esplanade has been used at Red Hill in the Trevarton Parcel near Highwas 36 (just SE of the salt block area at the base of steep portion of the 'access drainage'.) This area was not surveyed in this study.

Lacking specific experimental research evidence or anecdotal observations to the contrary, we can expect that the more a species is dependent on seed germination for population maintenance, the more likely indaziflam will have a significant, negative impact. Thus, until proven otherwise, we expect Esplanade will also control or suppress native annuals, biennials, and perennials. The effect is probably not significant with respect to many native perennials, as only a small percentage of their seeds will germinate in a given year and their seeds are generally long-lived. The exception here are short-lived, native perennials, including monocarpic species such as Eriogonum/Pterogonum alatum. Note that Esplanade has been shown to be useful in reducing populations of Dalmatian toadflax (*Linaria dalmatica*), a List B noxious weed. It is a short-lived perennial, that despite being rhizomatous, is relatively dependent on reproduction via seed.

We should expect detrimental effects on the populations of the following general categories of herbaceous, native plants:

~ Biennials, such as Cirsium canescens (sometimes a monocarpic perennial)

~ Annual species. Many of these, of course, are early seral or pioneer species that we aren't

particularly concerned about. But, some do not necessarily require some bare ground or disturbance in order to germinate. Some are uncommon or even local endemics. Consider species such as Linaria texensis, Linum pratensis, and Triodanis species, all of which are found at Red Hill. And, there are some early seral species such as Hedeoma hispida which are uncommon.

~ Short-lived perennials, such as *Penstemon* species, *Cirsium undulatum* and *ochrocentrum*, and monocarpic species such as *Frasera speciosa* and again, *Eriogonum alatum*.

The reason that Esplanade is such a powerful tool is that one application lasts two to three years and annual species, such as cheatgrass, generally have seeds of short viability. In general, the same applies to native annual species and thus, there is reason for concern. On the other hand, in cheatgrass infested areas, any other species in the seed bank will have difficulty having success. In the mid-term, any of the particularly susceptible categories—annuals, biennial, short-lived perennials—found in a cheatgrass infested area, may not persist anyway. In such cases, indaziflam would in effect, might only contribute to a faster rate of population reduction or localized extinction.

Some land management agencies are treating large areas with aerial applications. At Red Hill the need for such an approach is doubly apt because of the difficulty of the terrain. However, *Claytonia rubra*, a Species of Special Concern, can be found growing under isolated patches of shrubs in otherwise open areas (particularly, the north end of the lower part of the west slope of ‘North High Ridge). The shrubs will intercept some of the application; but indaziflam has a

long half-life and is resistant to degradation by ultraviolet light. Thus, it is reasonable to suggest that much of the indaziflam will make its way to the soil.

To summarize the preceding with respect to the potential use of Esplanade:

~ The duration of it's effectiveness makes it feasible to consider large scale treatments

~ Like any other herbicide treatment, there are undesirable nontarget effects and care needs to be taken to insure that the benefits outweigh the negative outcomes in native plant communities

~ Because dense cheatgrass infestations ultimately result in long-term and sometimes disastrous ecological effects, its control is often necessary—the benefits DO outweigh the detrimental effects

~ Its use can be expected to result in significant declines or even local extirpation of some native species of concern or value (i.e., those that are not early seral).

APPENDICES

REFERENCES & CITATIONS (Appendices 1, 2)

[These references were also consulted in the development of the discussion section of the preceding narrative]

Ackerfield, J. 2015. *Flora of Colorado*. BRIT Press, Fort Worth, TX.

Biota of North America Program, http://bonap.net (county-level range maps).

Colorado Department of Agriculture, Noxious Weed Program.
https://www.colorado.gov/pacific/agconservation/noxious-weed-species

Colorado Natural Heritage Program.
https://cnhp.colostate.edu/ourdata/trackinglist/vascular_plants/ (search application for tracked species).

Culver, D. R. & J. M. Lemly. 2013. Field Guide to Colorado's Wetland Plants. Vision Graphics, Loveland, CO. (plant identification, wetland indicator status)

Freeman, C. ca. 2009 (unpublished). *Chenopodium key.*

Nature Serve. http://explorer.natureserve.org/ (For species not tracked by CNHP, source for conservation status ranks)

Nature Serve. https://www.natureserve.org/conservation-tools/conservation-status-assessment [For an explanation of rank designations (e.g., G5S2)]

SEINet Portal Network. http//:swbiodiversity.org/seinet/index.php (online search application for herbarium acquisitions).

Shaw, R. 2008. *Grasses of Colorado*. University Press of Colorado. Boulder, CO.

USDA Plants Database. https://plants.sc.egov.usda.gov/java/ (County-level range maps; wetland indicator status)

Weber, W. A. & R. C. Wittman. 2012. *Colorado Flora, Eastern Slope*. 4th. ed. University Press of Colorado. Boulder, CO.

Wingate, J. 1994. *Illustrated Keys to the Grasses of Colorado*. Wingate Consulting. Denver, CO.

Wingate, J. 2017. *Sedges of Colorado.* PDI Publication Design. Wheat Ridge, CO.

Wingate, J. 2019 (unpublished). *'Juncus species of Colorado: keys to subgenera and species'.*

Appendix 1

Plant species list (spreadsheet)

Three hundred fifty species in 70 families were identified. The species count includes those for which the identification was tentative or probable. It does not generally include those cases identified only to genus. The spreadsheet design preserves the details of the entire field effort by compiling all the species found during each event (date), including the phenological state of the species and any references used to identify the specimen.

Explanation of Spreadsheet:

Documentation summary: Each numeral represents a dated, survey event, 1-11. Parentheses '( )' denote species which were only seen along entry and/or exit routes and not in that day's survey area.(For event 1, this distinction was not made).
Family name: scientific. Families listed in alphabetical order.
Scientific name: genus species. Listed in alphabetical order by genus. An asterisk is used to indicate a nonnative species.
Common name: (typically from Ackerfield, 2015, USDA Plants Database, and/or the investigator's usage).
Duration: P = perennial, B = biennial, A = annual, sl-P = short-lived perennial, woody P = woody perennial
Bloom month: indicates flowering period. For example '5' = May [typically blank for graminoids]
Wetland Indicator Status per 2012 National Wetland Plant List, US Army Corps of Engineers. Source: USDA Plants database (online) &/OR Field Guide to Colorado's Wetland Plants, Culver & Lemly, 2013. GP = Great Plains, WMVC = western mountains valleys and coasts
Notes: Pertinent information about the observation. Species of interest are denoted by a light blue shaded background.
1-11: Plant phenology observed on survey date, plus identification references utilized, if applicable. Plant phenology is indicated with abbreviations such ‘B’ and ‘PY-Inf’ for ‘flower bud stage’ and ‘previous year’s inflorescence’ respectively. If a reference (e.g., a flora or field guide) was used in the field or in the laboratory to identify a plant, this is indicated. For example, ‘W&W-K’ is used to signify ‘keyed out with Weber & Wittman’. A listing of the abbreviations utilized is given at the bottom of the list.

A narrative description of the area covered by each survey event is also provided at the bottom of this document.

APPENDIX 1. PLANT LIST: RED HILL Study Area, Boulder County POS. 2019 FINAL

DOCUMENTATION SUMMARY	FAMILY	SCIENTIFIC NAME	COMMON NAME	DURATION	BLOOM	WIS: GP, WMVC	NOTES	1. 4.28.19	2. 5.11.19	3. 5.26.19	4. 6.15.19	5. 6.30.19	6. 7.14.19	7. 7.28.19	8. 8.11.19	9. 8.23.19	10. 9.11.19	11. 9.11.19
1,2,3,4,5,6,7,8,9,10	**Agavaceae**	Yucca glauca	soapweed yucca	P	6			V, PY-Inf	V, PY-Inf	V	Fl	Fl,B	V	P-Fl	V,P-Fl,Fr	V	V,Fr	
2?,7,8	**Alliaceae**	Allium cernuum	nodding onion	P	5		2. tentative ID: 2-3 lvs, nodding B. Nodding pink umbels		B					B	Fl,Fr			
2?,3,4,5,6,7,8,9		Allium textile	prairie onion	P	4-6 (9-		2. tentative ID (2 lvs, DND). Erect white/pinkish umbels		V	Fl, DND	Fr, DND	Fr; DND	Fr	Fr;DND	Fr,L-Fr	L-Fr		
1,2,3,5,6,7,8,9,10	**Alsinaceae**	Cerastium arvense ssp strictum	mouse ear chickplant/weed	P	5-6			B,Fl; Ack-K	Fl,B	V,Fl		V,(Fl)	L-Fr	V		V (dried up)	V,L-Fr (senescent)	
1		Holosteum umbellatum*	jagged chickweed	A	(3)-4			E-Fr,L-Fl										
1,2,5,7,8,9,10		Paronychia jamesii	nailwort	P	6-8			PY-Inf, V	PY-Inf, V		B,Fl	Fl,B		Fr,Fl	Fr,(Fl)	Fr	Fr,(Fl)	
1,2,3,4,5,6,7,8,9,10	**Anacardiaceae**	Rhus aromatica subsp. trilobata	skunkbrush	woody	4		Flowers before leafing out	B	B, (E-V)	Fl,V	Fr	V,Fr	V,P-Fl,Fr	Fr	X	Fr,V	X	
6,(7)		Rhus glabra	smooth sumac	woody	7-8		7. only seen along access drainage						B	V				
(2),3,4,5,6,8,9,10		Toxicodendron rydbergii	poison ivy	woody	5-6		2. seen in access drainage & vicinity only		V	V	V	V	B		V	V	V,Fr	
2,3,7,9,11	**Apiaceae**	Conium maculatum*	poison hemlock	B	5-6	FACW, FAC	List C		V, PY-Inf	V, PY-Inf				Fr		Fr		V,Fr,L-Fr
1,2,3,5,6,7,8,9,10		Harbouria trachypleura	whiskeybroom parseley	P	(4)5-6			V,B,Fl	Fl,B	Fl		Fr	Fr	V,Fr	Fr,L-Fr,V	L-Fr	V	
1,2,3,5		Lomatium orientale	salt and pepper	P	4-5		Peduncles elongate in fruit	V,Fl	L-Fl, E-Fr	V,Fl,Fr		Fr						
(7),8	**Apocynaceae**	Agaloma marginata	snow-on-the-mountain	A	6-8		7: seen along & to the W the of the on-site gravel road (then 2-track) that parallels Hwy. 36 [not in this day's survey area]							X	Fl,L-Fl			
1		Apocynum androsaemifolium/sp	dogbane	P	6-8	UPL, FACU	1. tentative ID	V										
8,10		Apocynum sp.	dogbane	P											V		V	
(6),(7),8,9,(10)		Asclepias pumila	plains milkplant/weed	P	summer		Rhizomatous, most often noticed in prairie dog colonies. 6,10. on exit route, E /lower in elev than this day's survey area. 7. upper access drainage, not part of this day's survey area						Fl	Fl	Fl	V,Fl,B, P-Fl		
7,10		Asclepias speciosa	showy milkplant/weed	P	summer	FAC, FAC	Common, large, showy species with large pinkish flowers and broadly oblong leaves; rhizomatous							Fl			V	
4,(5),6,(8),(9),10		Asclepias stenophylla	slimleaf milkweed	P	6-7		Ack: uncommon; CNHP fully tracked. 5,9: Seen on exit route to S of 'access drainage'. 8: seen on entry route on N side of access drainage				B,V; Ack,	B,(Fl)	B,Fl,L-Fl		X	Fr	V,Fr	
1,4,5,6,7,8,9,10		Asclepias viridiflora	green milkweed	P	6-7		1. tentative ID. Largely occurs in two leaf forms—strait-edged, lance-linear [7,8,9]; & wavy-edged, oblong-elliptic [4,5,6,7,8,9,10]. Intermediate leaf forms—wavy edged & narrow, lance-elliptic: 6–1 spec, 8–2 specimens AS WELL AS other forms occur.	PY-Fr			B	B	L-Fl	Fl,V; Ack,W& W-R	V,P-Fl,(Fr)	Fr,V		
4,7,(8)	**Asparagaceae**	Asparagus officinalis*	garden asparagus	P	5-6						Fr,Fl			Fr	V			
2,3,5,7,8,9	**Asteraceae**	Achillea millefolium/lanulosa	western yarrow	P	5-7				V,PY-Inf	V,PY-Inf		Fl,B,V		Fl	L-Fr,Fr	V,L-Fl		
2,3,5		Agoseris parviflora	cutleaf false dandelion	P	5		Also, A. glauca var. laciniata		V, (B); Ack-R	Fl		Fr						
11		Ambrosia artemisiifolia var. elatior	annual ragweed	A			W&W Key E: disk flowes, spiny/fringed involucre; taprooted with finer leaves											Inf
1,2,3,4,5,6,7,8,9,10		Ambrosia psilostachya var. coronopifolia	western ragweed	P	7-10		W&W Keys E & G; rhizomatous with coarser leaves	V, PY-Inf	V, PY-Inf	V	V	V	V,(B)	V,B	B	Fl	X	
11		Ambrosia trifida	giant/great ragweed	A	7-9													Inf
5		Antennaria parviflora	small-leaf pussy-toes	P	6-7							V,Fr; DNK						
3		Antennaria rosea	rosy pussy-toes	P	5-6					V,Fl; W&W-								
1,2,7,8,9		Antennaria sp	pussy-toes	P			7,8. matforming, probably parviflora	V	V					L-Fr	V	V		
3,11		Arctium minus	common burdock	B	summer		W&W Key E: disk flowes, spiny/fringed involucre. List C			V								Fr,(Fl)
1,2,3,5		Arnica fulgens	foothill arnica	P	5-6		Opposite leaves, yellow orange petals	V	V	V,(B,Fl)		Fr						
2,8		Artemisia campestris	field sage	P	summer		'Grey' foliage, semi-evergreen; AKA Oligosporus pacificus		V, PY-Inf						B			
DOCUMENTATION SUMMARY	**FAMILY**	**SCIENTIFIC NAME**	**COMMON NAME**	**DURATION**	**BLOOM**	**WIS: GP, WMVC**	**NOTES**	**1. 4.28.19**	**2. 5.11.19**	**3. 5.26.19**	**4. 6.15.19**	**5. 6.30.19**	**6. 7.14.19**	**7. 7.28.19**	**8. 8.11.19**	**9. 8.23.19**	**10. 9.11.19**	**11. 9.11.19**
1,2,3,5,7,8,9,10		Artemisia dracunculus	wild tarragon	P	8-9		Key G: non-spiny disk flowers with awned/chaffy/toothed pappus; disk flowers sterile and abort; woody sub-shrub. Also, Artemisia	V, PY-Inf	V	V,PY-Inf		V		EB	Fr	V	Fr	

