

Lepidoptera of North America
12. Butterflies – 2018 Inventories
in nine Boulder County Open Spaces



Contributions of the
C.P. Gillette Museum of Arthropod Diversity
Colorado State University

Cover Illustration:

Western Green Hairstreak (*Callophrys affinis homoperplexa*)

Walker Ranch Loop Trail

Boulder Co., Colorado, June 6, 2018

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I. Abstract

This was the fifteenth year butterflies were inventoried on nine select properties within Boulder County Parks and Open Space (BCPOS) lands. The trend for all butterfly species was determined for all surveyed Open Spaces and shows a downward trend of approximately -1.3 Individuals per Research Hour per Year. This trend ($R^2=0.4$) explains 40% of the variation for years 2004 through 2018 which is a decrease of almost 3% /year. This leads to the conclusion that the butterfly population will be significantly diminished over time under present conditions. Our results indicate that most butterfly species are not reproducing successfully enough to keep their population numbers stable within Boulder County.

Cabbage Whites (*Pieris rapae*) and Aphrodite Fritillaries (*Speyeria aphrodite*) were the most numerous of individual butterflies while Field Crescents (*Phyciodes pulchella*) represented the widest distribution flying in each of the Open Spaces. These resident butterflies are indicator species, as they are primary for determining if the environment is remaining vital. Of course, the BCPOS properties are influenced by state-wide and national environmental changes.

Fourteen volunteers were in the field 70 days completing 175 hours of Research Hours (RH) in 2018 recording data and taking photographs. Often team members hiked somewhat near each member to observe, then experienced members input their sightings into the single day's data. The season's cumulative volunteer hours totaled 500. Of course, those following a transect were usually hiking alone, their numbers available separately, but in 2018 these were counted within the seasonal data.

II. Objectives

The overall objectives were:

1. Explore Southeast Buffer, Hall II, and Heil Valley, Walker, Reynold's and Caribou Ranches to record numbers and species of butterflies.
2. Determine population trends for each of the butterfly species in each of the surveyed lands, with a final Summary Trend for the entire nine selected Boulder County Open Spaces.
3. Set up and follow four transects to record numbers and species of butterflies toward establishing references for further studies.

4. Survey Anne U. White Trail and Plumley Canyon, previously devastated by the flood of 2013, to observe successional changes and garner data.
5. Include Steamboat Mountain in the inventory which had not been visited since 2011.
6. Add to the detailed inventories, where the location and nature of habitats is known to support many associated species of blossoming plants.

III. Research Methods

Research methods for the 2018 butterfly inventories continue to be consistent with past years to survey populations and species through a six month season. These particular Open Space areas were chosen because of the varied habitats and elevations. Nine areas of study were within Heil Valley, Walker, Caribou, Reynold's Ranches, Anne U. White Trail, the Southeast Buffer and Hall II.

The Heil Valley property supported three separate areas; Plumley Canyon, Geer Watershed, and North (including Red Gulch and North Pointe). On field days to Hall II and Steamboat Mountain we were escorted by Boulder County staff due to access issues related to flood damage, and private property. Team members were each granted written Research Permits for the Open Space lands extending from March through September, 2018.

In 2018, four transects following the modified Pollard method (Pollard, 1993) were added within the Open Spaces, to allow for repeated sampling using static transects and methods over time. These areas were: Anne U. White Trail by Cathy Comstock; Heil Ranch - Geer Watershed by Sue Hirschfeld; Walker Ranch - Loop Trail by Dan Fosco; and Caribou Ranch – Sherwood Road areas by Venice Kelly. In this report the transect data is included within the inventory results and specifically designated in the data tables as being during transects. It is reasonable to include data from transects within the extensive inventories because the same pathways had been visited in previous seasons. Each transect had a map and GPS points surveyed for reference. A transect by definition, followed its own preplanned path, observed butterflies within 6 meters in all directions within the time frame 10 am to 4 pm. The researchers chose these four transects because each person was more familiar with that particular area, therefore, the locations were not

randomly generated. Historically, data reported to the County over the many years proved useful for identification of species.

On every field day, in our meandering inventories (our standard method of surveying, as opposed to the Pollard method as mentioned above), we hiked for about three hours following trails, roads and streams. Survey efforts were concentrated in areas containing moisture, plentiful flower blossoms, and host plants which support significant numbers of butterflies. This inventory method is necessarily circuitous, as compared with restricted limitations defined by transects. We observed butterflies on the wing and used the net and release-live technique, recording species identifications and numbers. If a 'difficult to identify butterfly' was taken, it was given to the Gillette Museum, Colorado State University for identification and curating into the permanent collection. For the last several years we used digital photos in place of capturing specimens, which helped identification. Photos and locations of rare butterflies as noted by the Colorado Natural Heritage Program Watch List were sought: Arogos (*Atrytone arogos*) and Ottoe (*Hesperia ottoe*) Skippers, Hops Azure (*Celastrina humulus*), Dusted Skipper (*Atrytonopsis hianna*), and Moss' Elfin (*Callophrys mossii schryveri*). None of these rare butterflies was seen in the Open Space areas in 2018 by this team. We may not have been early enough in the spring to see the Moss' Elfin or present at the right time in late June to observe the Hops Azure.

Total numbers of individual butterflies and species observed during each field day were recorded on spreadsheets and analyzed for patterns occurring during the field seasons, noting changes in populations and species. For each location, 'Individuals per Research Hour' (I/RH) were calculated using the number of individual butterflies observed (I) divided by the research hours (RH) in the field. 'Species per Research Hour' (S/RH) were also determined by dividing the number of species observed during each day by the research hours in the field (RH). These are standard comparisons which this author developed for comparison, season to season and year to year.

IV. Introduction

Butterfly inventories listing numbers of individual butterflies and the identified species have taken place in BCPOS for many years: 15 years in Plumley Canyon at Heil Valley Ranch and at Caribou Ranch; 14 years in North Pointe and Red Gulch at Heil Valley Ranch; 13 years in the Southeast Buffer and Heil Valley - Geer Watershed. Preplanned transects using the Pollard method, were each surveyed within the Walker Ranch Loop Trail, Heil Valley - Geer Watershed, Anne U. White Trail and the Caribou Ranch vicinity, between six and thirteen times in 2018. The other Open Spaces were surveyed fewer times due to weather and availability of the research team. Fourteen volunteer research associates spent 175 hours in the field during 70 days in 2018. The total volunteer input was 500 hours.

Springtime weather was deleterious to the early emerging butterflies because of April snow, May hail, and extreme cold. Summer was hot and quite dry. Late summer was long and warm inviting many southern immigrant species to visit Boulder County. Specific emergent times are an unknown for most species. Therefore the surveyor may or may not be on site during just the right day when a species is most numerous. However, our previous studies allow us to predict within a week or so when each species will be flying. There are many inconsistencies when gathering data on butterflies. Certain butterflies colonize each year and raise broods here, but do not overwinter. Examples are the well-known Monarch (*Danaus plexippus*), Painted Lady (*Vanessa cardui*), and Variegated Fritillary (*Euptoieta claudia*). Some butterflies seem to be more common here in recent years, flying in from the southern tier of states, such as the Marine Blue (*Leptotes marina*) and tiny Reakirt's Blue (*Echinargus isola*). Known to ordinarily be a stray from the south, Western Pygmy Blue (*Brephidium exile*) may have established colonies in the Front Range. These are migrants from warmer climates which have arrived through a variety of weather conditions.

Some butterflies are non-migratory, such as the Gray Hairstreak (*Strymon melinus*), Common Checkered-skipper (*Pyrgus communis*), Boisduval's Blue (*Plebejus icarioides*) and Hops Blue (*Celastrina humulus*). Some overwinter locally and emerge early in the spring such as the Mourning Cloak (*Nymphalis antiopa*), Hoary Comma (*Polygonia gracilis*) and the higher

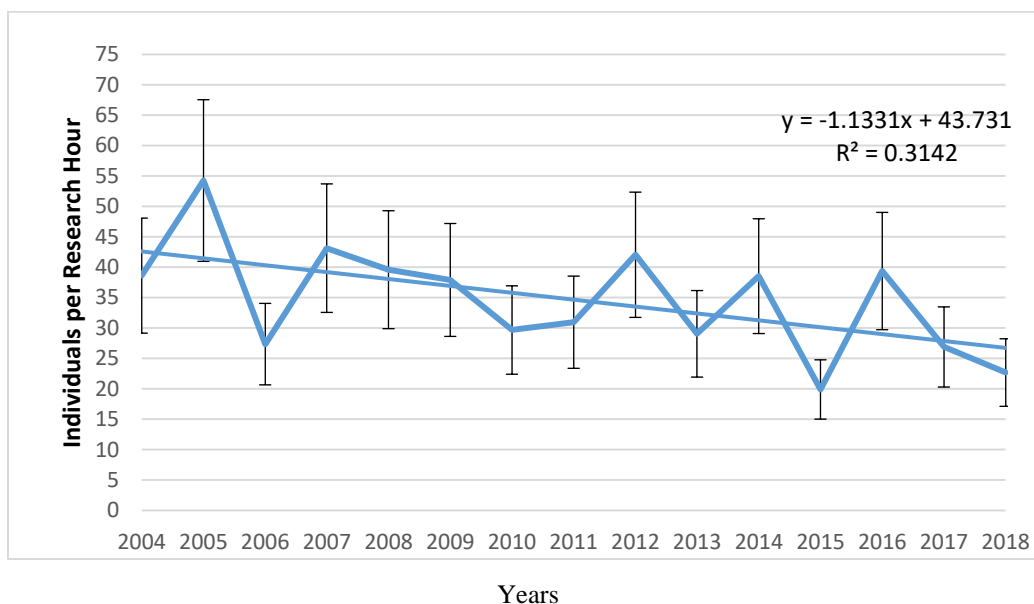
altitude Rocky Mountain Parnassian (*Parnassius smintheus*). The emergence of these local inhabitant butterflies would be affected by the late winter snows or early high temperatures.

At times we have found butterflies which live normally along the Rio Grande River or Arizona Mountains; The Lyside Sulphur (*Kricogonia lyside*), Southern Dogface (*Zerene cesonia*) and Fulvia Checkerspot (*Chlosyne fulvia*) in the Southeast Buffer. The Sleepy Orange (*Abaeis nicippe*), and Mexican Sulphur (*Eurema mexicana*) were found at Caribou Ranch. An Eastern Cloudless Sulphur (*Phoebis sennae eubule*) was photographed in Heil Valley (Plumley Canyon) previously and at Caribou Ranch June, 2018. These are found singly and cause great excitement. however, only the Cloudless Sulphur was found this year. Past experience of lepidopterists show that a lower level Jet Stream has picked some butterflies up and swirled them into Boulder County together within strong southern to southwesterly winds. The low-level jet is a common experience for forecasters in the Great Plains and Eastern US. As the name implies, it is a fast-moving ribbon of air in the low levels of the atmosphere. It can rapidly transport Gulf moisture and warmer temperatures to the North at speeds ranging from 25 to over 70 knots. (Haby).

V. Trend for all Open Spaces

More inventories than during any other year were completed within nine areas in seven Open Space properties. In addition, transect data begun this year in four Open Spaces were included in the Summary Trend. Initially the numbers of Individual Butterflies per Research Hour (I/RH) were calculated for each species in every Open Space. Following this preparation the total numbers of I/RH inclusive were analyzed to show fifteen years' results in these nine areas. The massive amount of data was compiled into a single summary graph shown below.

A. Individual Butterflies per Research Hour (I/RH) for All Species in All Seven Open Spaces



Years

Butterfly I/RH All
Species All County
Uncertainty

Years	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Butterfly I/RH All Species All County	38.6	54.2	27.4	43.1	39.6	38	29.7	31	42.1	29.1	38.5	19.9	39.4	26.9	22.7
Uncertainty	9.5	13.3	6.7	10.6	9.7	9.3	7.3	7.6	10.3	7.1	9.4	4.9	9.6	6.6	5.6

I/RH

Reproducibility 0.1

RH Error 0.2

I Error 0.1

0.06

0.24495

Over the past 15 years of collecting data we have detected a persistent and robust trend.

Measured in Individual (I) butterflies observed per Research Hour (RH), the trend is -1.13 I/RH, meaning that in 2004 a researcher could expect to see 44 butterflies per hour. By 2018, that researcher should expect to see 25 butterflies per hour, a decrease of 43%. This is a decrease of almost 3% / year. This trend explains roughly 40% of the annual variation.

Year-to-year butterfly populations are highly variable as shown in the chart above, depending on many factors such as weather, predator populations, the abundance of their food supply, the

success of their over-wintering, etc. Additionally, this butterfly count relied on volunteers of varying skills from year-to-year as well as between different counting expeditions over the summer. We did return each year to the same general areas, but we did not design rigorous transects that were re-walked at exactly the same days each year. These parameters, both natural variability and experimental error, are believed to be responsible for the other 60% of the inter-annual variability.

Error Analysis

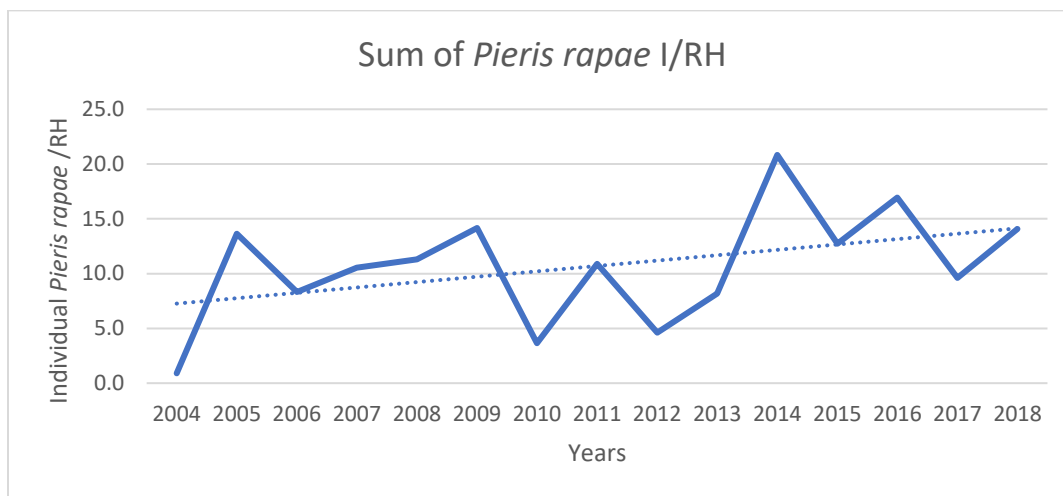
The quantity Individuals per Research Hour (I/RH) is a derived quantity with uncertainty in both the numerator and denominator. Sources of error in the number of individuals counted include issues such as certain individuals being double counted, researchers mis-reporting their numbers, transcription errors of the data, possible inclusion of unidentified species, and inclusion of Individuals outside the study area. Since this component is a total count, misidentification of any particular butterfly does not contribute to this uncertainty. Because of these factors, we estimate the error associated with each count to be approximately 10%.

The definition of a Research Hour is not precisely defined because it does not account for variations in the number of researchers participating. Some Research Hours may include several experts reporting their observations into one count. On other days it may be a single observer. Other contributing sources of error in the Research Hours include inaccurate recording of the starting and ending times, ambiguity about when the “return trip” begins since the count is only meant to occur during the outbound leg unless new species are encountered. For these reasons, the uncertainty in RH is estimated to be 20% of the reported value.

Another source of error is characterized as Reproducibility. This represents the collective factors such as informal transects that were not followed year-after-year. Volunteers wandered in the study area with only approximately repeatable paths. Also, outings were scheduled somewhat impromptu rather than in rigid schedules. Weather played a major factor in when in the season observers performed their observations. No two years had the same pattern of observations. This source of error is estimated to be approximately 10%, when comparing I/RH over time.

Overall, these individual sources of error combine to add approximately 25% uncertainty to each seasonal total of I/RH.

B. Summary of Individual *Pieris rapae* per Research Hour (I/RH) in All Open Spaces



Years	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Total <i>Pieris rapae</i> I/RH	0.9	13.6	8.3	10.5	11.3	14.2	3.7	10.9	4.6	8.2	20.8	12.7	16.9	9.6	14.1

It will be noted here that the Cabbage White was one of the most numerous butterflies in eight of the nine areas. It was absent in the higher elevation area, Caribou Ranch. An example of its success is shown on the Summary chart above where its population shows an increase. This is about a 38% increase in I/RH over 13 years. We can appreciate, even though we may not like its abundance, that this successful butterfly is an introduced species.

VI. Narration for Inventories in Each Open Space

The following Narration (Section VII.) is a companion to the Inventory Data Tables (Section X. page 21). It highlights species that were most numerous, dates of flights, and locations where butterflies were found within the Open Spaces. The Transect data is included here and also has been separated to stand alone in Appendix II page 62.

A. Southeast Buffer

The Southeast Buffer adjoins Hwy 128 on the south, Coalton Trail including Rock Creek on the north and east. It is a disturbed short-grass prairie with some grazing. Prairie dogs were once active on the crest, and they have recently been reintroduced. To the west and adjacent to the BCPOS properties are City of Boulder Open Space and Mountain Parks properties which cumulatively make up about 6,000 acres. Southeast Buffer was visited four times in 2018; April, May, June and August. Swallowtail Hill did not disappoint us. There were residents, an uncommon Black Swallowtail (*Papilio polyxenes*) and a Foothills species, the Anise Swallowtail (*P. zelicaon*). Olympia Marbles (*Euchloe olympia*) and Large Marbles (*E. ausonides*) flew on April 27. Clouded Sulphurs (*Colias philodice*) and Orange Sulphurs (*C. eurytheme*) were fairly common all summer. On May 17, the Checkered Whites (*Pontia protodice*) and Olympia Marbles (*Euchloe olympia*) were spiraling together upwards into the sky. Blue butterflies were nearly absent, only five Silvery Blues (*Glaucophyche lygdamus*) were seen on May 17, and a single visitor Reakirt's Blue (*Echinargus isola*) was found on June 27. We expected to see Melissa Blue (*Plebejus melissa*) which is usually present among the grasses, but did not. There were many Variegated Fritillaries (*Euptoieta claudia*) and Aphrodite Fritillaries (*Speyeria aphrodite*) flying on June 27. The wind was quite breezy that day and many butterflies were sheltering in the east-west ravine.

1. The total number of individual butterflies observed in the Southeast Buffer in 2018 was 271 slightly higher than the average of number of individuals over twelve years at 247.
2. The number of Individuals per Research Hour (I/RH) was higher (30) in 2018 than the average of 26 over the twelve years.
3. The numbers of species identified each season declined slightly during the twelve years of inventory in the Southeast Buffer: the number of species sighted in 2018 was 18 as compared with the 12- year average of 17 species. During the early seven years of inventory 2007-2013, the average number of species observed was 21, while the average during the more recent five years was 17.

B. Heil Valley, Geer Watershed

Researchers visited the watershed nine times. Included were Sue Hirschfeld's transect from the upper northern Geer Canyon Drive roadway across the ridge to beside a Geer stream and uphill beyond the stream crossing. From May 26 to August 28 she was in the field six times.

On April 2, eleven Mourning Cloaks (*Nymphalis antiopa*) had awakened from the winter's hibernation. May 26, found 17 Silvery Blues (*Glaucopsyche lygdamus*) arising as the morning warmed. Cabbage Whites (*Pieris rapae*) as always, were especially numerous around the barn and older farm buildings, and more common than in other Open Spaces. Orange Sulphurs (*Colias philodice*) were present around the alfalfa plants on site. During the August 17 walk, two species sighted were, the Common Wood Nymphs (*Cercyonis pegala*) and Small Wood Nymphs (*C. oetus*). These rested on plants long enough for us to get good looks for identification.

1. In 2018 the total numbers of individual butterflies (665) observed were above the 12-years average compared at 554 individual butterflies, likely because Sue Hirschfeld visited the transect five times during mid-season.
2. A slightly below average number of Individuals per Research Hour (I/RH) 33 compared to the average of 36 calculated for the 12 years.
3. Overall the cumulative number of species found 2007-2018, within the Geer Watershed was 94, nearly matched among the nine open spaces only in Heil Valley – North at 92. The number in 2018 was 40 matching the average for 12 years in Geer.
4. The number of Species per Research Hour (S/RH) in 2018 was 2.0 some lower than the average of 2.8.

C. Heil Valley-North

Heil Valley North areas include North Pointe, Red Gulch and Red Hill Saddle. The team visited five times from April 11 through August 29. During April 11 the Orange Sulphurs (*Colias eurytheme*), and two early arrival Painted Ladies (*Vanessa cardui*) were flying at North Pointe, as were the resident Mourning Cloaks (*Nymphalis antiopa*) and Hoary Commas (*Polytonia gracilis*). The Common Sootywings (*Pholisora catullus*) were found in the Red Gulch near the tall pigweed, (*Chenopodium*) their host plant. We especially look for this butterfly in the weedy area. On June 12, above the Marietta Canyon, 20 Boisduval's Blues (*Plebejus icarioides*),

Silvery Blues (*Glaucopsyche lygdamus*) and 26 Common Ringlets (*Coenonympha tullia*) were flying among the milkvetch (*Astragalus*). The most exciting butterfly found near the elk enclosure beside the red sand road at the top of the Red Hill was the American Snout (*Libytheana carinenta*). It was a newly sighted butterfly for Heil Ranch and for this team's inventories as it typically resides farther south in Arizona and Texas.. Also active were : Western Green Hairstreak (*Callophrys affinis*), Siva Juniper Hairstreak (*C. gryneus*) and Western Pine Elfin (*C. eryphon*).

