

Lepidoptera of North America 17

2019 Butterfly Inventories within Boulder County Open Spaces Boulder Colorado



By Janet Chu

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

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Boulder, Colorado**

By Janet Chu

964 Ravenwood Road

Boulder, Colorado 80303-3055

Contributions of the

C.P. Gillette Museum of Arthropod Diversity

Colorado State University

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Cover Illustrations

Ruddy Copper (*Lycaena rubidus*) on blue fall aster, August 29, 2019.

Western Green Hairstreak (*Callophrys affinis homoperplexa*) on thistle head,

May 16, 2019.

Boulder Co., Colorado, by John Barr©

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I. Acknowledgments

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Our mentors providing professional suggestions and assistance in identification are Dr. Paul A. Opler, C.P. Gillette Museum of Arthropod Diversity, Colorado State University, Ft. Collins and Mike Fisher, author of the Butterflies of Colorado. Active volunteers in 2019 include John Barr, Amy Chu, Cathy Comstock, Larry Crowley, Chris Friedman, Dan Fosco, Linda Hardesty, Sue Hirschfeld, Richard Holmes, Venice Kelly, with others helping as time allowed: Cathy Cook, Ann Cooper, Janet Hanley, Chuck Lowry, Jean Morgan, and Pam Piombino. Team members were each granted written Research Permits for access to the Open Space lands extending from March through December 2019.

Dr. Daniel Ziskin designed the computer program to determine the Individuals per Research Hour (I/RH), toward the final statistical compilation of Individuals per Research Hour 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 inventory. Note the graphs and interpretation for the Trend for all Open Spaces in Section VI.

II. Abstract

Butterfly Inventories took place for the 16th consecutive year within Boulder County Open Space properties. Over the years 2004-2019, 129 butterfly species have been sighted in eight of the Open Spaces; 76 were counted in this year alone. More photographers than ever before on the team this season captured nearly 93 of the known 202 butterflies in Boulder County.

These Butterfly Research Volunteers helped collect data during 340 field hours. Venice Kelly studying on Sherwood Road and in the main Caribou Ranch contributed at least 53 hours on site. Other volunteers did not complete the past transects due to several reasons: trail being moved in

the mid-season to a newer, grassier area from Geer Watershed, Heil Valley Ranch; unsafe high-speed bicycle interactions on the Loop Trail, Walker Ranch; personal reasons on Anne U. White Trail.

Late wet, cold spring weather slowed butterfly emergences, resulting in some normally typically spring species flying with the early summer species. Certain summer species flew later into the early fall. August and September were mostly hot and dry allowing the continued flight by many brush-foot (Nymphalidae) butterflies.

III. Objectives

The overall objectives were:

- 1) Explore the following areas to record both numbers of individuals and species of butterflies within Open Space properties: Southeast Buffer, Heil Valley (Red Gulch, North Pointe, Geer Watershed, Plumely Canyon), Walker (Loop Trail, Meyer's Homestead Trail), Reynold's (North Bog, Giggey Lake), and Caribou Ranch (Sherwood Road, Bluebird Mine, DeLonde Homestead), Mud Lake and Hall II.
- 2) Determine trends (I/RH) for each of the butterfly species in each of the surveyed lands.
- 3) Calculate the final Summary Trend (I/RH) for the Boulder County Open Spaces.
- 4) For a second year, follow four transects to record numbers and species of butterflies to establish references for further studies.
- 5) Add to detailed inventories the location and nature of habitats known to support many associated species of flowering plants available for nectar.

IV. Research Methods

Research methods for the 2019 butterfly inventories continue to be consistent with past years to survey populations and species through a six-month season. These Open Space areas were chosen because of the varied habitats and elevations and were within Heil Valley, Walker, Caribou, Reynold's Ranches, Anne U. White Trail, the Southeast Buffer and Hall II.

In 2019, four transects following the modified Pollard method (Pollard, 1993) were begun within the Open Spaces, to allow for repeated sampling using static transects and methods over time. A person conducting a transect followed a preplanned path, observed butterflies within 6 meters in

all directions within the time period 10 am to 4 pm. Each researcher chose his/her transect because of familiarity with that area. Only one was completed successfully; Sherwood Road transect in Caribou Ranch by Venice Kelly. Sherwood Road was surveyed successfully 18 times between April 20 and September 20, 2019. The other three were incomplete: Anne U. White Trail by Cathy Comstock; Heil Ranch - Geer Watershed by Sue Hirschfeld; Walker Ranch - Loop Trail by Dan Fosco. The Anne U. White Trail was sampled only four times. Geer Watershed transect was moved to a different area in Heil Ranch, for convenience, so consecutive data were compromised. The Loop Transect was abandoned because of unsafe conditions caused by bikes zooming downhill which caused it to be unsafe to stop and make observations. In this report the 2019 transect data is included within the inventory results. 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. (See Chu, 2018 Report).

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 for butterflies, and host plants for support of significant numbers of caterpillars. 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 and numbers. For the last several years, digital photos which helped identification were used in place of curated specimens. Photos and locations of rare butterflies as noted by the Colorado Natural Heritage Program Watch List were sought and successfully recorded in 2019: Arogos Skipper (*Atrytone arogos*), Hops Azure (*Celastrina humulus*), and Moss' Elfin (*Callophrys mossii schryveri*). 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. 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 (S) 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.

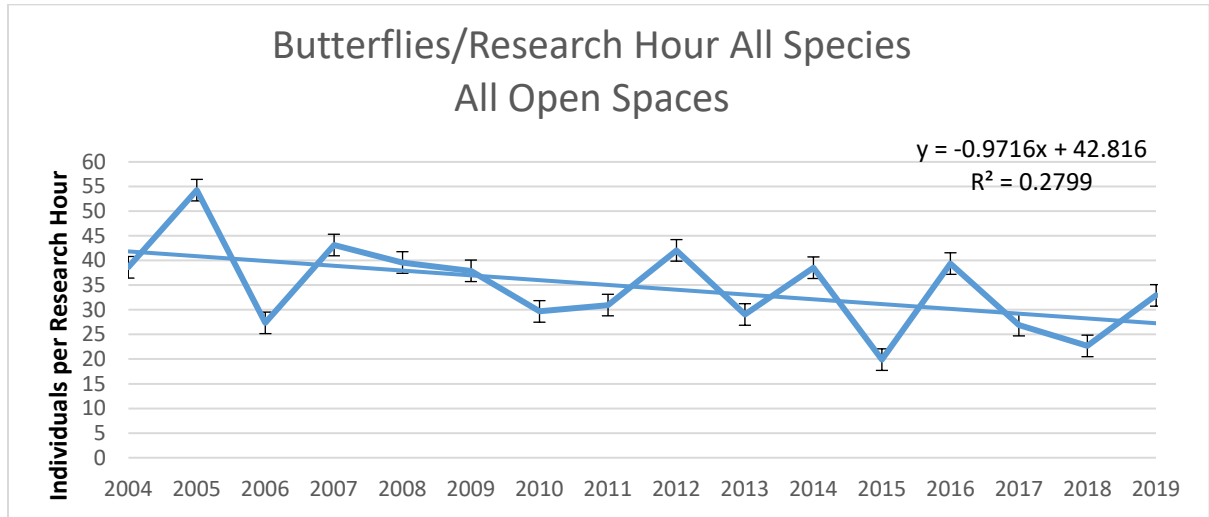
V. Introduction

Successful inventories have taken place within Boulder County Open Spaces for 16 years. The inventories were conducted in the Southeast Buffer (Rock Creek headwaters); Heil Valley – Geer Watershed, North Pointe, Red Gulch, and Plumely Canyon (service road); Walker Ranch – Meyer’s Homestead and Loop Trails; Reynold’s Ranch – Giggey Lake, North Bog; Anne U. White Trail, Caribou Ranch – Sherwood Road, Bridge Meadow, Bluebird Mine, Mud Lake; and one time in Hall II. The Steamboat Mountain was not visited in 2019. Caribou Ranch, Sherwood Road had successful transect completion; Walker Ranch - Loop Trail, Heil Ranch – Geer Watershed and Anne U. White had only a few transect surveys. Data for each area, including transect and ‘meandering’ methods, is combined and follows in Section XI.

VI. Trends

For sixteen consecutive years, the counts have continued in Boulder County Open Spaces. A trend has emerged for the numbers of butterflies observed in seven Open Spaces. Daniel Ziskin has analyzed all the information from each species and within each Open Space. Individuals (I) Research Hour (RH) is the unit that has continued to be the comparison from season to season and area to study area. For each Open Space, there is also data for the number of each species (S/RH) per Research Hour. The summary computed results are shown below:

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



Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Butterflies/Research Hour-All Species	38.6	54.2	27.3	43.1	39.6	37.9	29.7	31.0	42.1	29.1	38.5	19.8	39.3	26.7	22.7	32.9
uncertainty	9.5	13.2	6.7	10.5	9.7	9.3	7.3	7.6	10.3	7.1	9.4	4.8	9.6	6.5	5.6	8.1

Reproducibility 0.1 RH Error 0.2 I Error 0.1

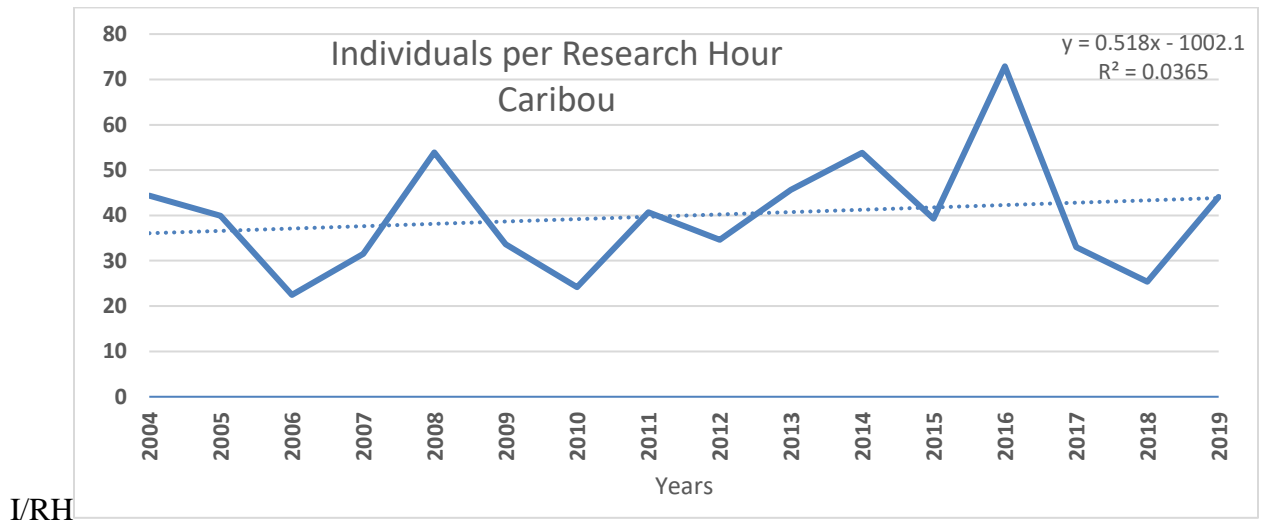
Over the past 16 years of collecting data there has been a persistent and robust trend. Measured in Individual (I) butterflies observed per Research Hour (RH) the trend is -1.0. This means that in 2004 a researcher could have expected to see 43 butterflies per hour. By 2019, that researcher should expect to see 27 butterflies per hour, a decrease of 1.7% per year. "Just like almost every other component of an ecosystem, there is inter-annual variability. In a relatively stable ecosystem, we would expect variations of butterfly populations to fluctuate around a mean value. However, we believe we are observing both normal inter-annual variability super-imposed on an overall decline of butterfly abundance on Boulder County Open Space. Statistically, the trend accounts for 28% of the observed variability. The other 72% is attributed to natural variability and experimental error," explains Daniel Ziskin. The author admits the certainty (R^2) is low but finds this decrease in populations is significant and should be watched.

B. Summary of Butterflies in Caribou Ranch I/RH

Caribou Ranch had consistent counts for the past sixteen years and provided complete information. Therefore, it follows that this was the most reliable single area for tracking numbers of butterflies; the trend is presented here. This overall positive trend was observed only in

Caribou (including Caribou Ranch, Sherwood Road, Bridge Meadow, Bluebird Mine and Mud Lake). This site demonstrated a trend over the past sixteen years of +0.5 compared to the aggregated trend of -1.0. However, the statistical significance of the trend is minimal considering that it explains only 3% of the inter-annual variation.

Caribou - Total Individual Butterflies/Research Hour



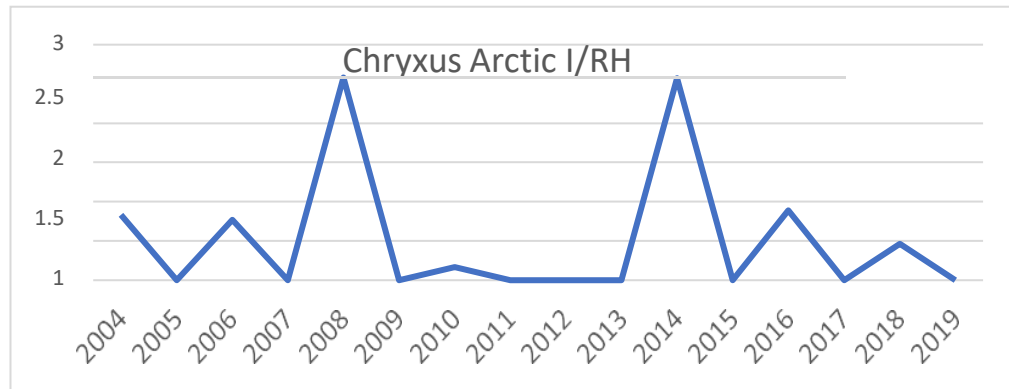
# I/RH	44.3	39.9	22.5	31.5	53.9	33.6	24.2	40.7	34.6	45.6	53.9	39.3	72.9	33	25.4	44.1
Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019

This is the single Open Space that we have inventoried where the trend is slightly upward. Measured in Individual (I) butterflies observed per Research Hour (RH), the trend for Caribou is a 52% increase over the sixteen years. Again, the author concedes that the certainty is low $R^2=0.04$ for this trend. These results are likely influenced by the numerous Research Hours and field days in 2018 and 2019. Caribou is a higher elevation than the other sites and less frequently encroached upon by people and less severely exposed to the air pollution experienced at the lower sites. Another reason might be that these higher elevation butterflies were not so compromised by the long, wet spring. We speculate that this could explain the more stable butterfly population there than in the county as a whole.