DOCUMENTATION SUMMARY	FAMILY	SCIENTIFIC NAME	COMMON NAME	DURATION	BLOOM	WIS: GP, WMVC	NOTES	1. 4.28.19	2. 5.11.19	3. 5.26.19	4. 6.15.19	5. 6.30.19	6. 7.14.19	7. 7.28.19	8. 8.11.19	9. 8.23.19	10. 9.11.19	11. 9.11.19
1,2,3,4,5,6,7,8,9,10		Artemisia frigida	fringed sage	subshrub	7-8		W&W Key G: non-spiny disk flowers with awned/chaffy/toothed pappus; woody sub-shrub; plains to subalpine	V	V	V	V	V	V	V	Inf	B	X	
1,2,3,4,5,6,7,8,9,10	Asteraceae	Artemisia ludoviciana	prairie /white sage, Louisiana sagewort	P	summer		W&W Key G: non-spiny disk flowers with awned/chaffy/toothed pappus; herbaceous perennial with more than one morphological "race"; plains to montane. Rhizomatous	V	V	V	V	V	V	X	V	V,B	Fl,Fr	
7		Brickelia californica	California brickellbush	P	8-9									V; W&W,Ack-R				
1,2,(5),6,7,8,9,10		Brickellia eupatorioides	false boneset	P	7-9		W&W: B. eupatorioides includes B. rosmarinafolia. 5. seen on lower portion of exit route to S of 'access drainage'.	PY-Inf	PY-Inf			V	V	V	B	B	L-Fl,Fr	
8,9,10		Brickelia grandiflora	tasselflower brickellbush	P	7-9										Fl; W&W-K	Fl	L-Fl,Fr	
2,3,4,5,6,7,8,9,10		Carduus nutans*	musk thistle	B	6-8		Leaf: edges have a whitish cast; broad, whitish central vein. List B		V	V,PY-Inf	B	B	Fr,Fl		L-Fr	V,L-Fr,Fr,Fl	X	
1,3,(5),11		Cichorium intybus *	chicory	P	6-9		W&W Key A: liguate flowers and latex juice; biennial with stiffly branched stems and sky blue flowers. List C. 5. only seen at lower portion of access drainage	V, PY-Inf		V,PY-Inf		B						Fl,Fr
7,8,9		Cirsium (Breea) arvensis*	Canada/creeping thistle	P	6-7	FACU, FAC	W&W Key G: non-spiny disk flowers w/ awned/chaffy/ toothed pappus; herbaceous perennial, plains to montane; rhizomatous. List B							Fl,B	Fr	Fr		
7,8,9		Cirsium ochrocentrum	yellowspine thistle	B	8-9									B	B	Fr		
1,2,3,4,5,6,7,8,9,10		Cirsium undulatum	wavyleaf thistle	B	6-7		W&W Key E: disk flowers with spiny/fringed involucre; florets bisexual. 3. /sp: V	V, PY-Inf,V	V,PY-Inf	V, PY-Inf,V	Fl,B	B,Fl,V	B,Fl,L-Fl	Fr	Fr	V,Fr	Fr,V	
8,9		Conyza canadensis*	horseweed	A	7-9		Native to e NA, but widely occuring throughout the world								B	Fr,L-Fl		
5		Crepis atribarba	slender hawk's-beard	P	6-7		Uncommon in BOCO—only 1 herbarium accession. Found at NW corner of this day's survey area—N flank of Red Hill					Fl; W&W,Ack-K						
2		Crepis occidentalis	large-flower hawk's beard	P	7-8				V									
10,11		Dyssodia papposa	fetid marigold	A	l summer												X	X
1,2,3,5,6,7,8,11		Ericameria nauseosa	rubber rabbitbrush	woody	8-10		Lvs narrowly linear, not gland dotted, covered w tomentum. Highly variable species with several defined varieties.	V, PY-Inf	V, PY-Inf	V,PY-Inf		V	V	Fl	V			Fl
1,3,7		Erigeron canus	hoary daisy	P	4-5		1. ID tentative	Fl; W&W,Ack-K		Fl; W&W,Ack-K				L-Fr,(Fr,L-Fl); W&W- K				
1,2,3,7,8,10		Erigeron divergens	fleabane daisy	A	5-8		1. DNK	B	B,(Fl)	Fl,B				Fl	Fl,B,L-Fl,Fr		Fl	
1,3,4,5,6,9,10		Erigeron tracyi/colo-mexicanus	fleabane	A,B,sl-P	5-7			PY-V&Inf		B,Fl,PY-V	Fl, L-Fl	B,Fl,P-Fl	Fl			L-Fr	L-Fr	
1,2,3,4,5,6,7,8,9,10		Gaillardia aristata	blanketflower	P	6-8			V	V, PY-Inf	V	B,V, L-Fl, Fl	Fl,B,V	Fr	Fl,L-Fl,Fr	Fr	Fr	Fr	
1,2,3,4,5,6,7,8,9,10		Grindelia squarrosa	curlycup gumplant/weed	P	6-10			PY-Inf,V	PY-Inf, V	V, PY-Inf	V	X	B,V	B,Fl	Fl,B,V	V,Fr,Fl	Fr	
1,2,3,4,5,6,7,8,9,10		Gutierrezia sarothrae	snakeplant/weed	P	8-9		Grazing increaser	V,PY-Inf	V, PY-Inf	V, PY-Inf	V, PY-Inf	V, PY-Inf	V	V	B,(Fl)	B,Fl	Fl	
8,10		Helianthus annuus	common sunflower	A	6-10										Fl,B		Fr,Fl	
1,3,4,5,6,7,8,9,10		Helianthus pumila	foothills sunflower	P	7-8?			V		V	B	Fl,B	B,Fl	Fl	V,B,Fl	L-Fr, Fr	Fr,L-Fr	
7,8		Helianthus rigidus ssp subrhomboideus	stiff sunflower	P	8-9		AKA: H. pauciflorus							B,V	V,Fl,B			
4		Heterotheca foliosa	hairy golden aster	P	7-9		Key D: sprawling perennial with appressed-pubescent leaves --> gray. Heads subtended by one or more leafy bracts that exceed the involucre				B							
2,3,4,5,6,7,8,9,10		Heterotheca villosa	golden aster	P	6-8				V, PY-Inf	V,PY-Inf	Fl	B,Fl	Fl,L-Fl	Fl,L-Fl	Fl,Fr,L-Fr	L-Fr	X	
1,3,5,7,8,10		Hymenopappus filifolia	fineleaf Hymenopappus, creamtips	P	5-9			V		V,B		B,Fl		Fr	Fr,B,Fl		V,L-Fr	
1,2		Hymenopappus sp	-	P			1. rosettes larger and greener than HYFI (also found in vicinity)	V	V									
7		Lactuca ludoviciana	biannual lettuce	B	7-8		Ack: uncommon. 7. lower access drainage; not part of this day's surveyarea							L-Fr,Fr,L-Fl				
2,3,4,5,6,7,8,9,10		Lactuca serriola*	prickly lettuce	WA	summer		Milky sap. 6. both pinnatifid and elliptic leaf forms seen		V	PY-Inf,V	V	V	V	V,B,Fl	Fl,B	B,Fl,Fr	Fl to L-Fr	
1, 7		Lactuca tartarica	blue lettuce	P	7-8	UPL, FAC	1. tentative ID	V						B,Fl,Fr				
5,6,7,8,9,10		Liatris punctata	gayfeather, blazing star	P	7-8							V,B	B	B	Fl,B	Fl,Fr	Fl	
4,7		Lygodesmia juncea	skeletonweed/plant	P	6-8		4. tentative ID, possibly Stephanomeria				V			Fl; W&W-K				
1,2,5	Asteraceae	Nothocalais cuspidata	false dandelion	P	4-6		Leaf edges are densely white hairy, wavy; milky sap	B,Fl	Fl			Fr,L-Fr						
1,2,3,5,7,8,9,10		Packera cana	woolly groundsel	P	5-6			V,B	V,B	V,B		V,(Fl)		L-Fr	V,L-Fr	V,L-Fr	L-Fr	
5,8		Packera fendleri	Fendler's ragwort	P	6-7							Fl,L-Fl,Fr			L-Fr			

DOCUMENTATION SUMMARY	FAMILY	SCIENTIFIC NAME	COMMON NAME	DURATION	BLOOM	WIS: GP, WMVC	NOTES	1. 4.28.19	2. 5.11.19	3. 5.26.19	4. 6.15.19	5. 6.30.19	6. 7.14.19	7. 7.28.19	8. 8.11.19	9. 8.23.19	10. 9.11.19	11. 9.11.19
1,2,4,8		Packera plattenis	Platte senecio, prairie groundsel	P	5-6		2. seen in access drainage & vicinity only	V	B		B,Fl				V			
1,3,5,6,10		Podospermum laciniatum*	false salsify, cutleaf vipergrass	P	5-6			V		B		Fr	Fl,Fr					
6		Pseudognaphalium canescens	cudweed	P	7-8								B; Ack,W&W-K					
1		Pseudognaphalium macounii	Macoun's cudweed	A, P		NA	Leaves stipitate glandular above. 1. Damp soils under pines.	PY-Inf, V										
4,8		Pseudognaphalium sp	cudweed	A to P			canescens or straminea: soil damp, but other wetland species lacking. 8. did not examine for glandular hairs or key, prob perennial				V				X			
1,2,3,4,5,6,7,8,9,10		Ratibida columnifera	prairie coneflower	P	7-8		Petals usually yellow, occasionally maroon--'Mexican hat'	V,PY-Inf	V, PY-Inf	V, PY-Inf	B	B	Fl	Fl,Fr	Fr	Fr		
2,3,5		Senecio integerrimus	lambs-tongue ragwort	P	4-6	FAC, FACU			V,B	Fl		Fr						
1,4,(5),7,8,9,10		Senecio spartioides	broom groundsel/senecio, butterweed	P	8-9		Key D: yellow ray and disk flowers, capillary or plumose pappus; "bushy" clumps with numerous stems and linear leaves; leaves equally distributed along the stem. 5: seen on exit route to S of 'access drainage'	V,PY-Inf			V, PY-Inf	V		V	V	B	B,Fl	
11		Solidago gigantea	giant goldenrod	P	7-9	FAC, FACW	leaves glabrous, stem usually glabrous. 1: <3 dm tall, lacks hairs on leaves.											Fr,L-Fl
1,5,6,7,8,9,10		Solidago missouriensis	Missouri/smooth goldenrod	P	7-9		Key D: yellow ray and disk flowers, capillary or plumose pappus; leaves gradually reduced in size, not serrate, petioles of basal lvs. Not strongly ciliated; leave and stem +/_ glabrous; stems often maroon. Rhizomatous.	V				V,B	B	B	Fl,L-Fl	Fl	L-Fl,Fr	
6,7,9		Solidago nana	baby goldenrod	P	7-9								B; W&W-K	B		Fl; W&W,Ack-K		
8,10		Solidago nemoralis	gray goldenrod	P	8-9										B,(Fl); Ack, W&W,FGP-K			
6		Solidago rigida	stiff goldenrod	P	8-9								V,B					
9		Soldidago speciosa var. pallida	showy goldenrod	P	8-9											B; Ack,W&W,FGP-K		
6		Solidago velutina	three-nerve goldenrod	P	7-9								B,(Fl)					
2,3		Solidago sp.	golden rod	P			2. possibly missouriensis		V, PY-Inf	V								
7,(8)		Stephanomeria	brownplume wire lettuce	P										Fr; W&W-K	X			
8,10		Symphyotrichum falcatum	white prairie aster	P	8-10										Fl,B; Ack-R		Fl; W&W-K	
8,9,10		Symphyotrichum porteri	Porter's aster	P	8-10										B,(Fl)	Fl,B	Fl	
1,2,3,4,5,7,9		Taraxacum officinale *	dandelion	P	4-5, 9			Fl,V	Fl	Fl,Fr	X	V,Fr		V		V		
1,2,4,5,6,7,9,10		Thelesperma megapotamicum	rayless greenthread, Hopi/Navajo tea	P	7-9			PY-Inf	PY-Inf		V,B	B	B	Fr		Fr,L-Fr,Fl	Fr,L-Fr	
5,7,8,9		Townsendia grandiflora	large flower Easter-daisy	P	6-8							Fl,B		Fl,L-Fl	Fl,Fr	Fr		
2,3,5,7,8,9,10		Townsendia hookeri	Hooker's Easter daisy	P	3-5				L-Fl	Fl,Fr		X		X	X	X	L-Fr	
1,2,4,5,6,7,8,9,10		Tragopogon dubius subsp.major	salsify / oysterplant	WA, B	5-6 (to 9)		White sap	V	V		Fr	Fr,(Fl)	Fr,L-Fr	L-Fr,Fr,Fl	P-Fr,(Fl,Fr)	L-Fr	L-Fl	
1,3,4,5,6,7,8,9		Virgulus falcatus &/or ericoides	heath aster	P	8-10		Also: Symphyotrichum. 4. Unable to identify spec/distinguish between the 2 sps. Similar species: V. ericoides-stem hairs appressed / ascending & involucre < 5 mm tall with < 20 ray flowers vs. VIFA spreading hairs & involucre > 5 mm tall with 20+ ray flowers.	V, PY-Inf		V	V	V	V	V	B	B		
4,8,10,11		Xanthium strumarium*	cocklebur	A	7-8?	FAC, FAC	Native to GP, e NA (but nevertheless designated noxious in some jurisdictions); considered non-native here				V, PY-Inf				B,Fl		Fr	Fr
3,9,10	**Berberidaceae**	Berberis/Mahonia repens	creeping barberry, Oregon grape	woody P	4-6					Fl, L-Fl						V,(Fr)	V	
	Boraginaceae	Asperugo procumbens*	German madwort	A	4-6													
1,2,3,6,7,9,11		Cynoglossum officinale *	hound's tongue	B	5-6		List B. 2. seen in access drainage only. 1,2: only 1 plant seen this day.	V		V, PY-Inf			Fr	Fr,V		V		V,Fr
(2),3,5		Lappula redowskii/occidentalis	flatspine stickseed	A, B	5-8		Aka L. occidentalis (with 2 subspecies), per USDA Plants db. Ack: introduced. 2. in access drainage		Fl, B	Fl		Fr,(Fl)						
1,(2),3,7,9		Lithospermum incisum	plains stoneseed	P	4-5		2. seen in access drainage & vicinity only	Fl	Fl	Fl				Fr		Fr,L-Fr		
2,3,5,7,8,9,10		Lithospermum multiflora	stoneseed	P	6-7		2. tentative ID		V, PY-Inf	V,B, (Fl, PY-Inf)		Fl		Fr	Fr	Fr	Fr	