Many Aphrodite Fritillaries (*Speyeria aphrodite*) and Variegated Fritillaries (*Euptoieta claudia*) were flying July 18 along with several Edward's Fritillaries (*S. edwardsii*). The Orange Sulphurs (*Colias eurytheme*) were airborne in Red Gulch and North Pointe. Both Common Wood Nymphs (*Cercyonis pegala*) and Small Wood Nymphs (*C. oetus*) made their appearances along with the small Common Checkered Skippers (*Pyrgus communis*). By August 29, the grasses were dry and flowers had wilted although Field Crescents (*Phyciodes pulchella*) and Western Branded Skippers (*Hesperia colorado*) were active.

1. The numbers of individual butterflies were 442 as compared to the average of 457 in Heil Valley, North.
2. The numbers of Individuals per Research Hour (I/RH) 33, were just below the average of 35 for the twelve years of inventorying.
3. The highest numbers of species found during a single season in Heil Valley, North were in 2018 and 2014, considerably higher than the average, 50, as compared with the average of 37. Two species new to Heil Valley, North, the American Snout (*Libytheana carinenta*) and Rocky Mountain Parnassian (*Parnassius smintheus*) brought the cumulative number of species in the North to 92.
4. Species per Research Hour (S/RH) were 3.7 as compared with the average of 3.2 for the twelve years.

D. Heil Valley, Plumley Canyon

The Plumley Canyon area includes the service road along the stream to near the Canyon entrance. No moisture was found in the service road crossing, and only in a few shallow puddles toward the canyon's opening. It's very difficult to hike up the Plumley Canyon because of the trail's washout following the 2013 flood. This year, the study in the Canyon only went up to the stream crossing near the Marietta Canyon mouth.

On May 10, there were more than 45 Western Pine Elfins (*Callophrys eryphon*) above the quarry. These males were circling each other energetically as they flew upwards showing their newly emerged colors. Julia Orangetips (*Anthocharis julia*) were airborne as well as both Olympia Marbles (*Euchloe olympia*) and Large Marbles (*E. ausonides*). Eight individuals each of the early flying Echo Azure (*Celastrina echo*) and Silvery Blue (*Glaucopsyche lygdamus*) flew above the many blossoms. On June 25, more than 12 Dun Skippers (*Euphyes vestris*) flew ahead of us. Silver-spotted Skippers (*Epargyreus clarus*) and a Woodland Skipper (*Ochlodes sylvanoides*) made an appearance. Only a single Russet Skipperling (*Piruna pirus*) was noted. The rare butterfly, Hops Azure (*Celastrina humulus*) was not seen in Plumley, likely because we were too late in the season. It's usually seen near the end of June.

1. The lowest numbers of individuals were in 2016 (162) and in 2018 (166) in Plumley Canyon.
2. The I/RH were lower (33) when compared with the average I/RH at 36.
3. Only 27 species were seen in 2018 as compared to one year's annual high of 48 in 2013. Three more recent counts, one in 2016 (18 species) and the two in 2017 and 2018 (both 27) yielded the lowest number of species in 12 years.
1. The number of research hours were only five in 2018, as compared to the highest, 16 hours in 2013. Likely two reasons for the low numbers of individuals were the lack of repeated observations and importantly the low availability of moisture.

E. Walker Ranch

The Walker Ranch, Meyer's Gulch Homestead Trail was visited eight times by Richard Holmes and John Barr. Additionally, the Loop Trail transect observations by Dan Fosco began April 22 and continued through September 10. The Homestead Trail was followed May 6 through August 13. Early season is the time the Elfins fly around the low Kinnikinnick (*Arctostaphylos*) bushes, and they were plentiful on April 22. The uncommon Brown Elfins (*Callophrys augustinus*) and Western Pine Elfins (*C. eryphon*) were present. Hoary Elfins (*C. polios*) were more numerous sorting themselves, each male over a different stand of Kinnikinnick. A Satyr Comma (*Polygonia satyrus*) added its brownish coloration to the spring greens. Julia Orangetips (*Anthocharis julia*) and Spring Whites (*Pontia sisymbrii*) made their appearances in May. Western Green Hairstreaks (*Callophrys affinis*) were visible mid-summer with their jungle-green and brick-red coloration often on the trails ahead of walkers. In June, there were added the orange blends of Silvery Checkerspots (*Chlosyne nycteis*), Northern Checkerspots (*C. palla*) and Variable Checkerspots (*Euphydryas anicia*). A singleton California Tortoiseshell (*Nymphalis californica*) was observed four times in May. The resident biennially appearing Chryxus Arctic (*Oeneis chryxus*) and the annual Uhler's Arctic (*O. uhleri*) flew together on June 1. Three species present in May and June were Dreamy Duskywings (*Erynnis icelus*), Pacuvius Duskywings (*E. pacuvius*) and Persius Duskywings (*E. persius*).

Dan Fosco walked the Loop Trail to the active Boulder stream below following transect protocol during April 22 through September 10. He was on that trail eight times in 2018. From May 22 through June 25, Western Green Hairstreaks (*Callophrys affinis*) flew in the largest numbers as compared to their presence in other Open Space areas. Gorgone Checkerspots (*Chlosyne gorgone*) were found May 22- June 25, but not in any other areas of Open Space study. These were often near the stream and moist habitat. More blue butterflies were found here also, likely because of moisture availability: Western Tailed-Blue (*Cupido amyntula*), Echo Azure (*Celastrina echo*), and Rocky Mountain Dotted-Blue (*Euphilotes ancilla*). Field Crescents (*Phyciodes pulchella*) were a common butterfly in 2018, with 28 occurring on June 6. Twenty Hedgerow Hairstreaks (*Satyrrium saepium*), the largest numbers of this uncommon butterfly ever in the Open Spaces on one day, were seen July 16.

1. This year had the second highest total number of Individual Butterflies counted, in 2018 on Walker Ranch.
2. The second lowest numbers of I/RH were in 2018 (14); the lowest in 2015 (12), however the greatest number of research hours, 53, occurred this season at Walker Ranch.
3. The average numbers of I/RH were 33 making 2018 counts the second lowest in 12 years.
4. During 2018, the second largest numbers of species (58) were found in Walker Ranch likely because of seven additional transect counts on Loop Trail. The highest number of species was in 2013 at 62.
5. The lowest number of Species/Research Hour (S/RH) was the lowest ever (1.0) compared with the average of 3.7 within Walker Ranch.

The dryness was a definite contributor to the low numbers of I/RH especially on the Homestead Trail and the southern-facing upper end of the Loop Trail. The poor weather in the late spring was likely a factor adding a continued lack of delectable host plants for caterpillars during a cold, damp, late spring and early drying of the soils in July.

F. Reynold's Ranch

Portions of the Reynold's Ranch on Magnolia Road that were inventoried were Giggey Lake, North Bog and West Hill. The Ranch was visited four times in 2018. On May 23, the chorus frogs were singing, but there was no butterfly activity to be noticed. The temperatures were still low at this higher elevation. On June 16, there was considerable activity. Six Rocky Mountain Parnassians (*Parnassius smintheus*) and two *Papilio* sp, Anise Swallowtails (*Papilio zelicaon*) and Two-tailed Swallowtails (*P. multicaudata*) were soaring. Queen Alexandra's Sulphur (*Colias alexandra*) dazzled in the meadows' vegetation with their bright yellow dorsal wings and greenish-white ventral surfaces. That day the most numerous butterflies were 35 Common Ringlets (*Coenonympha tullia ochracea*) and 40 Common Alpines (*Erebia epipsodea*). A Draco Skipper (*Polites draco*) was the only skipper noticed.

On August 24, a species new in this North Bog area was the Hedgerow Hairstreak (*Satyrium saepium*) on the wing, with more common Gray Hairstreaks (*Strymon melinus*). Ten Field Crescents (*Phyciodes pulchella*) were seen. This species was one of the three most common butterflies in 2018 in the Open Spaces. In addition, ten Small Wood Nymphs (*Cercyonis oetus*)

and three Common Wood Nymphs (*C. pegala*) were flying among the drying grasses. The few butterflies were bucking a strong breeze but continued to nectar on blue asters (Asters) and yellow composites. On that last day of the season we had three teams looking for butterflies, one in the North Bog, one at the Giggey Lake and a group on the West Hill. Our target species near the end of the season was again the Pine White (*Neophasia menapia*) we find either flying in the Pine (*Pinus ponderosa*) tops where they lay eggs, or nectaring on the low blossoms. Several were seen on August 24. However, while seated on a log eating lunch overlooking the great North Bog, we watched a snowy Pine White fly from one tall pine tree toward another, only to be snatched by a flycatcher midair.

1. The lower total number of individuals (199) may have been the result of weather stress in Reynold's Ranch.
2. The numbers of I/RH (20) were lower than the average of 24 I/RH.
3. In 2018, the numbers of species found were 29; that is equal to the average number over eight years of inventorying in Reynold's Ranch.
4. The numbers of Species per Research hours (S/RH) were average, 2.9 compared to an average of 3.0. Both the North Bog and Giggey Lake had some moisture, because these are spring fed, but the surrounding vegetation was quite dry.

The special smaller Silver-bordered Fritillary (*Boloria selene*) was not observed this year. Their host plant, violets (*Viola sororia*), continue to grow under the Cinquefoil (*Potentilla*) bushes. It was very exciting to find this at this bog in August 2011, but it is possible the colony did not survive.

G. Caribou Ranch

Caribou Ranch proper including the Bluebird Mine, was visited three times. Observations must be made following its opening July 1, thus limiting butterfly research. The Caribou area was expanded to include Venice Kelly's transect following the Sherwood Road to the Conger Mine and returning through the Bridge Meadow. She was in the field 17 times, observing at least 33 hours, more days and more hours than any other volunteer. She sighted two species that had not been recorded previously in this area, the uncommon southern visitor Cloudless Sulphur (*Phoebus sennae*) and native Uhler's Arctic (*Oeneis uhleri*). One species was given a subspecies name which was new to us, Ochre Branded Skipper (*Hesperia colorado ochracea*). Fisher has

defined this in his new book, Butterflies of Colorado (2017). Historically this subspecies is the one common in eastern Colorado Front Range. Previously, we had known it by the *H. colorado* species name, or the common name of Western Branded Skipper which we will continue to use.

The earliest butterflies seen April 19, were the White-lined Green Hairstreaks (*Callophrys sheridanii*) nectaring on Spring Beauty (*Claytonia*) blossoms. Another lovely early butterfly, Julia Orangetip (*Anthocharis julia*), was present for the month of May. The Rocky Mountain Parnassians (*Parnassius smintheus*) flew in good numbers from June 2-August 4. Queen Alexandra's Sulphur (*Colias alexandra*), most often sighted at this higher elevation, flew June 21 through August 13. Beginning on May 6, the Hoary Elfin (*Callophrys polios*) were observed and the Western Pine Elfin (*C. eryphon*) followed on May 22. Three species found in mid-July were: Ruddy Copper (*Lycaena rubidus*), Blue Copper (*L. heteronea*), and Purplish Copper (*L. helloides*). Six species of the larger fliers were seen by Venice, Rocky Mountain Parnassian (*Parnassius smintheus*), Black Swallowtails (*Papilio polyxenes*), Anise Swallowtails (*P. zelicaon*), Western Tiger Swallowtails (*P. rutulus*), Pale (*P. eurymedon*) and Two-tailed (*P. multicaudata*). Among the latest butterflies of this season, on August 31 were the Field Crescents (*Phyciodes pulchella*) and Pine Whites (*Neophasia menapia*).

Looking at the results from Caribou is a puzzle.

1. The greatest number of individual butterflies was counted in 2018 (1091) compared with an average of 536.
2. Notably though, with 43.5 RH over a span of 21 field days of data gathering, the Caribou area had the fewest I/RH ever (25) compared with the average of 40 I/RH. There were only two seasons with readings of low I/RH; these were 24 I/RH in 2010 with this year's low (25) in 2018.
3. The highest number of species counted (66) over the twelve years was in 2018, as well as the highest number of Research Hours on site, 43.5, with the average at 14.5 RH at Caribou.
4. In addition, the number of Species per RH was the lowest in 12 years of inventorying in Caribou.

H. Anne U. White Trail

The Anne U. White Trail follows along the Fourmile Stream. Cathy Comstock, by special permission, established a transect there, which she followed eight times, June 15 through September 2. This was a very difficult trail because only some sections had been repaired following the 2013 devastating flood. This trail has not been open to the public since the flood. Cathy would ride to the trailhead by bicycle and hike on Saturdays, the road being still under construction with large equipment filling the lane on weekdays. Four species coursed over the channel which was at time partially showing puddles, Anise Swallowtails (*Papilio zelicaon*), Western Tiger Swallowtails (*P. rutulus*), Pale Swallowtails (*P. eurymedon*), and most often noted the Two-tailed Swallowtails (*P. multicaudata*). Cabbage Whites (*Pieris rapae*) were abundant the entire season finding many Mustards (*Cruciferae*) upon which to lay eggs. These may have successfully produced two or three broods during June through September. The non-native Cabbage Whites have become well adapted to the gardens and hillsides of the Front Range. Aphrodite (*Speyeria aphrodite*) and Northwestern Fritillaries (*S. hesperis*) were as numerous here as they were in other areas. Brushfoot butterflies were well represented by the Mourning Cloaks (*Nymphalis antiopa*) and the Weidemeyer's Admirals (*Limenitis weidemeyerii*), as were the Woodland Skippers (*Ochlodes sylvanoides*), Taxiles Skippers (*Polites taxiles*) and the Dun Skippers (*Euphyes vestris*).

1. Along Anne U. White Trail, the numbers of individual butterflies sighted, (319) were somewhat higher than the average, 309.
2. An average number of Individuals per Research Hour, I/RH, was found in 2018 (24) when compared with the previous eleven years inventories at the average of 23.
3. The numbers of species in 2018 (32) were about average when compared the average number 33.
4. The numbers of Species per RH were lower (1.7) than the average 3.4.
5. The number of Research Hours was the second highest on record for Anne U. White, 18.5 RH. Cathy Comstock visited regularly eight days on the the transect.

I. Steamboat Mountain

Steamboat Mountain near Lyons was visited only once with wildlife technician, Jordan Smith on a cloudy day. No butterflies were seen that day therefore no record was kept. The data were incomplete and were not used in the Steamboat in the cumulative analysis.

J. Hall II

Hall II, on the east side of Highway 7, was visited only once with wildlife technician, Jordan Smith. The topography had quite changed as the quarried gravel was repositioned to add a road. On July 30 the scrub vegetation was extremely high and the old path to Bobcat Canyon was overgrown. Butterfly numbers were sparse, as only fourteen species and forty-one individuals of butterflies were recorded. The Common Wood-Nymph (*Cercyonis pegala*) was flying low through the dry weeds; the Variegated Fritillaries (*Euptoieta claudia*) were sailing above. There have often been Sulphurs puddling by the dozens, but the few Clouded Sulphurs (*Colias philodice*) and Orange Sulphurs (*C. eurytheme*) were flying above the gravel and pebbles.

VII. Weather

Boulder's summer (June-August) of 2018 was 25% drier than the 1897-1994 average and 0.7° F warmer than the 1961-90 average. June was hot, with average rainfall; July slightly cooler than average, with average rainfall; and August marginally cooler than average and very dry.

During May 3, 1.7" of rain brought us up to 7.67" so far this year, about 1.8" above the Boulder 1892-2000 average and 1.25" above the Boulder 1971-2000 average. On May 18 there was a hail storm at my east Boulder County home which dropped 4" of hail plus water in 45 minutes. Trees and early garden plantings were stripped. On July 1 a similar hail storm fell on Cal-Wood Education Center, Jamestown. Following this on the Fourth of July Count, in the Geier Meadow about 30% of the usual butterflies were sighted, and many of those had chipped wing margins. As for hailstorms, intense ones on 13 and 18 May, 18 June, and 23 July brought walnut-sized hail to areas of eastern Boulder County, shattering windshields, stripping treetops, damaging roofs, and helping to knock down a bald eagle nest. Butterflies don't survive the invasive wetness and pounding of hail.

The two events that stood out for me during this past summer (besides all the smoke from forest fires) were a fizzling midsummer monsoon and a series of violent hailstorms. After a hot June and first two weeks of July, the monsoon flow set in around 20 July, bringing relatively cool, cloudy days and a little rain each day. The coolness and cloudiness continued into August, but the rain shut off, and we received barely an inch of precipitation from 15 July-25 August. August was filled with many warm, clear days, some with southern winds. September was even warmer, clearer and with more accompanying southern winds. (Jones, 2018)

VIII. Results

Butterfly species and individuals were less common this summer from our observations. The Researchers commented on the lack of Blue species and the numbers of Fritillaries being low. In 2018, we actually counted 97 species of the 111 seen in the Open Spaces by our team over 15 years. There are 199 butterflies listed for Boulder County, CO in Butterflies and Moths of America website. Some of these remaining 88 species not recorded by our team are likely alpine and sub-alpine butterflies. Our surveys don't go into the sub-alpine or alpine, with Reynold's and Caribou Ranches being the highest elevations. The County Open spaces are in the Plains, Foothills and Montane zones. Also, other species may have been historically noted and have not been seen in the recent years.

Caribou had the most extreme results with greatest number of individuals counted in 2018 and yet the lowest number of Individuals per Research Hour; the greatest number of species and yet the lowest number of Species per Research Hour. Comparatively, Walker Ranch had the second highest number of Individuals counted over the 14 years and the second lowest I/RH. These two Open Spaces were well tested because Caribou had 33 hours of field observation and Walker 53. The transects provided a significant portion of the data in 2018: days using transect protocol; Caribou Ranch 15 of the 22 days of inventory data, Walker Ranch 9 of 13; Heil Valley-Geer Watershed 6 of 10, and Anne U. White, 8 of the 8. The collected data from transects were added according to the dates, into each inventory data table. The transects were chosen by Researchers because they were familiar and had been followed previous seasons. Transect data will prove valuable, reliable, and verifiable if many years' data gathering follow this first year.

IX. Conclusion

This team of Research Volunteers has produced massive field data which allows us to calculate a definite change in the presence of butterflies in the Open Space lands. Using the unit designed just for this study, Individual butterflies per Research Hour (I/RH) we initially calculated the I/RH in each Open Space area that we studied. Following this we used a computer program to calculate a cumulative and single chart for the years 2004-2018. The calculation indicates that there was a summary loss of -1.3 I/RH over the fifteen years. This trend ($R^2=0.4$) explains 40% of the variation for years 2004 through 2018 which is a decrease of almost 3% /year. The remaining 60 % is likely due to weather conditions, volunteer experience in identification, overwintering survival, etc . This indicates a significant loss of butterfly diversity due to many factors. Some of this loss is a result of extreme dryness in the Boulder County Foothills. This leads to the conclusion that the butterfly population will be significantly diminished over time under present conditions. Our results indicate that most butterfly species are not reproducing successfully enough to keep their population numbers stable within Boulder County.

X. Acknowledgments

We sincerely thank the Boulder County Parks and Open Space (BCPOS) for providing Research Permits which have been necessary to implement this research during the past fifteen years. Since 2002 the Open Space Department has welcomed the butterfly Research Specialists, allowing access to many properties for inventorying butterflies. In 2018, Susan Spaulding, Senior Wildlife Specialist provided close contact and advice; Amanda Hatfield, and Kevin Grady, Resource Protection Rangers have assisted in field work. Jenny Dalton assisted in page editing. We enjoy and hold dear the opportunities to cooperate with the staff members. I wish to commend the staff members and Open Space Department for the fine scientific and varied conservation methods they are diligently performing.

Boulder Open Space Department provided a grant to further the writing and completion of this report. Boulder County Nature Association provided a grant in 2018 specially to support the development of two transects. However, volunteers increased this to four transects studying butterflies in the Open Spaces for the first time.

Our mentor, providing professional suggestions and assistance in identification, continues to be Dr. Paul A. Opler, C.P. Gillette Museum of Arthropod Diversity, Colorado State University, Ft. Collins. My volunteer team is composed of John Barr, Amy Chu, Larry Crowley, Dan Fosco, Sue Hirschfeld, Richard Holmes, Venice Kelly, Chuck Lowry, Jean Morgan, Pam Piombino and Wynne Whyman. Chris Friedman and Linda Hardesty joined mid-summer. John, Dan, Venice, Pam, Wynne and Chris greatly assisted with digital photos.

Dr. Daniel Ziskin adapted the computer program to determine the Individual populations per Research Hour (I/RH), toward the final statistical compilation of Individual Butterflies per Research Hour (I/RH) for All Open Spaces surveyed. I am indebted to him for this specialized computer program which he has made available each year. His work has provided a different view of the butterfly survival in our Open Spaces. Note the graphs and interpretation he provided in the Trend for all Open Spaces in Section VI.

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XII. Data Tables follow:

Each butterfly species reported for individual Open Space areas is carried from one year to the next on the inventory data table, even though it may not have been seen in 2018. These Data Tables contain data from both the Inventory method and Transect Method.