There is a butterfly, Chryxus Arctic (*Oeneis chryxus*) which has a two-year cycle and it's interesting to see how this species continues the naturally scheduled pattern in Caribou. In the Front Range of the Rockies, this butterfly flies during even- numbered years however, in

California and other areas it flies during the odd- numbered years. Chryxus Arctic didn't appear in Caribou in 2012, but about seven individuals were counted in Walker Ranch that year.

C. The I/RH of Chryxus Arctic in Caribou Ranch



Chryxus Arctic I/RH	0.8	0	0.8	0	2.6	0	0.2	0	0	0	2.6	0	0.9	0	0.5	0
Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019

The Chryxus Arctic held to its biennial pattern and did not appear in 2019 or previous odd-numbered years. Its life cycle is two years long from adult to adult flying season. This is rather unusual except for high-elevation butterflies such as the other Arctic satyrs.

VII. Narration for Each Open Space

A. Southeast Buffer – Rock Creek

The small gulley running east and west had some moisture, but the hilltop was dry most of the summer. On April 26, Swallowtail Ridge continued to assure the researchers that it had a fitting name. Anise Swallowtails (*Papilio zelicaon*) were flying together in April. Males perch and patrol hilltops even though this ridge is seven miles from the foothills where these usually live. On August 22, Olympia Marbles (*Euchloe olympia*) flew with newly emerged male Western Clouded Sulphurs (*Colias eriphyle*). An Eastern Black Swallowtail (*Papilio polyxenes*) soared with Painted Ladies (*Vanessa cardui*) over purple Gayfeather (*Liatris*). No observations were made during June and July, typically the highest flight months.

B. Heil Valley – Geer Watershed

Moisture was in short supply in the Geer Watershed. As a result, most butterflies were seen near the intermittent streambeds or muddy puddles along the service road. There were nearly two

dozen Painted Ladies (*Vanessa cardui*) at a time on each trip all season. On May 31 and June 5, along the stream, Echo Azures (*Celastrina echo*) were the most numerous with Indra Swallowtails (*Papilio indra*), Common Ringlets, and Persius Duskywings (*Erynnis persius*). Dainty Sulphurs (*Nathalis iole*) appeared earlier than usual on June 5.

Sue Olmstead monitored Bluebird boxes and often Sue Hirschfeld, the butterfly researcher, accompanied her. When the transect was moved in July for convenience to the new Bluebird Nesting Box area, the ground was found to be mostly grasses, therefore not good butterfly habitat. However, Common Ringlets (*Coenonympha tullia ochracea*) found nectar on Daisies, and Pine Elfins (*Callophrys eryphon*) nectared on Sumac. A Silvery Blue (*Glaucopsyche lygdamus*) was observed ovipositing on a Lupine, one of its larval food plants.

Near the Barn, the late summer butterflies, Western Branded-Skippers (*Hesperia colorado*), were numerous on August 28, together with Cabbage Whites (*Pieris rapae*), Orange Sulphurs (*Colias eurytheme*) and Common Wood Nymphs (*Cercyonis pegala*).

C. Heil Valley – North

Heil Valley North includes the North Pointe roadway and Red Gulch valley. Researchers walked from the entrance of North Pointe uphill to the large pond, which has been dry for two years. During a three-hour observation on May 3, there were more than 40 Painted Ladies on this roadway. Both Large Marbles (*Euchloe ausonides*) and Olympia Marbles were flying. Western Pine Elfins were resting in an isolated group of Juniper trees.

Red Gulch in Heil Valley continues to be a favorable area for butterflies. The entrance, through private property, is overgrown with many flowers and has no trail. A single Common Sootywing (*Pholisora catullus*) was in the weedy Lambs Quarters, its host plant. Common Wood Nymphs and Common Checkered-skippers (*Burnsius communis*) were abundant July 25, with Orange Sulphurs and Aphrodite Fritillaries (*Speyeria aphrodite*). Cabbage Whites continue to be numerous near the residences abutting the north side of Red Gulch. Red Admirals (*Vanessa atalanta*) generally uncommon, were noted that day. We had just discussed the Hackberry trees, and to our pleasure newly emerged Hackberry Emperors (*Asterocampa celtis*) flew nearby. Our team did not observe the Emperors in other Open Spaces.

The higher area Red Saddle, above the Picture Rock Trail, was not visited this season.

D. Heil Valley – Plumely Canyon

On June 13, in the canyon beside the high quarry wall, we found the rare Hops Azures flying fast but not far, in the Hops vines. This seemed early according to our records. Common Ringlets were fluttering with the immigrant Painted Ladies. These Ladies had the highest overall numbers in Heil Valley and the total count in 2019. Dun Skippers (*Euphyes vestris*) flew close to the trails which is typical of their behavior. Aphrodite Fritillaries and Red Admirals were numerous in June and July. An uncommon American Lady (*Vanessa virginiensis*) was sighted on July 21. The ‘blue’ butterflies seemed scarce in the open space study areas in 2019; however, the Western Tailed-Blue (*Cupido amyntula*), Rocky Mountain Dotted-Blue (*Euphilotes ancilla*), Melissa (*Plebejus melissa*) and Boisduval’s Blue (*Icaricia icarioides*) did make appearances in Plumely. The stream, which was crossed by the bike path and vehicles, was a meeting place for new male butterflies and therefore photographers. July 13 and 21 had high numbers of species at this stream.

E. Walker Ranch – Loop Trail and Meyer’s Homestead Trail

Early butterflies on the Loop Trail April 8, were the White-lined Green Hairstreaks (*Callophrys sheridanii*), Mourning Cloaks (*Nymphalis antiopa*), California Tortoiseshells (*N. californica*) and Hoary Commas (*Polygonia gracilis*). These butterflies typically fly early and begin our season with color. Observing on the same trail May 4, Dan Fosco found the Julia Orange-tips (*Anthocharis julia*), Brown Elfins (*Callophrys augustinus*) and Hoary Elfins (*C. polios*) flying near the blooming Kinnikinnick beds. Uhler’s Arctics (*Oeneis uhleri*) flew over the meadows with many Painted Ladies. Common Ringlets were the ever-present meadow butterflies. In June, more butterflies were active such as: Orange Sulphurs, Western Green Hairstreaks (*Callophrys affinis*), Echo Azures, Silvery Blues, Gorgone Checkerspots (*Chlosyne gorgone*), and Field Crescents (*Phyciodes pulchella*). Red Admirals were more common this season than during past years. On July 23, an uncommon find was the Nais Metalmark (*Apodemia nais*) by Richard Holmes. “I know just where to go in Walker Ranch on the Homestead Trail to locate this butterfly,” he says proudly. Richard found 25 species that day including singleton Blue Copper (*Lycaena heteronea*), Gray Hairstreak (*Strymon melinus*), and Northern Crescent (*Phyciodes cocyta*). Walker Ranch continues to be a productive Open Space. It is a loss that observations on the Loop Trail will not continue because of the danger of fast and unsafe bike traffic.

F. Reynold's Ranch – North Bog and Giggey Lake

Observations were made at each location only once in 2019. The uncommon Silver- Bordered Fritillary (*Boloria selene*) was found beside Giggey Lake. We found it initially in the North Bog and had not seen it since 2013. It is unusual here, because this Lesser Fritillary generally lives in bogs in the northern tier of states. The Giggey Lake area seems to be a pocket remnant of a post glacial lake, and it has many higher elevation plants and butterflies. The Rocky Mountain Parnassian (*Parnassian smintheus*) is found here with the Queen Alexandra's Sulphur (*Colias alexandra*) and Common Ringlet. The Greenish Blue (*Plebejus saepiolus*) and Common Alpine (*Erebia epipsodea*), other higher elevation butterflies were located here on August 4.

G. Caribou Ranch – Sherwood Road, Bridge Meadow

Venice Kelly is to be commended for recording data during at least 29 field days and 53 field hours. Her study area is Caribou Ranch and the nearby transect, on Sherwood Road and Bridge Meadow. She walked this transect for seventeen days. According to her records, on April 20, the dainty White-lined Green Hairstreak, and the Green Comma (*Polygonia faunus*) flew. The overwintering Mourning Cloaks and the Hoary Commas made their early spring appearances. Painted Ladies flew the great distance from the southern California deserts to high elevation Caribou by April 25.

On May 2, the uncommon Two-banded Checkered Skipper (*Pyrgus ruralis*) was observed. The small Hoary Elfins flew around their host plant Kinnikinnick, each male holding one bush as his own. In June, during 13 field days, many butterflies became active: Large Marbles, Julia Orangetips, Dreamy Duskywings (*Erynnis icelus*), Persius Duskywings, and a Pacuvius Duskywing (*E. pacuvius*). Western Pine Elfins were noted on the tips of newer pine needles. Blues were not as numerous as we have seen in the past, but a few Echo Azures and Silvery Blues were noticed. Julia Orangetips were nectaring on the Wild Strawberries and Common Checkered-skippers on Potentilla. Painted Ladies were numerous all season.

During July the Rocky Mountain Parnassians, Western Tiger Swallowtails, and Checkered Whites were active. Orange Sulphurs, and Queen Alexandra's Sulphurs were numerous over the meadows. The Western Green Hairstreaks, Common Ringlets and Common Alpines were noticed cruising low over the flowers, and Rocky Mountain Dotted-Blues were mating near their host plants, Sulfur Flowers. Lupine Blues (*Icaricia lupini lutzi*) fluttered nearby. Nevada Skippers (*Hesperia nevada*) outnumbered the Draco Skippers (*Polites draco*) in 2019. Variegated Fritillaries (*Euptoieta claudia*) showed up with the difficult-to-identify Northern

Checkerspot (*Chlosyne palla*) and Northern Crescents. Orange Sulphurs were the most numerous in Caribou followed by the Queen Alexandra's Sulphurs and Small Wood Nymph (*Cercyonis oetus*).

Edith's Copper (*Lycaena editha*) was found for the first time in the 16 years of inventorying in the Open Spaces. Venice found this butterfly first during July 30, in the Bridge Meadow; then, on July 31, several were sighted beside the cabin near Bluebird Mine. This Boulder County record was confirmed by Mike Fisher and noted in Butterflies and Moths of America list. By September 4, the anticipated Pine Whites (*Neophasia menapia*) came down out of the Ponderosas, low enough in the flowers for researchers to snap some excellent photos.

H. Anne U. White Trail

In June, the Red Admirals, Painted Ladies and Weidemeyer's Admirals (*Limenitis weidemeyerii*) were all displaying their large and colorful wing patterns in Anne U. White. Silvery Blues were outnumbered by the Cabbage Whites. Two-tailed Swallowtails (*Papilio multicaudata*) and Western Clouded Sulphurs were there in June and August. The trail was not visited during July, but in August the Common Wood Nymph and Woodland Skippers (*Ochlodes sylvanoides*) were monitored. The Peck's Skipper (*Polites peckius*) was a newly noted butterfly on this trail, as it was in other parts of the county in 2019.

I. Steamboat Mountain

This area was not visited in 2019. It was visited in 2018 without a successful count but data were recorded for 2017.

J. Hall II

Hall II was visited only once by the Butterfly Team. Common Wood Nymphs and Common Checkered-Skippers outnumbered any other butterfly. In one Canada Thistle patch several Fritillaries, Aphrodite, Northwestern (*Speyeria hesperis*) and Coronis (*S. coronis*), were finding the final available nectar. This visit was late in the season August 16, and the dry shrubby weeds stood tall. The cottonwoods were failing to thrive in the dry streambed.

VIII. Results

Butterfly Inventories took place for the 16th consecutive year within Boulder County Open Space properties. Over the years 2004 -2019, 129 species have been sighted in the Open Spaces.

During 2019, 76 species were counted. Painted Ladies reached the highest numbers of individuals in the 2019 inventories. Butterfly Research Volunteer Citizen Scientists helped collect data over about 340 field hours.

There were more photographers than ever before on the team, and this season, captured nearly 96 of the known 202 butterflies in Boulder County. A slide show was produced with the many photographs and shown to the High Country Lepidopterist annual meeting at the Denver Museum of Nature and Science.

Dan Fosco saw many early season butterflies along the Loop Trail, Walker Ranch: White-lined Green Hairstreaks Brown Elfins and Hoary Elfins. Venice Kelly studying in Sherwood Road and Caribou Ranch contributed at least 53 hours on site; all but eleven were on the transect. In Caribou, Julia Orangetips, Orange Sulphurs and Dreamy Duskywings were a little more numerous than other butterflies.

Richard Holmes became fascinated with the intermittent stream across the bike path, near Plumely Canyon in Heil Ranch. He spent nearly 15 hours there taking close-up photos of the gathering male butterflies. Red Admirals, Painted Ladies, American Ladies, Common Wood-Nymphs, Variegated Fritillaries and Aphrodite Fritillaries gathered there in large numbers. Fritillaries and blue butterflies were lower in numbers. The long season continued until the snow and cold on October 10, with many butterflies nectaring in the Rabbitbrush. Noticeably, the Chryxus Artic held to its biennial pattern and did not appear in 2019.