1,2,3,4,5,6,7,8		Mertensia lanceolata	chiming bells	P	5-6			V,Fl	Fl,V	Fl	Fl	V	Fl	V	Fr			
1,2,4,5,6,7,8,9,10		Onosmodium molle/bejariensis ssp. occidentale	marbleseed	P	6-7			V	V		Fl,B,L-Fl	Fl,B,L-Fl	Fr	Fr	Fr	Fr,L-Fr	Fr	
2,3		Oreocarya virgata	miner's candle	B, P	7-8		2,3: only one plant seen each of these days		PY-Inf	V								
				A	3-4													
1,2,5,6,7,8,9,10	**Brassicaceae**	Alyssum simplex*	alyssum	A	3-4			Fl,B (Fr)	Fr, Fl		Fr		Fr	Fr,L-Fr	Fr,P-Fr	L-Fr,Fr	Fr,L-Fr	
2,3,5,8,9		Arabis pycnocarpa	hairy rockcress	A,B,P	5-7	FACU,FACU	AKA A. hirsuta var pycnocarpa		Fl,Fr; W&W, Ack-K	Fr,(Fl)		Fr; W&W-K			Fr; Ack-K	L-Fr,Fr; Ack-R		
1	**Brassicaceae**	Boecher stricta	Drummonds rockcress	P	4-6		1. tentative ID	PY-Inf										
3		Boechaera sp.	rockcress sp.	P	4-5					B								
1,3,4,5,6,7,8,9,10		Camelina microcarpa*	little/smallseed falseflax	A	4-6		Yellow flowers form ellipsoid pods with elongate style tip	E-Fl		Fl,(Fr)	Fr	Fr,Fl	Fr	Fr,L-Fr	L-Fr	L-Fr	L-Fr	
2		Capsella bursa-pastoris	shepherd's purse	A	4-5		2. seen in access drainage only		Fl, Fr									
1		Cardaria draba/sp.*	whitetop, hoary cress	P	5 (6)		Noxious weed List B	V										
3		Chorispora tenella*	blue/purple mustard	A	3-5					Fl								
1,2,3,5		Descurainia pinnata	pinnate tansy mustard	A	4-5		1,2: tentative ID (based on ltr grn, lwr nos. lack of disturbance) fruit is shorter and thicker--fusiform (compared to next)	V	V	Fr,Fl		Fr						
1,3,5,7,(8),9,10		Descurainia sophia*	flixweed	A	3-5		Fruit is longer and linear compared to	V,Fr, L-Fl		Fr, L-Fl		Fr,L-Fl		Fr,L-Fl	L-Fr	L-Fr,Fr	L-Fr	
1,2,3		Draba nemorosa	woodland draba	A	4-5			FL,Fr	Fr,L-Fl; Ack-K	Fr, L-Fl								
1		Draba reptans	Carolina draba	A	4			Fl										
1,2,3,5,7		Erysimum capitatum	wallflower	P	4-6		1: petals yel-orange; siliques angled upward	PY-Inf, B,(Fl); W&W-K	Fl,B	Fl		Fr		Fr				
1,3,4,6,7		Lepidium campestris*	field campestris	A	5,6		Also, Neoleppia. Shovel-shaped siliques	PY-Inf		Fl,B	Fr		Fr	Fr,L-Fr				
1,6,7,9		Neolepia campestre *	fieldcress	A	5-6											Fr,L-Fr		
1		Lepidium densiflorum	peppergrass	A	4-5		1. possibly virginicum. May not be native here.	B										
1,(3),4,6,8,10		Lepidium virginicum*	Virginia pepperweed	A,(B)	4-5		3. lower portion of access drainage, S side. Basal lvs spatulate; fruit orbicular, not obovate	B,(Fl,E-Fr); FGP,Ack-K		Fr,Fl; Ack-K	Fr; Ack-K,R		Fr		Fr		L-Fr,(Fr); Ack-R	
1,2,3		Lesquerella/Physaria montana	mountain bladderpod	P	5			Fl	Fl, B, V	Fl								
1,2,3,5,9		Physaria belli	Bell's twinpod	P	4-5		CNHP fully tracked species. Local endemic. 1: Cannot use key in flower stage, but only vitulifera, belli, and montana are likely in this area. Specimens lack growth form (trailing stems) of PHMO and distinctive leaf shape of PHVI; thus PHBE is probable.	Fl	Fl	Fl, L-Fl		Fr; W&W-K				L-Fr		
1,4,5,6,7,8,10		Sisymbrium altissimum*	Jim Hill/tumble mustard	WA	5-7		Basal & lower stem leaves deciduous	V,V,Fl			Fl,Fr	Fr,Fl	Fr	Fl,E-Fr	Fr		Fr,L-Fr	
1,2,3,5,7,8,9		Thlaspi arvense *	pennycress	A	4-6	FACU, UPL	WGP: 222; malodorous	Fl,B (Fr)	Fl,B	Fl,B,Fr,V		Fr		Fr	Fr, L-Fr	Fr		
5,6,7,9		Turritis glabra	tower mustard	A	5							Fr, PY-Inf	Fr	Fr	Fr,L-Fr	Fr; Ack-R		

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1,2,7,8,10	**Cactaceae**	Echinocereus viridiflorus	green hedgehog / hen & chicks cactus	P	6		Barrel w ribs; chartreuse yellow flowers born below branch apex; SW-s across rr tracks	V	V					V	V		V	
1		Coryphantha sp.	nipple cactus	P	5-6			V										
2		Coryphantha missouriensis	yellow nipple cactus	P	5-6		2: seen in access drainage only. Only 1 plant seen this day—w red fruit. Yellow or green flowers, nipples/tubercles w groove on top, lacks protruding central spine, mature fruit red		Fr (PY)									
1,2,3,4,6,7,8,9,10		Opuntia macrorhiza	prickly-pear cactus	P	6-7		Stems flattened with spines concentrated near top, yellow flowers; persistent edible fruit	V,PY-Fr	V,PY-Fr	PY-Fr	Fl,B; Ack-K		B,Fl	Fl; W&W-K	Fr,V,(Fl)	V	Fr	
5,7,8,9,10		Opuntia polyacantha	prickly-pear cactus	P	5-6		Yellow, red, or pink flowers; dry fruit					Fl,B		V	Fr	Fr	V	
4		Opuntia sp.	prickly-pear cactus	P							V,B,Fl							
5,6,7	**Campanulaceae**	Campanula rotundifolia	harebell	P	6-7							Fl,B	Fl, L-Fl	Fr,Fl				
(5)		Triodanis leptocarpa	slimpod Venus' looking-glass	A	5-6		Rare plant, S1. Only 8 statewide herbarium accessions					Fr,(Fl); Ack-K,R						
4,(5),6,9		Triodanis perfoliata	clasping Venus' looking-glass	A	5-6		5: seen at lower portion of access drainage AND along end of day exit route to S of access drainage				Fr, Fl; Ack-K-R	Fr,(Fl)	Fr,(L-Fl)			L-Fr		
1,4,6,(7),8,9,10	**Cannabaceae**	Celtis reticulata	netleaf hackberry	woody P			7: access drainage; not seen in this day's survey area	V			V		V	V	X	Fr	V	
11	**Capparacea**	Cleome serrulata	Rocky Mountain beeplamt	A	6-9													Fr,Fl
5,6,7,(8),10	**Caprifoliaceae**	Symphoricarpos alba/sp	snowberry	P	6-7		5,6: possibly rotundifolia. 6,10: very low shrub. 8: Likely ID					Fr,Fl; W&W, Ack-K	V,(Fr)	Fr; Ack-R	Fr		V,Fr	
2,7,9,11		Symphoricarpos occidentalis	western snowberry	P	summer	UPL, FAC	Weak shrub foming dense colonies in swales; pink bell flowers followed by white berries (turning black w age)		V					Fl,Fr		V		Fr
3		Symphoricapos sp.	snowberry	P			3: alba or rotundifolius											
	Caryophyllaceae	Dianthus armeria*	Deptford pink	A,B	6-8		See also, Alsinacaceae for taxa w free calx parts and clawless petals.											
8		Saponaria officinalis*	bouncing-bet	P	7-8	FACU, UPL	Rhizomatous; List B (CO is only state to designate it noxious)								Fl,L-Fl			
(3),4,5,6,7,8,9,10		Silene antirrhina	sleepy catchfly	A	5		3: lower access drainage			B,V, (Fl)	Fr	Fr	Fr		Fr	L-Fr	L-Fr	
2,7,8		Silene drummondi ssp. drummondii	Drummond's catchfly	P	5-6		At least some peduncles longer than the capsules		V, PY-Inf					Fr,L-Fr,L-Fl,Fl	Fr			
3		Stellaria media	common chickweed	A	4-5					Fr; Ack-K								
4,11	**Chenopodiaceae**	Chenopodium alba*	lambsquarters	A	summer		Plants db: both native & introduced types in L48. 4. tentative ID				V							Fr,Fl
8		Chenopodium dessicatum	arid land goosefoot	A	6-8		Pericarp non-adherent								Fr; Ack-K			
9		Chenopodium fremonti	Fremont's goosefoot	A	7-8		Usually in shaded areas									Fr		
8		Chenopodium incanum	mealy goosefoot	A	summer		Diminutive, associated w pd colonies. 3: on pd mound								Fr; Ack-K			
6,9,10		Chenopodium pratericola	desert goosefoot	A	6		10: possibly leptophyllum (W&W, Ack) or dessicatum (Ack)						Fr; W&W,Ack-K			Fr; Ack,W&W,CF-K		Fr; CF-K
3,4,5		Chenopodium sp	goosefoot	A			3,4,5: narrow leaf			E-V	V	V						
11		Salsola collina*	tumbleweed	A	7-9		Not prickly											Inf
3,4,5,6	**Commelinaceae**	Tradescantia occidentalis	western spiderwort	P	5-6		3: Only seen at beginning of entry drainage. Monocot			B	E-Fr, B,Fl	Fr	Fr,Fl					
5	**Convallariaceae**	Maianthenum/Smilacina racemosum ssp. Amplexicaule	large false Solomon's seal	P	5-6		Monocot. Ack: Ruscaceae					Fr						
3		Maianthenum/Smilacina stellata	false Solomon's seal	P	5-6		Monocot. Ack: Ruscaceae			Fl, B								
1,2,3,4,7,8,9	**Convolvulaceae**	Convolvulus arvensis*	field bindweed	P	6-9		Large rootmass; List C	V	V	V	V,Fl			Fl,E-Fr	Fl,Fr,V	Fl,Fr		
2		Cuscuta sp	dodder	?			2: likely ID		PY-V									

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4,(5),6,(7),8,9,10		Evolvulus nuttallianus	shaggy dwarf morning-glory	P	5-7		~ 1.5 dm tall; fuzzy, grey leaves; small, bluish flowers; upright stems, not 'viny'. 5. only seen at lower portion of access drainage. 7. upper access drainage, not part of this day's survey area				Fl	Fr,Fl	Fr,V		V	V,Fr	V, Fr	
2,5,7	**Crassulaceae**	Sedum lanceolata	spearleaf stonecrop	P	6-7				V			Fl		Fr				
1,2,3	**Cupressaceae**	Juniperus communis	common juniper	woody P	NA			V	V					V				
1,2,3,6,7,8,9,10		Juniperus scopulorum	Rocky Mountain juniper	woody P	NA			V	V,'Fr'	V,PY-'Fr'			V	V	V	Fr	V	
	Cyperaceae	Bolboschoenus maritimus ssp. paludosus	cosmopolitan bulrush, saltmarsh bulrush	P	5-8	OBL, OBL	AKA: Scirpus, Schoenoplectus											
4,5,6,7,8,10,11		Carex brevior	plains oval/short-beaked sedge	P	4-5	FAC, FAC	5: upper portion of access drainage, just below (E) of NE corner of this day's survey area				Inf; Win-K	Inf; Win-R	Inf; Win-K	Inf; Win-R	Inf; Win-K		Inf	Inf; Win-R
3		Carex buxbaumii	brown bog sedge	P	4-5	OBL, OBL	Uncommon. 3. upper access drainage, S side. Does not entirely fit Win description, p. 42: spikes fewer flowered; lvs not glaucous, nor blue-green, lf sheaves not reddish dotted. Also, found at closer to 6K ft, not 8500-10500 and on grassy slopes, not a wetland. Nevertheless, CABU is best fit.			Inf; Win-K									
1,3		Carex duriuscula	needleleaf sedge	P	4-5			Inf; Win-R		Inf; Win-K,R								
3,7		Carex filifolia	thread-leaf sedge	P	5-6					Inf; Win-R				Inf; Win-K				
2,3,7,8?,9,10		Carex inops subsp.heliophila	sunsedge	P	4-5		8,10: likely ID based on V		E-Fr. V	Inf				V, (Inf)	V	V,(Inf)	V	
11		Carex nebrascensis	Nebraska sedge	P		OBL, OBL	Wide, greyish leaves											Inf
2,6		Carex occidentalis	western sedge	P	4-5		2: With Wingate key, vallicola seems best fit, but CAVA doesn't fit geographic & elevational distribution (spec found at ~5950 ft.)		Inf; Win-K				Inf; Win-K					
2		Carex oreocharis	grassy-sloped sedge	P	4-5		**Uncommon, G3S2, CNHP-fully tracked**		Inf; Win-K									
3		Carex siccata	dry sedge	P	4-5		3. tentative ID			Inf; Win-K								
2		Carex sp.	sedge	P			Simlar to tahoensis: spikes gynecandrous & monoliform, perigynia winged—beaks flat; but perigynia and spikes smaller		Inf; Win-K									
3,4		Eleocharis compressa	flatstem spikerush	P	5	FACW, FACW				E-Fr; Win,Ack-K	Fr; Win-K							
8		Eleocharis palustris/ macrostachya/ Erythropoda	common spikerush	P		OBL, OBL	Perfect flowers; solitary terminal spikes; lenticular/biconvex achene w/conic tubercules; 2-styles; terete culms; most common spec.; wet soil								Inf; Ack-K			
1		Eleocharis species	spikerush	P	4-5		Unable to ID	X										
1,2,3,5,7	**Dryopteridaceae**	Cystopteris fragilis	brittle bladder fern	P	-		W&W: Athyriaceae	V, sori;	V, sori;	V, sori		sori		w sori				
3		Woodsia oregana	Oregon cliff fern	P	-					V, sori; Ack, W&W-R								
(7),8,10,11	**Euphorbiaceae**	Agaloma (Euphorbia) marginata	snow-on-the-mountain	A	7-8		7: amongst prairie dog burrows 60 m N of access drainage, not part of this day's survey area. Tap-rooted annual with upper leaves and flower bracts broadly white margined. Occurrence sporadic.							Fl	Fl,L-Fl		Fl,Fr	X
5,7,8,9,10		Chamaescye fendleri	Fendler's sandmat	P	6-7							Fl,Fr;Ack-K; D		Fl; D	X;D	Fr; DND	X	
1,2,3,5,7,8,9,10		Euphorbia/Tithymalus brachycera(s)	horned spurge	P	5-8			V	V	Fl		Fr		Fr	V	L-Fr	V	
(6),10,11		Euphorbia/Poinsetta dentata	toothed/spotted spurge	A	6-8		6. on exit route, E /lower in elev than this day's survey area						V,Fl,Fr				Fr	X
3,4,6,8,9		Euphorbia/Tithymalus spathulata	warty spurge	A	5-6					B	Fl		Fr		Fr	Fr,L-Fr		
1,4,5,6,7,8,9,10		Tragia ramosa	noseburn	P	6-7			PY-Inv,V			B	Fl,B	Fr,Fl	V	X	X	X	

