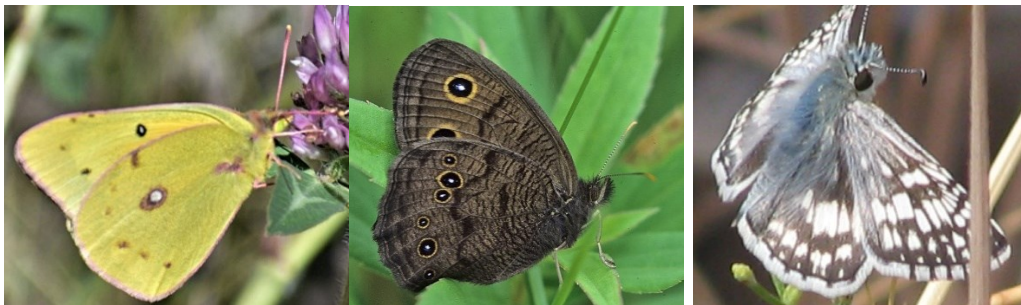


Lepidoptera of North America 18

2021 Butterfly Inventories
within Boulder County Open Spaces
Boulder, Colorado

By Janet Chu, Sue Hirschfeld, and Venice Kelly



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

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February 14, 2022

Cover Illustrations: Orange Sulphur (*Colias eurytheme*), Common Wood-nymph (*Cercyonis pegala*), and Common Checkered-skipper (*Burnsius communis*) in Geer Watershed at Heil Ranch following the Calwood Fire, Boulder County. Colorado, by Janet Chu©

ISSN 1084-8819

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I. Acknowledgments

We sincerely thank the Boulder County Parks and Open Space (BCPOS) for supporting the inventorying of butterflies within these spacious lands. Susan Spaulding, Senior Wildlife Specialist provided close contact and a warm friendship with the researchers. Amanda Hatfield and Kevin Grady, Resource Protection Rangers have been generous offering timely suggestions and helpful supervision which enhanced field work. The Research Permits were valued and gave us the opportunities to work closely with the staff. We enjoy and hold dear the occasions to cooperate with staff members. I wish to commend the Open Space Department for the continued scientific and varied conservation efforts to utilize and preserve these lands. 2021 was especially a challenge because of the horrendous Calwood Fire which destroyed many resources.

Mentors continue to provide professional support and encouragement. We thank Paul Opler, our advisor, the well-known Lepidopterist who is very familiar with the butterflies of the Colorado Front Range. Mike Fisher and Christian Nunes have been helpful in verifying the identification of species of butterflies. Active research volunteers in 2021 include: John Barr, Amy Chu, Janet Chu, Larry Crowley, Chris Friedman, Linda Hardesty, Sue Hirschfeld, Richard Holmes, Venice Kelly, Wynne Whyman with others helping as time allowed: Bev Postmus, Cathy Comstock, Cathy Cook, Ann Cooper, Carol Cushman, Dan Fosco, Joe Krieg, Jeff MacLachlan, Jean Morgan, Eric Olson, Pam Piombino, and Susan Spaulding. Sue Hirschfeld had special permission to perform a third-year survey in the Calwood burn area in the Heil Ranch, Geer Watershed, from the barn into the meadows and streamlets. Venice Kelly completed an intense survey within Caribou Ranch, specializing on the Sherwood Transect but including fieldwork at the Bluebird Mine, and further including the Mud Lake Trail.

Daniel Ziskin, an NCAR programmer, designed the the computer program which is accessed at the end of each season to compile data. His program determines the Individuals per Research Hour (I/RH) toward the statistical compilation for all Open Spaces surveyed. His design has profiled a different view of the butterfly inventory. It is comprehensive and all-inclusive preparing this report to answer the question, asked by many, “What is the trend of our butterfly population?” Note the graphs and interpretations for the Trends for the Open Spaces surveyed in Section VI, page 9.