IX. Conclusion

In 2019 there were lower numbers of blue butterflies, likely caused by the late, wet, cold spring. Butterflies emerged later; consequently, the spring butterflies were noted flying with the early summer butterflies.

Fritillaries were less often recorded this season, but the varieties were noticeable. There were more late summer butterflies because this season was extended longer into October, because especially flowering Rabbitbrush attracted many butterflies. The inventories to record numbers of individuals and species of butterflies were successfully completed in the Southeast Buffer, Heil Valley, Walker, Reynold's, Hall II and Caribou Ranches.

Trends for each of the butterfly species in each of the surveyed Open Space areas were analyzed. Consequently, a final Summary Trend I/RH for the entire selected areas within Boulder County Open Spaces was calculated. The trend is -01.0 which means a continued loss of individual butterflies in our county. Just like almost every other component of an ecosystem, there is inter-annual variability. In a relatively stable ecosystem, we would expect variations of butterfly populations to fluctuate around a mean value. A closer look was made of the Caribou I/RH Total for years 2004-2019 which indicated a slight positive trend. The results for butterfly of interest, the Chryxus Arctic, were also listed in this paper although it flies only biennially.

One transect was completed successfully in Caribou Ranch for a second season. The remaining three were unable to finish the necessary six weeks. Transects are valuable because they record numbers and species of butterflies toward establishing references for further studies. Detailed inventories designated the location and nature of habitats known to support many associated species of blossoming plants. Butterfly inventories should be continued because of changes locally, and the climate may affect these small creatures. They do have an important presence in the Open Spaces and will indicate a continuous vigorous environment.

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XI. Data Tables

Every table continues to preserve the name of each species that has been found in that open space areas. It is important to carry the sightings from one year to the next, even if the species has not been observed in 2019. These Data Tables contain information from both the Inventory Method and Transect Method.

* denotes the first ever sighted in this open space; ph= photo available

A. Southeast Buffer

Southeast Buffer	2019	4/26	4/26	8/22
<i>Papilio polyxenes</i>	Black Swallowtail			1
<i>P. zelicaon</i>	Anise Swallowtail	2		
<i>P. rutulus</i>	W. Tiger Swallowtail			
<i>P. multicaudata</i>	Two-tailed Swallowtail			
yellow swallowtail sp.				
<i>Pontia protodice</i>	Checkered White			
<i>P. occidentalis</i>	Western White	1		
<i>Pieris rapae</i>	Cabbage White			
<i>Euchloe olympia</i>	Olympia Marble	4		
* <i>E. ausonides</i>	Large Marble	1		
white sp.				1
<i>Colias philodice</i>	Clouded Sulphur	2	1	2
<i>C. eurytheme</i>	Orange Sulphur			2
sulphur sp.				1
<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			
<i>Strymon melinus</i>	Gray Hairstreak		1	
<i>Cupido amyntula</i>	W. Tailed-blue			
<i>Glaucopsyche lygdamus</i>	Silvery Blue			
<i>Euphilotes ancilla</i>	Rocky Mtn. Dotted-Blue			
<i>Echinargus isola</i>	Reakirt's Blue			
<i>Plebejus melissa</i>	Melissa Blue			
blue sp.				
<i>Danaus plexippus</i>	Monarch			
<i>Agraulis vanilla</i>	Gulf Fritillary			
<i>Euptoieta claudia</i>	Variegated Fritillary			
<i>Speyeria aphrodite</i>	Aphrodite Fritillary			3
<i>S. edwardsii</i>	Edwards' Fritillary			
fritillary sp.				
<i>Chlosyne fulvia</i>	Fulvia Checkerspot			
<i>C. gorgone</i>	Gorgone Checkerspot			
<i>Phyciodes tharos</i>	Pearl Crescent			
<i>P. pulchella</i>	Field Crescent			1
checkersp/crescent sp.				
<i>Aglaia milberti</i>	Milbert's Tortoiseshell			
<i>Nymphalis antiopa</i>	Mourning Cloak			
<i>Vanessa cardui</i>	Painted Lady		14	1
<i>Limenitis weidemeyerii</i>	Weidemeyer's Admiral			
<i>Coenonympha tullia ochracea</i>	Common (Ochre) Ringlet			
<i>Cercyonis pegala</i>	Common Wood Nymph			
<i>Erynnis aفرانيوس</i>	Aفرانيوس Duskywing			
<i>E. persius</i>	Persius Duskywing			
<i>Burnsius (Pyrgus) communis</i>	Common Checkered-skipper		1	
<i>Pyrgus scriptura</i>	Small Checkered-skipper			
<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.				

Southeast Buffer

Date, Conditions	Location within	Butterfly Activity	Blossoming Plants	Animals	Researcher
4/26/2019 9:30-11:30 am. 12-19°C, 50% to overcast sky, 0-5 mph wind	Hwy 128 gate to Swallowtail Hill	Olympia Marbles on Swallowtail Hill with 2 Zelicaon Swallowtails, 2 new small male philodice	All flowers very short Astragalus, wh, purp Daisy, Easter Dandelion Dandelion wavy-leaf Deer clover, purple Filaree Lambert's loco Mertensia Musineon Parsley fam. Nuttall's violet Paintbrush, white Salt & pepper Sand lily Wall flower	Magpie Meadowlark Red-tail Sparrow, Song Towhee, Spotted Prairie dog	Jan Chu Jean Morgan Chris Friedman
4/26/2019 9:30-11:30 am 12-19 °C, 50% to overcast sky, 0-5 mph wind	Coalton Parking lot onto trail and into meadow		Alyssum sp. Astragalus-low purple Filaree Golden Current Musineon Salt and Pepper (Lomatium) Sand Lily	Common Grackle Magpie Mallard pair Northern Flicker Red-wing Blackbird Robin Say's Phoebe	Amy Chu Ann Cooper Alex Oleksiy Linda Hardesty
8/22/2019 8:45-10:15 am 17 °C 60% clear, hazy Wind 0-5 mph	Hwy 128 to Swallowtail Hill	Dry, few at all Painted Lady nectaring on Liatris. Swallowtail at the top of Swallowtail Hill	Bindweed Bluestem small Buckwheat tall Gumweed Liatris	Dove Mourning Meadowlark W. Sparrow Vesper	Larry Crowley Jan Chu

Southeast Buffer	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
# of Species identified during the year in Southeast Buffer	25	20	21	24	19	18	20	15	23	13	16	18	12
Cumulative # Species 2007-2018 sighted in Southeast Buffer	21	23	33	37	41	44	44	44	46	46	47	47	48
Research Hours on Site	5	21	9	7.7	11.5	9	12	8	12	4.5	8	9	5.5
# Individual Butterflies Counted	256	373	353	443	160	227	169	178	294	121	119	271	39
# Individuals / Research Hour	51	18	39	40	14	25	14	22	24.5	27	15	30	7
# Species / Research Hour	5	0.9	2	3	2	2	1.6	2	2	3	2	2	2

B. Heil Valley-Geer Watershed

Heil Valley - Geer Watershed	2019	4/27	5/4	5/31	6/5	7/12	7/25	8/28
<i>Papilio polyxenes</i>	Black Swallowtail			1				1
<i>P. zelicaon</i>	Anise Swallowtail		1?	2				
<i>P. indra</i>	Indra Swallowtail			5	6			
<i>P. rutulus</i>	Western Tiger Swallowtail				2			
<i>P. eurymedon</i>	Pale Swallowtail			2	5	1		
<i>P. multicaudata</i>	Two-tailed Swallowtail							
swallowtail yel sp.						1		
swallowtail dark						2		
<i>Neophasia menapia</i>	Pine White							
<i>Pontia sisymbrii</i>	Spring White		1					
<i>P. protodice</i>	Checkered White			4	7	1		
<i>P. occidentalis</i>	Western White							
<i>Pieris rapae</i>	Cabbage White			7				16
<i>P. marginalis</i>	Margined White							
<i>Euchloe ausonides</i>	Large Marble			2	1			
<i>E. olympia</i>	Olympia Marble	2						
<i>Anthocharis julia</i>	Julia Orangetip							
white sp.				7	2	13	8	
<i>Colias philodice</i>	Clouded Sulphur			2				
<i>C. eurytheme</i>	Orange Sulphur			11	4			15
<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				2	3	1	
sulphur sp.					1	6	2	1
<i>Lycaena dione</i>	Gray Copper							
<i>L. heteronea</i>	Blue Copper							
<i>Callophrys affinis homoperplexa</i>	Western Green Hairstreak			1				
<i>C. gryneus</i>	Siva Juniper Hairstreak							
* <i>C. sheridanii</i>	White-lined Green Hairstreak			2				
<i>C. augustinus</i>	Brown Elfin							
<i>C. eryphon</i>	Western Pine Elfin		7	4	3			
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							
<i>Leptotes marina</i>	Marine Blue							
<i>Cupido amyntula</i>	Western Tailed-Blue			6	1			
<i>Celastrina echo</i>	Echo Azure		3	33	41			
* <i>C. echo lucia</i>	" Lucia type			2				
<i>Glaucopsyche piasus</i>	Arrowhead Blue				2			
<i>G. lygdamus</i>	Silvery Blue		1	10	9			
<i>Euphilotes ancilla</i>	Rocky Mountain Dotted-Blue							
<i>Echinargus isola</i>	Reakirt's Blue							
<i>Plebejus melissa</i>	Melissa Blue							1
<i>P. saepiolus</i>	Greenish Blue							
<i>P. icarioides</i>	Boisduval's Blue			2	7			
<i>P. lupini lutzi</i>	Lupine Blue							
<i>P. glandon rustica</i>	Arctic Blue							
blue sp.			7	14	8			1
<i>Danaus plexippus</i>	Monarch					1?		
<i>Apodemia nais</i>	Nais Metalmark							

<i>Euptoieta claudia</i>	Variegated Fritillary			5	2			
Heil Valley– Geer Watershed	2019	4/27	5/4	5/31	6/5	7/12	7/25	8/28
<i>Speyeria aphrodite</i>	Aphrodite Fritillary							8
<i>S. edwardsii</i>	Edwards' Fritillary							
<i>S. coronis</i>	Coronis Fritillary							
<i>S. callippe</i>	Callippe Fritillary							
<i>S. hesperis</i>	Northwestern Fritillary							3 ph
<i>S. mormonia</i>	Mormon Fritillary							
fritillary sp.						5	1	20+
<i>Chlosyne gorgone</i>	Gorgone Checkerspot			5	4			
<i>C. nycteis</i>	Silvery Checkerspot							
<i>C. palla</i>	Northern Checkerspot							
<i>Phyciodes pallida</i>	Pallid (Pale) Crescent							
<i>P. tharos</i>	Pearl Crescent							
<i>P. cocyta</i>	Northern Crescent							
<i>P. pulchella</i>	Field Crescent			1	4			
Crescent/checkerspot								1ph
<i>Polygonia satyrus</i>	Satyr Comma							
<i>P. gracilis</i>	Hoary Comma		1					
<i>Junonia coenia</i>	Common Buckeye							3
<i>Aglaia milberti</i>	Milbert's Tortoiseshell							
<i>Nymphalis antiopa</i>	Mourning Cloak			1				
<i>N. californica</i>	California Tortoiseshell							
<i>Vanessa atalanta</i>	Red Admiral				3	1		
<i>V. cardui</i>	Painted Lady	11	32	6	19	6		7
<i>V. virginensis</i>	American Lady							2
<i>Limenitis weidemeyerii</i>	Weidemeyer's Admiral							1
<i>Asterocampa celtis</i>	Hackberry Emperor							
<i>Coenonympha tullia ochracea</i>	Ochre (Common) Ringlet			5	41			
<i>Cercyonis pegala</i>	Common Wood-Nymph							16
<i>C. oetus</i>	Small Wood-Nymph							
wood nymph sp.							3	
<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							
<i>Thorybes pylades</i>	N. Cloudywing			4				
<i>Erynnis icelus</i>	Dreamy Duskywing			1				
<i>E. pacuvius</i>	Pacuvius Duskywing			2	4			
<i>E. afranius</i>	Afranius Duskywing							
<i>E. persius</i>	Persius Duskywing			14	3			
duskywing sp.				1				
<i>Burnsius (Pyrgus) communis</i>	Common Checkered-skipper					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			2	1			
<i>H. colorado</i>	Western Branded Skipper							19
<i>H. nevada</i>	Nevada skipper							
<i>Polites themistocles</i>	Tawny-edged Skipper							
<i>Ochlodes sylvanoides</i>	Woodland Skipper							
<i>Poanes taxiles</i>	Taxiles Skipper							
<i>Euphyes vestries</i>	Dun Skipper							
<i>Atrytonopsis hiama</i>	Dusted Skipper							
skipper sp.						2		1