A. Southeast Buffer

Southeast Buffer	2018	4/27	5/17	6/27	8/16
<i>Papilio polyxenes</i>	Black Swallowtail		1	1	
<i>P. zelicaon</i>	Anise Swallowtail		2	1	
<i>P. rutulus</i>	W. Tiger Swallowtail				
<i>P. multicaudata</i>	Two-tailed Swallowtail				
yellow swallowtail sp.					
<i>Pontia protodice</i>	Checkered White		2	1	
<i>P. occidentalis</i>	Western White				
<i>Pieris rapae</i>	Cabbage White		2		
<i>Euchloe olympia</i>	Olympia Marble	3ph	3		
* <i>E. ausonides</i>	Large Marble	1ph			
white sp.			7	12	1
<i>Colias philodice</i>	Clouded Sulphur	7	9	27	
<i>C. eurytheme</i>	Orange Sulphur	9	2	13	2
sulphur sp.		2	1	1alb	
<i>Zerene cesonia</i>	Southern Dogface				
<i>Abaeis nicippe</i>	Sleepy Orange				
<i>Kricogonia lyside</i>	Lyside Sulphur				
<i>Nathalis iole</i>	Dainty Sulphur				
<i>Lycaena dione</i>	Gray Copper			2ph	
<i>Strymon melinus</i>	Gray Hairstreak	5			1
<i>Cupido amyntula</i>	W. Tailed-blue				
<i>Glaucopsyche lygdamus</i>	Silvery Blue		5		
<i>Euphilotes ancilla</i>	Rocky Mtn. Dotted-Blue				
<i>Echinargus isola</i>	Reakirt's Blue			1	
<i>Plebejus melissa</i>	Melissa Blue				
blue sp.		1	3	1ph	1
<i>Danaus plexippus</i>	Monarch		1		
<i>Agraulis vanillae</i>	Gulf Fritillary				
<i>Euptoieta claudia</i>	Variegated Fritillary		5	48+	5
<i>Speyeria aphrodite</i>	Aphrodite Fritillary			36+	
<i>S. edwardsii</i>	Edwards' Fritillary				
fritillary sp.				1	1
<i>Chlosyne fulvia</i>	Fulvia Checkerspot				
<i>C. gorgone</i>	Gorgone Checkerspot				
<i>Phyciodes tharos</i>	Pearl Crescent				
<i>P. pulchella</i>	Field Crescent		40	1	1
<i>Aglaia milberti</i>	Milbert's Tortoiseshell				
<i>Nymphalis antiopa</i>	Mourning Cloak				
<i>Vanessa cardui</i>	Painted Lady				
<i>Limenitis weidemeyerii</i>	Weidemeyer's Admiral				
<i>Coenonympha tullia ochracea</i>	Common (Ochre) Ringlet				
<i>Cercyonis pegala</i>	Common Wood Nymph				
<i>Erynnis afranius</i>	Afranius Duskywing				
<i>E. persius</i>	Persius Duskywing				
<i>Pyrgus communis</i>	Common Checkered-skipper				
<i>Pyrgus scriptura</i>	Small Checkered-skipper		2		
<i>Pholisora catullus</i>	Common Sootywing				
<i>Hesperia uncas</i>	Uncas Skipper				
<i>H. ottoe</i>	Ottoe Skipper				
<i>H. leonardus</i>	Leonard's Skipper				
<i>Atrytone arogos</i>	Arogos Skipper				
<i>Anatrytone logan</i>	Delaware Skipper				
skipper sp.					

A. Southeast Buffer

Date, Conditions	Location within	Butterfly Activity	Researcher
4/27/2018 12:40-3:00 pm p.m.20°C, all clear sky, 5-20 mph wind 2 1/2 hrs	Hwy 128 gate to Swallowtail Hill	Little; Marbles on Swallowtail Hill, Gray hairstreaks on west facing ridge- edge flying fast	Chuck Lowry Jan Chu Jane Whittlesey Jean Morgan Larry Crowley
5/17/2018 10:10-1:00 pm 20-26 °C, 80 to 50 % overcast. wind 0-10 mph 3 hrs	Hwy 128 gate to Swallowtail Hill.	Checkered whites and Olympia marbles were spiraling together upwards – as were the Black Swallowtail and Zelicaon Swallowtail.	Chuck Lowry Jan Chu Larry Crowley
6/27/2018 9:20-11:20 am 26-34 °C, Sky 100% blue, Wind 5-30 mph 2 hrs	Hwy 128 to Swallowtail Hill.	Much wind. Most butterflies in the ravine, a few to the west leeward side of the ridge. Puddling. Two swallowtails at Swallowtail Hill.	Amy Chu Chuck Lowry Jan Chu Jean Morgan Larry Crowley
8/16/2018 10:00-11:20 am 22-26 °C, Clear sky but smoky haze. Wind 0-5 mph 1.5 hrs	Hwy 128 to Swallowtail Hill	Very dry. Flowers diminutive and sparse blossoms.	Amy Chu Jan Chu Larry Crowley

A. Southeast Buffer

Southeast Buffer	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
# of Species identified during the year in Southeast Buffer	25	20	21	24	19	18	20	15	23	13	16	18
Cumulative # Species 2007-2018 sighted in Southeast Buffer	21	23	33	37	41	44	44	44	46	46	47	47
Research Hours on Site yearly	5	21	9	7.7	11.5	9	12	8	12	4.5	8	9
# Individual Butterflies Counted	256	373	353	443	160	227	169	178	294	121	119	271
# Individuals / Research Hour	51	18	39	40	14	25	14	22	24.5	27	15	30
# Species / Research Hour	5	0.9	2	3	2	2	1.6	2	2	3	2	2

B. Heil Valley-Geer Watershed

Heil Valley Geer Watershed	2018	3/9	4/2	4/29	5/26	5/26	7/7	7/15	8/17	8/17	8/28
<i>Papilio polyxenes</i>	Black Swallowtail										
<i>P. zelicaon</i>	Anise Swallowtail				1						
<i>P. indra</i>	Indra Swallowtail					5					
<i>P. rutulus</i>	Western Tiger Swallowtail			1		5					
<i>P. eurymedon</i>	Pale Swallowtail				1		1				
<i>P. multicaudata</i>	Two-tailed Swallowtail										
swallowtail yellow sp.							2				
<i>Neophasia menapia</i>	Pine White										
<i>Pontia sisymbrii</i>	Spring White										
<i>P. protodice</i>	Checkered White										
<i>P. occidentalis</i>	Western White										
<i>Pieris rapae</i>	Cabbage White		1	10		8	42	16		18	11
<i>P. marginalis</i>	Mustard White										
<i>Euchloe ausonides</i>	Large Marble				1						
<i>E. olympia</i>	Olympia Marble										
<i>Anthocharis julia</i>	Julia Orangetip			1							
white sp.				7	6	5			37	2	
<i>Colias philodice</i>	Clouded Sulphur			3					1	2	
<i>C. eurytheme</i>	Orange Sulphur						7		2	4	1
<i>C. alexandra</i>	Queen Alexandra's Sulphur										
<i>C. cesonia</i>	Southern Dogface										
<i>Eurema mexicana</i>	Mexican Sulphur										
<i>Nathalis iole</i>	Dainty Sulphur										

Heil Valley– Geer Watershed	2018	3/9	4/2	4/29	5/26	5/26	7/7	7/15	8/17	8/17	8/28
sulphur sp.				3	2		6	6	2		
<i>Lycaena dione</i>	Gray Copper										
<i>L. heteronea</i>	Blue Copper										
<i>Callophrys affinis</i> <i>homoperplexa</i>	Western Green Hairstreak				5						
<i>C. gryneus</i>	Siva Juniper Hairstreak					1					
<i>C. augustinus</i>	Brown Elfin										
<i>C. eryphon</i>	Western Pine Elfin			5		1					
elfin sp.											
<i>Satyrus titus</i>	Coral Hairstreak										
<i>S. liparops</i>	Striped Hairstreak										
<i>S. saepium</i>	Hedgerow Hairstreak										
<i>Strymon melinus</i>	Gray Hairstreak									1	
<i>Leptotes marina</i>	Marine Blue										
<i>Cupido amyntula</i>	Western Tailed-Blue										
<i>Celastrina echo</i>	Echo Azure					2					
<i>Glaucopsyche piasus</i>	Arrowhead Blue					1					
<i>G. lygdamus</i>	Silvery Blue				5	12					
<i>Euphilotes ancilla</i>	Rocky Mountain Dotted-Blue										
<i>Echinargus isola</i>	Reakirt's Blue									1	
<i>Plebejus melissa</i>	Melissa Blue										
<i>P. saepiolus</i>	Greenish Blue										
<i>P. icarioides</i>	Boisduval's Blue										
<i>P. lupini lutzi</i>	Lupine Blue										
<i>P. glandon rustica</i>	Arctic Blue										
blue sp.				1	28		3	1			
<i>Danaus plexippus</i>	Monarch										
<i>Apodemia nais</i>	Nais Metalmark										
<i>Euptoia claudia</i>	Variegated Fritillary								8		
<i>Speyeria aphrodite</i>	Aphrodite Fritillary						3	12	1	30	1
<i>S. edwardsii</i>	Edwards' Fritillary								3		
<i>S. coronis</i>	Coronis Fritillary										
<i>S. callippe</i>	Callippe Fritillary										
<i>S. hesperis</i>	Northwestern Fritillary								1	5	
<i>S. mormonia</i>	Mormon Fritillary										
fritillary sp.						1	13	2	37	15	1
<i>Chlosyne gorgone</i>	Gorgone Checkerspot					1					
<i>C. nycteis</i>	Silvery Checkerspot										
<i>C. palla</i>	Northern Checkerspot										
<i>Phyciodes pallida</i>	Pale Crescent							1			
<i>P. tharos</i>	Pearl Crescent										
<i>P. cocyta</i>	Northern Crescent										
<i>P. pulchella</i>	Field Crescent				2			2			
<i>Polygonia satyrus</i>	Satyr Comma										
<i>P. gracilis</i>	Hoary Comma			1							
<i>Junonia coenia</i>	Common Buckeye										
<i>Aglaia milberti</i>	Milbert's Tortoiseshell										
<i>Nymphalis antiopa</i>	Mourning Cloak		11	1							
<i>N. californica</i>	California Tortoiseshell			1							
<i>Vanessa atalanta</i>	Red Admiral							1			
<i>V. cardui</i>	Painted Lady									1	
<i>V. virginiensis</i>	American Lady										
<i>Limenitis weidemeyerii</i>	Weidemeyer's Admiral										
<i>Asterocampa celtis</i>	Hackberry Emperor										

Heil Valley– Geer Watershed	2018	3/9	4/2	4/29	5/26	5/26	7/7	7/15	8/17	8/17	8/28
<i>Coenonympha tullia ochracea</i>	Ochre (Common) Ringlet				15	1	1	1			
<i>Cercyonis pegala</i>	Common Wood-Nymph								18	32	3
<i>C. oetus</i>	Small Wood-Nymph								5	4	
wood nymph sp.							26	53	38		
<i>Erebia epipsodea</i>	Common Alpine										
<i>Oeneis chryxus</i>	Chryxus Arctic										
<i>O. uhleri</i>	Uhler's Arctic										
<i>Epargyreus clarus</i>	Silver-spotted Skipper					1	1				
<i>Thorybes pylades</i>	N. Cloudywing					1ph					
<i>Erynnis icelus</i>	Dreamy Duskywing										
<i>E. pacuvius</i>	Pacuvius Duskywing					1					
<i>E. afranius</i>	Afranius Duskywing										
<i>E. persius</i>	Persius Duskywing					8					
<i>Pyrgus communis</i>	Common Checkered-skipper								5	1	
<i>Pholisora catullus</i>	Common Sootywing										
<i>Piruna pirus</i>	Russet Skipperling										
<i>Oarisma garita</i>	Garita Skipperling										
<i>Hesperia juba</i>	Juba Skipper										
<i>H. colorado</i>	Western Branded Skipper										
<i>H. nevada</i>	Nevada skipper										
<i>Polites themistocles</i>	Tawny-edged Skipper										
<i>Ochlodes sylvanoides</i>	Woodland Skipper									2	
<i>Poanes taxiles</i>	Taxiles Skipper										
<i>Euphyes vestris</i>	Dun Skipper							5			
<i>Atrytonopsis hianna</i>	Dusted Skipper										
skipper sp.										1	

ph= photos available

Date, Conditions Heil Valley - Geer Watershed	Location within Heil - Geer	Butterfly Activity	Researchers
3/9/2018	Transect	None	Sue Hirschfeld
4/2/2018 10:45 – 12:00 pm 9° C -16 °C 0-30 mph wind; 80% clouds	Pavilion Parking lot to Parking lot by barn and hillside to the north	Morning Cloaks seeking warm rocks; flying very little	Amy Chu Jan Chu Cathy Cook Larry Crowley Dan Fosco Jane Whittlesey Richard Holmes
4/29/2018 10:45-12:30 pm 18-21 °C, 40-80% overcast, 5-10 mph breeze	Barn parking lot to northern drainage; lower pavilion parking lot	White and Sulphurs in the air; others show little activity	John Barr Dan Fosco Larry Crowley Jean Morgan Jane Whittlesey Jan Chu
5/26/2018 9:30 – 11:30am 21-32 °C, clear sky to slight breeze	Transect; west of Barn	Few flying, but more activity as temperature went up	Sue Hirschfeld

Date, Conditions Heil Valley - Geer Watershed	Location within Heil - Geer	Butterfly Activity	Researchers
5/26/2018 9:45-12:35 pm 21-32 °C, Clear, no wind	From public parking lot to residence	Duskywings and Cloudywing were flying	Richard Holmes
7/7/2018 9:00-11:00 am 26 -33 °C, or so Clear sky, no wind.	Transect	Butterflies were flying; few would alight long enough to ID	Sue Hirschfeld
7/15/2018 9:15-11:00 am 26-30 °C, Cloudy, sprinkling, to sunny	Transect	Frits, wood nymphs, whites. No running water	Sue Hirschfeld
8/17/2018 9:30- 12:30 p.m. 19-22 °C Hazy with sun, slight breeze	Transect Hill, then road to drainage	Few butterflies; some on Canada thistle	Sue Hirschfeld Chris Friedman Linda Hardesty
8/17/2018 9:10 -12:30pm 19-22 °C Hazy with some sun. Wind 0-5 mph	Barn along stream toward culvert	Few shortened flowers. Pegala resting on plants and flying. NW and Aphrodite frit nectaring on Canada thistle.	Amy Chu Chuck Lowry Jan Chu Jean Morgan Larry Crowley Richard Holmes
8/28/2018 10-12:00 p.m. 15-21 °C Full sun. Light breeze	Transect -close to drainage along the hill part	Few butterflies sighted for 2 hours walking	Sue Hirschfeld

Heil-Geer Watershed	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
# of Species Identified Annually in Geer Watershed	42	56	44	49	36	38	38	42	22	43	30	40
Cumulative # of Species Sighted in Geer Watershed 2007-2018	81	87	90	91	91	91	91	92	92	92	93	93
Research Hours at Site	15.5	21	12.5	14	14	10	11	18	11	10	21	20
# Individual Butterflies Counted	569	1225	492	419	436	530	264	738	200	488	628	665
# Individuals / Research Hour	37	58	39	30	31	53	24	41	18	29	39	33
# Species / Research Hour	2.7	2.7	3.5	3.5	2.6	3.8	3.5	2.3	2	4.3	1.4	2

C. Heil Valley -North

Heil Valley Ranch North Pointe, Red Gulch,	2018	4/11	5/7	6/12	7/18	8/29
<i>*Parnassius smintheus</i>	Rocky Mountain Parnassian			2		
<i>Papilio polyxenes</i>	Black Swallowtail				1	
<i>P. zelicaon</i>	Anise Swallowtail			1		
<i>P. indra</i>	Indra Swallowtail			1		
<i>P. rutulus</i>	Western Tiger Swallowtail			3		
<i>P. eurymedon</i>	Pale Swallowtail			3		
<i>P. multicaudata</i>	Two-tailed Swallowtail		1	1	4	
swallowtail yel.				3		1
<i>Neophasia menapia</i>	Pine White					
<i>Pontia protodice</i>	Checkered White					
<i>P. occidentalis</i>	Western White					
<i>P. sisymbrii</i>	Spring White					
<i>Pieris rapae</i>	Cabbage White		6	3	27	
white sp.		2	5	2		4
<i>Euchloe ausonides</i>	Large Marble		3			
<i>E. olympia</i>	Olympia Marble					
<i>Anthocharis julia</i>	Julia Orangetip					
<i>Colias philodice</i>	Clouded Sulphur		2	3	9	1
sulphur sp.				2	1	3
<i>C. eurytheme</i>	Orange Sulphur	7			10	2
<i>C. alexandra</i>	Queen Alexandra's Sulphur					
<i>Nathalis iole</i>	Dainty Sulphur				3	
<i>Lycaena dione</i>	Gray Copper					
<i>Lycaena heteronea</i>	Blue Copper				5	
<i>L. helloides</i>	Purplish Copper					
<i>Callophrys affinis</i>	Western Green Hairstreak			1		
<i>C. gryneus</i>	Siva Juniper Hairstreak			1		
<i>C. eryphon</i>	Western Pine Elfin		1	2		
elfin sp.		3				
<i>Satyrrium behrii</i>	Behr's Hairstreak					
<i>S. titus</i>	Coral Hairstreak					
<i>Strymon melinus</i>	Gray Hairstreak				2	
<i>Leptotes marina</i>	Marine Blue					
<i>Cupido amyntula</i>	Western Tailed-blue					
<i>Celastrina echo</i>	Echo (Spring) Azure		1			
<i>Glaucopsyche piasus</i>	Arrowhead Blue			4		
<i>G. lygdamus</i>	Silvery Blue	1	3	13		
<i>Euphilotes ancilla</i>	Rocky Mountain Dotted-blue					
<i>Euphilotes ancilla barnesi</i>	ssp. RM Dotted-blue ID -Opler					
<i>Echinargus isola</i>	Reakirt's Blue			4	1	
<i>Plebejus melissa</i>	Melissa Blue			2ph	4	
<i>P. icarioides</i>	Boisduval's Blue			20		
<i>P. lupini lutzi</i>	Lupine Blue					
<i>P. glandon rustica</i>	Arctic Blue					
blue sp.			10	13	6	
<i>*Libytheana carinenta</i>	American Snout			1ph		
<i>Danaus plexippus</i>	Monarch					
<i>Limenitis archippus</i>	Viceroy					
<i>Euptoieta claudia</i>	Variegated Fritillary			4	12	
<i>Speyeria aphrodite</i>	Aphrodite Fritillary			7	14	2
<i>S. edwardsii</i>	Edwards' Fritillary				3	1
<i>S. coronis</i>	Coronis Fritillary					
<i>S. callippe</i>	Callippe Fritillary			1		

Heil Valley Ranch North Pointe, Red Gulch,	2018	4/11	5/7	6/12	7/18	8/29
<i>S. hesperis</i>	Northwestern Frit					
<i>S. mormonia</i>	Mormon Fritillary					
fritillary sp.				17	5	17
<i>Euphydryas anicia</i>	Variable Checkerspot					
<i>Chlosyne gorgone</i>	Gorgone Checkerspot					
<i>C. nycteis</i>	Silvery Checkerspot			1		
<i>C. palla</i>	Northern Checkerspot					
<i>Phyciodes pallida</i>	Pale Crescent					
<i>P. tharos</i>	Pearl Crescent					
<i>P. cocyta</i>	Northern Crescent					
<i>P. pulchella</i>	Field Crescent		1	5		6
<i>Polygonia satyrus</i>	Satyr Comma					
<i>P. gracilis</i>	Hoary Comma	1	3			
<i>Nymphalis antiopa</i>	Mourning Cloak	2	3			
<i>Junonia coenia</i>	Buckeye, Common					
<i>N. californica</i>	California Tortoiseshell					
<i>Vanessa atalanta</i>	Red Admiral					
<i>Aglaia milberti</i>	Milbert's Tortoiseshell		1			
<i>V. cardui</i>	Painted Lady	2	2		1	
<i>V. virginiensis</i>	American Lady					
<i>Limenitis weidemeyerii</i>	Weidemeyer's Admiral			1		
<i>Asterocampa celtis</i>	Hackberry Emperor				2	
<i>Coenonympha tullia ochracea</i>	Ochre (Common) Ringlet			26		
<i>Cercyonis pegala</i>	Common Wood-Nymph				5	
<i>C. oetus</i>	Small Wood-Nymph				2	
wood nymph sp.					13	
<i>Erebia epipsodea</i>	Common Alpine					
<i>Epargyreus clarus</i>	Silver-spotted Skipper			1		
<i>Erynnis afranius</i>	Afranius Duskywing					
<i>E. pacuvius</i>	Pacuvius Duskywing			1		
<i>E. persius</i>	Persius Duskywing			4		
<i>E. icelus</i>	Dreamy Duskywing					
duskywing sp				1		
<i>Pyrgus communis</i>	Common Checkered-skipper		3		8	3
<i>Pholisora catullus</i>	Common Sootywing		2			
<i>Piruna pirus</i>	Russet Skipperling					
<i>Oarisma garita</i>	Garita Skipperling			2		
<i>Hesperia juba</i>	Juba Skipper		3			
<i>H. colorado</i>	W. Branded Skipper					1
<i>H. pahaska</i>	Pahaska Skipper			1		
<i>H. viridis</i>	Green Skipper			1		
<i>H. nevada</i>	Nevada Skipper					
<i>Polites themistocles</i>	Tawny-Edged Skipper					
<i>P. mystic</i>	Long Dash					
<i>Atrytone arogos</i>	Arogos Skipper					
<i>Ochlodes sylvanoides</i>	Woodland Skipper					
<i>Poanes taxiles</i>	Taxiles Skipper					
<i>Euphyes vestris</i>	Dun Skipper				1	

* new species in this area

ph. = photo available

C. Heil Valley -North

Date, Conditions Heil Valley-North	Location	Butterfly Behavior	Researchers
4/11/2018 10:45-12:30pm 16°C, 40% Sunny sky, 10-40 mph wind	North Pointe to pond. Pond has been dry for a year, no elk tracks.	Short flights because of wind	Chuck Lowry Dan Fosco Jan Chu Jean Morgan