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11	**Fabaceae**	Amorpha fruticosa	false indigo	woody P	7?	FACW, FACW	Shrub; pinnate leaves with terminal leaflet; flowers in dense spike-like racemes; pods glabrous											Fr
1,2,3,5,7,8,9		Astragalus agrestis	purple milkvetch	P	5-7		Rhizomatous	V	V,B,(Fl)	B,Fl		Fl,Fr		V	Fr	Fr,V		
2		Astragalus crassicarpus	groundplum	P	5-6		2: seen only in access drainage area, vicinity (N/above) triple stock tanks		B, Fl									
1,2,3,5,6,7,8,9,10		Astragalus drummondii	Drummond's milkvetch	P	5-6		Grayish green lvs due to hairs; calyx w black hairs.	V	V, B, (Fl)	V		P-Fl,Fr	V	Fr	Fr	Fr	L-Fr	
1,2,3,5,7,8,9,10		Astragalus flexuosus	flexible milkvetch	P	6-8		1,2: tentative ID	V	V	V		Fl,Fr		Fr,Fl	Fr	Fr	Fr	
2,3,7,8,9,10		Astragalus laxmanii	prairie milkvetch	P	6-7		2: dolabriform hairs confirmed		V	V				Fr	Fr	Fr	Fr	
3		Astragalus parryi	Parry's milkvetch	P	5-6		3: only 1 plant seen			Fl								
1,2,3,5,7,8,9		Astragalus shortianus	Short's milkvetch	P	4-5			Fl	Fl	Fl,(Fr)		Fr		V	Fr	V,L-Fr	V	
1,2,3,5,7,8,9,10		Astragalus tridactylicus	foothill milkvetch	P	4-5		See Astragalus key, W&W, p. 202. Also, Orophaca	Fl	Fl			V		V	V	V	V	
7,8,9		Dalea candida	white prairie (bush)clover	P	~6-8		Lvs. wider—elliptic; leaflets 5-7							Fl,Fr	Fr	Fr		
2,4,(5),6,7,8,9,10		Dalea purpurea	purple prairie (bush)clover	P	~6-8		Lvs. narrower—linear-elliptic; leaflets 3-5. 5. seen on lower portion of exit route to S of 'access drainage'.		V		B	B	Fl	Fl	Fr	Fr	Fr	
3		Dalea sp.	prairie (bush)clover	P	-					V								
2,6,(8),11		Glycyrrhiza lepidota	wild licorice	P	7-8	FACU, FAC	2: seen only in access drainage vicinity this day. 6: probably same patch seen in 2, here at S end of this day's survey area. Pinnate lvs; petals white, racemic, yielding pods with hooked prickles; common in slightly moist sites						Fl					Fr
2,3,7,9		Lupinus argenteus / sp.	common lupine	P	7-8				V	V				Fr,Fl		L-Fr		
10?		Lathyrus eucosmus	bush vetchling	P	5-7		10: likely ID based on V char, geographic range, & altitude										V; Ack,W&W-R	
1		Lathyrus sp	peavine	P	-			V										
4,7		Medicago lupulina*	black medic	A, B, P	5-9		Tiny yellow flowers in capitate clusters; 3 leaflets; WGP: 314				Fl,Fr			Fr,Fl				
5,7,8,9,11		Medicago sativa*	alfalfa	P	6-7		Escape from cultivation. *3: including white petal form					V		Fl		P-Fl,Fr,Fl		Fr
7,9		Melilotus alba*	white clover	A	7,8									Fl,B		Fl,Fr		
2,3,5,7,8,10		Oxytropis lambertii	Lambert's locoweed	P	5-6		Hot pink or magenta petals; more slender plant		V,B,PY-Inf	Fl		Fl,Fr		Fr	V		Fr	
1,3,5,7,8,9,10		Oxytropis sericea	silky locoweed	P	5-7		White flowers; more robust plant; 2--could be hybrid (Fr)	Fl		Fl,B		Fr		V,Fr	Fr	Fr	Fr	
1,2,4,5,6,7,8,9,10		Psoralidium tenuiflorum	slimflower scurfpea	P	6-8		Small purple flowers,trifoliate foliage like alfalfa, but much less dense & lighter green	V	V		B,(Fl)	B,Fl	B,Fl,L-Fl	Fl	V,Fl,Fr	L-Fr,Fr,Fl	V,L-Fr; (Fl)	
6		Sophora nuttalliana	silky sophora	P	5-6		Also, Vexibia. Legumes constricted between the seeds. 8 herbarium accessions fr BOCO (SEINET, 10.8.19)						V, (Fr); Ack-R					
1,2,3,5,7,8,9,11		Thermopsis rhombifolia	golden banner	P	4-6			V	V,Fl,B	Fl, V		Fl,Fr		V	V,(Fr)	V		Fr
7		Trifolium pratense *	red clover	P	5-9	FACU, FACU	Leafy stems bear sessile heads of dark pink flowers							L-Fl,L-Fr,Fl				
1,2,3,4,7		Vicia americana	American milkvetch	P	5-6		var. americana, var. minor (V. linearis)	V	Fl	Fl	Fl,L-Fl			Fr; Ack-R				
4		Vicia ludoviciana	Louisiana vetch	P	6-7		Ack: uncommon. Only 4 BOCO herbarium records.				Fl							
							-											
4	**Fumariaceae**	Corydalis aurea	golden smoke	A, B	5		Pioneer species, especially in sandy or rocky sites, disturbance areas				Fl							
8?	**Gentianaceae**	Gentiana sp	gentian	P	9		8: probably bigelovii, affinis less likely								E-B; Ack-K,R			
1,2,3,4,5,6,8	**Geraniaceae**	Erodium cicutarium*	redstem filaree	WA	1-12		List C	V,Fl	Fl	Fl	Fl,Fr	Fl	Fr,Fl		Fl			
1,2,3,4,5,6,7,8,9,10		Geranium caespitosum	wild geranium	P	6-7			V	V	V,(Fl)	Fl	Fr,Fl	Fl,Fr	Fr,Fl	Fr,Fl	L-Fr,Fr,(Fl)	V,L-Fr; (Fl)	
1,3,7,(8),9	**Grossulariaceae**	Ribes aureum	golden currant	woody P	5-6	FACU, FAC	Yellow flowers, common on streamsides and near wet ditches in the lower valleys and plains	Fl		Fl				Fr	V	Fr		
1,2,3,5,6,7,8,9,10		Ribes cereum	wax current	woody P	4-5			Fl,V	V,V,Fl	Fl		V	Fr	V	V	V	X	
9	**Hydrangeaceae**	Jamesia americana	waxflower	woody P												V		

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2,3	**Hydrophyllaceae**	Ellisia nyctelea	Aunt Lucy	A	4-6		2: seen in access drainage only. W&W: alien; FGP, Pdb, BONAPS: native; Ackerfield does not specify 'adventive', etc.; petals white (to bluish)		V	Fl,B								
6,7		Phacelia heterophylla	scorpionweed	P	5-8								Fr	Fr				
1,2,3,4,5,6,7,8,10	**Hypericaceae [or Clusiaceae]**	Hypericum perforatum*	common St. John's-wort	P	6-7		List C. Locally, tends to be in bloom on the feast day, 6.24. Leaves w translucent dots. Sometimes infested w biocontrol beetles.	V, PY-Inf	V, PY-Inf	PY-Inf,V	B,Fl, PY-Inf	Fl,B	Fl	Fl,L-Fl,B	Fl,Fr	Fr,L-Fl	Fr	
1,3	**Iridaceae**	Iris missouriensis	wild iris	P	summer	FACW, FACW		V		Fl								
3,7,9		Sisyrinchum montanum var montanum	blue-eyed grass	P	5-6					Fl, B				Fr; W&W, Ack-K		Fr,L-Fr; Ack-K		
4	**Juncaceae**	Juncus dudleyi	Dudley's rush	P	5-6	FACW, FAC	1: 7.19 possibly J. interior				Inf; Win-K, Cul&Lem-R							
8)		Juncus ensifolius	swordleaf rush	P		FACW, FACW									Inf			
1,6,(7),8,(9),10		Juncus interior	interior rush	P		FACW, FAC	7: lower access drainage; not part of this day's survey area.	PY-Inf; Win-K					Inf; Win-K, C&L-R	Inf	Inf; Win-K,C&L-R	Inf	Inf	
8		Juncus torreyi	Torrey's rush	P		FACW, FACW									Inf; C&L-R			
11		Juncus sp	rush	P														Inf
8,(9)	**Lamiaceae**	Hedeoma hispida	rough false pennyroyal	A	5-7		Ack: uncommon. 9: this day, only seen on exit route								Fr	L-Fr/Fr		
1,3,4,6,(7),8,10		Marrubrium vulgare*	white horehound	P	6?		WGP: 304. 7. access drainage; not seen in this day's survey area	V, PY-Inf		V, PY-Inf	Fl		Fr, L-Fl	X	Fr		Fr	
2,5,7,9		Monarda fistulosa	beebalm	P	7-8				PY-Inf,V			V, PY-Inf		Fl		V		
4,8		Monarda pectinata	plains beebalm	A	?						Fl				Fl,Fr,L-Fr			
2,3,7,9,10		Nepeta cataria*	catnip	P	7-9	FACU, FACU	WGP: 344		V, PY-V	V				Fl,B		Fl,L-Fl,B,Fr	Fr	
11		Prunella vulgaris	heal-all	P	6-10	FAC, FACU												Fr
8,10		Salvia aethiopis*	Mediterranean sage	B	6-7		List A noxious weed. Common locally; rare or absent outside of Boulder & Montezuma Cos (perhaps so. Larimer Co.)								V,Fr		V	
1,2,3,5,6,7,8,9,10		Scutellaria brittonii	Britton's skullcap	P	5-7		Genus Scutellaria is distinguished by a transverse ridge on the calyx	V	V	V,(Fl)		Fr,(Fl)	V	V		L-Fr	V	
2,5,6,7,8,9,10	**Lilliacea**	Calochortus gunnisonii	mariposa lily	P	5-6				PY-Inf			B,Fl	Fl,Fr	Fr,Fl	Fr	Fr,L-Fr	L-Fr	
1,2,3		Leucocrinum montanum	sand lily	P	4-5			Fl,V	Fl, L-Fl,B	Fl,L-Fl								
1,2,3,4,5,6,7,8,9,10	**Linaceae**	Linum/Adenlinum lewisii	Lewis/blue flax	P	4-7			V, PY-Inf	V, PY-Inf, (Fl)	B,Fl, PY-Inf	Fl,Fr,B	Fr,Fl,B	L-Fr,Fr	L-Fr,Fr,(Fl)	L-Fr,Fr,Fl	L-Fr	L-Fr	
4,6		Linum/Adenolinum pratense	meadow flax	A			Uncommon, disjunct population at NW extreme of range				Fl		Fl,L-Fl					
3	**Losaceae**	Mentzelia albicaulis	White-stemmed blazingstar	A	5-6		SEINET, 10.11.19: 11 unique/independent accessions fr BOCO			B, E-Fl,(Fr); W&W,Ack,FGP-K								
3?,8,9?		Mentzelia nuda	white-flowered blazingstar	sl P	7-9		3,9: likely nuda, possibly multiflora (3: capsule length, 15-19 mm. 9: SLP; capsule length, 17-25 mm)			V,PY-Inf					Fl	Fr, L-Fr		
1	**Malvaceae**	Malva neglecta*	common mallow	A, B, sl P	4-10			V										
1,4,6,7,8,10		Sphaeralcea coccinea	scarlet mallow, cowboy's delight	P	5-6		Stellate hairs	V			Fl		Fr,Fl	V	V		Fr	
1,2,3,5,7,8,9	**Melanthiaceae**	Zigandenus paniculatus	foothill death-camas	P	5-6		AKA: Z. venenosus, Toxicoscordion paniculatum	V	V	V,B,(Fl)		Fr		L-Fr	L-Fr	L-Fr		
1,2,3	**Montiaceae**	Claytonia rosea	Rocky Mountain spring beatuty	P	3-6		2: seen in access drainage only	Fl	Fl	Fl								
1,2,3		Claytonia rubra	redstem springbeauty	A	4-5		**CNHP fully tracked species. Local endemic. Only 1 herbarium specimen fr BOCO**	Fl	Fl, B, V	Fl								
4,6		Phemeranthus parviflorus	sunbright, fameflower	P	5-6		AKA Talinum parviflorum				Fl, Fr; W&W-K, Ack-R		Fr,B					