Date, Conditions	Location within Heil - Geer	Butterfly Activity	Blossoming Plants	Animals	Researchers
4/27/2019 9-12 °C, 10-11:45 am 90 % overcast with few patches of sun, 0-10 mph wind	Parking lot toward Manager's cabin on roadway	Too cold; participated in Blitz. Only when sun warmed the air	Few Sand lily Dandelion Filaree	Crow Spotted Towhee Townsend's Solitaire	Chris Friedman Jan Chu Jean Morgan John Barr Richard Holmes
5/4/2019 12:50-2:50 pm Mildly warm sunny to cloudy to slightly windy					Chris Friedman
5/31/2019 10:20-12:40 pm 90% clear to 90% cloudy Wind 0-10 mph	Gate to culvert above barn	Best near muddy puddle		Humingbird, rufous Hummingbird, br tled Lazuli bunting Magpie Steller's jay Swallows, violet, green Towhee, spotted Turkey Wren, House Woodhouse toad	Amy Chu Chris Friedman Jan Chu Larry Crowley Linda Hardesty Pam Piombino Venice Kelly
6/5/2019 10:30-12:30 pm	Locked gate to streamlet, Bike crossing, uphill	Ringlet nectaring on daisy; silvery ovipositing on lupine, Pine elfin nectaring on Sumac		Towhee, spotted Turkey vulture Deer	Chris Friedman Jan Chu Amy Chu
7/12/2019 9-10:30 am 26 to 31°C, sunny, no wind.	Hike, not on a trail. Near new bluebird boxes	Knee-high grasses, difficult to see butterflies		10 turkeys	Sue Hirschfeld
7/25/2019 8:30-10:00 am 22-25 °C, overcast, humid, no wind.	Near new bluebird box trail; very steep	Dry grasses. Mostly flushed butterflies.			Sue Hirschfeld.
8/28/2019 9:40-12:00 pm 21-25 °C, Clear sky, wind 0-10 mph	Geer – Barn along creek to culvert	Canada thistles full of fritillaries/ hesperis, Aphrodite, Buckeye	Bindweed Canada thistle Chickery Erigeron, white Geranium, Fremont Gumweed Heterotheca Knapweed Mexican hat Milk vetch Poison hemlock Vervain Water cress	Bluebird mtn Flycatcher sp. Lazuli bunting Nuthatch, red breast Steller's jay	Chris Friedman Jan Chu Larry Crowley Linda Hardesty

Heil-Geer Watershed	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
# of Species Identified Annually in Geer Watershed	42	56	44	49	36	38	38	42	22	43	30	40	44
Cumulative # of Species Sighted in Geer Watershed 2007-2019	81	87	90	91	91	91	91	92	92	92	93	93	94
Research Hours at Site	15.5	21	12.5	14	14	10	11	18	11	10	21	20	13.5
# Individual Butterflies Counted	569	1225	492	419	436	530	264	738	200	488	628	665	584
# Individuals / Research Hour	37	58	39	30	31	53	24	41	18	29	39	33	43
# 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	3.3

C. Heil Valley Ranch-North

Heil Valley Ranch North Pointe, Red Gulch	2019	5/3	5/16	7/25
<i>Parnassius smintheus</i>	Rocky Mountain Parnassian			
<i>Papilio polyxenes</i>	Black Swallowtail		1ph	
<i>P. zelicaon</i>	Anise Swallowtail	1	1	
<i>P. indra</i>	Indra Swallowtail			
<i>P. rutulus</i>	Western Tiger Swallowtail			
<i>P. eurymedon</i>	Pale Swallowtail			
<i>P. multicaudata</i>	Two-tailed Swallowtail			3
swallowtail yel.			1	
<i>Neophasia menapia</i>	Pine White			
<i>Pontia protodice</i>	Checkered White			6
<i>P. occidentalis</i>	Western White			
<i>P. sisymbrii</i>	Spring White			
<i>Pieris rapae</i>	Cabbage White		22	12
white sp.		9	14	
<i>Euchloe ausonides</i>	Large Marble	5	4	
<i>E. olympia</i>	Olympia Marble	16		
<i>Anthocharis julia</i>	Julia Orangetip			
<i>Colias philodice</i>	Clouded Sulphur		3	
alba form				1
sulphur sp.				2
<i>C. eurytheme</i>	Orange Sulphur		2	18
<i>C. alexandra</i>	Queen Alexandra's Sulphur			
<i>Nathalis iole</i>	Dainty Sulphur			4
<i>Lycaena dione</i>	Gray Copper			9
<i>L. heteronea</i>	Blue Copper			
<i>L. helloides</i>	Purplish Copper			
<i>Callophrys affinis</i>	Western Green Hairstreak			
<i>C. gryneus</i>	Siva Juniper Hairstreak			
* <i>C. sheridanii</i>	White-lined Green Hairstreak	1		
<i>C. eryphon</i>	Western Pine Elfin	9		
<i>Satyrrium behrii</i>	Behr's Hairstreak			
<i>S. titus</i>	Coral Hairstreak			
<i>Strymon melinus</i>	Gray Hairstreak			1
<i>Leptotes marina</i>	Marine Blue			
<i>Cupido amyntula</i>	Western Tailed-blue	1	1	
<i>Celastrina echo sidara</i>	Echo Azure		2	
<i>Glaucopsyche piasus</i>	Arrowhead Blue			
<i>G. lygdamus</i>	Silvery Blue	1	4	
<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
<i>Plebejus melissa</i>	Melissa Blue			3

<i>P. icarioides</i>	Boisduval's Blue			
<i>P. lupini lutzi</i>	Lupine Blue			
<i>P. glandon rustica</i>	Arctic Blue			
blue sp.		7	13	2
<i>Libytheana carinenta</i>	American Snout			
<i>Danaus plexippus</i>	Monarch			1
<i>Limenitis archippus</i>	Viceroy			
<i>Euptoieta claudia</i>	Variegated Fritillary			2
<i>Speyeria aphrodite</i>	Aphrodite Fritillary			13
<i>S. edwardsii</i>	Edwards' Fritillary			
<i>S. coronis</i>	Coronis Fritillary			
<i>S. callippe</i>	Callippe Fritillary			
<i>S. hesperis</i>	Northwestern Frit			
<i>S. mormonia</i>	Mormon Fritillary			
fritillary sp.				4
Heil Valley Ranch North Pointe, Red Gulch	2019	5/3	5/16	7/25
<i>Polydryas arachne</i>	Arachne Checkerspot			
<i>Euphydryas anicia</i>	Variable Checkerspot			
<i>Chlosyne gorgone</i>	Gorgone Checkerspot			
<i>C. nycteis</i>	Silvery Checkerspot			
<i>C. palla</i>	Northern Checkerspot			
<i>Phyciodes pallida</i>	Pallid (Pale) Crescent			
<i>P. tharos</i>	Pearl Crescent			1ph
<i>P. cocyta</i>	Northern Crescent			
<i>P. pulchella</i>	Field Crescent		3	
<i>Polygonia satyrus</i>	Satyr Comma			
<i>P. gracilis</i>	Hoary Comma	1		
<i>Nymphalis antiopa</i>	Mourning Cloak	4		
<i>Junonia coenia</i>	Buckeye, Common			
<i>N. californica</i>	California Tortoiseshell			
<i>Vanessa atalanta</i>	Red Admiral			4
<i>Aglaia milberti</i>	Milbert's Tortoiseshell			
<i>V. cardui</i>	Painted Lady	40+	16	1
<i>V. virginensis</i>	American Lady			
<i>Limenitis weidemeyerii</i>	Weidemeyer's Admiral			3
<i>Asterocampa celtis</i>	Hackberry Emperor			5
<i>Coenonympha tullia ochracea</i>	Ochre (Common) Ringlet			
<i>Cercyonis pegala</i>	Common Wood-Nymph			56
<i>C. oetus</i>	Small Wood-Nymph			
<i>Erebia epipsodea</i>	Common Alpine			
<i>Epargyreus clarus</i>	Silver-spotted Skipper			
<i>Erynnis afranius</i>	Afranius Duskywing			
<i>E. pacuvius</i>	Pacuvius Duskywing			
<i>E. persius</i>	Persius Duskywing			
<i>E. icelus</i>	Dreamy Duskywing			
<i>Burnsius (Pyrgus) communis</i>	Common Checkered-skipper			16
<i>Pholisora catullus</i>	Common Sootywing		1	
<i>Piruna pirus</i>	Russet Skipperling			
<i>Oarisma garita</i>	Garita Skipperling			
<i>Hesperia juba</i>	Juba Skipper			
<i>H. colorado</i>	W. Branded Skipper			
<i>H. pahaska</i>	Pahaska Skipper			
<i>H. viridis</i>	Green Skipper			
<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			2
<i>Euphyes vestries</i>	Dun Skipper			3
<i>Atrytonopsis hianna</i>	Dusted Skipper			

*new species for this Heil North ++more than

ph = photo available

Date, Conditions	Location Heil North	Butterfly Behavior	Blossoming Plants	Animals	Researchers
5/3/2019 11:00-2:00 pm 16-19°C, 98% Sunny sky, 5-10 mph wind	North Pointe to pond. Pond has been dry for two years	Good flights. Whites were fast.	Wild plum Nuttall's violets Erigeron – spreading daisy	Canyon wren Golden eagle Hummingbird Raven Red-tail Spotted towhee Steller's jay Turkey vultures Western bluebird W. Chorus Frog	Chris Friedman Jan Chu Jean Morgan John Barr Larry Crowley Linda Hardesty Richard Holmes
Heil North					
5/16/2019 11:50 am – 2:25 pm 27°C, 50% blue to 70 % overcast, wind 0-5 mph	Red Gulch from LaFollette's to large fallen tree trunk.	Flying only when sun shone, mostly over streamlet	Some water running Dandelion Donkeytail? Erigeron Mahonia Milk Vetch Mouse-ear Mustard 1.5ft. Mustards, many kinds Parsley Plum, wild Sand lily Storks bill, Violet, Nuttall's Wax currant Yarrow	Dove, mourning Eagle, golden House wren Phoebe, Say's Towhee, Spotted Turkey vulture Deer, mule W. Chorus Frog	Chris Friedman Jan Chu Larry Crowley
5/16/2019 11:50 am -2:25 pm 27 °C, 50% blue to 70 % overcast, wind 0-5 mph	East from LaFollette's into lower Red Gulch	Flying, landing in meadow		Scrub jay Towhee spotted Wren, house Snake, racer	Amy Chu
7/25/2019 9:20-12:15 pm 21-23 °C, overcast, wind 0-5 mph	East from LaFollette's into lower Red Gulch	Humid, wet. Butterflies were in grass and were disturbed to fly. Mating of gray copper and whites. Frit nectaring on thistle		House Wren Hummingbird Br tl Say's Phoebe Spotted Towhee W. Tanager Yellow Breasted Chat 3 Plains garter snakes Fence lizard Black Witch Moth	Amy Chu Chris Friedman Gene Monroe Janet Chu John Barr Larry Crowley Lynn Monroe Richard Holmes

Years of Counts in Heil North	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
# of Species Identified During Each Year in Heil-North	34	45	41	40	33	24	30	50	38	31	33	50	35
Cumulative # Species 2007-2019 Sighted in Heil-North	50	62	77	81	81	85	86	89	90	91	91	92	93
Research Hours on Site	8	17	12.5	11.5	11.5	6.5	12	27	32	13	7.5	13.5	12
# Individual Butterflies Counted 2019	579	654	488	429	272	188	402	1077	508	246	204	442	359
# Individuals / Research Hour	72	38	39	37	24	29	36	40	16	19	27	33	29
# 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	2.9

D. Heil Valley-Plumely Canyon

Heil Valley – Plumely Canyon, Lichen Trail	2019	6/13	7/9	7/13	7/21	8/18
<i>Papilio polyxenes</i>	Black Swallowtail		2			
<i>P. zelicaon</i>	Anise Swallowtail	1				
<i>P. indra</i>	Indra Swallowtail	6				
<i>P. rutulus</i>	Western Tiger Swallowtail		1	1		
<i>P. eurymedon</i>	Pale Swallowtail					
<i>P. multicaudata</i>	Two-tailed Swallowtail					
swallowtail, black						
<i>Neophasia menapia</i>	Pine White					
<i>Pontia protodice</i>	Checkered White		1			
<i>P. occidentalis</i>	Western White					
<i>P. sisymbrii</i>	Spring White					
Heil Valley - Plumely Canyon	2019	6/13	7/9	7/13	7/21	8/18
<i>Pieris rapae</i>	Cabbage White	1			2	6
<i>P. marginalis</i>	Margined White					
<i>Euchloe ausonides</i>	Large Marble	1				
<i>E. olympia</i>	Olympia Marble					
<i>Anthocharis julia</i>	Julia Orangetip					
white sp.		3	2	1		
<i>Colias philodice</i>	Clouded Sulphur	1				
<i>C. eurytheme</i>	Orange Sulphur		1	1	4	7
<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			1		
sulphur sp.		3				
<i>Lycaena dione</i>	Gray Copper					
<i>Callophrys mossii schryveri</i>	Moss' Elfin					
<i>C. polios</i>	Hoary Elfin					
<i>C. eryphon</i>	Western Pine Elfin	2				
<i>C. affinis homoperplexa</i>	Western Green Hairstreak					
<i>C. sheridanii</i>	White-lined Green Hairstreak					
<i>C. gryneus</i>	Siva Juniper Hairstreak			1		
<i>Satyrium titus</i>	Coral Hairstreak					
<i>Strymon melinus</i>	Gray Hairstreak	1				
<i>Leptotes marina</i>	Marine Blue					
<i>Cupido amyntula</i>	Western Tailed-Blue	2			1	
<i>Celastrina echo</i>	Echo Azure	3				
<i>C. humulus</i>	Hops Azure	3ph				
<i>Glaucopsyche piasus</i>	Arrowhead Blue	4				
<i>G. lygdamus</i>	Silvery Blue	3				
<i>Euphilotes ancilla</i>	Rocky Mountain Dotted-Blue	1	1	2		
<i>Echinargus isola</i>	Reakirt's Blue					
<i>Plebejus melissa</i>	Melissa Blue	3				2
<i>P. icarioides</i>	Boisduval's Blue	4	6			
<i>P. lupini lutzi</i>	Lupine Blue					
<i>P. glandon rustica</i>	Arctic Blue					
blue sp.		18				
<i>Danaus plexippus</i>	Monarch					
<i>Euptoieta claudia</i>	Variegated Fritillary				9	1
<i>Speyeria aphrodite</i>	Aphrodite Fritillary	1	5	7	7	
<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			25	19