I. Abstract

The butterfly inventories continued for the 18th year in a few of the Boulder County Open Space properties. However, because of the Calwood Fire during October 17, 2020, two of the survey areas were inaccessible; Plumely Canyon and the work road through the streamlet near the Lichen Trail. Geer Watershed had been burned, but the meadows above the Resident Ranger's Cabin and associated streamlets were made accessible with our 2021 permit. Cabbage Whites (*Pieris rapae*), Orange Sulphurs (*Colias eurytheme*) and Common Wood-nymphs (*Cercyonis pegala*) were more numerous when compared to years 2015-2020 populations before the burn. In other Open Spaces, Anne U. White and Caribou, the resident species produced noticeably large populations: Julia Orangetips (*Anthocharis julia*), Pine Whites (*Neophasia menapia*), Northern Checkerspots (*Chlosyne palla*), Common Wood-nymphs, Small Wood-nymphs (*C. oetus*), Common Checkered-skippers (*Burnsius communis*). On the other hand, the well adapted non-native Cabbage Whites were again the most common during the long season; Variegated Fritillaries (*Euptoieta claudia*) and Dainty Sulphurs (*Nathalis iole*) were numerous flying in from colonies in the eastern plains and low foothills where their host plants were plentiful. 95 species were seen in 2021; 129 species have been seen between 2004 and 2021 in the County Open Spaces. 203 species are on the record for Boulder County as confirmed on the Butterflies and Moths of America (BAMOA) website.

III. Objectives

- 1) Continue Butterfly Inventories for the 18th consecutive year within Boulder County Open Space properties with special attention following the Calwood Fire in Heil Ranch.
- 2) Record both numbers of individuals and species of butterflies within the following areas: Southeast Buffer (Coalton Trail), Heil Valley Ranch (Geer, Red Gulch, North Pointe), Walker Ranch (Meyer's Homestead Trail), Reynold's Ranch (Giggey Lake), Caribou Ranch (Sherwood Transect, Bluebird Mine, Caribou Meadows), Mud Lake, and Anne U. White Trail.
- 3) Determine a Trend using Individuals/Research Hour (I/RH) for the Open Spaces surveyed.
- 4) Calculate the final Summary Trend (I/RH) of butterfly populations for Boulder County Open Spaces surveyed.
- 5) Follow Sherwood Transect recording numbers and species of butterflies, establishing references for further studies, within Caribou Ranch.

IV. Research Methods

The 2021 butterfly inventories followed two methods for surveying populations and species through a six-month season April through September.

The most used method involved meandering, our standard for surveying. On every field day the research team hiked for about three hours following trails, roads, and streams. Survey efforts were concentrated in areas where we had inventoried previous years containing moisture, flower blossoms for butterflies, and host plants for support of significant numbers of caterpillars. This 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 when needed. For the last several years digital photos have been used in place of curating specimens for identification. Researchers Venice Kelly, Chris Friedman, Dan Fosco, and John Barr have catalogs of photos.

The modified Pollard method was used for Sherwood Road, nestled between Mud Lake and Caribou Ranch, allowing for repeated sampling using a static transect over time. That is, a researcher follows a preplanned path, observing butterflies within 6 meters in all directions within the time frame 10 am to 4 pm.

Venice Kelly follows Sherwood Road to the Conger Mine and returns into the Bridge Meadow. This transect was surveyed 23 times between April 9 and September 22, 2021. Venice has excellent photographic records; therefore, no specimens were taken.

The area affected by the Calwood Fire in the Heil Ranch, Geer Watershed, had previously been a transect studied by Sue Hirschfeld. This year because of the special condition one season after the meadow had burned, the transect method was not followed. It was more important to use the meandering method to survey the meadow more completely from the Barn, along all streamlets and beside the Ponderosa Pines.

Data from all survey areas, including numbers of individual butterflies and number of species observed during each field day were recorded by each team leader on spreadsheets and analyzed for patterns occurring during the field season. For each location, the unit 'Individuals per Research Hour' (I/RH) was calculated using the number of individual butterflies observed (I) divided by the research hours (RH) of the team in the field. The 'RH' unit was the total of a

group's time not the total individual summation of times contributed. These are units which this author developed for comparison, season to season and year to year. Sites included: Heil Valley Ranch, Walker Ranch, Caribou Ranch, Reynolds Ranch, Anne U. White Trail, and the Southeast Grasslands Buffer. The study areas were chosen by team members because of varied habitats and elevations.

V. Introduction

During the past 18 years, inventories of butterfly species have been conducted under the leadership of Janet Chu resulting in records of the species which live in and occur incidentally, within the various Open Space areas. Inventories were conducted during 2021 in the Southeast Grassland Buffer (Swallowtail Hill, Rock Creek headwaters), Heil Valley Ranch (Geer Watershed, North Pointe, Red Gulch), Walker Ranch (Meyer's Homestead Trail), Reynolds Ranch (North Bog, West Hill), Caribou Ranch (Sherwood Road, Bridge Meadow, Bluebird Mine), Mud Lake and Anne U. White Trail. During the 2021 season, within Heil Ranch the Plumely Canyon, the service road and the entrance were inaccessible because of the Calwood Fire damage.