1hr15min			John Barr
Date, Conditions Heil Valley-North	Location	Butterfly Behavior	Researchers
5/7/2018 11:30- 1:00 pm 16-23 °C, sky high overcast, with about 30 min. of sun 1.5 hrs	Red Gulch	Flew only when the sun was out for 30 min. Butterflies seemed small.	Amy Chu Chuck Lowry Jan Chu Jane Whittlesey John Barr Larry Crowley Pam Piombino
6/12/2018 9:15 – 2:30 pm 21-23 °C, clear blue, 0-10 mph wind 5.15 hrs	Red Hill Saddle, above Marietta Canyon in Meadow,	Few in Meadow. Many in Saddle. Reakirt's Blue ovipositing on vetch bud. 2 large caterpillars on lupine, one tiny caterpillar in white lupine bundled buds. Tussock moth caterpillar	Dan Fosco Jan Chu Janet Hanley Jean Morgan Larry Crowley Sue Hirschfeld
7/18/2018 10:15-11:40am 25-31 °C, Sky 60 % cloudy, 0-10 mph 1.5 hrs	Red Gulch, through Ron Lafollette's for only ½ mi. Hot dry weedy	Butterflies active. Many had ragged edges as if they had been in wind or hail. Mating pegala	Amy Chu Asa Hurst with Ruby Chris Friedman Jan Chu Larry Crowley Linda Hardesty
8/29/2018 9:45-1:05 pm 18-27 °C, Sky blue. Wind 0-5 mph 3.15 hrs	North Pointe gate to pond (which was totally dry) Hackberry yellowing and dried.	Few butterflies, and those we saw were flying fast. Field Crescents and Checkered Skippers in pond bed.	Chris Friedman Chuck Lowry Jan Chu Jean Morgan Larry Crowley Linda Hardesty

C. Heil Valley-North - North Pointe, Red Gulch

Years of Counts in Heil North	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
# of Species Identified During Each Year in Heil-North	34	45	41	40	33	24	30	50	38	31	33	50
Cumulative # Species 2007-2018 Sighted in Heil-North	50	62	77	81	81	85	86	89	90	91	91	92
Research Hours on Site	8	17	12.5	11.5	11.5	6.5	12	27	32	13	7.5	13.5
# Individual Butterflies Counted 2018	579	654	488	429	272	188	402	1077	508	246	204	442
# Individuals / Research Hour	72	38	39	37	24	29	36	40	16	19	27	33
# Species / Research Hour	4	2.6	3.3	3.4	2.9	3.6	2.5	1.9	1.2	2.4	4.4	3.7

D. Heil Ranch – Plumley Canyon

Heil Valley – Plumley Canyon	2018	5/10	6/25
<i>Papilio polyxenes</i>	Black Swallowtail		
<i>P. zelicaon</i>	Anise Swallowtail	2	
<i>P. indra</i>	Indra Black Swallowtail		
<i>P. rutulus</i>	Western Tiger Swallowtail	1	
<i>P. eurymedon</i>	Pale Swallowtail		1
<i>P. multicaudata</i>	Two-tailed Swallowtail		
swallowtail, black		1	
<i>Neophasia menapia</i>	Pine White		
<i>Pontia protodice</i>	Checkered White		
<i>P. occidentalis</i>	Western White		
<i>P. sisymbrii</i>	Spring White		
<i>Pieris rapae</i>	Cabbage White	5	4
<i>P. marginalis</i>	Mustard White		
<i>Euchloe ausonides</i>	Large Marble	2	
<i>E. olympia</i>	Olympia Marble	1	
<i>Anthocharis julia</i>	Julia Orangetip	3	
white sp.		15	4
<i>Colias philodice</i>	Clouded Sulphur	1	
<i>C. eurytheme</i>	Orange Sulphur		
<i>C. alexandra</i>	Queen Alexandra's Sulphur		
<i>Zerene cesonia</i>	Southern Dogface		
<i>Phoebis sennae eubule</i>	Cloudless Sulphur		
<i>Eurema mexicana</i>	Mexican Sulphur		
<i>Nathalis iole</i>	Dainty Sulphur		
sulphur sp.			1
<i>Lycaena dione</i>	Gray Copper		
<i>C. mossii schryveri</i>	Moss' Elfin		
<i>C. polios</i>	Hoary Elfin		
<i>C. eryphon</i>	Western Pine Elfin	45+	
<i>Callophrys affinis homoperplexa</i>	Western Green Hairstreak	1	
<i>C. sheridanii</i>	White-lined Green Hairstreak		
<i>C. gryneus</i>	Siva Juniper Hairstreak		
<i>Satyrrium titus</i>	Coral Hairstreak		
<i>Strymon melinus</i>	Gray Hairstreak		
<i>Leptotes marina</i>	Marine Blue		
<i>Cupido amyntula</i>	Western Tailed-Blue		
<i>Celastrina echo</i>	Echo Azure	8	
<i>C. humulus</i>	Hops Azure		
<i>Glaucopsyche piasus</i>	Arrowhead Blue		
<i>G. lygdamus</i>	Silvery Blue	8	
<i>Euphilotes ancilla</i>	Rocky Mountain Dotted-Blue		
<i>Echinargus isola</i>	Reakirt's Blue		
<i>Plebejus melissa</i>	Melissa Blue		
<i>P. icarioides</i>	Boisduval's Blue		3
<i>P. lupini lutzi</i>	Lupine Blue		
<i>P. glandon rustica</i>	Arctic Blue		
blue sp.		20	

Heil Valley – Plumley Canyon	2018	5/10	6/25
<i>Monarch</i>	<i>Danaus plexippus</i>		
<i>Euptoieta claudia</i>	Variegated Fritillary		
<i>Speyeria aphrodite</i>	Aphrodite Fritillary		5
<i>S. edwardsii</i>	Edwards' Fritillary		
<i>S. callippe</i>	Callippe Fritillary		
<i>S. atlantis</i>	Atlantis Fritillary		
<i>S. hesperis</i>	Northwestern Fritillary		
fritillary sp.		1	
<i>Poladryas arachne</i>	Arachne Checkerspot		
<i>Chlosyne gorgone</i>	Gorgone Checkerspot		
<i>C. palla</i>	Northern Checkerspot		
<i>Phyciodes pallida</i>	Pale Crescent		
<i>P. tharos</i>	Pearl Crescent		
<i>P. cocyta</i>	Northern Crescent		
<i>P. pulchella</i>	Field Crescent	4	
crescent sp.			
<i>Polygonia interrogationis</i>	Question Mark		
<i>P. gracilis</i>	Hoary Comma	1	2
<i>Aglaia milberti</i>	Milbert's Tortoiseshell		
<i>Nymphalis antiopa</i>	Mourning Cloak		
<i>N. californica</i>	California Tortoiseshell		
<i>Vanessa atalanta</i>	Red Admiral		
<i>V. cardui</i>	Painted Lady		
<i>V. virginiensis</i>	American Lady		
<i>Limenitis weidemeyerii</i>	Weidemeyer's Admiral		
<i>L. archippus</i>	Viceroy		
<i>Asterocampa celtis</i>	Hackberry Emperor		
<i>Coenonympha tullia ochracea</i>	Ochre (Common) Ringlet	1	1
<i>Cercyonis pegala</i>	Common Wood-Nymph		
<i>C. oetus</i>	Small Wood-Nymph		
<i>Erebia epipsodea</i>	Common Alpine		
<i>Epargyreus clarus</i>	Silver-spotted Skipper		2
<i>Thorybes pylades</i>	N. Cloudywing		
<i>Erynnis pacuvius</i>	Pacuvius Duskywing		
<i>E. afranius</i>	Afranius Duskywing		
<i>E. persius</i>	Persius Duskywing		1
<i>Pyrgus communis</i>	Common Checkered-skipper		
<i>Pholisora catullus</i>	Common Sootywing		
<i>Piruna pirus</i>	Russet Skipperling		1
<i>Oarisma garita</i>	Garita Skipperling		
<i>Hesperia juba</i>	Juba Skipper		
<i>H. colorado</i>	Western Branded Skipper		
<i>H. pahaska</i>	Pahaska Skipper		
<i>Polites draco</i>	Draco Skipper		
<i>P. themistocles</i>	Tawny-edged Skipper		
<i>P. mystic</i>	Long Dash		
<i>Ochlodes sylvanoides</i>	Woodland Skipper		1
<i>Poanes taxiles</i>	Taxiles Skipper		
<i>Euphyes vestris</i>	Dun Skipper		12+
<i>Atrytonopsis hianna</i>	Dusted skipper		
skipper sp.			8

+= more than

D. Heil Valley, Plumley Canyon

Date, Conditions	Location leading into Heil-Plumley	Butterfly Activity	Researchers
5/10/2018 10:10-12:50 p.m. 16-26 °C 90- to 60% sunny. 2 1/2 hrs	Near second gate to crossing of streambed in Plumley. Very difficult walk.	Many flying; pairs of Pine Elfin circling each other from the quarry to stream crossing.	Chuck Lowry Dan Fosco Jan Chu Larry Crowley
6/25/2018 10:15-1:15 p.m. 16 – 24 °C, sky clear, no wind. Later breeze scattered clouds 3 hrs.	Wapiti Trail about half mile to stream crossing		Richard Holmes

Heil Valley - Plumley Canyon	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
# of Species Identified Each Year in Plumley Canyon	45	37	44	36	44	41	48	33	38	18	27	27
Cumulative # Species 2007-2018 sighted in Plumley Canyon	81	81	82	84	86	88	89	89	89	90	90	90
Research Hours on Site	8	13	17	6.5	18	7.5	16	8	16	7	5.5	5
# Individual Butterflies Counted	365	480	401	196	526	342	470	479	310	162	348	166
# Individuals / Research Hour	45	36	24	30	29	46	29	60	19	23	63	33
# Species / Research Hour	5.6	2.8	2.6	5.5	2.4	5.4	3.0	4.1	2.3	2.6	4.9	5.4

E. Walker Ranch- Meyer's Homestead, Loop Trail

Walker Ranch- Meyer's Homestead and Loop Trails	2018	4/22	4/30	5/6	5/10	5/16	5/17	5/22	6/1	6/6	6/21	6/25	7/16	7/26	8/8	8/13	9/10
<i>Parnassius smintheus</i>	Rocky Mountain Parnassian									2	1						
<i>Papilio polyxenes</i>	Black Swallowtail							1									
<i>P. zelicaon</i>	Anise Swallowtail																
<i>P. indra</i>	Indra Swallowtail									3							
<i>P. rutulus</i>	Western Tiger Swallowtail									2		1					
<i>P. eurymedon</i>	Pale Swallowtail							1		1	1	5					
<i>P. multicaudata</i>	Two-tailed Swallowtail																
swallowtail sp.									4					1			
<i>Neophasia menapia</i>	Pine White																
<i>Pontia protodice</i>	Checkered White																
<i>P. sisymbrii</i>	Spring White		1		2		2										
<i>Pieris rapae</i>	Cabbage White				3	1	3		6								
white sp.		5	3	5				11	4	4	1		1	1		1	
<i>Euchloe ausonides</i>	Large Marble							2		2							
<i>Anthocharis julia</i>	Julia Orangetip		2		2		2	2	1								
<i>Colias philodice</i>	Clouded Sulphur							1		1					1		
<i>C. eurytheme</i>	Orange Sulphur															1	
<i>C. alexandra</i>	Queen Alexandra's Sulphur													1			
<i>Nathalis iole</i>	Dainty Sulphur												1		1		
sulphur sp.						1					1		1	1		2	
<i>Lycaena heteronea</i>	Blue Copper												1				
<i>Satyrrium saepium</i>	Hedgerow Hairstreak		1										20	1	2		
<i>Callophrys affinis</i>	W. Green Hairstreak		4		3		3	43	3	21	2	27					
<i>C. sheridanii</i>	White-line Green Hairstreak		1 4														
<i>C. gyrneus siva</i>	Siva Juniper Hairstreak								1	1		2					
<i>C. spinetorum</i>	Thicket Hairstreak																
<i>C. augustinus</i>	Brown Elfin	3	2	3	3		3	2									
<i>C. polios</i>	Hoary Elfin	10	1		11		11	2	4								
<i>C. eryphon</i>	Western Pine Elfin	4		4	3	1	3	8	4								

Walker Ranch-Meyer's Homestead and Loop Trails	2018	4/22	4/30	5/6	5/10	5/16	5/17	5/22	6/1	6/6	6/21	6/25	7/16	7/26	8/8	8/13	9/10
elfin sp.			2														
<i>Strymon melinus</i>	Gray Hairstreak																
<i>Cupido amyntula</i>	Western Tailed-Blue							1		2	1						
<i>Celestrina echo</i>	Echo Azure	1		1		1	1	6		1							
<i>Glaucopsyche piasus</i>	Arrowhead Blue																
<i>G. lygdamus</i>	Silvery Blue		2			2	1		3	8	1						
<i>Euphilotes ancilla</i>	Rocky Mountain Dotted-Blue							1	3	10		20					
<i>Echinargus isola</i>	Reakirt's Blue									1		1	2				
<i>Plebejus melissa</i>	Melissa Blue															2	
<i>P. saepiolus</i>	Greenish Blue																
<i>P. icarioides</i>	Boisduval's Blue							1	1		3						
<i>P. lupini lutzi</i>	Lupine Blue																
<i>Agriades glandon rustica</i>	Arctic Blue																
blue sp.			3		40		35	10	1	4	3	13		3			
<i>Danaus plexippus</i>	Monarch																
<i>Apodemia nais</i>	Nais Metalmark												1				
<i>Euptoieta claudia</i>	Variegated Fritillary												1		1		2
<i>Speyeria aphrodite</i>	Aphrodite Fritillary										1	3			1		
<i>S. edwardsii</i>	Edwards' Fritillary																
<i>S. callippe</i>	Callippe Fritillary																
<i>S. hesperis</i>	Northwestern Fritillary												2		7		
<i>S. mormonia</i>	Mormon Fritillary																
fritillary sp.										1		2	2	3	6	2	
<i>Chlosyne gorgone</i>	Gorgone Checkerspot							9		9		3					
<i>C. nycteis</i>	Silvery Checkerspot										1						
<i>C. palla</i>	Northern Checkerspot										1						
<i>Phyciodes cocyta</i>	Northern Crescent									2	4	1					
<i>P. pulchella</i>	Field Crescent								2	28		2			6		5
<i>Phyciodes pallida</i>	Pale Crescent																
<i>Poladryas arachne</i>	Arachne Checkerspot																
<i>Euphydryas anicia</i>	Variable Checkerspot									1	6	2					
<i>Polygonia satyrus</i>	Satyr Comma	1		1											1		

Walker Ranch- Meyer's Homestead and Loop Trails	2018	4/22	4/30	5/6	5/10	5/16	5/17	5/22	6/1	6/6	6/21	6/25	7/16	7/26	8/8	8/13	9/10
<i>Polygonia gracilis</i>	Hoary Comma			1 0				1	1	1	1	1	1				1
<i>Aglaia milberti</i>	Milbert's Tortoiseshell																1
<i>Nymphalis antiopa</i>	Mourning Cloak																
<i>N. californica</i>	California Tortoiseshell		1		1	1	1										
<i>Vanessa atalanta</i>	Red Admiral																
<i>V. cardui</i>	Painted Lady											2				1	
<i>V. virginiensis</i>	American Lady																
<i>Limenitis weidemeyerii</i>	Weidemeyer's Admiral												1				
<i>Coenonympha tullia ochracea</i>	Ochre (Common) Ringlet								8		4	4		1			
<i>Cercyonis pegala</i>	Common Wood Nymph												8	1	1		
<i>C. oetus</i>	Small Wood Nymph													15		3	
<i>Erebia epipsodea</i>	Common Alpine																
<i>Oeneis chryxus</i>	Chryxus Arctic								1								
<i>O. uhleri</i>	Uhler's Arctic							2	12 +	2							
<i>Erynnis icelus</i>	Dreamy Duskywing				1	1	7				3						
<i>E. pacuvius</i>	Pacuvius Duskywing		1		1		8	3	10 +	4	1	2			1		
<i>E. persius</i>	Persius Duskywing				1			1			1						
duskywing sp.					15			2	1	2		1					
<i>Pyrgus communis</i>	Common Checkered- skipper															1	
<i>*Pholisora catullus</i>	Common Sootywing												1				
<i>Piruna pirus</i>	Russet Skipperling										6	7	2				
<i>Oarisma garita</i>	Garita Skipperling																
<i>Hesperia juba</i>	Juba Skipper																
<i>H. colorado</i>	Western Branded Skipper																
<i>Polites themistocles</i>	Tawny-edged Skipper																
<i>P. mystic</i>	Long Dash																
<i>Ochlodes sylvanoides</i>	Woodland Skipper													1	19	2	4
<i>Poanes taxiles</i>	Taxiles Skipper																
<i>Euphyes vestris</i>	Dun Skipper											1	2	1			
skipper sp.											2						

*First time sighted for this area

*= more than

E. Walker Ranch- Meyer's Homestead, Loop Trail

Date Conditions	Location Walker Ranch	Butterfly Behavior	Researchers
4/22/2018	Homestead Trail	Some mud; no puddling	John Barr
4/30/2018 10:45-12:45 pm 15 °C 30% overcast, hazy from AZ fire. 0-5 wind.	Loop Trail to Boulder Stream	Short flights;	Dan Fosco Chuck Lowry Jean Morgan Kira McCoy Jan Chu
5/6/2018	Meyer's Gulch Homestead	No puddling; no orange tips.	John Barr
5/10/2018 9:55-3:45 p.m. 21°C. slight breeze. Clear to scattered becoming cloudier and breezier by 1:30.	Meyer's Gulch	More than last week.	Richard Holmes
5/16/2018 9:55-3:45p.m. 21°C. Slight breeze, Clear sky becoming cloudier and breezier by 1:30.	Meyer's Gulch		Richard Holmes
5/17/2018 11:20-2:45 p.m. 26 °C. Windy. Sunny, scattered clouds becoming cloudier 3 hrs. 25 min	Meyer's Gulch Homestead Trail. 1/2 mi beyond the barn.	Sometimes a butterfly would stay for quite a while in a puddle.	Richard Holmes
5/22/2018 12:20-2:45 pm 17-21 °C. Sunny, Hazy, breezy on top, calm on the lower section	Transect Loop Trail	Activity throughout	Dan Fosco
6/1/2018 9:15-2:25 pm 21-27 °C. 100% clear. Quite windy all day.	Meyers Gulch Beyond the barn up to power lines.		Richard Holmes

Date Conditions	Location Walker Ranch	Butterfly Behavior	Researchers
6/6/2018 10:15-2:15 pm 21-24 °C. Partly sunny, breezy on top, calm lower on trail.	Transect Loop Trail	Activity throughout	Dan Fosco
6/21/2018 9:40-2:20 p.m. 16-23°C. Sunny, clear to cloudy. Wind calm to slight breeze 4hr.40 min	Meyer's Gulch		Richard Holmes
6/25/2018 1:30-3:45 pm Mostly sunny. Breezy on top of trail, calm lower on trail.	Walker Loop Transect	Activity throughout	Dan Fosco
7/16/2018 12:30-2:45 pm 18-21 °C Sunny, breezy on top, calm below.	Loop Trail Transect	Activity throughout	Dan Fosco
7/26/2018 9:50-12:45 p.m. 18-21 °C. Sky clear becoming partly cloudy. Wind calm.	Walker Ranch – Meyer's Homestead Trail	Numbers down; heavy rains may have caused this. Trail was all moist.	Richard Holmes
8/8/2018 12:20-2:45 pm 18-21 °C. Partly sunny, breezy on top, calm below	Loop Trail Transect	Activity throughout	Dan Fosco
8/13/2018 10-12:00 pm 22-24 °C Sky clear, breeze	Meyer's Gulch	Sparse, none basking on road. No moisture anywhere.	Richard Holmes
9/10/2018 1:15-3:30 pm 24-27 °C Sunny, breezy on top, calm below.	Loop Trail Transect	Activity only in wetter areas and where the only flowers were blooming	Dan Fosco

E. Walker Ranch- Meyer's Homestead, Loop Trail

Walker Ranch, Meyer's Homestead Trail and Loop	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
# Species Identified during 2018 in Walker	30	35	45	35	50	47	62	43	45	43	31	58
# Species Sighted in 'Meyer's Trail' 2007-2018	33	38	60	70	72	75	75	75	76	76	76	77
# Research Hours on Site	5	4	18	16	16.5	7	14.5	11	29	17	13.5	53
# Individual Butterflies Counted	160	203	1144	437	472	399	394	322	351	549	299	759
# Individual Butterflies / Research Hour	32	54	64	27	29	57	27	29	12	32	22	14
# Species / Research Hour	6.0	8.8	2.5	2.2	3.0	6.7	4.3	3.9	1.5	2.5	2.3	1