<i>Polydrias arachne</i>	Arachne Checkerspot					
<i>Chlosyne gorgone</i>	Gorgone Checkerspot	4				
<i>C. palla</i>	Northern Checkerspot					
<i>Phyciodes pallida</i>	Pallid (Pale) Crescent					
<i>P. tharos</i>	Pearl Crescent					
<i>P. cocyta</i>	Northern Crescent			1		
<i>P. pulchella</i>	Field Crescent					
crescent sp.		3				
<i>Polygonia interrogationis</i>	Question Mark					
<i>P. gracilis</i>	Hoary Comma					
<i>Aglaia milberti</i>	Milbert's Tortoiseshell					
<i>Nymphalis antiopa</i>	Mourning Cloak	1		2		
<i>*Junonia coenia</i>	Common Buckeye				1	2
<i>N. californica</i>	California Tortoiseshell					
Heil Valley - Plumely Canyon	2019	6/13	7/9	7/13	7/21	8/18
<i>Vanessa atalanta</i>	Red Admiral	5		2	8	
<i>V. cardui</i>	Painted Lady	26	2	6	8	
<i>V. virginensis</i>	American Lady				2	
<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	24				
<i>Cercyonis pegala</i>	Common Wood-Nymph				7	11
<i>C. oetus</i>	Small Wood-Nymph					
<i>Erebia epipsodea</i>	Common Alpine					
<i>Epargyreus clarus</i>	Silver-spotted Skipper		1			
<i>Thorybes pylades</i>	N. Cloudywing					
<i>Erynnis pacuvius</i>	Pacuvius Duskywing	1				
<i>E. afranius</i>	Afranius Duskywing					
<i>E. persius</i>	Persius Duskywing	1				
<i>Burnsius (Pyrgus) communis</i>	Common Checkered-skipper	3	2			4
<i>Pholisora catullus</i>	Common Sootywing					
<i>Piruna pirus</i>	Russet Skipperling		1	1		
<i>Oarisma garita</i>	Garita Skipperling					
<i>Hesperia juba</i>	Juba Skipper		1			
<i>H. colorado</i>	Western Branded Skipper					
<i>*H. viridis</i>	Green Skipper		1	1		
<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					
<i>Poanes taxiles</i>	Taxiles Skipper				1	
<i>*Atrytone arogos</i>	Arogos Skipper		2	1		
<i>Euphyes vestris</i>	Dun Skipper		1	2	20+	
<i>Atrytonopsis hianna</i>	Dusted skipper					
skipper sp.		2			1	

* new species for this area + more than indicated number

Date, Conditions	Location leading into Heil-Plumely	Butterfly Activity	Blossoming Plants	Animals	Researchers
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6/13/2019 9:45-1:45 pm 17-21 °C 50% sunny. 0-5 mph wind	From First locked gate, to streamlet to Plumely. Just up to Hops plants	Hops Azure flying fast then hiding within bush near the quarry. Little water in stream crossing.	Penstemon, white, Mouse ears	Hummingbird, br.tled Lazuli Bunting Steller's Jay Towhee Turkey Wren, House	Chris Friedman Jan Chu John Barr Linda Hardesty Pam Piombino Wynne Whyman
7/9/2019 10:40-12:50 pm 21°C Clear, sunny, breezy	Dirt Service Road to streamlet				Richard Holmes Connie Redak
7/13/2019 9:00-1:40 pm 25-30 °C, calm, clear sky	Service Road, followed the rocky streambed				Richard Holmes
7/21/2019 9:30-12:30 pm 20-25 °C, Clear, calm	Heil Ranch Plumely; road to stream	Dun Skippers everywhere!			Richard Holmes
Date, Conditions	Location leading into Heil- Plumely	Butterfly Activity	Blossoming Plants	Animals	Researchers
8/18/2019 1 hour	Bridge to lower Wapiti Trail, Lichen Loop			3 turkeys	Chris Friedman

Heil Valley - Plumely Canyon	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
# of Species Identified Each Year in Plumely Canyon	45	37	44	36	44	41	48	33	38	18	27	27	44
Cumulative # Species 2007-2018 sighted in Plumely Canyon	81	81	82	84	86	88	89	89	89	90	90	90	93
Research Hours on Site	8	13	17	6.5	18	7.5	16	8	16	7	5.5	5	15.5
# Individual Butterflies Counted	365	480	401	196	526	342	470	479	310	162	348	166	335
# Individuals / Research Hour	45	36	24	30	29	46	29	60	19	23	63	33	22
# 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	2.8

E. Walker Ranch

Walker Ranch- Meyer's Homestead and Loop Trails	2019	4/8	5/4	6/7	6/10	6/14	6/26	7/2	7/23
<i>Parnassius smintheus</i>	Rocky Mountain Parnassian								
<i>Papilio polyxenes</i>	Black Swallowtail								
<i>P. zelicaon</i>	Anise Swallowtail								
<i>P. indra</i>	Indra Swallowtail				1				

<i>P. rutulus</i>	Western Tiger Swallowtail								
<i>P. eurymedon</i>	Pale Swallowtail				3		1	1	1
<i>P. multicaudata</i>	Two-tailed Swallowtail								
swallowtail sp.									
<i>Neophasia menapia</i>	Pine White								
<i>Pontia protodice</i>	Checkered White								1
<i>P. sisymbrii</i>	Spring White								
* <i>P. occidentalis</i>	Western White				1				2
<i>Pieris rapae</i>	Cabbage White								
white sp.			4	3	1	2			3
<i>Euchloe ausonides</i>	Large Marble				1				
<i>Anthocharis julia</i>	Julia Orangetip		1		1				
<i>Colias philodice</i>	Clouded Sulphur			5					
<i>C. eurytheme</i>	Orange Sulphur			8	5	2	2		2
<i>C. alexandra</i>	Queen Alexandra's Sulphur						1		
<i>Nathalis iole</i>	Dainty Sulphur								
Walker Ranch- Meyer's Homestead and Loop Trails	2019	4/8	5/4	6/7	6/10	6/14	6/26	7/2	7/23
<i>Lycaena heteronea</i>	Blue Copper								1
<i>Satyrium saepium</i>	Hedgerow Hairstreak								
<i>Callophrys affinis</i>	W. Green Hairstreak			7	47	7	1	1	2
<i>C. sheridanii</i>	White-line Green Hairstreak	4	1						
<i>C. gyrneus siva</i>	Siva Juniper Hairstreak				2				
<i>C. spinetorum</i>	Thicket Hairstreak								
<i>C. augustinus</i>	Brown Elfin		4						
<i>C. polios</i>	Hoary Elfin		10						
<i>C. eryphon</i>	Western Pine Elfin				3	3			
elfin sp.									
<i>Strymon melinus</i>	Gray Hairstreak								1
<i>Cupido amyntula</i>	Western Tailed-Blue								
<i>Celestrina echo</i>	Echo Azure			1	8	1	1		
<i>Glaucopsyche piasus</i>	Arrowhead Blue							3	
<i>G. lygdamus</i>	Silvery Blue				2	2	3		
<i>Euphilotes ancilla</i>	Rocky Mountain Dotted-Blue						6	4	5
<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						5	4	2
<i>P. lupini lutzi</i>	Lupine Blue								
<i>Agriades glandon rustica</i>	Arctic Blue								
blue sp.			2	1	6		1		
<i>Danaus plexippus</i>	Monarch								
<i>Apodemia nais</i>	Nais Metalmark								1
<i>Euptoieta claudia</i>	Variegated Fritillary								
<i>Speyeria aphrodite</i>	Aphrodite Fritillary								

<i>S. edwardsii</i>	Edwards' Fritillary								
<i>S. callippe</i>	Callippe Fritillary								
<i>S. hesperis</i>	Northwestern Fritillary								
<i>S. mormonia</i>	Mormon Fritillary								
fritillary sp.				1					1
<i>Chlosyne gorgone</i>	Gorgone Checkerspot				47	3	3		
<i>C. nycteis</i>	Silvery Checkerspot						1	2	
<i>C. palla</i>	Northern Checkerspot							2	2
<i>Phyciodes cocyta</i>	Northern Crescent								1
<i>P. pulchella</i>	Field Crescent				27	2	5		
<i>Phyciodes pallida</i>	Pallid (Pale) Crescent								
<i>Polydrys arachne</i>	Arachne Checkerspot								
<i>Euphydryas anicia</i>	Variable Checkerspot							1	
<i>Polygonia satyrus</i>	Satyr Comma								
<i>P. gracilis</i>	Hoary Comma	2					1	1	1
<i>Aglaia milberti</i>	Milbert's Tortoiseshell								
<i>Nymphalis antiopa</i>	Mourning Cloak	1	1						
<i>N. californica</i>	California Tortoiseshell	1							
Walker Ranch-Meyer's Homestead and Loop Trails	2019	4/8	5/4	6/7	6/10	6/14	6/26	7/2	7/23
<i>Vanessa atalanta</i>	Red Admiral			6	1	2	2		1
<i>V. cardui</i>	Painted Lady		26	2	4	7	1	1	3
<i>V. virginiensis</i>	American Lady				1				1
<i>Limenitis weidemeyerii</i>	Weidemeyer's Admiral								
<i>Coenonympha tullia ochracea</i>	Ochre (Common) Ringlet			8	1	8	2	1	1
<i>Cercyonis pegala</i>	Common Wood Nymph								2
<i>C. oetus</i>	Small Wood Nymph								2
<i>Erebia epipsodea</i>	Common Alpine								
<i>Oeneis chryxus</i>	Chryxus Arctic								
<i>O. uhleri</i>	Uhler's Arctic		2						
<i>Erynnis icelus</i>	Dreamy Duskywing					4	2	3	1
<i>E. pacuvius</i>	Pacuvius Duskywing				1		2		
<i>E. persius</i>	Persius Duskywing					2	2	3	
duskywing sp.				1	1		4		
<i>Burnsius (Pyrgus) communis</i>	Common Checkered-skipper								
<i>Pholisora catullus</i>	Common Sootywing								
<i>Piruna pirus</i>	Russet Skipperling								3
<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								1
<i>P. mystic</i>	Long Dash								
<i>Ochlodes sylvanoides</i>	Woodland Skipper							2	
<i>Poanes taxiles</i>	Taxiles Skipper								1
<i>Euphyes vestris</i>	Dun Skipper								2

skipper sp.								2	
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Date Conditions	Location Walker	Butterfly Behavior	Blooming Plants	Animals	Researchers
4/8/2019 12:50-4:00 pm 15-18 °C, Hazy, 5-20 mph wind	Loop Trail to and along S. Boulder Creek		Candytuft Mahonia Pasque Flower Spring Beauty	Steller's Jay Robin Bird of Prey	Dan Fosco
5/4/2019 10:10-1:00 pm 15-18 °C, overcast, wind 0- 10 mph	Loop Trail to and along S. Boulder Creek		Ball cactus Chickweed Chokecherry Cinquefoil Erigeron, white Geranium Kinnikinnick Lily, sand Loco, Lambert's Locoweed, pink Mertensia Parsley, Mtn Penstemon virens Physaria sp., yel Spring Beauty Sulfur Flower Violet, Nuttall's	Flicker Grackle, common Hummingbird bd tled Raven Townsend's Solitaire Warbler, Yel rump Chipmunk	Dan Fosco
Date Conditions	Location Walker	Butterfly Behavior	Blooming Plants	Animals	Researchers
6/7/2019 9:40-1:40 pm 22 °C, 90% clear, no breeze	Meyer's Homestead Trail	Many puddling	Campanula Dandelion Golden banner Larkspur Mertensia Mouse-ear Mtn Parsley Nuttall's violet Physaria sp. Sunspot Wild iris	Flicker Hummingbird, brd-tld Lazuli Bunting Raven Redtail Robin Sparrow, Chipping Towhee, Green tled W. Tanager Wren, House Slime mold! Mule deer	Chris Friedman Jan Chu Larry Crowley Linda Hardesty Richard Holmes
6/10/2019 10:30-12:30 pm 15-18 °C, mostly sunny sky, wind 0-5 mph	Loop Trail to and along S. Boulder Creek		Antennaria Skullcap, Briton Chickweed Cinquefoil Corydalis Erigeron, white Evening primrose Fendler's Waterleaf Gaillardia Geranium Heterotheca Larkspur Loco, Lambert's -purple Mahonia Mertensia sp., Bluebells Miners candle Parsley, Mountain Penstemon virens Physaria sp., yellow Salsify Shooting Stars Spiderwort Tradescantia Sulphur Flower Wallflower Yarrow	Crow/Raven Grackle Hummingbird Bd tl Robin Towhee Gr tailed Golden Mantled Ground Squirrel	Dan Fosco

6/14/2019 10:35-1:30 pm 20's F Breezy, sky mostly clear	Meyer's Gulch				Richard Holmes
6/26/2019 10:45-2:00 pm 21°C, partly cloudy.	Meyer's Gulch				Richard Holmes
7/2/2019 9:45 – 12:50pm 21 °C, clear, light breeze. Hard rain the evening before.	Meyer's Homestead Trail; Beyond barn to three puddles.				Richard Holmes
7/23/2019 9:30-2:30 pm 20-26 °C, Clear, calm, slight breeze.	Meyer's Homestead Trail	Nais Metalmark is very special.			Richard Holmes

Walker Ranch, Meyer's Homestead Trail and Loop Trail	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
# Species Identified during 2018 in Walker	30	35	45	35	50	47	62	43	45	43	31	58	47
# Species Sighted in 'Meyer's Trail' 2007-2018	33	38	60	70	72	75	75	75	76	76	76	77	78
# Research Hours on Site	5	4	18	16	16.5	7	14.5	11	29	17	13.5	53	27
# Individual Butterflies Counted	160	203	1144	437	472	399	394	322	351	549	299	759	449
# Individual Butterflies / Research Hour	32	54	64	27	29	57	27	29	12	32	22	14	16
# 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	1.7