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5,6,7,8,9,10	**Nyctaginaceae**	Oxybaphus/Mirabilis hirsutus	hairy four o-clock	P	7-8		5: possibly lanceolata (hybrid)				Fr,B; W&W, Ack-K	V	B	B,Fl,Fr	Fr	B,Fl,Fr,L-Fr	Fr,B,Fl	
(5),6,7,8,10		Oxybaphus/Mirabilis linearis	narrowleaved umbrellawort	P	6-8		5. seen on lower portion of exit route to S of 'access drainage'. Broad flat involucre resembles an umbrella					B	B,Fr	Fr	Fr		L-Fr,Fr,Fl	
8	**Onagraceae**	Epilobium ciliatum	American willow-herb	P	6-8	FACW, FACW									L-Fr,Fr			
1,2,3,4,5,6,7,8,9,10		Gaura coccinea	scarlet gaura	P	5-6		Pioneer species, can establish in disturbed sites	V	V	V	B,Fl	L-Fl,E-Fr	Fr,Fl	Fr,(Fl)	V,(Fr)	L-Fr,(Fl,B)	V,L-Fr	
11		Gaura parviflora/mollis	lizard tail, small-flowered gaura	B	summer		Also, Oenothera curtifolia											Fr,Fl
1,2,3,5,7,8,9		Oenothera howardii	Howard's evening primrose	P	4-6		1,2: likely ID	V	V	V		L-Fl,Fl		V	V	V		
4		Oenothera/Calylophus serrulata	yellow sundrops	P	6-8						B,Fl							
4,7,10		Oenothera villosa	common evening-primrose	B	7-8	FACU, FAC					V			V			Fl,Fr	
1,2,6,7,8	**Orobanchaceae**	Castilleja integra	foothills paintbrush	P	5-6		1: tentative ID	V	V				Fl,Fr	Fl,Fr	Fl,Fr			
1,2,3,9		Castilleja sessiliflora	plains paintbrush	P	4-6		1: tentative ID	V; Ack-R	E-Fl	Fl,B						Fr		
(5)		Orobanche/Aphyllon fasciculatum	clustered broomrape	P	6-7		5. seen on lower portion of exit route to S of 'access drainage'.					P-Fl						
9		Orobanche multiflora	multiflower broomrape													Fr,(Fl)		
3,4,5,6,10,11	**Oxalidacea**	Oxalis dillenii	slender yellow wood sorrel	P	5-6		3: access drainage. 5. seen on lower portion of exit route to S of 'access drainage'.			E-B, Fl, B; W&W-L	Fl,Fr; W&W-K	Fl,Fr	Fr; W&W-K				V	Fl
1,2		Oxalis sp	wood sorrel					V	V									
1,4,5,6,7,8,9,10	**Papaveraceae**	Argemone polyanthemos	prickly poppy	P	6-8		5: seen on exit route to S of 'access drainage'	V			B	Fl	Fr,Fl	B,Fl	Fl	V	V	
3	**Phrymaceae**	Mimulus floribundus	manyflowered monkey-flower	A	5-7					B, Fl; W&W, Ack-K			Fr,Fl; W&W-K					
10?		Mimulus guttatus	yellow monkey-flower	A,P			10: possible ID for leafless, senescent specimens			B, Fl; W&W, Ack-K							Fr	
1,2,3,4,6,7,8,9,10	**Pinaceae**	Pinus ponderosa	Ponderosa pine	woody P	NA			V	V	V	V		X	V, PY-female cone		female cone	PY cones	
3		Pseudotsuga menziesii	Douglas fir	woody P	NA					V								
1,2,3	**Plantaginaceae**	Collinsia parviflora	blue-eyed Mary	A	3-5			Fl	Fl	Fl								
1,3,4,5,6		Linaria canadensis var texana	blue toadflax	A	3-5		**Uncommon. 3: lower access drainage area. 5: end of day exit route to S of access drainage**	V,(Fl)		B, Fl		Fr	Fr					
1,2,3,4,5,6,7,8,9		Linaria dalmatica*	Dalmatian toadflax	P	5-10		List B CO noxious weed with large yellow, spurred flowers; rhizomatous, shor-lived; ovate leaves are glabrous and glaucous	V	V	V	Fl	V,post-Fl,Fl	V,B	Fl	Fr,L-Fr,P-Fl,(Fl)	L-Fr,(L-Fl,Fl)		
2,7?		Penstemon angustifolius	narrow-leaved penstemon	P	5(6)		2,7: tentative ID. Blue flowers--not 1-sided; leaves glabrous & glaucous		V					Fr,L-Fr; Ack-R				
3,4,5,7,8,9,10		Penstemon secundiflorus	sidebells penstemon	P	5-6					B,(Fl); W&W-K	Fl	Fr		Fr	Fr	L-Fr	Fr	
1,3,5,6,7,8,9		Penstemon virens	Front Range beardtongue	P	5-7			V,PY-Inf		V,B,PY-Inf		Fr	Fr	L-Fr	Fr	Fr		
5,7,(8),9		Penstemon virgatus	one-sided penstemon	P	6-7							B,Fl; Ack,W&W-K		Fr,Fl; Ack-K	Fr	Fr		
1,(8)		Plantago major*	common plantain	P	5-7	FAC, FAC		V							V,Fr			
1,4,(5),6,8		Plantago patagonica	woolly plantain	A	6-7		Tiny annual with woolly grey leaves. 5. seen on exit route to S of access drainage	V			X	Inf	Fr		Fr			
3		Veronica arvensis*	corn speedwell	A	4-6	FACU, FACU	3: S side of upper (above fence, gate) access drainage			Fl,Fr; Ack,FGP-K								
3		Veronica biloba	bilobed speedwell	A	5-6					Fl; W&W, Ack-R,K								
10		Veronica peregrina var. xalapensis	purslane speedwell	A		FACW, OBL	Stipitate glandular										L-Fr	

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1,2,3,5,7,8,9,10	**Poaceae**	Achnatherum hymenoides	Indian ricegrass	P				PY-Inf	PY-Inf	PY-Inf, (E-Inf)		Inf		Inf	Inf	Inf	Inf	
10		Achnatherum robustum	sleepygrass	P	7-8		C3. 3: Possibly, Nasella viridula, but for most characters, ACRO is better fit. (Unable to discern 5 veins on glumes)											
9		Achnatherum scribneri	Scribner's needlegrass	P			Shaw: infrequent. SEINET(~8.25.19): 13 collections from Boulder Co.									Inf; Win,Shaw-K		
1,2,4		Agropyron cristatum*	crested wheatgrass	P			C3	V, PY-Inf			Inf							
11		Agrostis gigantea*	redtop bent(grass)	P	7-8	FACW, FAC	C3											Inf
1,2,3,4,6,7,8,9		Andropogon gerardii	big bluestem	P		FACU, FACU	Caespitose or short rhizomatous perennial with racemes branched into digitate groups; spikelets in pairs: 1) sessile and bisexual and 2) pediceled and staminate; leaves long-haired; C4	PY-Inf&V	PY-Inf&V	PY-Inf&V	V, PY-Inf,V		Inf; Win-K	V	Inf	Inf		
1,2,3,4,5,7,9,10		Anisantha (Bromus) tectorum*	cheatgrass, downy brome	A	3-4		Caespitose winter annual with open panicles of flexuous branches and pedicels; long and narrow lemmas gradually taper to the long awn; C3; List C	V, PY-Inf	V,E-Inf	Inf	Inf	Inf		Inf		Fr,L-Fr	Fr,L-Fr	
1,2,4,7,8,9,10		Aristida purpurea	purple three-awn	P			Caespitose perennial with contracted, spikelike panicles; lemmas with 3 divergent awns; C4; common in pdog colonies; grazing increaser.	PY-Inf,V	PY-Inf, V		Inf			Inf	Inf	Inf	Inf	
1,4,5,8,9,10		Bouteloua curtipendula	sideoats grama	P			Caespitose perennial with panicles of relfexed, spicate branches ("flags") of pendent spikelets; papillose-based hairs along blade margins; C4	PY-Inf			PY-Inf		Inf		Inf	Inf	Fr	
4,5,6,8,9		Bromus briziformis	rattlesnake brome	A	5-6						Inf; Shaw-R	Inf	Inf		Inf	Fr		
1,2,4,5,7,9,10		Bromus (Bromopsis) inermis*	smooth brome	P	5-7	UPL, UPL	Rhizomatous perennial with open panicles; "W"/"M" fold half-way down blades; C3; common pasture and hay grass	V	V,PY-Inf		Inf	Inf		Inf		Inf	V	
1		Bromus commutatus	meadow brome	A			1: tentative ID Under pines	PY-Inf; Win,Shaw,W&W-K										
(3),4,5,6,7,8,10		Bromus japonicus*	Japanese brome	A	4-5		3: lower access drainage. C3			Inf. Win-K,Shaw-R	Inf	Inf	Inf	Inf	Inf		Fr,L-fr	
1,4,6,8,10,11		Buchloe dactyloides	buffalo grass	P	4-6		Stoloniferous dioecious perennial: staminate -- spicate panicles and pistillate -- panicle of burr-like clusters; leaf blades typically hairy; dominant plant of shortgrass prairie; C4	V			Inf		Inf		V		V	X
1,6,8,9,10		Chondrosum (Bouteloua) gracile	blue grama	P			Caespitose perennial with panicles of spicate branches resembling flags; tuft of hairs at leaf collar; dominant plant of shortgrass prairie but common in most western grasslands; C4	PY-Inf					Inf		Inf	Inf	Inf	
4		Critesion murinum	mouse/smooth barley	A	4-5						Inf; Shaw-R							
10		Critesion pusillum	little barley	A													Inf; Shaw-K	
11		Dactylis glomerata *	orchardgrass	P		FACU, FACU	Caespitose perennial with contracted, 1-sided panicles; sheaths and blades keeled; common pasture or hay grass; C3											Inf
8		Danthonia spicata	poverty oatgrass	P											Inf; Win-K, Shaw-R			
4,(5),6,10		Dichanthelium linearifolium	slimleaf panicgrass	P			C3. Wingate: rare; Shaw: infrequent. Not a CNHP-tracked species. 5: on exit route to S of 'access drainage'.				Inf	Inf; Shaw-K				L-Fr,(Fr); Shaw, Win-R	V,L-Fr	
1,4,6,(7),8,10		Dichanthelium oligosanthes	few-flowered panic grass	P	5-6		var. scribnerian. 7. access drainage; not seen in this day's survey area. C3.	V			Inf		Inf		L-Fr		V,L-Fr	
8,10		Echinochloa crus-galli	barnyard grass	A											Inf; Shaw-K		Inf	
2,10		Elymus albicans	Montana/Griffith's wheatgrass	P			Elymus lanceolata X Pseudoroegneria spicata		PY-Inf,V; Ack-K								Inf	
2,3,6,8,9,11		Elymus canadensis	Canada wildrye	P	5-6	FACU, FAC	C3		PY-Inf	PY-Inf			Inf		Inf	Inf		Inf
4,5,6,7,8		Elymus elymoides	bottlebrush squirreltail	P	5-6		C3				Inf	Inf	Inf	Inf	Inf			

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8		Elymus lanceolatus	streambank wheatgrass	P			C3. 8: tentative ID								Inf; Win,Shaw-K			
5?,9		Elymus repens	quackgrass	P			C3. 5: tentative ID					Inf; Win,Shaw-K				Inf; Win, Ack-K		
8,9,10		Elymus trachycaulus	slender wheatgrass	P											Inf; Win,Shaw-K	Inf; Shaw-K	Inf; Shaw,W&W-K	
5		Elymus sp?					5. unable to ID (Win, Shaw, Ack). similar to albicans, bakeri, etc., but more flowers per spikelet—9 to 10, or like lanceolatus, but w long awns					Inf						
(3),4,5,6,7,9,10		Hesperostipa comata	needle-and-thread grass	P			3. lower access drainage. Caespitose perennial with open or contracted panicles of 1 flowered spikelets with extremely long lemma awns (6+ cm); C3			Inf	Inf	Inf	L-Fr,Fr	L-Fr		L-Fr	L-Fr	
4	**Poaceae**	Hordeum murinum*	wall barley	A	4-5		Common 'street weed', C3				Inf; Shaw-R							
1,4,6,7,8,9,10		Koeleria macrantha	junegrass	P	5-6		C3	PY-Inf			Inf		Inf	Inf	Inf	Inf	Inf	
5,7,9		Leucopoa kingii	spike fescue, King's fescue, spikegrass	P			C3					Inf; Win-K, Shaw-R		Inf		Inf; Ack,W&W-K		
10		Leymus triticoides	beardless/creeping wildrye	P			10: tentative ID, Ack: 6000-9500; this location about 5700											
10		Lycurus phleoides	common wolftail	P			W&W: L. setosus; Ack: Muhlenbergia phleoides										Inf; Shaw-K	
1,9		Muhlenbergia montana	mountain muhly	P			1:tentative ID: lemma awns 8 mm.	PY-Inf; Shaw-K								Inf; Shaw-K		
6,11		Muhlenbergia paniculata	tumblegrass	P									Inf					Inf
1		Muhlenbergia richardsonii	mat muhly	P	7-9		1: tentative ID	PY-Inf,V										
11		Muhlenbergia wrightii	spike muhly	P														Inf; Win,Shaw-K
5,6,7,8,10,11		Nasella viridula	needle grass	P	5-6		C3					Inf	Inf	Inf	P-Fr,Fr		Inf	Inf
(2),4,6,(8),10,11		Panicum virgatum	switchgrass	P		FAC, FACW	2: seen only in access drainage vicinity this day. Rhizomatous. C4		PY-Inf, V		V, PY-Inf		V, PY-Inf		Inf		Inf	Inf
1,2,3,4,5,6,7,8,9,10		Pascopyrum (Agropyrum) smithii	western wheatgrass	P			Rhizomatous perennial with erect spikes; very blue foliage, upper surface of leaf blades stongly ribbed; dominant plant of mixedgrass prairie; C3	V	V	V	V, Inf	V	V		V	V	V	
9,10		Phleum pratense	timothy	P		FACU, FAC	Caespitose perennial with dense, cyllindrical, spikelike panicles; wide glumes w 2 'horns'; common pature or hay grass; C3									Inf	Inf	
5,9,10		Piptatherum micranthum	littleseed ricegrass	P			C3					Inf				Inf; Shaw-K	Inf	
2		Poa arida	plains bluegrass	P			C3, rhizomatous		Inf; Win-K									
3,4,5,6,7,8,9,10		Poa compressa*	Canada bluegrass	P			C3			V	Inf	V,Inf	Inf	Inf	Inf	Inf	Inf	
4,7,8,10		Poa pratensis*	Kentucky bluegrass	P		FACU, FAC	Rhizomatous perennial with open panicle; lemma with cobwebby hairs at base; C3				Inf; FGP-K			Inf	Inf		Inf	
1,3		Poa fendleriana	muttongrass	P				Inf; Win-K		Inf; Win-K								
2,3,4		Poa secunda	Sandberg bluegrass	P	5-6				Inf	Inf; Win,Shaw-K	Inf; Win, FGP-K							
(8)		Polypogon monspeliensis*	annual rabbitsfoot grass	A		FACW, FACW												
8,9		Pseudoroegneria spicata	bluebunch wheatgrass	P											Inf; Win-K, Shaw-R	Inf; Shaw,Win-K		
(8),11	**Poaceae**	Schedonorus arundinaceus*	tall fescue	P		FACU, FAC	Formerly, Festuca. C3								Inf			Inf
1		Schedonorus (Festuca) pratensis*	meadow fescue	P		FACU, FACU	Caespitose to short-rhizomatous perennials with glabrous auricles; slightly nodding, narrow panicle; C3	PY-Inf; Shaw,Win-K										
1,2,3,4,7,8,9,10		Schizachyrium scoparium	little bluestem	P	~7			PY-V	PY-V,Inf	PY-Inf,V	V, PY-V			E-Inf, Py-Inf	Inf	Inf	V	
9,11		Sporobolus compositus/asper	composite/tall/rough dropseed	P			AKA: S. asper var compositus. SEINET search 8.25.19: 13 specimens sourced from Boulder Co.									Inf; Shaw-K		Inf; Win-K,Shaw-R
2,6,9,11		Sporobolus cryptandrus	sand dropseed	P			2: tentative ID		PY-Inf				Inf			Inf; Win-K		Inf