F. Reynold's Ranch- Giggey Lake, North Bog

Reynold's Ranch Giggey Lake, North Bog	2018	5/23	6/15	8/24	8/24
<i>Parnassius smintheus</i>	Parnassian, Rocky Mtn.		6		
<i>Papilio polyxenes</i>	Black Swallowtail			1	
<i>P. zelicaon</i>	Anise Swallowtail		1		
<i>P. rutulus</i>	W. Tiger Swallowtail				
<i>P. eurymedon</i>	Pale Swallowtail				
<i>P. multicaudata</i>	Two-tailed Swallowtail		2		
<i>Neophasia menapia</i>	Pine White			2	1
<i>Pieris rapae</i>	Cabbage White				
<i>Pontia protodice</i>	Checkered White				1
white sp.			5		
<i>Euchloe ausonides</i>	Large Marble		1		
<i>Anthocharis julia</i>	Julia Orangetip				
<i>Colias philodice</i>	Clouded Sulphur				2
<i>C. eurytheme</i>	Orange Sulphur		2	3	
<i>C. alexandra</i>	Queen Alexandra's Sulphur		8		
sulphur sp.			1	2	5
<i>Lycaena rubidus</i>	Ruddy Copper				
<i>L. heteronea</i>	Blue Copper				
<i>L. helloides</i>	Purplish Copper				
<i>Callophrys affinis</i>	Canyon Green Hairstreak				
<i>C. spinetorum</i>	Thicket Hairstreak				
<i>C. eryphon</i>	W. Pine Elfin				
<i>*Satyrium saepium</i>	Hedgerow Hairstreak			1	
<i>Strymon melinus</i>	Gray Hairstreak			2	
<i>Celastrina echo</i>	Echo (Spring) Azure				
<i>Glaucopsyche lygdamus</i>	Silvery Blue		1		
<i>Echinargus isola</i>	Reakirt's Blue				
<i>Plebejus melissa</i>	Melissa Blue				
<i>Euphilotes ancilla</i>	R Mtn Dotted Blue				
<i>Plebejus saepiolus</i>	Greenish Blue				1ph
<i>Glaucopsyche piasus</i>	Arrowhead Blue				
<i>P. icarioides</i>	Boisduval's Blue				
<i>P. glandon rustica</i>	Arctic Blue				
blue sp.			4		
<i>Danaus plexippus</i>	Monarch				
<i>Limnitis weidemeyerii</i>	Weidemeyer's Admiral				
<i>Euptoieta claudia</i>	Variegated Fritillary		1		
<i>Speyeria aphrodite</i>	Aphrodite Fritillary			1	4
<i>S. edwardsii</i>	Edwards' Fritillary				
<i>S. coronis</i>	Coronis Fritillary				2ph
<i>S. callippe</i>	Callippe Fritillary				
<i>S. hesperis</i>	Northwestern Fritillary				
<i>S. mormonia</i>	Mormon Fritillary				
<i>Boloria selene</i>	Silver-bordered Fritillary				
fritillary sp.				1	
<i>Chlosyne palla</i>	Northern Checkerspot				
<i>Phyciodes pallida</i>	Pale Crescent				
<i>P. tharos</i>	Pearl Crescent				
<i>P. cocyta</i>	Northern Crescent				
<i>P. pulchella</i>	Field Crescent		7	10	
<i>Polygonia gracilis</i>	Hoary Comma				
<i>Vanessa virginiensis</i>	American Lady				
<i>Vanessa cardui</i>	Painted Lady				
<i>Aglaia milberti</i>	Milbert's Tortoiseshell				
<i>Nymphalis antiopa</i>	Mourning Cloak				
<i>Coenonympha tullia ochracea</i>	Common (Ochre) Ringlet		35		
<i>Vanessa atalanta</i>	Red Admiral				

Reynold's Ranch Giggey Lake, North Bog	2018	5/23	6/15	8/24	8/24
<i>Cercyonis oetus</i>	Small Wood Nymph			8	2
* <i>C. pegala</i>	Common Wood Nymph				3
Wood Nymph sp.					5
<i>Erebia epipsodea</i>	Common Alpine		40		
<i>Oeneis chryxus</i>	Chryxus Arctic				
<i>Erynnis icelus</i>	Dreamy Duskywing				
* <i>E. pacuvius</i>	Pacuvius Duskywing		1		
<i>E. persius</i>	Persius Duskywing		8		
<i>Oarisma garita</i>	Garita Skipperling				
<i>Hesperia colorado</i>	W. Branded Skipper			8	
<i>Polites draco</i>	Draco Skipper		1		
<i>Ochlodes sylvanoides</i>	Woodland Skipper			6	
<i>Pyrgus communis</i>	Common Checkered- Skipper				
<i>Euphyes vestris</i>	Dun Skipper				
Skipper sp.			2	2	

*First year sighted in this area

ph.= photo available

F. Reynold's Ranch- Giggey Lake, North Bog

Date, Conditions	Location within Reynold's	Butterfly Activity	Researchers
5/23/2018 10:10-10:45a.m. 18 °C, 5% blue sky, wind 5-10mph	Giggey Lake	none	Chuck Lowry Dan Fosco Jan Chu Larry Crowley Venice Kelly
6/15/2018 9:30-11:30 a.m. 22-25°C, 90% blue sky to 60% clouds Wind 5-20 mph	North Bog	Not boggy except in a few places. Many Ringlets and Alpines flying	Jan Chu Janet Hanley Larry Crowley Sue Hirschfeld
8/24/2018 9:47-12:45 p.m. 18-21°C,	North Bog	Cattle had grazed.	Chuck Lowry
8/24/2018 9:30-12:00p.m. Breezy	Giggey Lake		John Barr
8/24/2018 9:30-11:45 18-21°C, sky blue - heavy smoke haze sky, wind 5-10 mph.	West Hill Reynold's Ranch	Nectaring on blue aster and yellow composite; few flying in breeze.	Amy Chu Chris Friedman Jan Chu Jean Morgan Larry Crowley Linda Hardesty Scott Crowley Sue Hirschfeld Venice Kelly

F. Reynold's Ranch- Giggey Lake, North Bog

Reynold's Ranch, Giggey Lake and North Bog	2011	2012	2013	2014	2015	2016	2017	2018
# Species Identified during 2018 in Reynold's	32	46	36	9	26	32	26	29
# Species Sighted in Reynold's 2011-2018	35	55	55	55	57	57	58	61
# Research Hours on Site	13	11.5	10.5	4	6	11	10	10
# Individual Butterflies Counted	541	635	395	47	183	612	171	199
# Individuals / Research Hour	41.6	55	37.6	12	3	5.6	17	20
# Species / Research Hour	2.5	4	3.4	2.1	4	3	2.6	2.9

G. Caribou Ranch, Mud Lake-Sherwood Road, Bridge Meadow

Caribou Ranch	2018	4/19	5/6	5/22	5/22	6/2	6/4	6/8	6/13	6/21	6/26	6/27	7/5	7/18	7/21	7/24	8/4	8/8	8/10	8/13	8/20	8/24	8/31	9/14
<i>Parnassius smintheus</i>	Rocky Mountain Parnassian					2	9	2	2	6	1		2	1	9		1							
<i>Battus philenor</i>	Pipevine Swallowtail																							
<i>Papilio polyxenes</i>	Black Swallowtail														2				1					
<i>P. zelicaon</i>	Anise Swallowtail							1		1														
<i>P. rutulus</i>	W. Tiger Swallowtail										2	1												
<i>P. eurymedon</i>	Pale Swallowtail										1													
<i>P. multicaudata</i>	Two-tailed Swallowtail						1																	
swallowtail sp.											2													
<i>Neophasia menapia</i>	Pine White																		2	5	1	1		
<i>Pontia protodice</i>	Checkered White												1											
<i>P. occidentalis</i>	Western White																							
<i>Pieris rapae</i>	Cabbage White														1	3		1						
<i>P. marginalis</i>	Mustard White																							
<i>Euchloe ausonides</i>	Large Marble			8	2	10	5	7	6	3		2												
<i>Anthocharis julia</i>	Julia Orangetip		1	6	6	10		4	2															
white sp.				2	2	4					5	1							1					
<i>Colias philodice</i>	Clouded Sulphur							1	5	1						2	1			2				5
<i>C. eurytheme</i>	Orange Sulphur											2		2	2	1	6			2				1
<i>C. alexandra</i>	Queen Alexandra's Sulphur									15	20	5	18	18	25	15	22	7	1	6	2			
<i>*Phoebis sennae eubule</i>	Cloudless Sulphur								1											7				
sulphur sp.											1				1				11			1+		
<i>Eurema mexicana</i>	Mexican Sulphur																							
<i>Abaeis nicippe</i>	Sleepy Orange																							
<i>Nathalis iole</i>	Dainty Sulphur															1								1
<i>Lycaena rubidus</i>	Ruddy Copper														1		1			2				
<i>L. heteronea</i>	Blue Copper													1	9		1	2						
<i>L. helioides</i>	Purplish Copper													5	1		3	2						
<i>Callophrys affinis homoperplexa</i>	Western Green Hairstreak			2		4		2																
<i>C. sheridanii</i>	White-lined Green Hairstreak	3																						
<i>C. spinetorum</i>	Thicket Hairstreak																							

Caribou Ranch	2018	4/19	5/6	5/22	5/22	6/2	6/4	6/8	6/13	6/21	6/26	6/27	7/5	7/18	7/21	7/24	8/4	8/8	8/10	8/13	8/20	8/24	8/31	9/14
<i>C. augustinus</i>	Brown Elfin																							
<i>C. polios</i>	Hoary Elfin		5	1		6		3																
<i>C. eryphon</i>	Western Pine Elfin			7	1	8	1		2	2														
<i>elfin</i> sp.			2	3																				
<i>Satyrrium saepium</i>	Hedgerow Hairstreak																	1	1		3			
<i>Strymon melinus</i>	Gray Hairstreak																				1			
<i>Cupido amyntula</i>	Western Tailed-Blue												2	1				1						
<i>Celastrina echo</i>	Echo Azure		1					1																
<i>Glaucopsyche piasus</i>	Arrowhead Blue						1		1															
<i>G. lygdamus</i>	Silvery Blue			1		4	3	2	2	4														
<i>Euphilotes ancilla</i>	Rocky Mountain Dotted-Blue								2	8	5	5			1									
<i>Echinargus isola</i>	Reakirt's Blue							1		2			1		2		3							1
<i>Plebejus melissa</i>	Melissa Blue																							
<i>P. saepiolus</i>	Greenish Blue																	1	1	1				
<i>P. icarioides</i>	Boisduval's Blue									1	1	4	5	1	2	1								
<i>P. lupini</i>	Lupine Blue								1	1			4	1	1									
<i>P. glandon rustica</i>	Arctic Blue																							
<i>blue</i> sp.						2		7	7	7		5	4		1	1			1					
<i>Euptoieta claudia</i>	Variegated Fritillary		1						2	1				1	2		2	1		1	3			
<i>Speyeria aphrodite</i>	Aphrodite Fritillary																		1	1				
<i>S. edwardsii</i>	Edwards' Fritillary																1							
<i>S. coronis</i>	Coronis Fritillary														1		2							
<i>S. hesperis</i>	Northwestern Fritillary												1				1	5		1				
<i>S. mormonia</i>	Mormon Fritillary																							
<i>fritillary</i> sp.				1				2	2	2						2	5	5	2	6				
<i>Poladryas arachne</i>	Arachne Checkerspot																							1
<i>Chlosyne gorgone</i>	Gorgone Checkerspot																							
<i>C. nycteis</i>	Silvery Checkerspot									4	4													
<i>C. palla</i>	Northern Checkerspot								2	12	8	2			1									
<i>Phyciodes pallida</i>	Pale Crescent																							
<i>P. tharos</i>	Pearl Crescent						1																	
<i>P. cocyta</i>	Northern Crescent								2				1	1	1									
<i>P. pulchella</i>	Field Crescent					7	2	6	3	3					1		1		1	3	8	1+	7	25

Caribou Ranch	2018	4 / 1 9	5 / 6	5 / 2 2	5 / 2 2	6 / 2 2	6 / 4	6 / 8	6 / 1 3	6 / 2 1	6 / 2 6	6 / 2 7	7 / 5	7 / 1 8	7 / 2 1	7 / 2 4	8 / 4	8 / 8	8 / 1 0	8 / 1 3	8 / 2 0	8 / 2 4	8 / 3 1	9 / 1 4
<i>Euphydryas anicia</i>	Variable Checkerspot																							
<i>Polygonia faunus</i>	Green Comma														1	1	1				1			1
<i>P. gracilis</i>	Hoary Comma				1								1											1
<i>P. comma</i> sp.			1																					
<i>Junonia coenia</i>	Common Buckeye																							
<i>Nymphalis antiopa</i>	Mourning Cloak		2	1		1	1										1				1		1	1
<i>Vanessa atalanta</i>	Red Admiral																							
<i>V. cardui</i>	Painted Lady																							
<i>V. virginiensis</i>	American Lady																							
<i>Danaus plexippus</i>	Monarch																							
<i>Limenitis weidemeyerii</i>	Weidemeyer's Admiral																1		1	1	1			
<i>Coenonympha tullia ochracea</i>	Common (Ochre) Ringlet					9	2	6	7	1 1		5	1	1										
<i>Cercyonis pegala</i>	Common Wood-Nymph																							
<i>C. oetus</i>	Small Wood-Nymph													1 3	4 1	7	2 3	1 6	1 4	1 7	1 6	1	2	
<i>Erebia epipsodea</i>	Common Alpine						1	1					1											
<i>Oeneis chryxus</i>	Chryxus Arctic						1	1	3	6	1	2	2	1	3									
<i>* O. uhleri</i>	Uhler's Arctic							1																
<i>Thorybes pylades</i>	Northern Cloudywing																							
<i>Erynnis icelus</i>	Dreamy Duskywing			2				1																
<i>E. pacuvius</i>	Pacuvius Duskywing					1																		
<i>E. persius</i>	Persius Duskywing			5	1	2 0	3 0	2	3	6	6	1												
duskywing sp.								4		2														
<i>Pyrgus ruralis</i>	Two-banded Checkered-Skipper			4																				
<i>P. communis</i>	Common Checkered-Skipper			1						1										1	1			
<i>Piruna pirus</i>	Russet Skipperling														2									
<i>Oarisma garita</i>	Garita Skipperling												1											
<i>Hesperia juba</i>	Juba Skipper																							
<i>H. colorado</i>	Western Branded Skipper																							

Caribou Ranch	2018	4/19	5/6	5/22	5/22	6/2	6/4	6/8	6/13	6/21	6/26	6/27	7/5	7/18	7/21	7/24	8/4	8/8	8/10	8/13	8/20	8/24	8/31	9/14
*H. colorado ochracea	Ochre Branded Skipper																2					1		
H. pahaska	Pahaska Skipper																							
H. viridis	Green Skipper																							
H. nevada	Nevada Skipper					1		1	2	4														
Polites draco	Draco Skipper					1																		
P. mystic	Long Dash																							
Poanes taxiles	Taxiles Skipper														1									
Ochlodes sylvanoides	Woodland Skipper																1		1	2	5	2		
Euphyes vestris	Dun Skipper																							
skipper sp.								2	2				1					1				1	+	

*new subspecies name

+ = more than

G. Caribou Ranch, Mud Lake-Sherwood Road, Bridge Meadow

Caribou Ranch	Location	Butterfly Behavior	Researchers
4/19/2018 10:00 – 12:00 pm 6°C, 60% high overcast, sun, calm.	Sherwood Road to mine, return on Bridge Meadow	Three white-lined hairstreaks; one sunning itself on gravel.	Venice Kelly Dan Fosco Jan Chu Jean Morgan
5/6/2018 1:00 – 2:30 pm 17 °C, Mostly cloudy	Bridge Meadow, Sherwood Road to Pine White Meadow	Nothing in Bridge Meadow yet	Venice Kelly
5/22/2018 10-11:40 am 19-21°C, 90% clear to some clouds.	Bridge Meadow and Sherwood Road	Two-banded Skippers at seep and first hot-spot.	Venice Kelly
5/22/2018 11:43 – 12:20 pm 21°C, Partly sunny	Mud Lake – around the lake and thru south meadow		Venice Kelly
6/2/2018 10:20-1:20 pm Clear blue sky. 16-21 °C, Windy	Transect, Bridge Meadow and Sherwood Road.	Male persius' at seep; 4 female persius around golden banner. Ringlets, field crescents orange tips active in meadow.	Venice Kelly Connie Redak Richard Holmes

6/4/2108 10-12:00 pm 24 °C, 10% clouds, 0-7 mph wind	Caribou Ranch Bridge Meadow and Sherwood Road		Amy Chu Jane Whittlesey
6/8/2018 10:30-11:40 am 21-23°C, 60% cloudy	Sherwood Road		Jeff Maclachlan Venice Kelly
6/13/2018 1:30-2:40 pm 27 °C, windy, sunny with 20% puffy clouds	Bridge Meadow	Lupine blue, Cloudless sulphur	Venice Kelly
6/21/2018 2 – 4:21 pm 22-24°C, Partly cloudy to cloudy	Transect, bridge meadow, Sherwood Road to seep	Many puddlers at seep- checkerspots, blues, QA's. Small nycteis, and two normal sized.	Kathy Barylski Venice Kelly
6/26/2018 10:20-1:25pm 24-29 °C, Sky clear. Wind breezy	Sherwood Road to Seep		Richard Holmes
6/27/2018 10:30-11:40 am. 23-26 °C, Blue sky, few clouds	Mud Lake, mostly east and south sides	Fritillaries were big – perhaps Edward's.	Venice Kelly
7/5/2018 11:30-12:20 pm 20 °C, Sun, then full clouds	Caribou parking lot to first meadow.	Dry; flowers seemed to have bloomed earlier. Not so many butterflies	Venice Kelly
7/18/2018 9:45-10:50 am 18-24 °C, mostly sunny, quite breezy	Bridge Meadow, Parnassian hill to the right after gate	Blues tattered; ringlet very worn. Hesperis and coppers fresh.	Jeff Maclachlan Venice Kelly
8/20/2018 18-21 °C, Blue sky, smoky air. 2 hrs.	Sherwood Road to Pine White Meadow	Woodland skippers nectaring on pearly everlasting and asters; Mourning cloak was on aspen sap.	Venice Kelly Jeff Maclachlan John Barr
7/21/2018 9:30-1:30 pm 25-31 °C, Clear sky, smoky, wind 0-10 mph	Caribou parking lot to Sherwood Road to mine	Lots of flying. ASA and Amy in meadow often. Leslie netting.	Jan Chu, Leslie Larson, Ru Wing, Amy Chu, ASA Hurst 35 adults on BoCo walk & Venice Kelly
7/24/2018 10:30-11:45 am 24 °C, Sun to clouds.	Sherwood Road to seep, Bridge Meadow	Day after hard rain; not much flying. Hardly any Butterflies at seep.	Venice Kelly
8/4/2018 11:20-1:25 pm 24 °C, Mostly clear Breezy			Venice Kelly

8/8/2018 9:25-12:25 pm 16-19 °C, clear to partly cloudy. wind 0-10 mph.	Caribou Ranch Bluebird Mine to stream	Few flying	Venice Kelly Chuck Lowry Jan Chu Larry Crowley
8/10/2018 10:15-2:15pm 21-24 °C, Clear Sky, Breezy.	Sherwood Rd, past Conger mine to meadow		Richard Holmes
8/13/2018 10:15-1:00pm 24 °C, clear sky	Sherwood Rd to Pine White meadow, Bridge Meadow		Venice Kelly
8/20/2018 18-21 °C, Blue sky, smoky air.	Sherwood Road to Pine White Meadow	Woodland skippers nectaring on pearly everlasting and asters; Mourning cloak was again on aspen sap.	Venice Kelly Jeff MacLachlan John Barr
8/24/2018 windy		Woodland skippers nectaring on blue asters, Pine white on white composite, Hedgerow hairstreak on Canada thistle, Branded skipper on yellow composite. Gray Hairstreak male	John Barr
8/31/2018 11:00 – 12:30 pm 20 °C, Sunny, windy with few clouds.	Sherwood road to Pine White meadow		Venice Kelly
9/14/2018 11:11-12:45 pm 26°C, Blue sky, breezy	Transect Sherwood Road to Pine White Meadow, Bridge Meadow	Field crescents flying strong.	Venice Kelly Jeff MacLachlan

Caribou Ranch	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
# of Species Identified in Caribou Ranch	48	48	40	20	46	28	38	47	55	50	59	66
Cumulative # of Species Sighted in Caribou 2007-2018	75	75	80	80	81	82	83	83	84	85	86	88
# of Research Hours on Site	10	12	8.5	6	12.5	8	8	14	15	10	27.5	43.5
# of Individual Butterflies Counted	358	647	278	145	488	304	361	752	587	657	770	1091
# Individuals /Research Hour	36	54	33	24	39	38	45	54	39	65	28	25
# Species /Research Hour	4.8	4.0	4.7	3.3	3.7	3.5	4.8	3.4	3.6	5.0	2.1	1.5

H. Anne U. White Trail

Anne U. White Trail	2018	6/15	6/24	6/30	7/1	7/14	7/21	8/19	9/2
<i>Parnassius smintheus</i>	Rocky Mountain Parnassian								
<i>Papilio polyxenes</i>	Black Swallowtail								
<i>P. zelicaon</i>	Anise Swallowtail	2							
<i>P. indra</i>	Indra Swallowtail								
<i>P. rutulus</i>	W. Tiger Swallowtail	2		1	5	3	1		1
<i>P. eurymedon</i>	Pale Swallowtail	5		2					
<i>P. multicaudata</i>	Two-tailed Swallowtail	2	2	3	9	5	6	1	1
<i>Pontia protodice</i>	Checkered White								
<i>P. sisymbrii</i>	Spring White								
<i>Pieris rapae</i>	Cabbage White	7	5	3	8	18	16	7	7
<i>Euchloe ausonides</i>	Large Marble								
<i>E. olympia</i>	Olympia Marble								
<i>Anthocharis julia</i>	Julia Orangetip								
<i>Colias philodice</i>	Clouded Sulphur						1		
<i>C. eurytheme</i>	Orange Sulphur						1		
<i>Nathalis iole</i>	Dainty Sulphur								
sulphur sp.						1			
<i>Callophrys affinis</i> <i>homoperplexa</i>	W. Green (Bramble) Hairstreak	1							
<i>C. sheridanii</i>	White-lined Green Hairstreak								
<i>C. gryneus</i>	Siva Juniper Hairstreak								
<i>C. mossii</i>	Moss' Elfin								
<i>C. polios</i>	Hoary Elfin								
<i>C. eryphon</i>	Western Pine Elfin								
<i>Satyrium titus</i>	Coral Hairstreak								
<i>Strymon melinus</i>	Gray Hairstreak					1		1	
<i>Cupido amyntula</i>	Western Tailed-Blue								1
<i>Celastrina echo</i>	Echo Azure								
<i>Glaucopsyche piasus</i>	Arrowhead Blue								
<i>G. lygdamus</i>	Silvery Blue								
<i>Euphilotes ancilla</i>	Rocky Mountain Dotted-Blue								
<i>Echinargus isola</i>	Reakirt's Blue	1							
<i>Plebejus saepiolus</i>	Greenish Blue								
<i>P. melissa</i>	Melissa Blue								
<i>P. icarioides</i>	Boisduval's Blue								
<i>P. lupini lutzi</i>	Lupine Blue								
<i>P. glandon rustica</i>	Arctic Blue								
blue sp.		3	2		1				
<i>Apodemia nais</i>	Nais Metalmark								
<i>Danaus plexippus</i>	Monarch								
<i>Euptoieta claudia</i>	Variegated Fritillary			2				3	
<i>Speyeria aphrodite</i>	Aphrodite Fritillary			1	11	29	17		7
<i>S. edwardsii</i>	Edwards' Fritillary								
<i>S. coronis</i>	Coronis Fritillary								
<i>S. callippe</i>	Callippe Fritillary								
<i>S. hesperis</i>	Northwestern Fritillary					4	11	3	3
<i>S. mormonia</i>	Mormon Fritillary								
fritillary sp.		1							
<i>Chlosyne gorgone</i>	Gorgone Checkerspot								
<i>C. palla</i>	Northern Checkerspot								