F. Reynold's Ranch

Reynold's Ranch Giggey Lake, North Bog	2019	7/14	8/4
<i>Parnassius smintheus</i>	Parnassian, Rocky Mtn.	11	
<i>Papilio polyxenes</i>	Black Swallowtail		2
<i>P. zelicaon</i>	Anise Swallowtail	1	
<i>P. rutulus</i>	W. Tiger Swallowtail		1
<i>P. eurymedon</i>	Pale Swallowtail		
<i>P. multicaudata</i>	Two-tailed Swallowtail		
<i>Neophasia menapia</i>	Pine White		
<i>Pieris rapae</i>	Cabbage White		
<i>Pontia protodice</i>	Checkered White	13	5

<i>P. occidentalis</i>	Western White	4	1
white sp.		5	5
<i>Euchloe ausonides</i>	Large Marble	1	
<i>Anthocharis julia</i>	Julia Orangetip		
<i>Colias philodice</i>	Clouded Sulphur		
<i>C. eurytheme</i>	Orange Sulphur	7	15
	alba form female	2	
<i>C. alexandra</i>	Queen Alexandra's Sulphur	12	10
sulphur sp.			
<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	1	
<i>Satyrrium saepium</i>	Hedgerow Hairstreak		
<i>Strymon melinus</i>	Gray Hairstreak		1
<i>Celastrina echo</i>	Echo Azure		
<i>Glaucopsyche lygdamus</i>	Silvery Blue		
<i>Echinargus isola</i>	Reakirt's Blue	1	8
<i>Plebejus melissa</i>	Melissa Blue		
<i>Euphilotes ancilla</i>	R Mtn Dotted Blue	1	
<i>Plebejus saepiolus</i>	Greenish Blue	7	31
<i>Glaucopsyche piasus</i>	Arrowhead Blue		
<i>P. icarioides</i>	Boisduval's Blue	2	1
<i>P. glandon rustica</i>	Arctic Blue		
blue sp.		14	6
<i>Danaus plexippus</i>	Monarch	1	
<i>Limenitis weidemeyerii</i>	Weidemeyer's Admiral		
<i>Euptoieta claudia</i>	Variegated Fritillary	1	1
<i>Speyeria aphrodite</i>	Aphrodite Fritillary		
Reynold's Ranch Giggey Lake, North Bog	2019	7/14	8/4
<i>S. edwardsii</i>	Edwards' Fritillary		
<i>S. coronis</i>	Coronis Fritillary		
<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		1
fritillary sp.		2	1
<i>Chlosyne palla</i>	Northern Checkerspot	4	
<i>Phyciodes pallida</i>	Pallid (Pale) Crescent		
<i>P. tharos</i>	Pearl Crescent		1
<i>P. cocyta</i>	Northern Crescent		
<i>P. pulchella</i>	Field Crescent		
<i>Polygonia gracilis</i>	Hoary Comma		
<i>Vanessa virginiensis</i>	American Lady		
<i>Vanessa cardui</i>	Painted Lady	7	8
<i>Aglaia milberti</i>	Milbert's Tortoiseshell		
<i>Nymphalis antiopa</i>	Mourning Cloak		
<i>Coenonympha tullia ochracea</i>	Common (Ochre) Ringlet	16	3
<i>Vanessa atalanta</i>	Red Admiral		
<i>Cercyonis oetus</i>	Small Wood Nymph		8
<i>C. pegala</i>	Common Wood Nymph		
wood nymph sp.			
<i>Erebia epipsodea</i>	Common Alpine	10	
<i>Oeneis chryxus</i>	Chryxus Arctic		
<i>Erynnis icelus</i>	Dreamy Duskywing		
<i>E. pacuvius</i>	Pacuvius Duskywing		
<i>E. persius</i>	Persius Duskywing		
duskywing sp.		1	
<i>Oarisma garita</i>	Garita Skipperling		

<i>Hesperia colorado</i>	W. Branded Skipper		
<i>Polites draco</i>	Draco Skipper		
<i>Ochlodes sylvanoides</i>	Woodland Skipper		4
<i>Burnsius (Pyrgus) communis</i>	Common Checkered- skipper		
<i>Euphyes vestris</i>	Dun Skipper		
skipper sp.			

Date, Conditions	Location within Reynold's	Butterfly Activity	Blossoming Plants	Animals	Researchers
7/14/2019 9:30-11:45 a.m. 23°C, 50% light clouds, wind 5-25 mph	North Bog	Many flying. Western white ovipositing on mustards	Arnica Bistort Black-eyed Susan Clover, pink, red Elephant, pink Erigeron Gaillardia Geranium, Fremont Geyer's onion Iris Lambert's loco Lily, Sego Mertensia Milk vetch Mouse-ears Paintbrush, yellow Parsley Pasque flower Penstemon, viridis Potentilla Pussy toes Sedum Shooting star Sow thistle Sunspot	Flicker Kestrel Robin Swallow, violet-green	Chris Friedman Jan Chu Larry Crowley Linda Hardesty Richard Holmes Venice Kelly Wynne Whyman
Date, Conditions	Location within Reynold's Ranch	Butterfly Activity	Blossoming Plants	Animals	Researchers
8/4/2019 9:00-11:45 am Sky 90% blue to showers, wind 0-15	Giggey Lake along Magnolia roadway, then east of the pond to barbed wire.	One Boloria selene, pair of Black Swallowtails flying together, nectaring on bull thistle, coppery color female Greenish blue	Bed straw Bistort Black-eyed Susan Clover, red, white Death Camus Erigeron Timothy Gaillardia Geier's onion Geranium, Fremont Gilia Goldenrod Harebell Lambert's Loco Lily Mariposa Mertensia Mouse-ear Mullein Paintbrush, yellow Potentilla Salsify Sedum Sulfur flower Thistle, Bull, Canada Thistle, Sow Yarrow, white	Coot Flicker Mallard Red wing Song sparrow nesting Swallow, violet-green Vole	Chris Friedman Chuck Lowry Jan Chu Larry Crowley Linda Hardesty Richard Holmes Venice Kelly

Reynold's Ranch, Giggey Lake, North Bog	2011	2012	2013	2014	2015	2016	2017	2018	2019
# Species Identified during 2018 in Reynold's	32	46	36	9	26	32	26	29	25
# Species Sighted in Reynold's 2011-2018	35	55	55	55	57	57	58	61	61
# Research Hours on Site	13	11.5	10.5	4	6	11	10	10	5
# Individual Butterflies Counted	541	635	395	47	183	612	171	199	237
# Individuals / Research Hour	41.6	55	37.6	12	3	5.6	17	20	47
# Species / Research Hour	2.5	4	3.4	2.1	4	3	2.6	2.9	5

G. Caribou Ranch-Mud Lake

Caribou, Sherwood Road	2019	4/20	4/25	5/2	5/12	6/2	6/4	6/8	6/14	6/19	6/20	6/25	6/28	6/29	7/7	7/12	7/18	7/21	7/26	7/29
<i>Parnassius smintheus</i>	Rocky Mountain Parnassian											3		1	12		7	10	2	9
<i>Battus philenor</i>	Pipevine Swallowtail																			
<i>Papilio polyxenes</i>	Black Swallowtail														4	1	1			
<i>P. zelicaon</i>	Anise Swallowtail																			
<i>P. rutulus</i>	W. Tiger Swallowtail										1					1	2		1	1
<i>P. eurymedon</i>	Pale Swallowtail										1									1
<i>P. multicaudata</i>	Two-tailed Swallowtail																			
swallowtail sp													1							
<i>Neophasia menapia</i>	Pine White																			
<i>Pontia protodice</i>	Checkered White								3		2	2		11	22	3	10	15	5	10
<i>P. occidentalis</i>	Western White																			
<i>Pieris rapae</i>	Cabbage White																			
<i>P. marginalis</i>	Margined																			

	(Mustard) White																			
<i>Euchloe ausonides</i>	Large Marble					7	9		5	1	4	5		4	1	1				
<i>Anthocharis julia</i>	Julia Orangetip					7	6ph		9		9	8		5	2					
white sp.			1			2	4					3	1		9		4	5	4	7
<i>Colias philodice</i>	Clouded Sulphur								1									2	2	
<i>C. eurytheme</i>	Orange Sulphur						2		11	2	6	9		4	6	3	8	6	2	6
alba									4								1			
<i>C. alexandra</i>	Queen Alexandra's Sulphur													6			24	38	11	24
<i>Phoebis sennae eubule</i>	Cloudless Sulphur																			
sulphur sp.							1						2					2		
<i>Eurema mexicana</i>	Mexican Sulphur																			
<i>Abaeis nicippe</i>	Sleepy Orange																			
<i>Nathalis iole</i>	Dainty Sulphur													1			4			
* <i>Lycaena editha</i>	Edith's Copper																			
<i>Lycaena rubidus</i>	Ruddy Copper																			
<i>L. heteronea</i>	Blue Copper																	5	1	1
<i>L. helloides</i>	Purplish Copper																			1
<i>Callophrys affinis homoperplexa</i>	Western Green Hairstreak										1		2	3	1		1			
<i>C. sheridanii</i>	White-lined Green Hairstreak	3	5																	

Caribou, Sherwood Road	2019	4/20	4/25	5/2	5/12	6/2	6/4	6/8	6/14	6/19	6/20	6/25	6/28	6/29	7/7	7/12	7/18	7/21	7/26	7/29
<i>C. spinetorum</i>	Thicket Hairstreak																			
<i>C. augustinus</i>	Brown Elfin						2													
<i>C. polios</i>	Hoary Elfin			1ph	6	10	9		3		2	1								
<i>C. eryphon</i>	Western Pine Elfin					9	8		7		12	5	3	5	1					
elfin sp.						3	5													
<i>Satyrrium saepium</i>	Hedgerow Hairstreak																			
<i>Strymon melinus</i>	Gray Hairstreak																	1		
<i>Cupido amyntula</i>	Western Tailed-Blue												2	2	3		1			1
<i>Celastrina ladon sidara</i>	Echo Azure					1	1		4	1	3	5		1						
<i>Glaucopsyche piasus</i>	Arrowhead Blue																			
<i>G. lygdamus</i>	Silvery Blue					4	3			1	1	2		4						
<i>Euphilotes ancilla</i>	Rocky Mountain Dotted-Blue												2	1	7		5	17	5	11
<i>Echinargus isola</i>	Reakirt's Blue														3			3		1
<i>Plebejus melissa</i>	Melissa Blue																			

<i>P. saepiolus</i>	Greenish Blue																	1	
<i>P. icarioides</i>	Boisduval's Blue													2			3	10	4
<i>P. lupini lutzi</i>	Lupine Blue									1			1	4	1	2	3	3	3
<i>P. glandon rustica</i>	Arctic Blue																	1	
blue sp.						8		4		2	6		3	19	4	6	4	7	8
<i>Euptoieta claudia</i>	Variegated Fritillary											1	1	6		2	1	7	1
<i>Speyeria aphrodite</i>	Aphrodite Fritillary															1	1		
<i>S. edwardsii</i>	Edwards' Fritillary																		
<i>S. coronis</i>	Coronis Fritillary																		
<i>S. hesperis</i>	Northwestern Fritillary																	2	
<i>S. mormonia</i>	Mormon Fritillary																		
fritillary sp.								2								4	5	2	2
<i>Poladryas arachne</i>	Arachne Checkerspot																		
<i>Chlosyne gorgone</i>	Gorgone Checkerspot																		
<i>C. nycteis</i>	Silvery Checkerspot									1									
<i>C. palla</i>	Northern Checkerspot									2	1	4		3	3	4	7	1	3
<i>Phyciodes pallida</i>	Pallid Crescent																		
<i>P. tharos</i>	Pearl Crescent																		
<i>P. cocyta</i>	Northern Crescent												1	1		1	4	1	1
<i>P. pulchella</i>	Field Crescent										3	1	5	1					1
<i>Euphydryas anicia</i>	Variable Checkerspot															1	1		
<i>Polygonia faunus</i>	Green Comma	1						1											
<i>P. gracilis</i>	Hoary Comma	1														1			1

Caribou, Sherwood Road	2019	4/20	4/25	5/2	5/12	6/2	6/4	6/8	6/14	6/19	6/20	6/25	6/28	6/29	7/7	7/12	7/18	7/21	7/26	7/29
<i>Junonia coenia</i>	Common Buckeye																	1		
<i>Aglaia milberti</i>	Milbert's Tortoiseshell				1															
<i>Nymphalis antiopa</i>	Mourning Cloak	3	1		1	2	1							1						
<i>Vanessa atalanta</i>	Red Admiral					1					1									
<i>V. cardui</i>	Painted Lady		8		9	2	14		3		3	3	3	11	8		6	5	12	9
<i>V. virginiensis</i>	American Lady																			
<i>Danaus plexippus</i>	Monarch																			
<i>Limenitis weidemeyeri</i>	Weidemeyer's Admiral																		2	1
<i>Coenonympha tullia ochracea</i>	Common (Ochre) Ringlet						4		4		9	8	4	6	8		6	7	1	5
<i>Cercyonis pegala</i>	Common Wood-Nymph																			
<i>C. oetus</i>	Small Wood-Nymph																	1	5	8