In addition, there are several active lists of butterflies maintained by Steve R. Jones, personally; Christian Nunes for the City of Boulder Mountain Parks and Open Space; and the Butterfly Pavilion. The Gillette Museum of Arthropod Diversity maintains an enormous and active butterfly collection. Since the creation of Boulder County Parks and Open Space in 1975, this is the first and only review of Open Space butterflies.

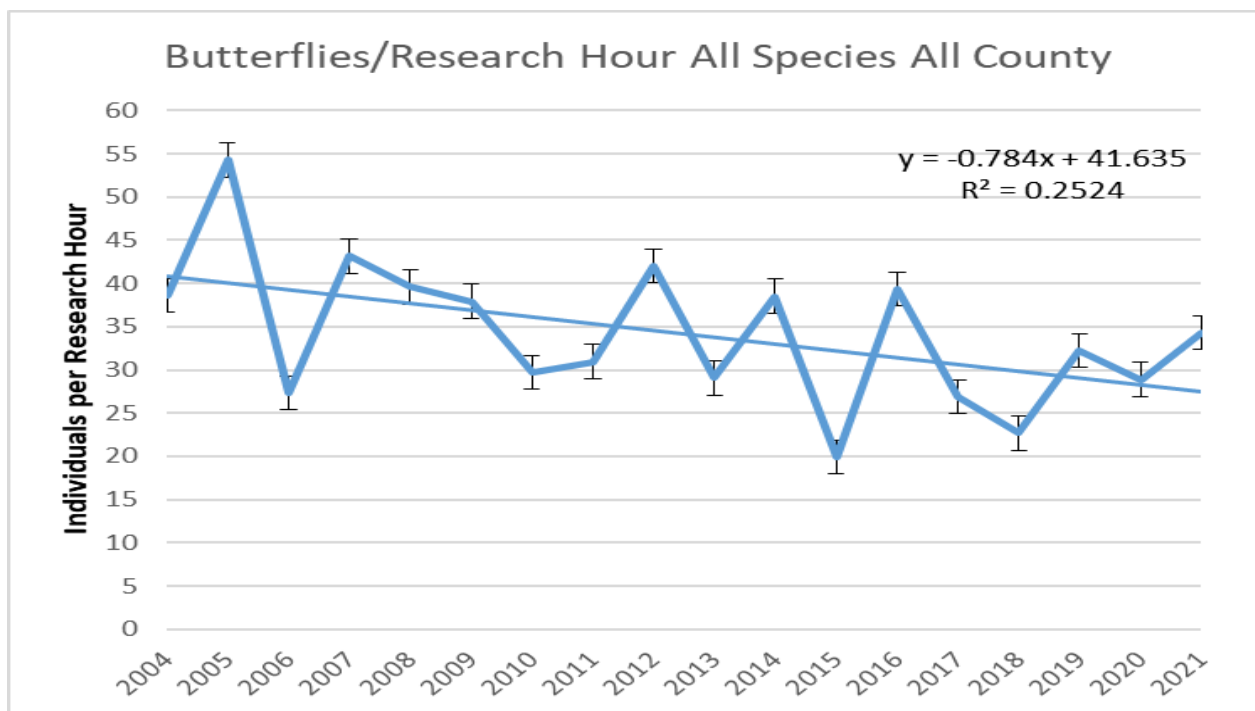
Data for each area, including Caribou transect and meanderings are combined and follow in Section X, page 20.

VI. Trends

When considering all the Individual Butterflies per Research Hour (I/RH) counted in seven of the Open Space areas in 2021 there is a continuing downward trend. Daniel Ziskin has analyzed collectively all the information for each species and within each surveyed Open Space.

The following is the resulting chart:

A. All Species in All Surveyed Open Spaces – Butterflies per Research Hour



Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Butterflies/Research Hour All Species All County	39	54	27	43	39	39	29	31	42	29	38	20	39	27	23	32	29	34

Reproducibility	0.1
RH Error	0.2
I Error	0.1
	0.06
	0.244949

Data Analysis

The error associated with each data point has three main sources. There is error in counting, error in research hours and error in year-to-year reproducibility. Errors in counting can occur when individual butterflies are counted twice by different researchers or if the butterfly was there but

undetected. We estimate this to add 10 per cent uncertainty. Research Hours (RH) are compiled by the number of researchers and their time in the field. Although calculating the RH is trivial, not all researchers nor hours are equally productive. We estimate that variations in the value of each RH contributes 20 per cent uncertainty. Year after year the same locations are surveyed but there is only one formal transect. There is a lack of rigorous adherence to which summer days the sites are visited and by whom. This leads to an overall lack of reproducibility that is overlaid upon the annual variation that naturally occurs which we estimate to add 10 per cent to the uncertainty. Collectively these sources of error combine to create about 25 per cent uncertainty of any given I/RH calculation.