Anne U. White Trail	2018	6/15	6/24	6/30	7/1	7/14	7/21	8/19	9/2
<i>Phyciodes pallida</i>	Pale Crescent	5			1				
<i>P. tharos</i>	Pearl Crescent								
<i>P. cocyta</i>	Northern Crescent								
<i>P. pulchella</i>	Field Crescent							2	2
<i>Polygonia satyrus</i>	Satyr Comma								
comma sp.			1						
<i>Junonia coenia</i>	Common Buckeye								
<i>Nymphalis antiopa</i>	Milbert's Tortoiseshell		1						
<i>N. californica</i>	California Tortoiseshell								
<i>N. antiopa</i>	Mourning Cloak		1		3	1	1		
<i>Vanessa atalanta</i>	Red Admiral								1
<i>V. cardui</i>	Painted Lady								
<i>V. virginiensis</i>	American Lady								
<i>Limenitis weidemeyerii</i>	Weidemeyer's Admiral	1	2		2	4	4		1
<i>Coenonympha tullia ochracea</i>	Common (Ochre) Ringlet	1		1	5	5			
<i>Cercyonis pegala</i>	Common Wood-Nymph						4		
<i>C. oetus</i>	Small Wood-Nymph								
<i>Oeneis uhleri</i>	Uhler's Arctic								
<i>Epargyreus clarus</i>	Silver-spotted Skipper	1				1			
<i>Pholisora catullus</i>	Common Sootywing			1	1	1			
<i>Erynnis persius</i>	Pacuvius Duskywing								
<i>E. persius</i>	Persius Duskywing		1						
<i>E. icelus</i>	Dreamy Duskywing								
<i>Pyrgus communis</i>	Common Checkered-Skipper				1	1			
<i>Piruna pirus</i>	Russet Skipperling		1						
<i>Hesperia juba</i>	Juba Skipper								
<i>H. colorado</i>	W. Branded Skipper								
<i>H. viridis</i>	Green Skipper								
<i>Polites themistocles</i>	Tawny-edged Skipper		1						
<i>P. mystic</i>	Long Dash		1						
<i>Ochlodes sylvanoides</i>	Woodland Skipper			1		1	1	1	1
<i>Poanes taxiles</i>	Taxiles Skipper		2	1	1	4	2	2	2
<i>Euphyes vestris</i>	Dun Skipper	4	2		2	1	1		1
<i>Atrytonopsis hianna</i>	Dusted Skipper								
skipper sp.			1						

H. Anne U. White Trail

Date, Conditions	Location within Anne U White	Butterfly Activity	Researcher
6/15/2018 9:30-12:15 pm 22-26 °C, 40% clouds to overcast	Parking lot to 'rock narrow' cliff		Cathy Comstock Jan Chu
6/24/2018 8:45-11:30 am 15-18 °C, Overcast to sprinkles. Calm wind 10:30-11:00 some sunlight	Locked gate to bench on hillside	Little flight because of lack of sunshine.	Cathy Comstock Amy Chu Connie Redak Jan Chu Janet Hanley Jean Morgan Richard

			Holmes Sue Hirschfeld
6/30/2018 10-12 pm 20-21 °C, mostly cloudy, Overcast. Windy.	Transect		
7-1-2018 10-12 pm 20-26 °C, Clear sky, wind.	Transect		Cathy Comstock
7/14/2018 10-12:00 pm 25-22 °C, Clear to mostly clear sky; calm to relatively still.	Transect	Only 1 new; gray hairstreak. Many Aphrodites	Cathy Comstock
7/21/2018 9:10-11:15 am 21-31 °C, Sky clear to mostly clear; wind calm to relatively still.	Transect		Cathy Comstock
8/19/2108 11:15-1:15 pm 20- 25 °C, Sky clear, Wind calm.	Transect		Cathy Comstock
9/2/2018 11:10-1:15 pm 21-31 °C, Clear sky. Calm wind.	Transect		Cathy Comstock

H. Anne U. White Trail

Anne U. White Trail	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
# Species Identified during the year	44	45	35	31	47	50	29	17	10		24	32
# Research Hours on Site	9.5	16	10	10.5	19.5	13.5	11	6	3		3.5	18.5
# Individual Butterflies Counted	366	536	217	112	773	509	334	105	33		96	319
# Individuals / Research Hour	38.5	33.5	21.7	10.7	39.6	37.7	30	17.5	11		27.4	24
# Species / Research Hour	4.6	2.8	3.5	3	2.4	3.7	2.6	2.8	3.3		6.8	1.7

I. Steamboat Mountain

Steamboat Mountain near Lyons was visited only once with Wildlife Technician Jordan Smith on a cloudy day. No butterflies were seen that day therefore no record was kept. There is data for 2011 and 2017, but not included here. This was not included in the Summary Chart.

J. Hall II

Hall II	2018	7/30
<i>Papilio rutulus</i>	W. Tiger Swallowtail	
<i>P. multicaudata</i>	Two-tailed Swallowtail	2
swallowtail yellow sp.		3
<i>Pontia protodice</i>	Checkered White	
<i>P. sisymbrii</i>	Spring White	
<i>Pieris rapae</i>	Cabbage White	3
white sp.		1
<i>Euchloe ausonides</i>	Large Marble	
<i>Colias philodice</i>	Clouded Sulphur	2
<i>C. eurytheme/philodice alba form</i>	Sulphur female	
<i>C. eurytheme</i>	Orange Sulphur	3
sulphur sp.		2
<i>Callophrys mossii</i>	Moss Elfin	
* <i>Strymon melinus</i>	Gray Hairstreak	1
<i>Cupido amyntula</i>	W. Tailed-blue	
<i>Glaucopsyche lygdamus</i>	Silvery Blue	
<i>Echinargus isola</i>	Reakirt's Blue	
<i>Plebejus melissa</i>	Melissa Blue	2
<i>P. lupini lutzi</i>	Lupine Blue	
<i>P. glandon rustica</i>	Arctic Blue	
blue sp.		
<i>Danaus plexippus</i>	Monarch	
<i>Euptoieta claudia</i>	Variegated Fritillary	5
<i>Speyeria aphrodite</i>	Aphrodite Fritillary	2
<i>S. edwardsii</i>	Edwards' Fritillary	
<i>S. hesperis</i>	Northwestern Fritillary	
fritillary species		1
<i>Phyciodes cocyta</i>	Northern Crescent	
<i>P. pulchella</i>	Field Crescent	
<i>P. tharos</i>	Pearl Crescent	2
<i>Polygonia gracilis</i>	Hoary Comma	
<i>Nymphalis antiopa</i>	Mourning Cloak	
<i>Vanessa atalanta</i>	Red Admiral	1
<i>V. cardui</i>	Painted Lady	
<i>V. virginensis</i>	American Lady	
<i>Limenitis weidemeyerii</i>	Weidemeyer's Admiral	
<i>Asterocampa celtis</i>	Hackberry Emperor	
<i>Coenonympha tullia ochracea</i>	Common Ringlet	
<i>Cercyonis pegala</i>	Common Wood-Nymph	5
<i>Pyrgus communis</i>	Common Checkered-skipper	3

Hall II	2018	7/30
<i>Pholisora catullus</i>	Common Sootywing	
<i>Hesperia colorado</i>	W. Branded Skipper	
* <i>Polites mystic</i>	Long Dash	1
<i>H. leonardus pawnee</i>	Leonard's Skipper	
<i>Ochlodes sylvanoides</i>	Woodland Skipper	2
<i>Poanes taxiles</i>	Taxiles Skipper	
<i>Atrytonopsis hianna</i>	Dusted Skipper	

* new species in 2018 for this area

Date	Location within Hall II	Behavior of butterflies	Researchers
July 30, 2018 9:30 – 12:30 p.m. 18-25 °C, Sky 95% blue, wind 5-10 mph 3 hrs	From quarry into Bobcat Canyon	Sparse in the early morning, but more flying later. The numbers are way down. Weedy overgrown area.	Jordan Smith, Amy Chu Ann Cooper Cara Saley Chris Friedman Chuck Lowry Jan Chu Janet Hanley Larry Crowley Linda Hardesty Pam Piombino Richard Holmes

J. Hall II

Hall II	2013	2014	2015	2016	2017	2018
# of Species Identified During Each Year in Hall II	31	17	17	10		14
Cumulative # Species Sighted in Hall II	31	32	37	37		41
Research Hours on Site	15	3.5	4	5		3
# Individual Butterflies Counted	319	95	104	66		41
# Individuals / Research Hour	21	27	26	13		13
# Species / Research Hour	2.1	4.8	4	2		4.6

Appendix I. Butterflies Observed During Boulder County Open Space Surveys - 2004-2018

Common Name	Scientific Name	Author(s)
Parnassian and Swallowtails <i>Papilionidae</i> Family		
Parnassian, Rocky Mountain	<i>Parnassius smintheus</i>	Doubleday
Swallowtail, Black	<i>Papilio polyxenes</i>	Fabricius
Swallowtail, Anise	<i>P. zelicaon</i>	Lucas
Swallowtail, Indra	<i>P. indra</i>	Reakirt
Swallowtail, Western Tiger	<i>P. rutulus</i>	Lucas
Swallowtail, Pale	<i>P. eurymedon</i>	Lucas
Swallowtail, Two-tailed	<i>P. multicaudata</i>	W.F. Kirby
Whites and Sulphurs <i>Pieridae</i>		
White, Pine	<i>Neophasia menapia</i>	C.&R. Felder
White, Spring	<i>Pontia sisymbrii</i>	(Boisduval)
White, Checkered	<i>P. protodice</i>	(Boisduval & LeConte)
White, Western	<i>P. occidentalis</i>	(Reakirt)
White, Cabbage	<i>Pieris rapae</i>	(Linnaeus)
White, Mustard	<i>P. marginalis</i>	Scudder
Marble, Large	<i>Euchloe ausonides</i>	(Lucas)
Marble, Olympia	<i>E. olympia</i>	(W.H. Edwards)
Orangetip, Julia	<i>Anthocharis julia</i>	(W.H. Edwards)
Sulphur, Clouded	<i>Colias philodice</i>	Godart
Sulphur, Orange	<i>C. eurytheme</i>	Boisduval
Sulphur, Queen Alexandra's	<i>C. alexandra</i>	W.H. Edwards
Dogface, Southern	<i>Zerene cesonia</i>	(Stoll)
Orange, Sleepy	<i>Abaeis nicippe</i>	(Cramer)
Sulphur, Lyside	<i>Kricogonia lyside</i>	(Godart)
Sulphur, Cloudless (Eastern)	<i>Phoebis sennae eubule</i>	(Linnaeus)
Sulphur, Mexican	<i>Eurema mexicana</i>	(Boisduval)
Sulphur, Dainty	<i>Nathalis iole</i>	Boisduval
Coppers, Hairstreaks, Blues <i>Lycaenidae</i>		
Copper, Gray	<i>Lycaena dione</i>	(Scudder)
Copper, Blue	<i>L. heteronea</i>	Boisduval
Copper, Ruddy	<i>L. rubidus</i>	(Behr)
Copper, Purplish	<i>L. helleoides</i>	(Boisduval)
Hairstreak, Western Green	<i>Callophrys affinis homoperplexa</i>	W. Barnes & Benjamin
Hairstreak, Siva Juniper	<i>C. gryneus siva</i>	(W.H. Edwards)
Hairstreak, White-lined Green	<i>C. sheridanii</i>	(W.H. Edwards)
Hairstreak, Thicket	<i>C. spinetorum</i>	(Hewitson)
Elfin, Brown	<i>C. augustinus</i>	(Westwood)
Elfin, Western Pine	<i>C. eryphon</i>	(Boisduval)
Elfin, Moss'	<i>C. mossii schryveri</i>	(Cross)
Elfin, Hoary	<i>C. polios</i>	(Cook & F. Watson)
Elfin, Western Pine	<i>C. eryphon</i>	(Boisduval)
Hairstreak, Hedgerow	<i>Satyrium saepium</i>	(Boisduval)
Hairstreak, Behr's	<i>S. behrii</i>	(W.H. Edwards)
Hairstreak, Coral	<i>S. titus</i>	(Fabricius)
Hairstreak, Striped	<i>S. liparops</i>	(LeConte)
Hairstreak, Hedgerow	<i>S. saepium</i>	(Boisduval)

Hairstreak, Gray	<i>Strymon melinus</i>	Hübner
Blue, Marine	<i>Leptotes marina</i>	(Reakirt)
Tailed-Blue, Western	<i>Cupido amyntula</i>	(Boisduval)
Azure, Echo	<i>Celastrina echo</i>	(Clench)
Azure, Hops	<i>C. humulus</i>	Scott & D. Wright
Blue, Arrowhead	<i>Glaucopsyche piasus</i>	(Boisduval)
Blue, Silvery	<i>G. lygdamus</i>	(E. Doubleday)
Dotted-Blue, Rocky Mountain	<i>Euphilotes ancilla</i>	(W. Barnes & McDunnough)
Blue, Reakirt's	<i>Echinargus isola</i>	(Reakirt)
Blue, Melissa	<i>Plebejus melissa</i>	(W.H. Edwards)
Blue, Greenish	<i>P. saepiolus</i>	(Boisduval)
Blue, Boisduval's	<i>P. icarioides</i>	(Boisduval)
Blue, Lupine	<i>P. lupini lutzi</i>	P. dos Passos
Blue, Arctic	<i>P. glandon rustica</i>	(W.H. Edwards)
Metalmarks	Riodinidae	
Metalmark, Nais	<i>Apodemia nais</i>	(W.H. Edwards)
Brushfoots	Nymphalidae	
Monarch	<i>Danaus plexippus</i>	(Linnaeus)
Snout, American	<i>Libytheana carinenta</i>	(Cramer)
Fritillary, Gulf	<i>Agraulis vanillae</i>	(Linnaeus)
Fritillary, Variegated	<i>Euptoieta claudia</i>	(Cramer)
Fritillary, Aphrodite	<i>Speyeria aphrodite</i>	(Fabricius)
Fritillary, Edwards'	<i>S. edwardsii</i>	(Reakirt)
Fritillary, Coronis	<i>S. coronis</i>	(Behr)
Fritillary, Callippe	<i>S. callippe</i>	(Boisduval)
Fritillary, Northwestern	<i>S. hesperis</i>	(W.H. Edwards)
Fritillary, Mormon	<i>S. mormonia</i>	(Boisduval)
Fritillary, Silver-bordered	<i>Boloria selene</i>	([Schiffermüller])
Checkerspot, Fulvia	<i>Chlosyne fulvia</i>	(W.H. Edwards)
Checkerspot, Gorgone	<i>C. gorgone</i>	(Hübner)
Checkerspot, Silvery	<i>C. nycteis</i>	(E. Doubleday)
Checkerspot, Northern	<i>C. palla</i>	(Boisduval)
Checkerspot, Arachne	<i>Poladryas arachne</i>	(W.H. Edwards)
Checkerspot, Variable	<i>Euphydryas anicia</i>	(E. Doubleday)
Crescent, Pale	<i>Phyciodes pallida</i>	(W.H. Edwards)
Crescent, Pearl	<i>P. tharos</i>	(Drury)
Crescent, Northern	<i>P. cocyta</i>	(Cramer)
Crescent, Field	<i>P. pulchella</i>	(Boisduval)
Comma, Green	<i>Polygonia faunus</i>	(W.H. Edwards)
Comma, Satyr	<i>P. satyrus</i>	(W.H. Edwards)
Comma, Hoary	<i>P. gracilis</i>	(Grote & Robinson)
Buckeye, Common	<i>Junonia coenia</i>	(Hübner)
Tortoiseshell, Milbert's	<i>Aglais milberti</i>	(Godart)
Cloak, Mourning	<i>Nymphalis antiopa</i>	(Linnaeus)
Tortoiseshell, California	<i>N. californica</i>	(Boisduval)
Admiral, Red	<i>Vanessa atalanta</i>	(Linnaeus)
Lady, Painted	<i>V. cardui</i>	(Linnaeus)
Lady, American	<i>V. virginiensis</i>	(Drury)
Admiral, Weidemeyer's	<i>Limenitis weidemeyerii</i>	W.H. Edwards
Emperor, Hackberry	<i>Asterocampa celtis</i>	Boisduval, LeConte

Ringlet, Common (Ochre)	<i>Coenonympha tullia ochracea</i>	W.H. Edwards
Wood-Nymph, Common	<i>Cercyonis pegala</i>	(Fabricius)
Wood-Nymph, Small	<i>C. oetus</i>	(Boisduval)
Alpine, Common	<i>Erebia epipsodea</i>	Butler
Arctic, Chryxus	<i>Oeneis chryxus</i>	(E. Doubleday)
Arctic, Uhler's	<i>O. uhleri</i>	(Reakirt)
Skippers	<i>Hesperiidae</i>	
Skipper, Silver-spotted	<i>Epargyreus clarus</i>	(Cramer)
Cloudywing, Northern	<i>Thorybes pylades</i>	(Scudder)
Duskywing, Dreamy	<i>Erynnis icelus</i>	(Scudder & Burgess)
Duskywing, Pacuvius	<i>E. pacuvius</i>	(Lintner)
Duskywing, Afranius	<i>E. afranius</i>	(Lintner)
Duskywing, Persius	<i>E. persius</i>	(Scudder)
Checkered-skipper, Two-banded	<i>Pyrgus ruralis</i>	(Boisduval)
Checkered-skipper, Common	<i>Pyrgus communis</i>	(Grote)
Sootywing, Common	<i>Pholisora catullus</i>	(Fabricius)
Skipperling, Russet	<i>Piruna pirus</i>	(W.H. Edwards)
Skipperling, Garita	<i>Oarisma garita</i>	(Reakirt)
Skipper, Uncas	<i>Hesperia uncas</i>	W.H. Edwards
Skipper, Ottoe	<i>H. ottoe</i>	(W.H. Edwards)
Skipper, Leonard's	<i>H. leonardus pawnee</i>	Dodge
Skipper, Juba	<i>H. juba</i>	(Scudder)
Skipper, Western Branded	<i>H. colorado</i>	(Scudder)
Skipper, Pahaska	<i>H. pahaska</i>	Leussier
Skipper, Green	<i>H. viridis</i>	(W.H. Edwards)
Skipper, Nevada	<i>H. nevada</i>	(Scudder)
Skipper, Draco	<i>Polites draco</i>	(W.H. Edwards)
Skipper, Tawny-edged	<i>P. themistocles</i>	(Latreille)
Long Dash	<i>P. mystic</i>	(W.H. Edwards)
Skipper, Arogos	<i>Atrytone arogos</i>	(Boisduval & LeConte)
Skipper, Woodland	<i>Ochlodes sylvanoides</i>	(Boisduval)
Skipper, Taxiles	<i>Poanes taxiles</i>	(W.H. Edwards)
Skipper, Dun	<i>Euphyes vestris</i>	(Boisduval)
Skipper, Dusted	<i>Atrytonopsis hianna</i>	(Scudder)

Appendix II. Transect Data

A. Heil Valley-Geer Watershed by Sue Hirschfeld



1. Starting Tree



4. Soggy drainage, south of the tree,
followed the road back towards the culvert



6. Tree by Creek – Thistle patch
'Fritillary area'



7. Washed out creek bed. Sue Hirschfeld, Jane Whittlesey and
Larry Crowley

Heil – Geer Narration

Habitats of first third (from the big Ponderosa tree at start) include mostly grassy meadow and a small area of wet meadow/springs along small east flowing stream in northeast portion of area. Small wet area full of thistles by a culvert where road crosses the small stream often has butterflies. Remainder of transect is along a dirt road bordered by many Ponderosa trees and large meadow. One area drops down to a small floodplain of the main large drainage that can be too high to cross in the spring to absolutely dry (at the end of the season). Wet sand at the crossing provides moisture for butterflies puddling. Personal e-mail by Sue Hirschfeld. Oct 27, 2018.

Parking by barn in Heil Valley Open Space

(Can't see Starting Tree from Parking Lot by Barn.)

Follow the gravel road northwest, to the tree that stands alone on the north side of road

(Bluebird box attached on east side)

1. Starting Tree GPS 40.149874, -105.319077 from Google Earth Satellite

(Junction) Fork in road

Return here after going to Starting Tree.