<i>Erebia epipsodea</i>	Common Alpine										1	1		1	1				1	
<i>Oeneis chryxus</i>	Chryxus Arctic																			
<i>O. uhleri</i>	Uhler's Arctic																			
<i>Thorybes pylades</i>	Northern Cloudywing																			
<i>Erynnis icelus</i>	Dreamy Duskywing				2			2	1	4	4		1	2						
<i>E. pacuvius</i>	Pacuvius Duskywing									1										
<i>E. persius</i>	Persius Duskywing				2			2		2	5	3	3	5		5	2	2	3	
duskywing sp.											2									
<i>Pyrgus ruralis</i>	Two-banded Checkered-Skipper			1ph			4													
<i>B. communis</i>	Common Checkered-Skipper									1	1		2	3			1			
<i>Piruna pirus</i>	Russet Skipperling																8		4	
<i>Oarisma garita</i>	Garita Skipperling																			
<i>Hesperia juba</i>	Juba Skipper																			
<i>H. colorado</i>	Western Branded Skipper																			2
<i>H. colorado orchracea</i>	Ochre Branded Sk.																			
<i>H. pahaska</i>	Pahaska Skipper																			1
<i>H. viridis</i>	Green Skipper																			
<i>H. nevada</i>	Nevada Skipper									5	1	1	2	3						
<i>Polites draco</i>	Draco Skipper									1										
<i>P. mystic</i>	Long Dash																			
<i>Poanes taxiles</i>	Taxiles Skipper																			1
<i>Ochlodes sylvanoides</i>	Woodland Skipper																			
<i>Euphyes vestries</i>	Dun Skipper																			
skipper sp.															3					1?
Caribou, Sherwood Road	2019	7/30	7/31	8/8	8/12	8/29	9/4	9/5	9/10	9/15										
<i>Parnassius smintheus</i>	Rocky Mountain Parnassian	1		2	2															
<i>Battus philenor</i>	Pipevine Swallowtail																			
<i>Papilio polyxenes</i>	Black Swallowtail		1																	
<i>P. zelicaon</i>	Anise Swallowtail																			1
<i>P. rutulus</i>	W. Tiger Swallowtail																			1
<i>P. eurymedon</i>	Pale Swallowtail		1																	
<i>P. multicaudata</i>	Two-tailed Swallowtail																			
Swallowtail sp.																				
<i>Neophasia menapia</i>	Pine White					4	2	6												
<i>Pontia protodice</i>	Checkered White	4	1	4		3	1			5										

<i>P. occidentalis</i>	Western White		1							
<i>Pieris rapae</i>	Cabbage White									
<i>P. marginalis</i>	Margined (Mustard) White									
<i>Euchloe ausonides</i>	Large Marble									
<i>Anthocharis julia</i>	Julia Orangetip									
white sp.			5	2						1
<i>Colias philodice</i>	Clouded Sulphur				1					
<i>C. eurytheme</i>	Orange Sulphur	2	3	8	11	4	2	4	6	5
alba				1	1					
<i>C. alexandra</i>	Queen Alexandra's Sulphur	4	17	16	13	6	1	1	1	9
<i>Phoebis sennae eubule</i>	Cloudless Sulphur									
sulphur sp.										
<i>Eurema mexicana</i>	Mexican Sulphur									
<i>Abaeis nicippe</i>	Sleepy Orange									
<i>Nathalis iole</i>	Dainty Sulphur									
* <i>Lycaena editha</i>	Edith's Copper	1	8							
<i>Lycaena rubidus</i>	Ruddy Copper	1								
<i>L. heteronea</i>	Blue Copper		6							
<i>L. helloides</i>	Purplish Copper	1	3	4	5					1
<i>Callophrys affinis homoperplexa</i>	Western Green Hairstreak									
<i>C. sheridanii</i>	White-lined Green Hairstreak									
<i>C. spinetorum</i>	Thicket Hairstreak									
<i>C. augustinus</i>	Brown Elfin									
<i>C. polios</i>	Hoary Elfin									
<i>C. eryphon</i>	Western Pine Elfin									
Caribou, Sherwood Road	2019	7/30	7/31	8/8	8/12	8/29	9/4	9/5	9/10	9/15
<i>Satyrrium saepium</i>	Hedgerow Hairstreak									
<i>Strymon melinus</i>	Gray Hairstreak									
<i>Cupido amyntula</i>	Western Tailed-Blue	1		1						
<i>Celastrina ladon sidara</i>	Echo Azure									
<i>Glaucopsyche piasus</i>	Arrowhead Blue									
<i>G. lygdamus</i>	Silvery Blue									
<i>Euphilotes ancilla</i>	Rocky Mountain Dotted-Blue		3							
<i>Echinargus isola</i>	Reakirt's Blue					1		3		
<i>Plebejus melissa</i>	Melissa Blue									
<i>P. saepiolus</i>	Greenish Blue			3						

<i>P. icarioides</i>	Boisduval's Blue		2	2						
<i>P. lupini lutzi</i>	Lupine Blue			3	1					
<i>P. glandon rustica</i>	Arctic Blue									
blue sp.		6								3
<i>Euptoieta claudia</i>	Variegated Fritillary		3							2
<i>Speyeria aphrodite</i>	Aphrodite Fritillary		4							
<i>S. edwardsii</i>	Edwards' Fritillary									
<i>S. coronis</i>	Coronis Fritillary									
<i>S. hesperis</i>	Northwestern Fritillary		3	2	5	1				2
<i>S. mormonia</i>	Mormon Fritillary									
fritillary sp.			4	2	1	1				2
<i>Poladryas arachne</i>	Arachne Checkerspot									
<i>Chlosyne gorgone</i>	Gorgone Checkerspot									
<i>C. nycteis</i>	Silvery Checkerspot									
<i>C. palla</i>	Northern Checkerspot	3	7	2						
<i>Phyciodes pallida</i>	Pallid Crescent									
<i>P. tharos</i>	Pearl Crescent									
<i>P. cocyta</i>	Northern Crescent		6	2						1
<i>P. pulchella</i>	Field Crescent						1	3	1	
<i>Euphydryas anicia</i>	Variable Checkerspot									
<i>Polygonia faunus</i>	Green Comma					2				
<i>P. gracilis</i>	Hoary Comma									
comma sp.						1				
<i>Junonia coenia</i>	Common Buckeye									
<i>Aglaia milberti</i>	Milbert's Tortoiseshell									
<i>Nymphalis antiopa</i>	Mourning Cloak					1	1			
Caribou, Sherwood Road	2019	7/30	7/31	8/8	8/12	8/29	9/4	9/5	9/10	9/15
<i>Vanessa atalanta</i>	Red Admiral			1						
<i>V. cardui</i>	Painted Lady	1	6	4	1		1			4
<i>V. virginiensis</i>	American Lady									
<i>Danaus plexippus</i>	Monarch									
<i>Limenitis weidemeyerii</i>	Weidemeyer's Admiral	1	1	1	1	1		1		2
<i>Coenonympha tullia ochracea</i>	Common (Ochre) Ringlet	1								
<i>Cercyonis pegala</i>	Common Wood-Nymph									
<i>C. oetus</i>	Small Wood-Nymph		12	13	12	14	5	6	6	29

<i>Erebia epipsodea</i>	Common Alpine									
<i>Oeneis chryxus</i>	Chryxus Arctic									
<i>O. uhleri</i>	Uhler's Arctic									
<i>Thorybes pylades</i>	Northern Cloudywing									
<i>Erynnis icelus</i>	Dreamy Duskywing									
<i>E. pacuvius</i>	Pacuvius Duskywing									
<i>E. persius</i>	Persius Duskywing		1	2	1					
<i>Pyrgus ruralis</i>	Two-banded Checkered-Skipper									
<i>Brunsius (P.) communis</i>	Common Checkered-Skipper							1		1
<i>Piruna pirus</i>	Russet Skipperling		3	1						
<i>Oarisma garita</i>	Garita Skipperling									
<i>Hesperia juba</i>	Juba Skipper									
<i>H. colorado</i>	Western Branded Skipper			1				1	2	
<i>H. colorado ochracea</i>	Ochre Branded sk.									
<i>H. pahaska</i>	Pahaska Skipper	1								
<i>H. viridis</i>	Green Skipper									
<i>H. nevada</i>	Nevada Skipper									
<i>Polites draco</i>	Draco Skipper									
<i>P. mystic</i>	Long Dash									
<i>Poanes taxiles</i>	Taxiles Skipper		1							
<i>Ochlodes sylvanoides</i>	Woodland Skipper							1	6	
<i>Euphyes vestries</i>	Dun Skipper		1							
skipper sp.			2		2					

G. Caribou Ranch-Mud Lake

Caribou Ranch	Location	Butterfly Behavior	Blossoming Plants	Animals	Researchers
4/20/2019 12:00-1:15pm 15°C 50% Cloudy	Sinkhole, seep, bridge meadow		Candy tufts Spring beauties		Venice Jeff
4/25/2019 1-2:15 p.m 30% cloud cover, 10°C, breezy	Sherwood Road Transect		Few strawberry	Ruby-crowned kinglet	Venice Kelly
5/2/2019 1:15-2:15 pm 9°C, Mostly cloudy, breezy	Sherwood Road to mine, return on Bridge Meadow				Venice Kelly Jeff Maclachlan
5/12/2019 11:30 – 1:00 pm 13 °C, Clear sky	Sherwood Road Transect Also CR103 found Julia orangetip		Candy tufts Spring beauty	Chickadees Kinglets, Ruby cr. Magpie	Venice Kelly Jeff Maclachlan
6/2/2019 9:30-10:48 am 15°C, Partly sunny, breezy	Sherwood Rd transect	Orangetip nectaring on strawberry	Strawberry Larkspur Whiskbroom parsley Golden banner Mertensia		Venice Kelly Jeff Maclachlan
6/4/2019 10:15-12:15pm 15-19 °C, Mostly sunny, breezy	Bridge Meadow and Sherwood Road	Two-banded Skippers at seep and first hot-spot.	Cut-leaf Daisy Senecio	Western Tanager	Venice Kelly
6/14/2019 12:00-1:30 pm 20 °C, 50% dark clouds, breezy			Sulfur flower Sedum		Jeff Maclachlan Venice Kelly
6/19/2019 10:30-11:30 am 12 °C, 50% cloudy, windy	Mud Lake Meadow on North side of lake.		Cutleaf daisy Golden banner Larkspur Lupine Mertensia Mouse-ear chickweed Paintbrush Parsley Penstemon Potentilla Sedum Senecio Strawberry Sulfur flower Tower mustard Wall flower Wax current	Junco Mallard and ducklings Pygmy nuthatch Red tailed hawk Redwing blackbirds Robin Ruby crown kinglet Swallows, tree	Venice Kelly
6/20/2019 9:40-12 pm 15-18 °C, Windy, sunny	Sherwood transect	Common checkered-skipper nectaring on Potentilla	Anemone Red Bluebell Iris Mustard Tower Penstemon Potentilla Shooting star Skullcap Sulfur flower Wall flower		Venice Kelly
6/25/2019 9:40-1120 am 20°C, cloudy to sunny; breezy	Sherwood transect		Choke cherry Bog orchid Salsify Green gentian	Hairy woodpecker Western tanager Black Abert's squirrel	

6/28/2019 10:15-2:15 pm 21-27 °C Clear, sunny, slight breeze.	Sherwood Road				Richard Holmes
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Caribou Ranch	Location	Butterfly Behavior	Blossoming Plants	Animals	Researchers
6/29/2019 9:45-11:45 am 22°C, overcast, sunny, breezy	Sherwood Road Transect	Choke cherry fragrance, painted lade nectaring there	Pussytoes, white Dandelion, false Yarrow budding Dogbane budding	Turkey vultures circling.	Venice Kelly
7/7/2019 9:30-11:30 am 18 °C, Mostly cloudy	Sherwood Transect	Dotted Blue mating; pine elfin old. Black Swallowtail ovipositing on cow parsnip. Puddlers at seep.	Artemisia Gaillardia Coral root Bed straw Black eyed Susan Yarrow Gumweed Fremont geranium Rose Chicory		Jeff MacIachlan Venice Kelly
7/12/2019 9:40-11:00 am. 24 °C, 30% cloudy	Caribou Open Space; from parking lot, trail to first meadow		Arnica Mertensia Potentilla Sedum Bedstraw Lupine Sulphur flower Rose Locoweed Paintbrush red,yellow Parsley, mtn Geranium, Fremont Penstemon Coral root Wallflower Golden banner Onion, Geier Mouse ears Yarrow pine, white Pussytoes pink, white Daisy, cutleaf Hairbell Gaillardia Gentian, green Chicory Aster, purple Clover, red Artemesia Gumweed		Venice Kelly Jeff MacIachlan
7/18/2019 10:30-12:40 pm 23-25 °C, High thin clouds, breezy	Sherwood Rd transect	Puddling Queen Alexandra's. Bridge meadow has lots of flowers, esp. sulfur flower and purple asters	Mariposa lily Miner's candle		Venice Kelly Wynne Whyman
7/21/2019 9:00- 12:00 pm 16-18 °C, Clear, slight breezy	Sherwood Road, Caribou parking lot to Sherwood Rd.	Hail and rain reduced the numbers of butterflies.	Many flowers in bloom		Venice Kelly Amy Chu Native Plants Jan Chu Larry Crowley BoCo Public walk
7?26, 2019 9:30-noon 18-23 °C, 40% cloudy to overcast	Caribou gate, walked roadway toward Monarda Meadow		Mariposa Fireweed Death camas Dogbane	Mule deer Ground squirrel, golden mantle Chipmunk, Colorado	Venice Kelly Wynne Whyman