When considering the Individual Butterflies per Research Hour (I/RH) counted in seven of the Open Space areas and for the aggregation of all species, over the time period spanning 2004 through 2021, there is a continuing trend downward. This trend is evident despite a high degree of interannual variability. The slope suggests that the Boulder County butterfly population is steadily declining by about 2 per cent per year.

This is data produced by committed citizen scientists who have become knowledgeable lepidopterists. There is now data for the Boulder County to which we may proudly refer.

VII. Narration for Each Open Space

A. Southeast Grassland Buffer

This Southern Grassland Buffer was visited twice in 2021. The April 26 visit was early, and only one each Olympia Marble (*Euchloe olympia*) and Clouded Sulphur (*Colias philodice eriphyle*) was observed.

On August 8 several species were found to be active: 19 Cabbage Whites, 28 Orange Sulphurs (*Colias eurytheme*), and 101 Common Checkered-skipper. One Black Swallowtail (*Papilio polyxenes*) flew over the Coalton Trailhead, but none were seen on the Swallowtail Hill within the Buffer. Just north of the Trail in the pasture, each time we took a step Dainty Sulphurs (*Nathalis iole*) flew out of the short dry grasses by the dozens, flying low reminding us of locust

invasions. Gray-toned Variegated Fritillaries (*Euptoieta claudia*) appeared to have lost colorful scales. These do not overwinter here but colonize in the eastern plains and low foothills every year. They can build up large numbers where the larval hosts are available. (See Table A for reference.)

B. Anne U. White Trail

The Anne U. White Trail was visited by the research team four times in April and twice in September. It was unusual to observe five species of swallowtails on the trail during one day, June 3: Anise Swallowtail (*Papilio zelicaon*), Indra Swallowtail (*P. indra*), Western Tiger Swallowtail (*Papilio rutulus*), Pale Swallowtail (*P. eurymedon*), and Two-tailed Swallowtail (*P. multicaudata*). Julia Orangetips (*Anthocharis julia*) were more numerous than had ever been seen at one time on this trail. Many Large Marbles were among the Julias making a bright display of aerial whites. The Echo Azure with a dark cross in hind wing, (*Celastrina echo sidara*) was newly sighted on this trail, in the mud beside the stream. Several blues were ‘puddling’ at the steps where dogs and people trod. The azures were nectaring on small white asters.

On June 17 we traversed a sunny spot with a long muddy patch in the trail where a Red Admiral (*Vanessa atalanta*) repeatedly rested. Weidemeyer’s Admirals (*Limenitis weidemeyerii*) were drinking right at the water’s edge. These were sighted again at the same streamside on June 24.

American Snout (*Libytheana carinenta*), a seldom seen butterfly visitor in this county, was photographed by Venice Kelly on September 4 for the first time on this trail. Woodland Skippers (*Ochlodes sylvanoides*) were newly emerged and colorful but other butterflies were tattered and old. On September 16 the Orange Sulphurs were interacting as they flew. (See Table B for reference.)

C. Heil Valley Ranch – North Pointe and Red Gulch

Early exploration of North Pointe followed the little used dirt road to the pond. On May 1 few butterflies were flying early in the season. Seven Mourning Cloaks (*Nymphalis antiopa*) and their co-habitators Hoary Commas (*Polygonia gracilis*) were seen over the ravine which follows the old ranch roadway. A single Anise Swallowtail (*Papilio zelicaon*), the Western Tiger

Swallowtail (*P. rutulus*), White-lined Green Hairstreak (*Callophrys sheridanii*) and Western Pine Elfin (*C. eryphon*) flew near the blossoming wild plums.

Red Gulch is entered with permission across LaFollette's property. There is no trail, therefore the intermittent stream is followed including the Heil Ranch Open Space meadows on both sides. By May 24 the Olympia Marbles were in full flight. Inside the Red Gulch on August 16, Common Wood-nymph and Common Checkered-skippers were numerous, especially near any available muddy patches in the gully. The ground was dry, however 40 Melissa Blues (*Plebejus melissa*) were sipping moisture from a dripping clay pipe below LaFollette's home.