(Following readings are from hand held Gorman GPS unit)

2. Culvert

40.1458

-105.19144

3. Starting Tree stands by itself on north side of road 40.14978

-105.31915

4. Soggy drainage, south of the tree, follow the road back towards the culvert

40.14958

-105.19144

5. Go back to Fork in the Road

40.147771

-105.31559

and then go south taking dirt Path toward creek

6. Tree by creek (Fritillaries in thistle patch)

40.14608

-105.19119

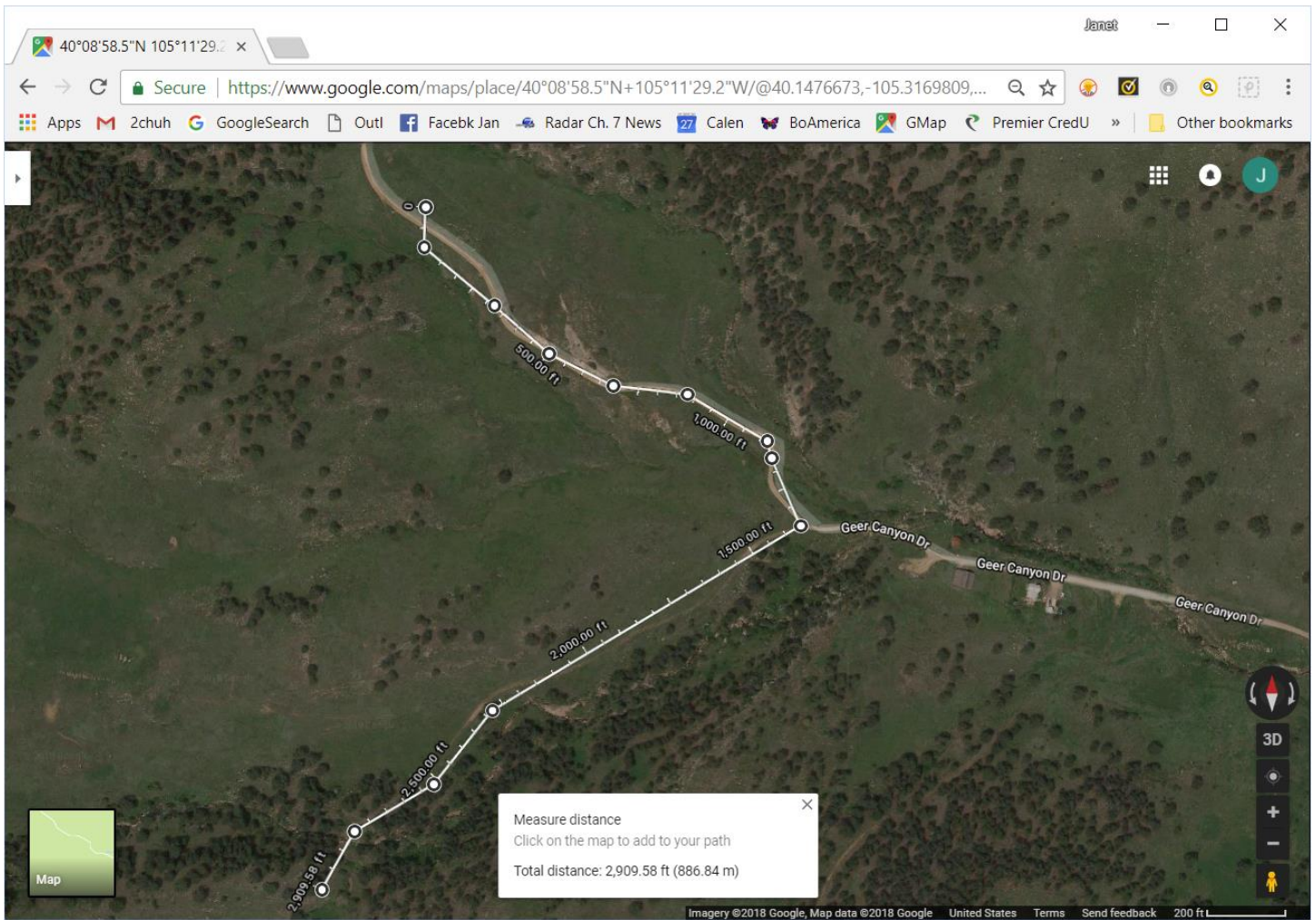
7. Creek crossing (washed out creek bed)

40.14554

-105.19188

8. Across the creek (silver-spotted skippers in wild licorice.)

Heil Valley – Geer Watershed Trail



Google Earth Satellite map

Heil Valley Geer Watershed	2018	3/9	5/26	7/7	7/15	8/17	8/28
<i>P. zelicaon</i>	Anise Swallowtail		1				
<i>P. eurymedon</i>	Pale Swallowtail		1	1			
swallowtail yellow sp.				2			
<i>Pieris rapae</i>	Cabbage White			42	16		11
<i>Euchloe ausonides</i>	Large Marble		1				
white sp.			6			37	
<i>Colias philodice</i>	Clouded Sulphur					1	
<i>C. eurytheme</i>	Orange Sulphur			7		2	1
sulphur sp.			2	6	6	2	
<i>Callophrys affinis</i> <i>homoperplexa</i>	Western Green Hairstreak		5				
<i>G. lygdamus</i>	Silvery Blue		5				
blue sp.			28	3	1		
<i>Euptoieta claudia</i>	Variegated Fritillary					8	
<i>Speyeria aphrodite</i>	Aphrodite Fritillary			3	12	1	1
<i>S. edwardsii</i>	Edwards' Fritillary					3	
<i>S. hesperis</i>	Northwestern Fritillary					1	

fritillary sp.				13	2	37	1
<i>Phyciodes pallida</i>	Pale Crescent				1		
<i>P. pulchella</i>	Field Crescent		2		2		
<i>Vanessa atalanta</i>	Red Admiral				1		
<i>Coenonympha tullia ochracea</i>	Ochre (Common) Ringlet		15	1	1		
<i>Cercyonis pegala</i>	Common Wood-Nymph					18	3
<i>C. oetus</i>	Small Wood-Nymph					5	
wood nymph sp.				26	53	38	
<i>Epargyreus clarus</i>	Silver-spotted Skipper			1			
<i>Pyrgus communis</i>	Common Checkered-skipper					5	
<i>Euphyes vestris</i>	Dun Skipper				5		

Date, Conditions Heil Valley - Geer Watershed	Location within Heil - Geer	Butterfly Activity	Researchers
3/9/2018	Transect	None	Sue Hirschfeld
5/26/2018 9:30 – 11:30am 21-32 °C, clear sky to slight breeze	Transect; west of Barn	Few flying, but more activity as temperature went up	Sue Hirschfeld
7/7/2018 9:00-11:00 am 26 -33 °C, or so Clear sky, no wind.	Transect	Butterflies were flying; few would alight long enough to ID	Sue Hirschfeld
7/15/2018 9:15-11:00 am 26-30 °C, Cloudy, sprinkling, to sunny	Transect	Frits, wood nymphs, whites. No running water	Sue Hirschfeld
8/17/2018 9:30- 12:30 p.m. 19-22 °C Hazy with sun, slight breeze	Transect Hill, then road to drainage	Few butterflies; some on Canada thistle	Sue Hirschfeld Chris Friedman Linda Hardesty
8/28/2018 10-12:00 p.m. 15-21 °C Full sun. Light breeze	Transect - close to drainage along the hill part	Few butterflies sighted for 2 hours walking	Sue Hirschfeld

Heil-Geer Watershed	2018
# of Species Identified on the Transect in Geer Watershed	21
Cumulative # of Species Sighted in Geer Water- shed 2007-2018	93
Research Hours at Site	13
# Individual Butterflies Counted	446

B. Anne U. White Trail – Fourmile Canyon by Cathy Comstock



Entrance to Anne U. White blocked for public.
Access for Research only.



Trail beginning leading into tree-covered slopes



Entrance to Anne U. White – Fourmile Canyon.
Cathy Comstock 6-16-2018



Creekbed with piled timbers showing the difficulty
of locating the transect.

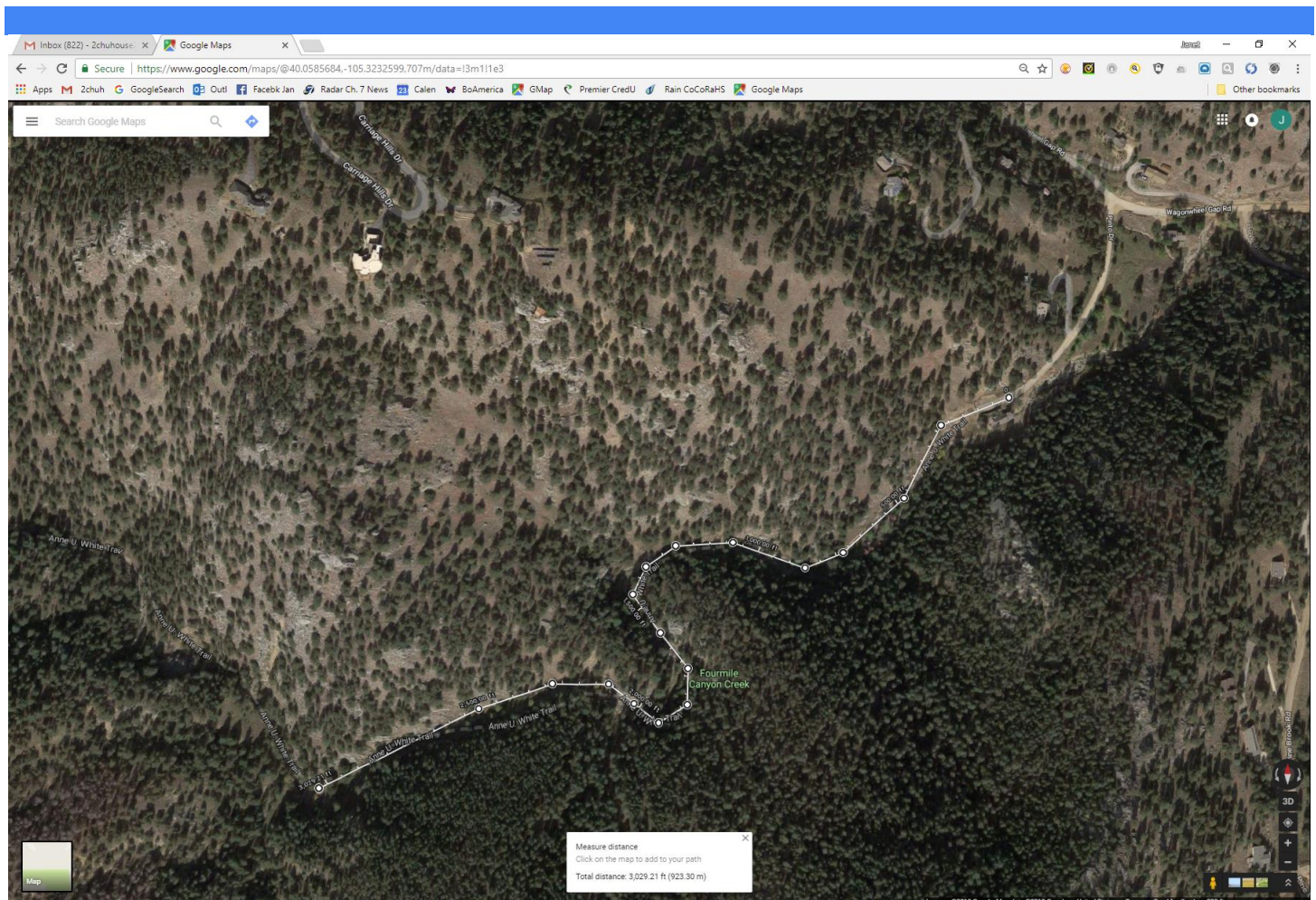
A = Mostly grasses, some bushes, lots of bare rock, all framed but not covered by tall trees, all due to Boulder flood several years ago and construction done on the place since then to try to give some form. Far from finished. Haven't a clue what to call this, since it combines Barren, Shrub Upland, reconstruction, and a stream to the side. It's transitional ecotone, of course, but the whole trail is that.

B = Shrub wetland in that there is a stream running through, but most years it doesn't overflow its banks, in which case it's Shrub upland? Also transitional ecotone with steeply rising slopes on either side (but with more shrub wetland than as described in D, with forest rising close to the stream).

C = Savanna framed by small stream running through and forest on either side. (Transitional ecotone, but of a different nature than B or C) At one point it's a small meadow on a hillside next to creek

D = Transitional ecotone: Forest close by on either side, with rocks and some vegetation alongside a small stream.

GPS Location



Google Earth Satellite map

Transect beginning 40.059256

Transect end point 40.059769, -105.342690 (GPS)

Anne U. White Trail	2018	6/15	6/24	6/30	7/1	7/14	7/21	8/19	9/2
<i>P. zelicaon</i>	Anise Swallowtail	2							
<i>P. rutulus</i>	W. Tiger Swallowtail	2		1	5	3	1		1
<i>P. eurymedon</i>	Pale Swallowtail	5		2					
<i>P. multicaudata</i>	Two-tailed Swallowtail	2	2	3	9	5	6	1	1
<i>Pieris rapae</i>	Cabbage White	7	5	3	8	18	16	7	7
<i>Colias philodice</i>	Clouded Sulphur						1		
<i>C. eurytheme</i>	Orange Sulphur						1		
sulphur sp.						1			
<i>Callophrys affinis homoperplexa</i>	W. Green (Bramble) Hairstreak	1							
<i>Strymon melinus</i>	Gray Hairstreak					1		1	
<i>Cupido amyntula</i>	Western Tailed-Blue								1
<i>Echinargus isola</i>	Reakirt's Blue	1							
blue sp.		3	2		1				
<i>Euptoieta claudia</i>	Variegated Fritillary			2				3	
<i>Speyeria aphrodite</i>	Aphrodite Fritillary			1	11	29	17		7
<i>S. hesperis</i>	Northwestern Fritillary					4	11	3	3
fritillary sp.		1							
<i>Phyciodes pallida</i>	Pale Crescent	5			1				
<i>P. pulchella</i>	Field Crescent							2	2
comma sp.			1						
<i>Nymphalis antiopa</i>	Milbert's Tortoiseshell		1						
<i>N. antiopa</i>	Mourning Cloak		1		3	1	1		
<i>Vanessa atalanta</i>	Red Admiral								1
<i>Limnitis weidemeyerii</i>	Weidemeyer's Admiral	1	2		2	4	4		1
<i>Coenonympha tullia ochracea</i>	Common (Ochre) Ringlet	1		1	5	5			
<i>Cercyonis pegala</i>	Common Wood-Nymph						4		
<i>Epargyreus clarus</i>	Silver-spotted Skipper	1				1			
<i>Pholisora catullus</i>	Common Sootywing			1	1	1			
<i>E. persius</i>	Persius Duskywing		1						
<i>E. icelus</i>	Dreamy Duskywing								
<i>Pyrgus communis</i>	Common Checkered-Skipper				1	1			
<i>Piruna pirus</i>	Russet Skipperling		1						
<i>Polites themistocles</i>	Tawny-edged Skipper		1						
<i>P. mystic</i>	Long Dash		1						
<i>Ochlodes sylvanoides</i>	Woodland Skipper			1		1	1	1	1
<i>Poanes taxiles</i>	Taxiles Skipper		2	1	1	4	2	2	2
<i>Euphyes vestris</i>	Dun Skipper	4	2		2	1	1		1
skipper sp.			1						

Anne U. White Trail

Date, Conditions	Location within Anne U White	Butterfly Activity	Researcher
6/15/2018 9:30-12:15 pm 22-26 °C, 40% clouds to overcast	Parking lot to 'rock narrow' cliff		Cathy Comstock Jan Chu

6/24/2018 8:45-11:30 am 15-18 °C, Overcast to sprinkles. Calm wind 10:30-11:00 some sunlight	Locked gate to bench on hillside	Little flight because of lack of sunshine.	Cathy Comstock Amy Chu Jan Chu Sue Hirschfeld
6/30/2018 10-12 pm 20-21 °C, mostly cloudy, Overcast. Moderately windy	Transect		
Cathy 7-1-2018 10-12 pm 20-26 °C, Clear sky, Still wind	Transect		Cathy Comstock
7/14/2018 10-12:00 pm 25-22 °C, Clear to mostly clear sky; calm to relatively still	Transect	Only 1 new; gray hairstreak. Many Aphrodites	Cathy Comstock
7/21/2018 9:10-11:15 am 21-31 °C, Sky clear to mostly clear; wind calm to relatively still	Transect		Cathy Comstock
8/19/2108 11:15-1:15 pm 20- 25 °C, Sky clear, Wind calm	Transect		Cathy Comstock
9/2/2018 11:10-1:15 pm 21-31 °C, Clear sky. Calm wind.	Transect		Cathy Comstock

Anne U. White Trail	2018
# Species Identified during the year	32
# Research Hours on Site	18.5
# Individual Butterflies Counted	319

C. Walker Ranch – Loop Trail by Dan Fosco



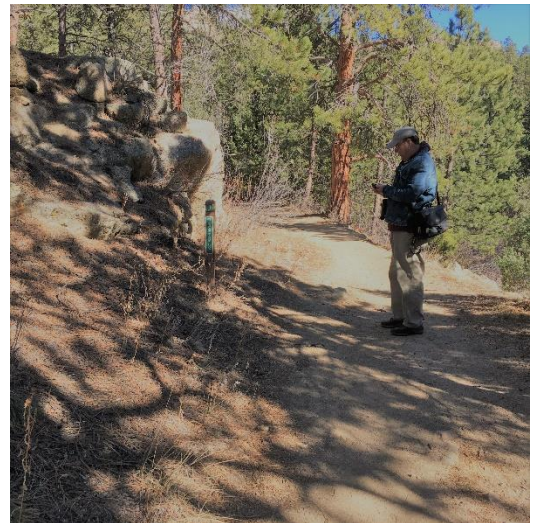
#1 Dan Fosco at beginning of Transect, showing favorite Butterfly Nectaring bush to Researchers Jane (taking photo), Jan Chu, Venice Kelly, Amy Chu.



#3



#5



#6 Dan Fosco at Trail marker on Loop Trail

Walker Ranch – Loop Trail

The parking lot and trailhead begin on top, so you first walk down the slope which is shaped like a south facing dish concluding along the South Boulder Creek. This initial part of the trail heats up early in the spring for early butterflies, i.e. Sheridan Hairstreaks, and California Tortoiseshell butterflies. The 1KM transect starts approximately 1/3 of the way down. The initial hillside habitat is dry open, shrub (Mountain mahogany, buckbrush, currant and sumac), herbaceous forbs and grassland. There is a sprinkling of Ponderosa Pine and Cottonwood trees in the wetter areas). About halfway down is a seep that stays wet most of the season and is an area of high insect activity. As you continue downward from this seep, an open Ponderosa Pine forest takes over until you reach the South Boulder Creek which then becomes riparian. The transect ends at the power lines that bisect the creek. Personal e-mail Dan Fosco, 10/30/2018. Narrative for Walker Loop (1.3 km more or less)

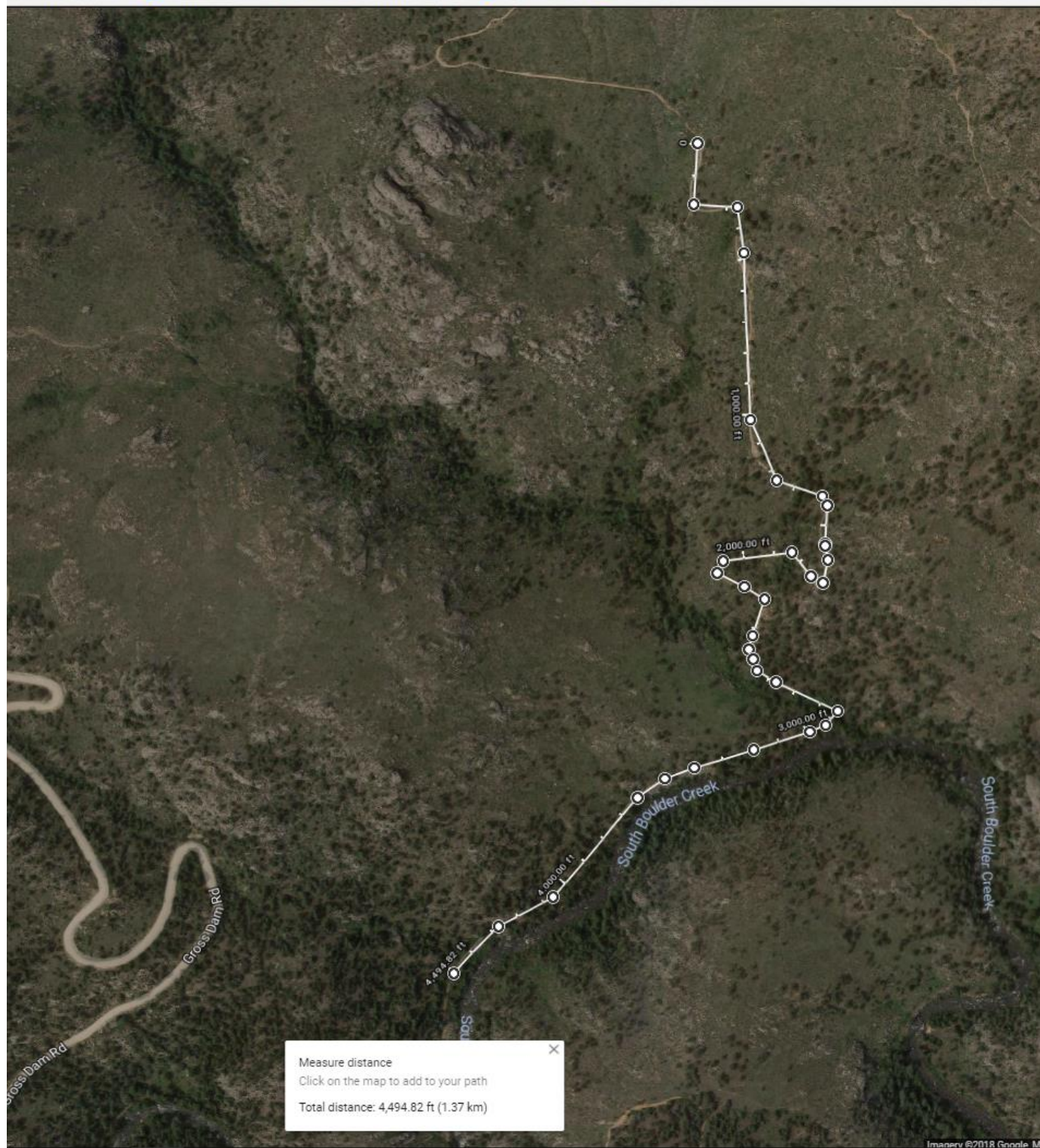
is Dan's Garmin (Google map reading)