7/29/2019 9:30-1:00pm 20-23 °C, blue sky mostly	Transect Sherwood Road, Bridge Meadow	Numbers at the seep	Marsh marigold Purple bellflower Bridge meadow beautiful		Venice Kelly Richard Holmes
7/30/2019 9:30-11:00 am 21 °C, completely clouded	Bridge Meadow	Many damaged butterflies. First Edith's in Open Space records.			Venice Kelly
Caribou Ranch	Location	Butterfly Behavior	Blossoming Plants	Animals	Researchers
7/31/2019 9:05-11:35 pm Sky high overcast, clear No wind	Locked gate to Bluebird Mine	Q.A. nectaring on Gaillardia		Crossbill Dipper Jay Steller's Junco dark eyed Raven Warbler, Audubon's	Amy Chu Richard Holmes Venice Kelly Larry Crowley Jan Chu
8/7/2019 9:40-noon 20-22 °C, Partly cloudy	Sherwood Rd Transect		Monarda Goldenrod Rudbeckia Clover sweet Monkshood Pearly everlasting Dandelion, false		Venice Kelly
8/12/2019 10-12:30 pm 15-21 °C, Blue sky, breezy	Sherwood Rd Transect and Pine White meadow	Same 'old' persius at seep; hesperis mating and flying all over			Venice Kelly
8/29/2019 10-12:20pm 18-25 °C, Clear sky, breezy	Sherwood Transect				Venice Kelly
9/4/2019 11:00-1:00 pm 21 °C, 80% cloud cover windy	Sherwood Transect	Pine whites nectaring	Meadows and flowers dry,		Venice Kelly
9/5/2019 10-11:45 am 21-14 °C, 40% cloudy	Sherwood Transect				Venice Kelly Jeff MacIaclan
9/10/2019 11-12:30 am 14-16 °C	Sherwood Transect	Cucullia drosilis caterpillar		Pine Squirrels	Venice Kelly
9/15/2019 9:30-11, 11:17- 12:30pm 21°C, blue sky	Caribou Homestead and Blue Bird Mine		Dry underfoot, asters available for nectar	Golden mantled ground squirrel	Venice Kelly Wynne Whyman

H. Anne U. White Trail

Caribou Ranch	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
# of Species Identified in Caribou Ranch	48	48	40	20	46	28	38	47	55	50	59	61	65
Cumulative # of Species Sighted in Caribou 2007-2019	75	75	80	80	81	82	83	83	84	85	86	88	88
# of Research Hours on Site	10	12	8.5	6	12.5	8	8	14	15	10	27.5	43	53
# of Individual Butterflies Counted	358	647	278	145	488	304	361	752	587	657	770	1071	2336
# Individuals /Research Hour	36	54	33	24	39	38	45	54	39	65	28	25	44
# 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	1.4	1.2
Anne U. White Trail				2019				6/3	6/28	8/3	8/14		
<i>Parnassius smintheus</i>				Rocky Mountain Parnassian									
<i>Papilio polyxenes</i>				Black Swallowtail					1				
<i>P. zelicaon</i>				Anise Swallowtail									

<i>P. indra</i>	Indra Swallowtail				
<i>P. rutulus</i>	W. Tiger Swallowtail		2		
<i>P. eurymedon</i>	Pale Swallowtail				
<i>P. multicaudata</i>	Two-tailed Swallowtail	4	3	5	2
<i>Pontia protodice</i>	Checkered White	1	2		
* <i>P. occidentalis</i>	Western White		2		
<i>P. sisymbrii</i>	Spring White				
<i>Pieris rapae</i>	Cabbage White	12	14	5	9
<i>Euchloe ausonides</i>	Large Marble				
<i>E. olympia</i>	Olympia Marble				
marble sp.			2		
<i>Anthocharis julia</i>	Julia Orangetip				
<i>Colias philodice</i>	Clouded Sulphur	3	3	3	5
<i>C. eurytheme</i>	Orange Sulphur		2		
<i>Nathalis iole</i>	Dainty Sulphur				
<i>Callophrys affinis homoperplexa</i>	W. Green (Bramble) Hairstreak				
<i>C. sheridanii</i>	White-lined Green Hairstreak				
<i>C. gryneus</i>	Siva Juniper Hairstreak				
<i>C. mossii</i>	Moss's 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				
<i>Cupido amyntula</i>	Western Tailed-Blue				
<i>Celastrina ladon sidara</i>	Echo Azure				
<i>Glaucopsyche piasus</i>	Arrowhead Blue				
<i>G. lygdamus</i>	Silvery Blue	4			
* <i>Euphilotes ancilla</i>	Rocky Mountain Dotted-Blue		1		
<i>Echinargus isola</i>	Reakirt's Blue				
<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.			6		
<i>Apodemia nais</i>	Nais Metalmark				
<i>Danaus plexippus</i>	Monarch				
<i>Euptoieta claudia</i>	Variegated Fritillary				
<i>Speyeria aphrodite</i>	Aphrodite Fritillary		4	20	22
<i>S. edwardsii</i>	Edwards' Fritillary				
<i>S. coronis</i>	Coronis Fritillary				
<i>S. callippe</i>	Callippe Fritillary				
<i>S. hesperis</i>	Northwestern Fritillary			1	
<i>S. mormonia</i>	Mormon Fritillary				
fritillary sp.			2		
<i>Chlosyne gorgone</i>	Gorgone Checkerspot				
<i>C. palla</i>	Northern Checkerspot		3		
<i>Phyciodes pallida</i>	Pallid (Pale) Crescent				
Anne U. White Trail	2019	6/3	6/28	8/3	8/14
<i>P. tharos</i>	Pearl Crescent				
<i>P. cocyta</i>	Northern Crescent				
<i>P. pulchella</i>	Field Crescent				
<i>Polygonia satyrus</i>	Satyr Comma				

comma sp.		1			
<i>Junonia coenia</i>	Common Buckeye				
<i>Aglais milberti</i>	Milbert's Tortoiseshell				
<i>Nymphalis californica</i>	California Tortoiseshell				
<i>N. antiopa</i>	Mourning Cloak		1		
<i>Vanessa atalanta</i>	Red Admiral	1	3		
<i>V. cardui</i>	Painted Lady	1	4		1
<i>V. virginiensis</i>	American Lady				
<i>Limenitis weidemeyerii</i>	Weidemeyer's Admiral	1	2	3	1
<i>Coenonympha tullia ochracea</i>	Common (Ochre) Ringlet				
<i>Cercyonis pegala</i>	Common Wood-Nymph			7	11
<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				
<i>Erynnis pacuvias</i>	Pacuvius Duskywing				
<i>E. persius</i>	Persius Duskywing				
<i>E. icelus</i>	Dreamy Duskywing				
<i>Burnsius (Pyrgus) communis</i>	Common Checkered-Skipper				
<i>Piruna pirus</i>	Russet Skipperling				
<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				
<i>P. mystic</i>	Long Dash				
<i>Ochlodes sylvanoides</i>	Woodland Skipper			10	11
<i>*Polites peckius</i>	Peck's Skipper			1	2
<i>Poanes taxiles</i>	Taxiles Skipper			7	2
<i>Euphyes vestris</i>	Dun Skipper				1
<i>Atrytonopsis hianna</i>	Dusted Skipper				
skipper sp.					

Anne U. White Trail

Date, Conditions	Location within Anne U White	Butterfly Activity	Blossoming Plants	Animals	Researcher
6/3/2019 9:45 – 12:00 pm 21-20 °C, Mostly clear sky to overcast; calm to still	Transect				Cathy Comstock
6/28/2019 9:30-11:30 am 21-20 °C, Clear, calm	Transect				Cathy Comstock

8/3/2019 8:10-11:15 am 21-29 °C, calm wind, clear sky	Transect			Chickadee Mtn Flycatcher Cord Crow Goldfinch, Lesser Hummingbird Bd tl Jay, Steller's Nuthatch Wh br Nuthatch, Rd br Swallow Violet gr	Cathy Comstock
8/14/2019 8:10-12:00 pm 20-25 °C, Clear sky, calm wind	Transect				Cathy Comstock

Anne U. White Trail

Anne U. White Trail	2007	2008	2009	2010	2011	2012	2013	2014	2015		2017	2018	2019
# Species Identified during the year 2007-2019	44	45	35	31	47	50	29	17	10		24	32	23
# Research Hours on Site	9.5	16	10	10.5	19.5	13.5	11	6	3		3.5	18.5	10
# Individual Butterflies Counted	366	536	217	112	773	509	334	105	33		96	319	216
# Individuals / Research Hour	38.5	33.5	21.7	10.7	39.6	37.7	30	17.5	11		27.4	24	21.6
# Species / Research Hour	4.6	2.8	3.5	3	2.4	3.7	2.6	2.8	3.3		6.8	1.7	2.2

Hall II	2019	8/16
<i>Papilio rutulus</i>	W. Tiger Swallowtail	
<i>P. multicaudata</i>	Two-tailed Swallowtail	
<i>Pontia protodice</i>	Checkered White	
<i>P. sisymbrii</i>	Spring White	
<i>Pieris rapae</i>	Cabbage White	2
white sp.		3
<i>Euchloe ausonides</i>	Large Marble	
<i>Colias philodice</i>	Clouded Sulphur	
<i>C. eurytheme/philodice alba form</i>	Sulphur female	1
<i>C. eurytheme</i>	Orange Sulphur	13
sulphur sp.		1
<i>Callophrys mossii</i>	Moss Elfin	
* <i>Strymon melinus</i>	Gray Hairstreak	
<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	3
<i>P. lupini lutzi</i>	Lupine Blue	
<i>P. glandon rustica</i>	Arctic Blue	
<i>Danaus plexippus</i>	Monarch	

I. Hall II

<i>Euptoieta claudia</i>	Variegated Fritillary	
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Hall II	2019	8/16
<i>Speyeria aphrodite</i>	Aphrodite Fritillary	2
<i>S. edwardsii</i>	Edwards' Fritillary	
<i>S. hesperis</i>	Northwestern Fritillary	2
fritillary species		22
* <i>S. coronis</i>	Coronis Fritillary	2
<i>Phyciodes cocyta</i>	Northern Crescent	
<i>P. pulchella</i>	Field Crescent	
<i>P. tharos</i>	Pearl Crescent	
<i>Polygonia gracilis</i>	Hoary Comma	
<i>Nymphalis antiopa</i>	Mourning Cloak	
<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>Asterocampa celtis</i>	Hackberry Emperor	
<i>Coenonympha tullia ochracea</i>	Common Ringlet	
<i>Cercyonis pegala</i>	Common Wood-Nymph	16
* <i>C. oetus</i>	Small Wood-Nymph	2
<i>Burnsius (Pyrgus) communis</i>	Common Checkered-skipper	20
<i>Pholisora catullus</i>	Common Sootywing	
<i>Hesperia colorado</i>	W. Branded Skipper	
* <i>Polites mystic</i>	Long Dash	
<i>H. leonardus pawnee</i>	Leonard's Skipper	
<i>Ochlodes sylvanoides</i>	Woodland Skipper	1
<i>Poanes taxiles</i>	Taxiles Skipper	
<i>Atrytonopsis hianna</i>	Dusted Skipper	

Hall II

Date 2019	Location within Hall II	Behavior of butterflies	Animals	Plants blooming	Researchers
August 16, 9:20 – 12:00 p.m. 26-30 °C, Sky 85% blue, wind 0-5 mph	Bobcat Canyon, return on high road	Weedy overgrown area. Fritillaries flying fast, nectaring in old Bull Thistles	Canyon wren Goldfinch, Am Goldfinch, Lesser Hummingbird Kestrel Mourning, Dove Woodhouse's Toad	Clematis-seeded Golden rod Gumweed Knapweed Melilotus Solidago	Ranger John Queen Chris Friedman Chuck Lowry Jan Chu Larry Crowley Linda Hardesty Sue Hirschfeld

Hall II	2013	2014	2015	2016		2018	2019
# of Species Identified During Each Year in Hall II	31	17	17	10		14	10
Cumulative # Species Sighted in Hall II	31	32	37	37		41	45
Research Hours on Site	15	3.5	4	5		3	2.5
# Individual Butterflies Counted	319	95	104	66		41	90
# Individuals / Research Hour	21	27	26	13		13	36
# Species / Research Hour	2.1	4.8	4	2		4.6	4.4

Appendix I. Butterflies Observed During Boulder County Open Space Surveys - 2004-2019

Common Name	Scientific Name	Author(s)
Parnassian and Swallowtails	Papilionidae 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	Pieridae Family	
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, Margined	<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, Western Clouded	<i>Colias eriphyle</i>	W.H. Edwards
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	Lycaenidae Family	
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. helloides</i>	(Boisduval)
Hairstreak, Western Green	<i>Callophrys affinis homoperplexa</i>	W. Barnes&Benjamin
Hairstreak, 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>Satyrrium 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>Icaricia saepiolus</i>	(Boisduval)
Blue, Boisduval's	<i>I. icarioides</i>	(Boisduval)
Blue, Lupine	<i>I. lupini lutzi</i>	P. dos Passos
Blue, Arctic	<i>Agriades glandon rustica</i>	(W.H. Edwards)
Metalmarks	Riodinidae Family	
Metalmark, Nais	<i>Apodemia nais</i>	(W.H. Edwards)
Brushfoots	Nymphalidae Family	
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, Atlantis	<i>S. atlantis</i>	(W.H. Edwards)
Fritillary, Northwestern	<i>S. hesperis</i>	(W.H. Edwards)
Fritillary, Mormon	<i>S. mormonia</i>	(Boisduval)
Fritillary, Silver-bordered	<i>Boloria selene</i>	([Schifferrmüller])
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>Polydryas arachne</i>	(W.H. Edwards)
Checkerspot, Variable	<i>Euphydryas anicia</i>	(E. Doubleday)
Crescent, Pallid	<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. virginensis</i>	(Drury) Admiral,
Weidemeyer's Admiral	<i>Limenitis weidemeyerii</i>	W.H. Edwards
Emperor, Hackberry	<i>Asterocampa celtis</i>	Boisduval, LeConte
Ringlet, Common	<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, Persius	<i>E. persius</i>	(Scudder)
Checkered-skipper, Two-banded	<i>Pyrgus ruralis</i>	(Boisduval)
Checkered-skipper, Common	<i>Burnsius 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)