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10		Thinopyrum intermedium*	intermediate wheatgrass	P	6		Also, Elytrigia. C3										Inf	
11		Thinopyrum ponticum*	tall/rush wheatgrass	P	~7		AKA Elymus/Elytrigia elongata				8``							Inf
(3),6		Vulpia octoflora	sixweeks fescue	A	4-5		C3. 3: Lower portion of access drainage, S side.			Inf; Shaw-R			Inf; Ack-K,Shaw-R					
3,7,8,9	**Polemoniaceae**	Ipomopsis/Gilia spicata	spike gilia	P	4-6					Fl,B				Fr	L-Fr,V	L-Fr		
7,8	**Polygonaceae**	Acetosella vulgaris*	sheep sorrel	P	5-6		WGP: 494							Fr	Fr,L-Fr			
9,10		Eriogonum effusum	prairie babysbreath, buckwheat	subshrub P	7-8		Grazing increaser									Fl, L-Fl; W&W-K	Inf	
1,2,3,5,7,8,9,10		Eriogonum flavum	buckwheat	P	6-8			V	V	V, PY-Inf		Fl;W&W-K		V,Fl,L-Fl	L-Fl	L-Fl	L-Fr	
1,2,3,4,5,7,8,9,10		Eriogonum umbellatum	wild buckwheat	P	summer			V	V, PY-Inf, B	V,B	Fl	Fl		L-Fl	Fr	V,Fr	X	
2,3,7,9		Fallopia convulvulus*	false bindweed	A	5-6				V	V				Fr		Fr		
11		Persicaria pennsylvanicum	Pennsylvania smartweed	A	7-9	FACW, FACW												Fl; Ack-K
8,10		Polygonum arenastrum/aviculare *	devil's shoestring, common/prostrate knotweed	A	6-10		WGP: native (but treats arenastrum & aviculare as separate sps.); Ack: introduced; W&W: alien								Fl,B			Fl,Fr; Ack-K
4,8,11		Polygonum ramosissimum	bushy knotweed	A	7-8						V; Win,W&W-K				Fr,(Fl); Ack,W&W-K			Fr;Ack-K
6		Polygonum sawatchense ssp. Sawatchense		A	7-8		W&W keys to douglasii						Fl; Ack,W&W-K					
1,2,3,5,7,8,9,10		Pterogonum (Eriogonum) alatum	winged buckwheat	P	7-8		Biennial with winged, yellow-green, pendant fruits; monocarpic	PY-Inf	V, PY-Inf	V, PY-Inf		B,Fl		Fl,Fr	Fr,Fl,B,V	P-Fl,B,Fl	Fl,V,Fr	
1,6,7,10		Rumex crispus*	curly dock	P	5 (6)	FAC, FAC		V, PY-Inf					Fr	Fr			Fr	
1,(5),(8),10,11		Rumex triangulivalvis/salicifolius	willow, triangle-valved dock	P	~6	FACW, FAC	1,10: elliptic-oblong, wavy edged leaf form. 11: straight edged, lance-linear leaf form. 5: seen on lower portion of exit route to S of 'access drainage' (not in this day's survey area). Small fruits, shaped like equilateral, 3-sided pyramid, undissected; typically, tubercles light colored, contrasted with darker flanges	V, PY-Inf				Fr			Fr		Fr	Fr
1	**Primulaceae**	Androsace occidentalis	western rockjasmine	A	4-5			Fr; Ack-K										
7	**Ranunculaceae**	Anemone cyllindrica	candle anemone	P	5-6					Fr				Fr; Ack-K				
3		Anemone (Pulsatilla) patens var multifida	pasque flower	P	3-4					Fr								
2		Clematis ligusticifolia	virgin's bower	P	7-8		2: only one plant seen, mtn mahogany thicket		E-V; PY-vine									
4,(5)		Delphinium carolinianum	plains/white/Carolina larkspur	P	5-6		5: seen on lower portion of exit route to S of 'access drainage'.				Fl, B	Fl						
1,2,3,5,7,9,10		Delphinium geyeri	Geyer's larkspur	P	6-7			V	V	V,(B)		B,Fl,V		Fl,B		L-Fr	V-Senesc	
1?,3,5		Delphinium nuttallianum	Nuttall's larkspur	P	5-6		1: tentative ID	V		Fl,V		Fr,Fl						
3		Ranunculus ranunculinus	tadpole buttercup	P	5-6	FAC, FACU	17 BOCO herbarium accessions, but Investigator's 1st & only encounter			Fl, B; Ack-K								
2,3,6,7,(8),9,10	**Rosaceae**	Amelanchier alnifolia var alnifolia	serviceberry	woody P	5-6				Fl, B,V	L-Fl, E-Fr, (Fl)			Fr	Fr	V	V	V	
1,2,3,4,5,6,7,8,9,10		Cercocarpus montanus	mountain mahogany	woody P	5			V	V	V,B	V	Fr	Fr	V	V,Fr	V,L-Fr	V, Fr	
3,4,7,11		Crataegus succulenta	Rocky Mountain hawthorn	woody P	5					V,Fl	Fr			Fr				Fr,Fl
2,3,5,7,(8),9		Physocarpus monogynous	ninebark	woody P	?				V,(PY-Inf)	V		V		V	V	V		
1,2,3,4,5,6,7,8,9,10		Potentilla (Drymocallis) fissa	bigflower cinquefoil	P	5-6			V, PY-Inf	V,B,(Fl)	V,Fl,B	Fr,V	Fr,(Fl)	V	V	V	Fr	X	
1,2,3,5,7,9		Potentilla pensylvanica	Pennsylvania cinquefoil	P	5-6			V	V	V		Fl,B		Fr		V		
1,2,3,5,6,7,8,9,10		Potentilla recta*	woolly cinquefoil	P	6-7		WGP: 510	V, PY-Inf	V,(PY-Inf)	V		B,(Fl)	Fl,B	Fr,(Fl)	Fr	Fr	Fr	
1,(5),6,(7),9,10		Prunus americana	American plum	woody P	4,5	UPL, FACU	5: seen on exit route to S of 'access drainage'. 7: access drainage; not seen in this day's survey area	Fl				Fr	V			V	V	
2,6,7,8,(9),10		Prunus pumila var. besseyi	sand cherry	woody P	5-6		9: this day, only seen on entry & exit routes		B,Fl,L-Fl				V	Fr	V	V	V	

DOCUMENTATION SUMMARY	FAMILY	SCIENTIFIC NAME	COMMON NAME	DURA-TION	BLOOM	WIS: GP, WMVC	NOTES	1. 4.28.19	2. 5.11.19	3. 5.26.19	4. 6.15.19	5. 6.30.19	6. 7.14.19	7. 7.28.19	8. 8.11.19	9. 8.23.19	10. 9.11.19	11. 9.11.19
1,2,3,4,5,6,7,8,9		Prunus (Padus) virginiana	chokecherry	woody P	4-5	FACU, FACU		V	X	Fl	V	V	V	Fr		V		
6,7,9,10		Rosa arkansana	Arkansas rose	P	7-8								V; W&W-R	B,Fr,Fl; Ack-K		V,Fr	V; Ack-R	
1,11		Rosa rubiginosa/eglanteria	sweetbriar rose	P	?			V; W&W-K	V									Fr
2,3,8		Rosa sp.	wild rose	P			3: prickles w wide bases, but prickles also extending to terminus on current year growth. 8: acicularis or arkansana			V, PY-Fr								
5		Rosa sayi (acicularis)) or arkansana	Say's rose	P	7							B; W&W-K						
2,8,10		Rosa woodsii/blanda	Wood's rose	P	6-7		Broad-based thorns; purple-black woody stems; sepals ~2mm wide		V						V		V	
1,2,3,5,6,7,8,9,10		Rubus (Oreobatus) deliciosus	delicious/Boulder raspberry	woody P	6-8			V	V	V		V	Fr	Fr,L-Fr	L-Fr	X	V	
1,2,3,4,5,9	**Rubiaceae**	Galium aparine*	catchwilly, cleavers	A	5-7	FACU, FACU		V,Fl	V	B, Fl	V	Fr				L-Fr		
3		Galium boreale	northern bedstraw	P	7-8					V								
3	**Salicaceae**	Populus angustifolia	narrowleaf cottonwood	woody P		FACW, FACW	3: possibly balsamifera—lvs immature			V								
11		Populus deltoides ssp. monilifera	plains cottonwood	woody P	4-5	FAC, FAC	Petiole flattened perpendicular to the plane of the deltoid leaf											V
3,5,6,7,8,9	**Santalaceae**	Comandra umbellata	bastard toadflax	P	4-6		Monotypic family in CO; vegetatively, looks like a small Dalmatian toadflax.			B,Fl		V	Fr,V	Fr,V	V	Fr		
3,7	**Sapindaceae**	Acer glabrum	Rocky Mountain maple	woody P						E-Fr				V				
2,3,5,7	**Saxifragaceae**	Heuchera parviflora	common alumroot	P	5-6				B	V,B		Fr		V				
1,2,4,7,8,10,11	**Scrophulariaceae**	Scrophularia lanceolata	lanceleaf figwort	P	5-8			V	V		B			Fr	Fr		Fr/L-Fr	X
3,(7),10		Verbascum blattaria*	moth mullein	B	7-8		7: this day, only seen along S side of access drainage. WW p. 544. List B.			PY-Inf				Fr,Fl			Fr	
1,2,3,5,6,7,8,9,10		Verbascum thapsus*	common mullein	B	7-9		List B noxious weed	V, PY-Inf	PY-Inf, V	V,PY-Inf		V, PY-Inf	Fl	Fl,B	V,Fr,	V,Fr	V,Fr	
(5),6,7,8,9,10	**Solanaceae**	Physalis hederifolia	ivy leaf ground cherry	P	6-8		5: only seen at lower portion of access drainage					Fr,Fl	B,Fl	Fl,B	Fr	Fl	Fr,L-Fr	
4		Physalis heterophylla	clammy ground cherry	P	6-7						B,Fl; Ack,W&W-K							
8,9,10		Physalis hispida	prairie ground cherry	P	6-8		AKA P. pumila var hispida								Fr	V; Ack-K	V	
4,6,7,8,10		Physalis longifolia	longleaf ground cherry	P	6-7						V,(B)		B; Ack-K	B,Fl,Fr; Ack-K	V; Ack-K		V; Ack-K	
(6),8		Quincula lobata	Chinese lantern	P	5(6)		6. on exit route, E /lower in elev than this day's survey area. Rotate, purple flowers, opening-closing with diurnal cycle. Typically assoc w prairie dog colonies.						Fl		Fl			
8		Solanum triflorum	cutleaf nightshade	A	summer		Often associated w prairie dog colonies, esp. the mounds								Fl,Fr,B			
8)	**Typhaceae**	Typha angustifolia	narrow-leaved cattail	P	7-8	OBL, OBL	8: tentative ID—small plants, lacking inflorescence. Staminate and carpellate parts of the spike separated.								V			
9,11	**Ulmaceae**	Ulmus pumila*	Siberian elm	woody P	3-4	UPL, UPL	8: likely ID, 15 cm height									V		V
2,4,5	**Urticaceae**	Parietaria pennsylvanica	pellitory	A	5-6				V, (B)		Fr	Fr						
4,(5),6,8,10	**Verbenaceae**	Glandularia bipinnatifida	dakota mock vervain	A, P	5-6		5. seen in upper access drainage adjacent to prairie dog area (North High Valley)				Fl	Fl	Fr,Fl		Fl,Fr		V,(Fl)	
11		Phyla cuneifolia	fogfruit	P	6-7													Fr,Fl
1,4,8,10		Verbena bracteata*	bracted/prostrate vervain	A	4-10		Native to Great Plains; may not be native here	V			Fl				Fr,Fl,V		X	
11	**Violaceae**	Hybanthus verticillatus	baby-slippers	P														
1		Viola kitaibeliana*	field pansy	A	4-5		Uncommon. Small violet, single flower, lobed stipules, basal leaves simple, entire (not lobed); but, petals lt. violet, not bi-colored	V, Ack-K										

DOCUMENTATION SUMMARY	FAMILY	SCIENTIFIC NAME	COMMON NAME	DURA-TION	BLOOM	WIS: GP, WMVC	NOTES	1. 4.28.19	2. 5.11.19	3. 5.26.19	4. 6.15.19	5. 6.30.19	6. 7.14.19	7. 7.28.19	8. 8.11.19	9. 8.23.19	10. 9.11.19	11. 9.11.19
1,2,3,4,5,8		Viola nuttalli	Nuttall's/yellow violet	P	4-5			Fl,V	Fl, L-Fl	Fl,V,L-Fl	Post-Fl	V			V			
2		Viola scopulorum (canadensis)	Canada violet	P	5-6		2: flowering plants seen only in access drainage. Preflowering plants may (tentative ID) have been seen in Event 2 survey area		Fl									
8	**Vitaceae**	Parthenocissus vitaceae	woodbine	P	?		Native sp. w tendrils lacking adhesive pads.								V			
(2?)		Vitis riparia	wild grape	woody-P	6-7	FAC, FACU	2: tentative ID, only 1 plant (from previous year) seen this day. Access drainage		E-V, PY-Vine									

Column headings, abbreviations, explanatory notes

Columns

B. Documentation summary: Each numeral represents a dated, survey event. '( )' denotes species was only seen along entry and/or exit routes and not in that day's survey area. See below for brief description of travel routes.