Location	Latitude	Longitude	Possible Butterflies
(Potential start)	39.94867	-105.33896	
1. Dogbane on Loop Trail	39.5691	-105.20324	early hairstreaks; rocks warm early.
2. Ponderosa Pine, Spring, Utility pole overhead	39.56851	-105.20273	rocks to left; Nais metalmark rocks heat up fast. Early morning spot for sightings
3. Turn around point (potential) Powerline is landmark to the right	39.56712	-105.20235	elevation 6934. Ball cactus Hot spot for brown elfin, kinnikinnick
(off transect)	39.56671	-105.20286	
4. Puddle point; trail splits	39.56592	-105.20203	stay to right
Left at fork – if creek isn't too high	39.56585	-105.20172	California tortoiseshell, elfins, blues
5. 1mi. marker	39.56572	-105.2250	picnic tables on left. Margined and Orange-tips early in year. Elfins, blues
6. Creek, utility line	39.942378	-105,338128	Sunny rocks. Butterflies (reading from Google Earth map)
	39.56548	-105.20328	500-100 yds is sunny, butterflies

Walker Ranch - Loop Trail

!3m/data=!3m1!1e3

alen BoAmerica GMap Premier CredU Rain CoCoRaHS Google Maps Google Contacts



Google Earth map

Walker Ranch – Loop Trail

Walker Ranch- Loop Trails	2018	4/ 3 0	5/ 2 2	6/ 6	6/ 2 5	7/ 1 6	8/ 8	9/ 1 0
<i>Parnassius smintheus</i>	Rocky Mountain Parnassian			2				
<i>Papilio polyxenes</i>	Black Swallowtail		1					
<i>P. indra</i>	Indra Swallowtail			3				
<i>P. rutulus</i>	Western Tiger Swallowtail			2	1			
<i>P. eurymedon</i>	Pale Swallowtail		1	1	5			
<i>P. sisymbrii</i>	Spring White	1						
white sp.		3	11	4		1		
<i>Euchloe ausonides</i>	Large Marble		2	2				
<i>Anthocharis julia</i>	Julia Orangetip	2	2					
<i>Colias philodice</i>	Clouded Sulphur		1	1			1	
<i>Nathalis iole</i>	Dainty Sulphur					1	1	
sulphur sp						1		
<i>Lycaena heteronea</i>	Blue Copper					1		
<i>Satyrrium saepium</i>	Hedgerow Hairstreak	1				20	2	
<i>Callophrys affinis</i>	W. Green Hairstreak	4	43	21	27			
<i>C. sheridanii</i>	White-line Green Hairstreak	14						
<i>C. gyrneus siva</i>	Siva Juniper Hairstreak			1	2			
<i>C. augustinus</i>	Brown Elfin	2	2					
<i>C. polios</i>	Hoary Elfin	1	2					
<i>C. eryphon</i>	Western Pine Elfin		8					
Elfin sp.		2						
<i>Cupido amyntula</i>	Western Tailed-Blue		1	2				
<i>Celestrina echo</i>	Echo Azure		6	1				
<i>G. lygdamus</i>	Silvery Blue	2		8				
<i>Euphilotes ancilla</i>	Rocky Mountain Dotted-Blue		1	10	20			
<i>Echinargus isola</i>	Reakirt's Blue			1	1	2		
<i>P. icarioides</i>	Boisduval's Blue		1					
blue sp.		3	10	4	13			
<i>Apodemia nais</i>	Nais Metalmark					1		
<i>Euptoieta claudia</i>	Variegated Fritillary					1	1	2
<i>Speyeria aphrodite</i>	Aphrodite Fritillary				3		1	
<i>S. hesperis</i>	Northwestern Fritillary					2	7	
fritillary sp.				1	2	2	6	
<i>Chlosyne gorgone</i>	Gorgone Checkerspot		9	9	3			
<i>Phyciodes cocyta</i>	Northern Crescent			2	1			
<i>P. pulchella</i>	Field Crescent			28	2		6	5

Walker Ranch- Loop Trails	2018	4/ 3 0	5/ 2 2	6/ 6	6/ 2 5	7/ 1 6	8/ 8	9/ 1 0
<i>Euphydryas anicia</i>	Variable Checkerspot			1	2			
<i>Polygonia satyrus</i>	Satyr Comma						1	
<i>Polygonia gracilis</i>	Hoary Comma		1	1	1	1		1
<i>Aglaia milberti</i>	Milbert's Tortoiseshell							1
<i>N. californica</i>	California Tortoiseshell	1						
<i>V. cardui</i>	Painted Lady				2			
<i>Limenitis weidemeyerii</i>	Weidemeyer's Admiral					1		
<i>Coenonympha tullia ochracea</i>	Ochre (Common) Ringlet				4			
<i>Cercyonis pegala</i>	Common Wood Nymph					8	1	
<i>O. uhleri</i>	Uhler's Arctic		2	2				
<i>E. pacuvius</i>	Pacuvius Duskywing	1	3	4	2		1	
<i>E. persius</i>	Persius Duskywing		1					
duskywing sp.			2	2	1			
<i>*Pholisora catullus</i>	Common Sootywing					1		
<i>Piruna pirus</i>	Russet Skipperling				7	2		
<i>Poanes taxiles</i>	Taxiles Skipper						19	4
<i>Euphyes vestris</i>	Dun Skipper				1	2		

Walker Ranch – Loop Trail

Date, Conditions	Location within SE Buffer	Butterfly Activity	Researcher
5-22-2018 12:20– 2:45p.m. 65-70°F Hazy Sunny, Breezy on top – calm below	Walker Ranch Loop	Activity throughout	Dan Fosco
6-6-2018 10:15 a.m.– 2:15p.m. 70- 75°F Partly Sunny, Breezy on top – calm below	Walker Ranch Loop	Activity throughout	Dan Fosco
6-25-2018 1:30– 3:45p.m. 70°F Mostly Sunny, Breezy on top – calm below	Walker Ranch Loop	Activity throughout	Dan Fosco
7-16-2018 12:30– 2:45p.m. 65-70°F Sunny,	Walker Ranch Loop	Activity	Dan Fosco

Breezy on top – calm below		throughout	
8-8-2018 12:20– 2:45p.m. 65-70°F Partly Sunny, Breezy on top – calm below	Walker Ranch Loop	Activity throughout	Dan Fosco
9-10-2018 1:15– 3:30p.m. 75-80°F Sunny, Breezy on top – calm below	Walker Ranch Loop	Activity ONLY in wetter areas and where the only flowers were blooming	Dan Fosco

Walker Ranch - Loop Trail	2018
# Species Identified during 2018 in Walker Loop Trail	58
# Species Sighted in 2007-2018 at Walker Ranch – Loop Trail and Homestead Trails	77
# Research Hours on Site	36.5
# Individual Butterflies Counted	759

D. Caribou Ranch – Sherwood Road by Venice Kelly



2. Sherwood Road



3. Near first curve – hole in the ground



4. Seep near the Conger Mine



4. Seep inviting many butterflies



8. End of the transect in savanna with soggy ground, willows, small aspen

Caribou Ranch - Sherwood Road Narrative

From the gate of Sherwood Road follow an old developed gravel mining road. The transect is on the road passing thru Ponderosa pine forests and aspen groves. Woody and herbaceous plants grow along the road. At the mine there is a seep that bubbles up from the edge of the road and flows for about 50 feet (15 meters). The seep spills over its banks at the east end and flows down the edge of the road for another 15 to 20 meters. Turn around at the west end of the seep and walk back to where the trail to Mud Lake and Caribou open space crosses the mining road. The transect starts again following the foot trail into the meadow. It could be called a savanna with scattered trees and shrubs with grasses and non-woody vegetation and flowers. The last part of the transect follows the riparian area and then back to the gate. personal e-mail from Venice Kelly. October 30, 2018

GPS reading - Handheld Garmin first (G), then Google Earth (GE) is second

1. Gate N39.90814 W -105.51360 G
 39.980148 -105.513658 GE

Private gate separating gravel Road 126 from Sherwood Road

2. Aspens - first grove – hot spot to the right (North east)
 39.98014 105.51363 G (Elevation 8,370)

3. first curve – hole in the ground – hot spot
 39.9773 105.51960 G
 Large Ponderosa pines growth to the right

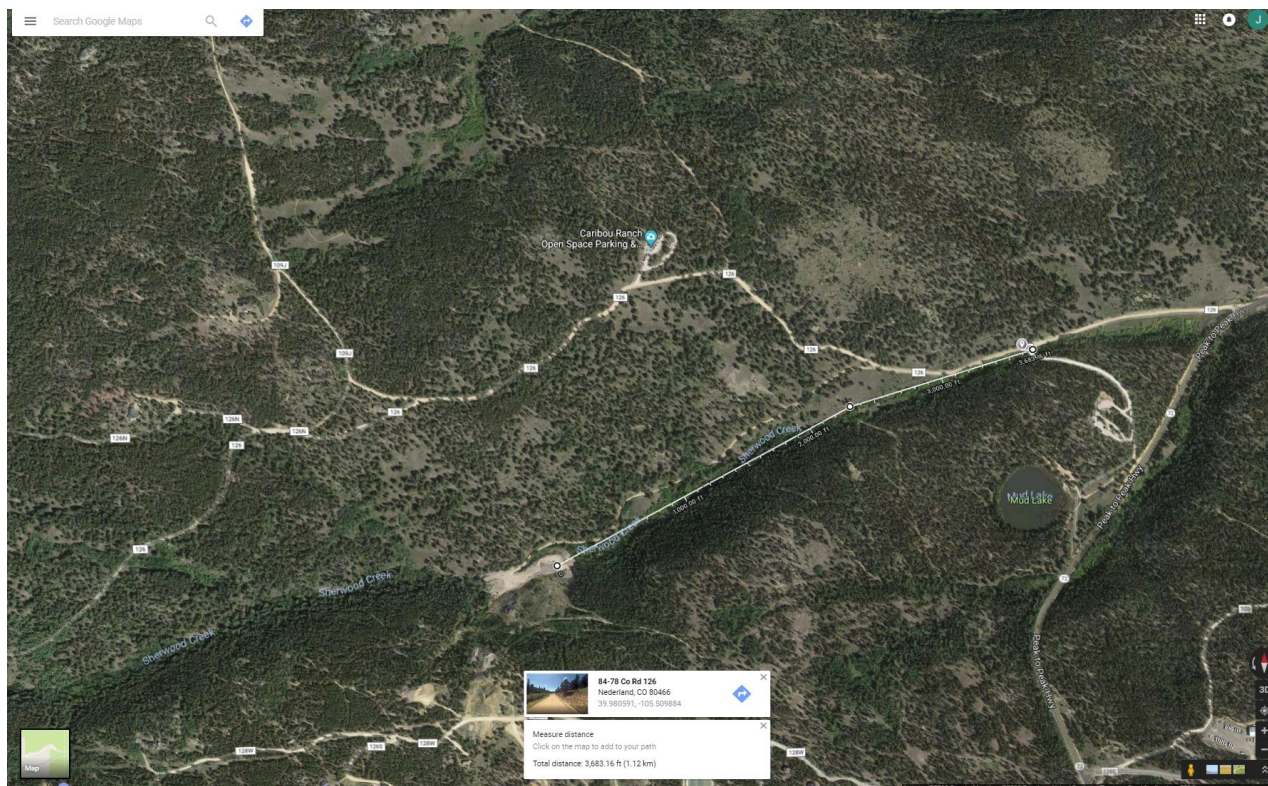
4. Seep - on right (Northeast)
 39.976393 105.522466G
 Drainage stained with iron

5. Conger Mine – Dead Zone – Wooden structure – Turn around
 39.97640 105.52238 G
 39.976399 105.522462 GE
 (About 907 meters according to Google Earth to this spot)

6. Trailhead Crossing from Caribou Open Space
 39.97941 105.51574 G
 (Begin again by taking trail downhill)

7. Bridge (Bridge Meadow)
 39.97948 105.51407 G

8. End at Drainage – small aspens over Sherwood Creek
 39.97960 105.51340 G
 (Distance 1.24 km GE)



Caribou Ranch, Sherwood Road Data

Caribou, Sherwood Road	2018	4 / 1 9	5 / 6	5 / 2 2	6 / 2	6 / 8	6/ 1 3	6/ 2 1	7/ 5	7/ 1 8	7/ 2 1	7/ 2 4	8/ 4	8/ 1 3	8/ 2 0	8/ 3 1	9/ 1 4
<i>Parnassius smintheus</i>	Rocky Mountain Parnassian				2	2	2	6	2	1	7		1				
<i>Papilio polyxenes</i>	Black Swallowtail										2						
<i>P. zelicaon</i>	Anise Swallowtail					1		1									
<i>Neophasia menapia</i>	Pine White													2	5	1	
<i>Pontia protodice</i>	Checkered White								1								
<i>Pieris rapae</i>	Cabbage White										1	3					
<i>Euchloe ausonides</i>	Large Marble			8	1 0	7	6	3									
<i>Anthocharis julia</i>	Julia Orangetip		1	6	1 0	4	2										
white sp.				2	4												
<i>Colias philodice</i>	Clouded Sulphur					1	5	1				2	1	2			5
<i>C. eurytheme</i>	Orange Sulphur									2	2	1	6	2	2		1
<i>C. alexandra</i>	Queen Alexandra's Sulphur							1 5	1 8	1 8	1 8	1 5	2 2	6	7		
<i>*Phoebis sennae eubule</i>	Cloudless Sulphur						1										
sulphur sp.											1						
<i>Nathalis iole</i>	Dainty Sulphur												1				1
<i>Lycaena rubidus</i>	Ruddy Copper										1		1	2			

Caribou, Sherwood Road	2018	4 / 1 9	5 / 6	5 / 2 2	6 / 2 2	6 / 8	6/ 1 3	6/ 2 1	7/ 5	7/ 1 8	7/ 2 1	7/ 2 4	8/ 4	8/ 1 3	8/ 2 0	8/ 3 1	9/ 1 4
<i>L. heteronea</i>	Blue Copper									1	9		1				
<i>L. helloides</i>	Purplish Copper									5			3				
<i>Callophrys affinis homoperplexa</i>	Western Green Hairstreak			2	4	2											
<i>C. sheridanii</i>	White-lined Green Hairstreak	3															
<i>C. polios</i>	Hoary Elfin		5	1	6	3											
<i>C. eryphon</i>	Western Pine Elfin			7	8		2	2									
<i>elfin</i> sp.			2	3													
<i>Satyrrium saepium</i>	Hedgerow Hairstreak													1			
<i>Cupido amyntula</i>	Western Tailed-Blue									2	1						
<i>Celastrina echo</i>	Echo Azure		1			1											
<i>Glaucopsyche pius</i>	Arrowhead Blue						1										
<i>G. lygdamus</i>	Silvery Blue			1	4	2	2	4									
<i>Euphilotes ancilla</i>	Rocky Mountain Dotted-Blue						2	8			1						
<i>Echinargus isola</i>	Reakirt's Blue					1		2	1		2		3				1
<i>P. saepiolus</i>	Greenish Blue													1	1		
<i>P. icarioides</i>	Boisduval's Blue							1	5	1	2						
<i>P. lupini lutzi</i>	Lupine Blue						1	1	4	1	1						
<i>blue</i> sp.					2	7	7	7	4			1					
<i>Euptoieta claudia</i>	Variegated Fritillary		1				2	1		1	2		2	1	3		
<i>Speyeria aphrodite</i>	Aphrodite Fritillary													1			
<i>S. edwardsii</i>	Edwards' Fritillary												1				
<i>S. coronis</i>	Coronis Fritillary										1		2				
<i>S. hesperis</i>	Northwestern Fritillary									1			1		1		
<i>fritillary</i> sp.				1		2	2	2				2	5	4	2		
<i>Poladryas arachne</i>	Arachne Checkerspot																1
<i>C. nycteis</i>	Silvery Checkerspot							4									
<i>C. palla</i>	Northern Checkerspot						2	1 2			1						
<i>P. cocyta</i>	Northern Crescent							2		1	1	1					
<i>P. pulchella</i>	Field Crescent				7	6	3	3					1	3	8	7	2 5
<i>Polygonia faunus</i>	Green Comma										1	1	1		1		1
<i>P. gracilis</i>	Hoary Comma								1								1
<i>comma</i> sp.			1														
<i>Nymphalis antiopa</i>	Mourning Cloak		2	1	1								1		1	1	1
<i>Limnitis weidemeyerii</i>	Weidemeyer's Admiral												1	1	1		
<i>Coenonympha tullia ochracea</i>	Common Ringlet				9	6	7	1 1	1	1							
<i>C. oetus</i>	Small Wood- Nymph									1 3	3	7	2 3	1 7	1 6	2	
Caribou Ranch, 2018		4	5	5	6	6	6/	6/	7/	7/	7/	7/	8/	8/	8/	8/	9/

Sherwood Road		/	/	/	/	/	1	2	5	1	2	2	4	1	2	3	1	4
		1	6	2	2	8	3	1		8	1	4		3	0	1		
<i>Erebia epipsodea</i>	Common Alpine					1			1									
<i>Oeneis chryxus</i>	Chryxus Arctic					1	3	6	2	1	3							
* <i>O. uhleri</i>	Uhler's Arctic					1												
<i>Erynnis icelus</i>	Dreamy Duskywing			2		1												
<i>E. pacuvius</i>	Pacuvius Duskywing				1													
<i>E. persius</i>	Persius Duskywing			5	2	2	3	6										
duskywing sp.						4		2										
<i>Pyrgus ruralis</i>	Two-banded Checkered-Skipper			4														
<i>P. communis</i>	Common Checkered-Skipper			1				1						1	1			
<i>Piruna pirus</i>	Russet Skipperling										2							
<i>Oarisma garita</i>	Garita Skipperling								1									
<i>H. colorado</i>	Western Branded Skipper																	
* <i>H. colorado ochracea</i>	Ochre Branded Skipper												2					
<i>H. nevada</i>	Nevada Skipper				1	1	2	4										
<i>Polites draco</i>	Draco Skipper				1													
<i>Poanes taxiles</i>	Taxiles Skipper										1							
<i>Ochlodes sylvanoides</i>	Woodland Skipper												1	2	5			
skipper sp.						2	2		1									

Caribou Ranch	Location	Butterfly Behavior	Researchers
4/19/2018 10:00 – 12:00 pm 6°C, 60% high overcast, sun, calm. 2	Sherwood Road to mine, return on Bridge Meadow	Three white-lined hairstreaks; one sunning itself on gravel.	Venice Kelly Dan Fosco Jan Chu Jean Morgan
5/6/2018 1:00 – 2:30 pm 17 °C, Mostly cloudy 1.5	Bridge Meadow, Sherwood Road to Pine White Meadow	Nothing in Bridge Meadow yet	Venice Kelly
5/22/2018 10-11:40 am 19-21°C, 90% clear to some clouds.1.5	Bridge Meadow and Sherwood Road	Two-banded Skippers at seep and first hot-spot.	Venice Kelly
6/2/2018 10:20-1:20 pm Clear blue sky. 16-21 °C, Windy 2	Transect, Bridge Meadow and Sherwood Road	Male persius' at seep; 4 female persius around golden banner. Ringlets, Field Crescents orange tips active in meadow.	Venice Kelly Connie Redak Richard Holmes
6/8/2018 10:30-11:40 am 21-23°C, 60% cloudy 1	Sherwood Road		Venice Kelly Jeff Maclachlan
6/13/2018 1:30-2:40 pm 27 °C, windy, sunny with 20% puffy clouds 1	Bridge Meadow	Lupine blue, Cloudless sulphur	Venice Kelly
6/21/2018 2 – 4:21 pm 22-24°C, Partly cloudy to cloudy 1.5	Transect, bridge meadow, Sherwood Road to seep	Many puddlers at seep-checkerspots, blues, QA's. Small nycteis, and two normal sixed.	Venice Kelly Kathy Barylski
7/5/2018 11:30-12:20 pm 20 °C, Sun, then full clouds 1	Caribou parking lot to first meadow.	Dry; flowers seemed to have bloomed earlier. Not so many butterflies.	Venice Kelly
7/18/2018 9:45-10:50 am 18-24 °C, mostly sunny, quite breezy 1	Bridge Meadow, Parnassian Hill to the right after gate	Blues tattered; ringlet very worn. Hesperis and coppers fresh.	Venice Kelly Jeff Maclachlan

7/21/2018 1 hr.			Venice Kelly
7/24/2018 10:30-11:45 am 24 °C, Sun to clouds. 1	Sherwood Road to seep, Bridge Meadow	Day after hard rain; not much flying. Hardly any Butterflies at seep.	Venice Kelly
8/4/2018 11:20-1:25 pm 24 °C, Mostly clear Breezy 2	Transect		Venice Kelly
8/13/2018 10:15-1:00pm 24 °C, clear sky 3	Sherwood Rd to Pine White meadow, Bridge Meadow		Venice Kelly
8/20/2018 18-21 °C, Blue sky, smoky air. 2 hrs.	Sherwood Road to Pine White Meadow	Woodland skippers nectaring on pearly everlasting and asters; Mourning cloak was on aspen sap.	Venice Kelly Jeff MacLachlan John Barr
8/31/2018 11:00 – 12:30 pm 20 °C, Sunny, windy with few clouds. 1.5	Sherwood Road to Pine White meadow		Venice Kelly
9/14/2018 11:11-12:45 pm 26°C, Blue sky, breezy 1.5	Transect Sherwood Road to Pine White Meadow, Bridge Meadow	Field Crescents flying strong.	Venice Kelly Jeff MacLachlan

Caribou Ranch- Sherwood Road	2018
# Species Identified during 2018 in Caribou-Sherwood Transect	61
# Species Sighted in 2018 Caribou-Sherwood Road	61
# Research Hours on Site	24.5
# Individual Butterflies Counted	830