C. Family name, scientific
D. Scientific name: genus species. An asterisk is used to indicate a nonnative species.
E. Common name
F. Duration column: P = perennial, B = biennial, A = annual, sl-P = short-lived perennial, woody P = woody perennial
G. Bloom month: indicates flowering period, e.g., 5 = May

H. Wetland Indicator Status per 2012 Natl Wetland Plant List, US Army Corps of Engineers. Source: USDA Plants database (online) &/OR Field Guide to Colorado's Wetland Plants, Culver & Lemly:
GP = Great Plains , WMVC = western mountains valleys and coasts

I. Notes

J, K . . . . Phenology identification codes (cols. J, K, . . .): V = vegetative, B = flower bud, Fl = in flower, Fr = in fruit, LY/PY = last/previous year, Inf = inflorescence, E = early, L = late;

Identification resources cited, abbreviations: Ack = Ackerfield, J, Flora of Colorado; BONAP = Biota of North America Plant Atlas, online (bonap.org); Carter = Trees and Shrubs of Colorado; C&L = Culver & Lemly, Field Guide to Colorado's Wetland Plants (2013); CF = Craig Freeman, Chenopodium key; W&W = Weber & Wittman, Colo Flora, 4th., ed; WGP =

Column B, survey event:

Event no. Date	Narrative description
1. 4.28.19	From end of 2-track at salt block area (just behind 'Esplanade Hill'), went up S side of access drainage up to SE corner of the NW portion of RHSA. Then, 7 N-S transects between drainage (S boundary) and north boundary fenceline as high to the W as the N end of the N. high ridgeline. This includes the praire dog areas. Then from ridgeline-N fenceline intersection, E-ward along fenceline, then S-ward about 50-75 yds E of the E boundary of RHSE to original drainage, returning along N side of drainage
2. 5.11.10	Entry westward up middle of access drainage. This drainage served as S boundary of survey area. N fenceline served as N boundary. 6 N-S transects on contour from just E of ridge line, down W slope to about 150 yards from two track (W boundary of RHSA. Also did about 5-6 transects on S facing slope (on N side of upper access drainage) of North High Ridge. Exit eastward above 'access drainage' on N side.
3. 5.26.19	SW area of RHSA; N &W boundary delimited by access 2-track fr Heil VR & N foot of RH; E boundary delimited by western rim of Red Hill, S boundary delimited by 'cascading creek' on W Portion & by S rim of RH on E portion
4. 6.15.19.	2 transects adjacent to Hwy. 36, fr entry gate just N of St. Vrain Rd, northward to old barbwire fence with set in rock footing. Transects at about 30-50 yds and 100-150 yds W of E Boundary fence
5. 6.30.19	4 E-W transects along E base up to summits of Red Hill, White Hill & N. Promontory ridge summits. E boundary defined by fenceline & North Promontory Ridge; W boundary, the west edge Of the summit of RH
6. 7.14.19	2 N-S transects along mid-elevation flank of hillside facing E to Hwy 36, S boundary being the RHSE access drainage, N boundary being the fenceline that bounds N boundary of RHSA
7. 7.28.19	6 ~ N-S, S-N transects, w part of NE polygon of RHSA: N boundary = N fence/N boundary of RHSA; W boundary is drainage along 2 track that forms W boundary of N portion of RHSA; S boundary is lower flank of Red Hill l, E boundary is ¾ to 5/6 up the West side of North High Ridge
8. 8.11.19.	Seven ~N-S/S-N transects of NE portion of RHSA: bounded to E by E boundary of RHSA; to N by fenceline, to W by high ridgeline, to S by access drainage
9. 8.23.19	Four E-W & W-E transects of southern extreme of RHSA (& adjoining areas to S of E portion): NE corner, high point of N. Promontory Ridgel; NW corner/boundary being the E-W running portion of the 2 track (fr Heil VR) where it crosses Saddle, curving S&W in vicinity of ungulate exclosure; SW corner being about 40 SW of ungulate exclosure along 2-track; SE corner being S of NE corner, about 60 yds N of S fence line (that runs along E foot of N. Promontory Ridge & White Hill)
10. 9.11.19	SE extreme of greater RHSA. Gridded area: S boundary is the fenceline w Loukonen Property; E boundary is the North Hills OS (HVR) fenceline—approx 100 W of Hwy. 36; N boundary is approx in line w the top of South Promontory Ridge; W boundary is South High Ridge. In addition to gridded area, a loop was made to the N, fr NE corner to NW corner of the gridded area
11. 9.11.19	Brief exploration of drainage areas and abandoned, gravel roadway adjacent to Hwy 36, just to the S and W of the gated entry (somewhat N of St. Vrain Rd) Note: not all species were—Only Those not seen in Events 1-10 or otherwise of interest)

Appendix 2A **[with location details, internal version]**

Location and abundance details for species of interest (including Species of Special Concern) This spreadsheet provides the following information:

Scientific name
Event#, Date
Location number (sequentially, for all events combined)
Northing, GPS coordinates for latitude
Westing, GPS coordinates for longitude
Elevation (feet)
Status (e.g., 'uncommon')
Photo
Notes

Plants are listed alphabetically by genus (Plant family is not specified). The 'status' column indicates information such as: A) an authority notes that the plant is uncommon or rare; B) the plant is tracked by the CNHP; C) the number of herbarium accessions from Boulder County or Colorado; and/or D) global and state conservation rank, The Natural Heritage Network (e.g., G3S2). For Column H, 'yes' or 'no' indicate whether a photo was taken or not, respectively. (Note that most photos taken are not included in Appendix 3.) The notes column gives details on the number of plants present and/or the dimensions (in meters) of the area containing the occurrence. Sometimes it includes other information such as the substrate (e.g., 'loose or exposed white rock') or over story woody plants. An abbreviated version—lacking location details—of this spreadsheet table is provided as Table 1, below.

Appendix 2A. Red Hill Study Area plant inventory: DETAILED documentation of plant species of interest. 2019

Scientific name	Event#, Date	Location Number	Northing (GPS latitude)	Westing (GPS longitude)	Elevation (feet)	Status	Photo+	Notes
Achnatherum scribneri	9, 8.23.19	1	not recorded	see notes	- -	Shaw: infrequent; SEINET:14 collections from Boulder Co	No	No. of plants not assessed. About 20 m NW of Diachanthelium linearifolium, Loc 3 (SE corner of Event 9 inventory area, south/high end of 'north promontory ridge')
Asclepias stenophylla	4, 6.15.19	1	40 10.7617	105 15.4115	5443	G4-5, S2; CNHP fully tracked	No	2 plants; 1 plant seen to the N on same hillside & approx same elev. 1 of 3 plants in bud. Distinguished from A. engelmania by minutely hairy stems.
	5, 6.30.10	2	40 10.3364	105 16.4109	5718	SEINET search, 9.13.19:	Yes	1 plant
	5, 6.30.10	3	40 10.3289	105 16.1767	5483	22 accessions, Boulder Co.	No	1 plant
	6, 7.14.19	4	40 10.6715	105 15.6976	5287		No	1 plant
	6, 7.14.19	5	40 10.9255	105 15.9957	5629		Yes	1 plant
	6, 7.14.19	6	40 10.9586	105 15.8929	5611		No	1 plant
	6, 7.14.19	7	40 10.7692	105 15.7810	5381		No	1 plant
	6, 7.14.19	8	40 10.7440	105 15.7609	5361		No	~25 plants, 7X10 sm#
	8, 8.11.19	8	40 10.5250	105 16.3036	5700		No	2 plants, 1.5X0.5 sm
	9, 8.23.19	9	40.171*	105.272	- -		Yes	1 plant
	10, 9,11.19	10	40 09.8860	105 16.3782	5579		Yes	~11 plants, 3X6 sm. Adjacent to elk jump in E fence line
Carex oreocharis	2, 5.11.19	1	40.1766	105.2805	~6050	G3S2, CNHP fully tracked	No	~20 plants; <1 X 1 sm. Approx location, determined after the event w GoogleMaps. Specimens available.
						9.25.19 SEINET search: 13, Colo; 4 , BoCo		
Claytonia rubra	1, 4.28.19	1	40 10.7708	105 16.2506	6350	G5S1, CNHP fully tracked	Yes	~20 plants under Pinus ponderosa; local endemic
	1, 4.28.19	2	40 10.9940	105 16.2940	6432	9.12.19 SEINET search: only 1	No	2X5 sm, 100s of plants. Many other such groupings in vicinity. Damp soils under pines near N boundary of RHSA—to N of the 'north high valley'.
	2, 5.11.19	3	40 10.4885	105 16.2142	5861	accession from Boulder Co—	No	8X7 sm, 100s of plants, in 'access drainage' under Rhus aromatica. ~10 other mass groupings under shrubs in next 150 yds west (up the drainage)
	2, 5.11.19	4	40 10.8918	105 16.6615	6059	1995, Heil Ranch, BCPOS	No	1.5 X4 sm, mass grouping under Ribes cereum & Prunus virginana. W-facing slope
	2, 5.11.19	5	40 10.9063	105 16.6840	6049	[16 records, state wide]	No	5X8 sm, mass grouping under Rhus aromatica & Ribes cereum. W-facing slope
	2, 5.11.19	6	40 10.8892	105 16.7042	- -		No	2X2 sm, mass grouping under Ribes cereum & Rhus aromatica. W-facing slope. 3 more similar mass groupings under shrubs seen nearby to the S on this slope
	3, 5.26.19	7	40 10.4522	105 17.4508	6319		Yes	5X4 sm mass grouping under Pinus ponderosa
	3, 5.26.19	8	40 10.4380	105 17.4632	6345		No	4X5 sm mass grouping
	3, 5.26.19	9	40 10.1807	105 17.2559	6066		No	1X3 sm mass grouping under Prunus americana; more groupings along this cascade (running water in May) for next ~50 m W/upstream.
	3, 5.26.19	10	40 10.4650	105 17.1127	6368		No	mass grouping, 0.5X1 sm
	3, 5.26.19	11	40 10.5449	105 16.9732	6443		No	mass grouping, 2X5 sm, under Cercocarpus montanum
Crepis atribarba	5, 6.30.10	1	40.176146	105.2824	- -	No Crepis species are CNHP tracked	No	Fr memory, 10.10.19: 3-4 plants in 1X1sm, a few other plants in vicinity. GPS coordinates fr Google Maps
						SEINET, 10.19.19: 1 BOCO herbarium accession (1901) [78 records, state wide]		
Dichanthelium linearifolium	4, 6.15.19	1	not	recorded	- -	Wingate: rare; Shaw: infrequent.	No	Abundance not recorded. Location somewhat S & E and lower in elev than LIPR 4-1. Pressed specimens available.
	5, 6.30.10	2	not	recorded	- -	NOT a CNHP-tracked species	No	Growing out of crack in large boulder. Found on exit route heading SW to NE, on S side of 'access drainage'
	9, 8.23.19	3	40.172*	105.278	- -	SEINET search, 9.13.19:	Yes	5 clumps in rock crevices, spikelets largely disarticulated, at top of S end of 'north promontory ridge'
Scientific name	**Event#, Date**	**Location Number**	**Northing (GPS latitude)**	**Westing (GPS longitude)**	**Elevation (feet)**	**Status**	**Photo+**	**Notes**
	10, 9.11.19	4	40 09.9176	105 16.6187	5913	22 specimens, Boulder Co.	Yes	~7 plants in boulder crevice

	10, 9.11.19	5	40 09.8031	105 16.5552	5816		Yes	~10 plants (none w intact inflorescence), growing w D. oligosanthes, in rock outcrop crevice
Hedeoma hispida	8, 8.11.19	1	40 10.7027	105 16.4816	5865	Ack: uncommon; not CNHP tracked. Near upper limit of documented altitude range (3800-6000)	No	Several plants, 1X1 sm, next to prairie dog mound
	9, 8.23.19	2	40.171*	105.273		SEINET, 9.13.19: 12 spec fr BOCO	Yes	4 plants, 0.5 X 1 sm
Helianthus rigidus ssp subrhomboideus	8, 8.11.19	1	40 10.8878	105 16.4998	5908		Yes	Largest colony in investigator's experience: 10 X 30 sm, hundreds of stems. Another large colony on same slope, to the S.
Hybanthus verticillatus	11, 9.11.19	1	40.175882	105.259309	- -	Ack: uncommon. Not tracked.	Yes	2 plants on shoulder of old gravel road at Hwy 36 access N of St. Vrain Rd (where main drainage goes under the road). GPS coordinates obtained after the fact w GoogleMaps.
						9.12.19 SEINET search: 29 accessions fr BOCO		
Lactuca ludoviciana	7, 7.28.19	1	40 10.4365	105 16.0942	5455	Ack: uncommon	Yes	Low density, 5X7 sm. Here, w JeffCo, at SW extreme of range
						SEINET, 9.14.19: 4 BOCO specimens		
Linaria canadensis	1, 4.28.19	1	40 10.4463	105 16.1002	5976	Ack: uncommon. Not tracked.	Yes	Couple dozen plants in 1 sm area; another small patch ~2 m away. Ack: herbarium spec in CO only fr Boulder & Denver Cos. Investigator has seen in Douglas & Baca Cos. & elsewhere in Boulder Co. (Ruth Roberts Preserve)
(Nuttallanthus texanus)	2, 5.26.19	2	40 10.3711	105 16.1038	5583	SEINET search, 9.14.19:	Yes	3 dozen+ plants, 5X5 sm, lower access drainage, S side
	3, 5.26.19	3	40 10.3150	105 16.6517	6044	Only 2 BoCo specimens	Yes	Did not assess extent and numbers. This location is ~ 200 m S of access drainage—on exit route from Red Hill-White Hill summits area
	6, 7.14.19	4	40 10.9648	105 15.8797	5621		No	A few plants
	6, 7.14.19	5	40 10.9461	105 15.7435	5557		No	Scores of plants, 1.5X7 sm
Linum pratense	4, 6.15.19	1	40 10.7746	105 15.4874	5444	Local endemic. Ack: uncommon.	No	1X3 sm
	6, 7.14.19	2	40 10.6911	105 15.7429	5302	Not CNHP tracked	No	low density, 0.5X0.5 sm
	6, 7.14.19	3	40 10.5997	105 15.9497	5424	10.13.19 SEINET: 10 BOCO accessions	No	low density, 0.5X0.5 sm
Orobanche multiflora	9, 8.23.19*	1	40.174	105.283	- -	Ack: no herbarium specimens from	Yes	1 plant, ESE flank of Red Hill. Open hillside dominated by Heterotheca villosa
(O. ludoviciana, ssp multiflora)	9, 8.23.19	2	40.173	105.288	- -	BoCo—nearest, Douglas, Weld	No	2 plants, 4 m apart. E/downslope fr ungulate exclosure
						9.25.19 SEINET: 36, CO; 0, BoCo		10.25.19: USDA Plants Database map shows this species has been documented in BOCO.
Physaria belli	1, 4.28.19	1	40 10.4669	105 16.1913	6064	G2-3,S2-3; CNHP fully tracked	Yes	Rock slide area adjacent to access drainage. 15 X 25 sm, many plants (>20). Not in fruit, ID not diagnostic, but specimens lack the characteristic leaves of P.vitulifera and the growth form of P. montana [no other species are likely in this area]
	1, 4.28.19	2	40 10.4302	105 16.1032	5916	Local endemic	No	1 plant
	1, 4.28.19	3	40 10.4280	105 16.0744	5911		No	Scores of plants, 30 X 30 sm; just W of triple decker stock tanks along N slope of ravine ('access drainage')
	2, 5.11.19	4	40 10.4280	105 16.0744	5719		No	1 plant at a high point in access drainage bottom
	3, 5.26.19	5	40 10.5775	105 17.0126	6175		Yes	10 plants, 4X8 sm, on red rock
	3, 5.26.19	6	40 10.4293	105 17.4206	6313		No	2 dozen+ plants, 30X30 sm, on red rock
	3, 5.26.19	7	40 10.3604	105 17.3234	6248		No	Few dozen plants, 25X30 sm, red rock
	3, 5.26.19	8	40 10.3909	105 17.1982	6195		No	Scores of plants on red rock, 15X80 sm
	3, 5.26.19	9	40 10.3813	105 17.2324	6156		No	4 plants on red rock, 1X1 sm
	3, 5.26.19	10	40 10.3636	105 17.2237	6151		No	Scores of plants on red rock cliff, 20X15 sm
Scientific name	**Event#, Date**	**Location Number**	**Northing (GPS latitude)**	**Westing (GPS longitude)**	**Elevation (feet)**	**Status**	**Photo[+]**	**Notes**
	3, 5.26.19	11	40 10.3459	105 17.2403	6238		No	~13 plants, 1.5X4 sm
	3, 5.26.19	12	40 10.4287	105 17.1422	6374		No	12 plants, 5X4 sm
	5, 6.30.10	13	40 10.4543	105 16.8874	6107		Yes	Prob a few dozen plants—did not spend much time to assess. 30X30 sm on loose white rock. With Cercocarpus montanum, Astragalus tridactylicus

	5, 6.30.10	14	40 10.4455	105 16.9289	6116		No	~ 1 dozen plants, 5X6 sm. ~ 2 other locations w PHBE in vicinity, coordinates not recorded
	9, 8.23.19	15	40.174*	105.285	- -		No	~6 plants, loose red rock, 3X4sm. Under Cercocarpus montanus
	9, 8.23.19	16	40.173	105.281	- -		No	3 plants, 1.5X3 sm, loose white rock, w Cercocarpos montanus & Gutierrezia sarothrae
	9, 8.23.19	16	40.172	105.279	- -		No	1 plant
	9, 8.23.19	17	40.173	105.286	- -		No	2 dozen plants, 4X10 sm, loose red rock
	9, 8.23.19	18	40.172	105.285	- -		No	1 dozen plants, 3X2 sm, loose red rock
Rosa rubiginosa	1, 4.28.19	1	40 10.9365	105 16.3077	6416	Introduced	No	Only 1 plant seen as of 10th visit. More plants seen on Event 11 adjacent to Hwy. 36.
Rhus glabra (large colonies)	6, 7.14.19	1	40 10.5491	105 15.9969	5447	Infrequent. 9.10.19 SEINET:	Yes	30X30 sm, high density. A few large colonies in this vicinity—biggest concentration in surveyors's experience—all at S end of this day's survey area [adjacent to or along the edge of the N side of the 'access drainage' (generally at or above altitude of triple-decker stock tank)
						32 specimens from Boulder Co.		
Salvia aethiopsis	8, 8.11.19	1	40 10.4381	105 16.0463	5530	List A noxious weed	No	Few dozen plants, 5X15 sm, along stock trail just above triple decker water tanks on N side of access drainage; more plants below.
	10, 9,11.19	2	39 56.0992	105 19.1633	5529		No	~4-5 plants, in vegetative/rosette stage (dug up this day by DH); 1X3 sm
Saponaria officinalis	8, 8.11.19	1	40 10.9396	105 16.4273	5914	List B noxious weed	No	Small patch among shrubs, 1X 1sm. This is the only known instance of this species being encountered in this study.
Triodanis leptocarpa	5, 6.30.10	1	40 10.4438	105 16.1864	5569	Ack: uncommon; G5?S1, CNHP fully tracked.	Yes	Numbers and extent covered difficult to assess—small, slender plant, largely in fruit. Lower access drainage, south side.
						SEINET 10.8.19: 8 records, CO; 4 fr BOCO		
Vicia ludoviciana	4, 6.15.19	1	40 10.7746	105 15.4874	5444	Ack: uncommon. Not CNHP tracked. At this spot, found w Linum pratense.	No	Low density, 1.5X3 sm. Common at this elevation on this hillside (i.e., along this N-S transect), to the S of this recorded location
						SEINET, 9.14.19: 4 BOCO records		

sm = square meter

***** Event 9 locations determined with a smart phone. [All other events: Garmin GPSMAP 66st]

+ Not all photos taken are included in RHSA images document (Appendix 3)

Ack = Jennerfield Ackerfield. Flora of Colorado. 2015.

SEINET = SEINet Portal Network. Http//:swbiodiversity.org/seinet/index.php

CNHP = Colorado Natural Heritage Program. https://cnhp.colostate.edu/ourdata/trackinglist/vascular_plants/

Boulder Co. Parks & Open Space Small Grants Program, 2019

Red Hill Study Area plant inventory (Trevarton Open Space, greater Heil Valley Ranch area)

Appendix 2B. Red Hill Study Area plant inventory: SUMMARY of plants of interest, including Species of Special Concern* 2019

Scientific name	'Authority designation'	CNHP tracking &++ conservation status	SEINET^ Boulder Co.	SEINET^ State wide	Notes#
Achnatherum scribneri	Shaw: infrequent	G4SNR**	14	153	Near northern extreme of range (Laramie Co., WY)
Asclepias stenophylla	Ack: infrequent	G4-5,S2; CNHP fully tracked	22	35	A central Great Plains species, disjunct in CO. Front Range counties, from Douglas to Larimer
Carex oreocharis	Win: infrequent	G3,S2; CNHP fully tracked	4	13	Known fr 5 disjunct population areas in WY,CO,NM (2), & AZ
Claytonia rubra	Ack: uncommon	G5S1; CNHP fully tracked	1	16	Local endemic. Annual. Present here in many locations, many w scores to hundreds of plants, always w overstory shrubs or trees. Single herbarium specimen fr BOCO: 1995, Heil Ranch
Crepis atribarba		G5SNR	1	78	Single herbarium accession fr BOCO (1901). Here at SE extreme of range—extending fr SC CO to NW NE. No Crepis species are CNHP tracked
Dichanthelium linearifolium	Win: rare; Shaw: infrequent	G5SNR	22	34	WY, CO, & NM represent W extreme of range
Hedeoma hispida	Ack: uncommon	G5SNR	12	55	Annual. Here, near upper limit of documented altitude range (Ack: 3800-6000)
Helianthus rigidus ssp subrhomboideus		G5SNR	3	15	Infrequent, in investigator's experience. Two large (& a few small) colonies were found. No Helianthus species are CNHPtracked
Hybanthus verticillatus	Ack: uncommon	G4G5SNR	29	140	Jefferson to Larimer Cos., represent NW extreme of range
Lactuca ludoviciana	Ack: uncommon	G4G5SNR	4	20	Here, w JeffCo, at SW extreme of range. No Lactuca species are tracked
Linaria canadensis	Ack: uncommon	G4G5SNR	2	20	Also Nuttallanthus texanus. BONAP distribution map+: Larimer, Boulder, Adams, Jefferson, Douglas, & El Paso Cos. Investigator has also seen in Baca Co.
Linum pratense	Ack: uncommon	G5S4	10	60	Boulder, Jefferson, & Broomfield Cos. represent NW extreme of range and apparently a disjunct population. (Also, TX, KS, NM, AZ, OK) Annual
Orobanche multiflora		G5T5S?**	0	36	Also, O. ludoviciana ssp multiflora. Nearest herbarium accessions from Weld and Douglas Cos.
Physaria belli	Ack: locally common	G2-3,S2-3; CNHP fully tracked	52	100	Local endemic. Known from Larimer, Boulder, & Jefferson Cos. BONAP+: also El Paso Co.
Rosa rubiginosa		Introduced	8	10	Except for a number of plants near the east entry gate along Hwy. 36 just north of St. Vrain Rd, only 1 plant was seen in this study.
Rhus glabra		G5SNR	32	113	Relatively infrequent along FR. Large colonies present. Besides BOCO specimens, nearest herbarium specimens are from SE WY and El Paso Co.
Salvia aethiopis	List A noxious weed##	Introduced	1	1	Found at 2 locations in this study. Rare. Known fr 2 counties in CO. Largely absent from adjoining states.
Saponaria officinalis	List B noxious weed	Introduced	21	102	Only 1 small patch seen in this study. Typically infrequent compared to many other List B species.
Triodanis leptocarpa	Ack: uncommon	G5?S1; CNHP fully tracked	4	8	Annual. Here at SW extreme of range. Based on herbarium accessions, Northern CFR populations are disjunct fr those in WY, NE, KS, and
Vicia ludoviciana	Ack: uncommon	G5SNR	4	60	Boulder, Larimer, & Jefferson Co. populations are at N extreme of range—along w/ northern CA

*Species of Special Concern = species tracked by CNHP and/or with a Conservation Status of S1 or S2

++**CNHP** = Colorado Natural Heritage Program

For tracked species, see search application at https://cnhp.colostate.edu/ourdata/trackinglist/vascular_plants/

For an explanation of rank designations (e.g., G5S2), see https://www.natureserve.org/conservation-tools/conservation-status-assessment

For species not tracked by CNHP, conservation status ranks obtained via search at http://explorer.natureserve.org/

^Number of herbarium accessions, SEINET = SEINet Portal Network, http//:swbiodiversity.org/seinet/index.php, online search application for herbarium acquisitions.

#Notes referring to known range and population occurrence are largely based on USDA Plants Database maps, https://plants.sc.egov.usda.gov/java/

+**BONAP** = Biota of North America Program, http://bonap.net/MapGallery/County/Nuttallanthus%20texanus.png

##Colorado Department of Agriculture, https://www.colorado.gov/pacific/agconservation/noxious-weed-species

**NR = not assessed, T =global assessment for infraspecific taxon

Ack = Jennerfield Ackerfield. Flora of Colorado. 2015.

Shaw = Robert Shaw. Grasses of Colorado. 2008.

Win = Janet Wingate, Illustrated Keys to the Grasses of Colorado, (1994) **OR** Sedges of Colorado (2017)

Appendix 3

Images: plant occurrences of interest (including Species of Special Concern)

Selected images are presented in the order taken, organized by Event order, 1-11. Images are provided of the following species, listed here in alphabetical order by genus:

Asclepias stenophylla

Claytonia rubra

Dichanthelium linearifolium

Hedeoma hispida

Helianthus rigidus ssp subrhomboideus (large colony)

Hybanthusverticillatus

Lactuca ludoviciana

Linaria canadensis

Linum pratense

Mentzelia albicaulis

Orobanche multiflora

Physaria belli

Rhus glabra (large colony)

Sophora nuttallianum (in fruit)

Triodanis leptocarpa

Vicia ludoviciana

Appendix 3: Images: plant occurrences of interest

Red Hill Study Area
(Trevarton parcel, greater Heil Valley Ranch/North Foothills OS)

CONTENTS

Red Hill Study Area

(Trevarton parcel, greater Heil Valley Ranch/North Foothills OS)

Images: plant occurrences of interest

CONTENTS

EVENT 1, 4.28.19

Physaria belli, Loc 1, Photo 1

Physaria belli, Loc 1, Photo 2

Claytonia rubra, Loc 1, Photo 1

Claytonia rubra, Loc 1, Photo 2

Linaria canadensis, Loc 1, Photo 1

EVENT 3, 5.26.19

Linaria canadensis, Loc 3, Photo 1

Claytonia rubra, Loc 7, Photo 1

Claytonia rubra, Loc 7, Photo 2

Mentzelia albicaulis
[Not included in Appendix 2. SW corner, top of Red Hill (GPS coordinates not taken)]
Common, but only seen at one location in this series of survey efforts.
With Euphorbia spathulatus, Delphinium geyeri, Allysum minus.

EVENT 5, 6.30.19

Triodanis leptocarpa, Loc 1, Photo 1. [out of focus, but species ID is discernible]

Physaria belli, Loc 3

Asclepias stenophylla, Loc 2, Photos 1,2

<u>Event 6, 7.14.19</u>
Sophora (Vexibia) nuttalinum. [Not included in Appendix 2]

Rhus glabra colony, Loc 1, Photo 1

Rhus glabra colony, Loc 2, Photo 1

EVENT 7, 7.28.19

Lactuca ludoviciana, Loc 1, Photo 1

EVENT 8, 8.19

Helianthus rigida var subrhombodea, large colony. Loc 1 Photos 1,2

EVENT 9, 8.23.19

Dichanthelium linearifolium, Loc 3, Photo1. [almost all florets have dropped]

Orobanche multiflora, Loc 1, Photo 2

Orobanche multiflora, Loc 2, Photo 1

Hedeoma hispida, Loc 2, Photo 1

Event 10, Sept 11, 2019

Asclepias stenophylla (in fruit), Loc 10, Photo 1

Event 11, 9.11.19

Hebanthus verticillatus. Loc 1, Photo 1