On August 16 more than 100 fritillaries were flying downstream one after another above the stream bed from 9:15-11:00 a.m. Twenty-four Variegated Fritillaries (*Euptoieta claudia*) and 17 Aphrodite Fritillaries (*Argynnis aphrodite*), and 11 Northwestern Fritillaries (*Speyeria hesperis*) were identified within this group. We had seen this behavior with fritillaries flying downstream previously in Heil Ranch near the Pavilion. The notable white butterflies were Cabbage Whites (*Pieris rapae*). Some Common Checkered-skippers were mating. Three Hackberry Emperors (*Asterocampa celtis*) were the only ones we found in 2021 in the Open Space surveys. (See Table C for reference.)

D. Heil Ranch - Geer Watershed

Following the Calwood Fire, members of the butterfly group went into Geer meadow and along Geer Stream to identify and count butterflies, and to observe changes in numbers and diversity over time. Late in May, the first sight of the intensity of the burn was shocking. However, the Meadow was covered with grasses and the diversity of the flowers was reassuring. At this time few butterflies were observed by Sue Hirschfeld and Chris Friedman. (Refer to Section D)

Heavy spring and summer rainstorms created flood surges from the burned slopes that filled culverts and overflowed into Geer Creek. The banks along the creek were filled with wood debris and ash. Changes to the creek due to scour and sedimentation were observed every visit. Due to episodes of flooding we did not go into Geer during early June.

By July and August both the diversity and numbers of butterflies increased. An unusual number of Variegated Fritillary were counted. At times, large numbers of newly emerged Cabbage

Whites, Common Checkered-skippers and Orange Sulphurs were observed puddling on the wet sediment. Few blues of different species were found all summer. Refer to the data on page 31.

A surprising diversity and number of species continued into September. Given the major environmental changes produced by the Calwood Fire to the Heil – Geer forest, meadow, and drainage system, some butterfly species appear to have successfully utilized the new resources whereas others did not benefit from the changes. Sue Hirschfeld and Chris Friedman were in the field in Geer Watershed 18 Research Hours over a seven-day period 5/28 - 9/19, 2021.

Compared with previous emergences (leaving the chrysalis as newly formed adults), certain resident species produced large increases in the population of adults following the October 2020 Calwood Fire. It was further noted by the editor that several species were more numerous than typically were counted between 2016 and 2020. Orange Sulphurs and Common Wood-nymphs had larger populations than in the past six years. It is not often we see bursts of populations of these butterflies. Cabbage Whites (*P. rapae*) were by and far the most abundant.

A. Abundant Butterflies in Geer Watershed 2016-2021

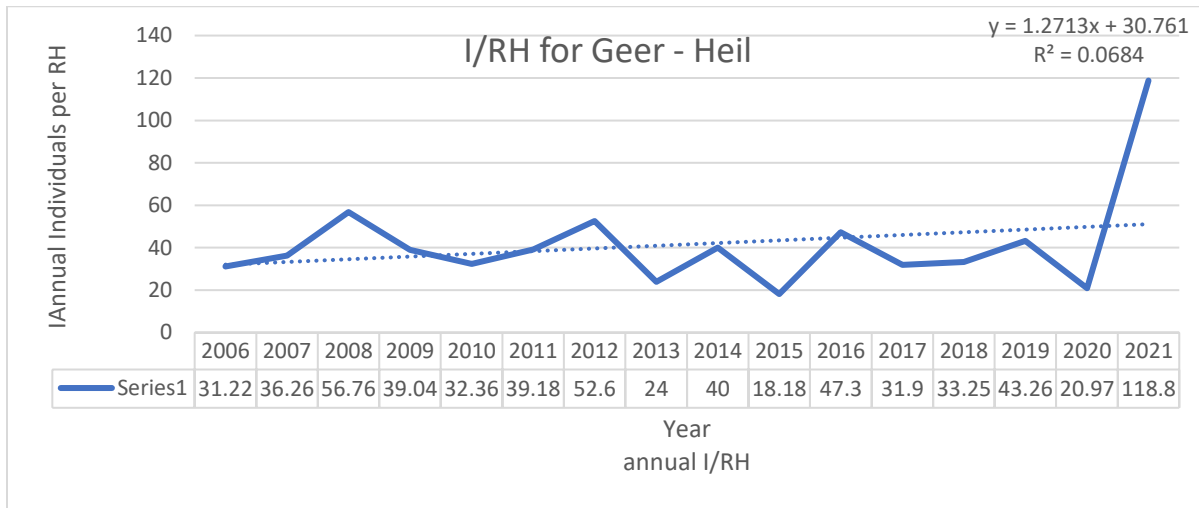
Geer Watershed Individual Butterflies	2016	2017	2018	2019	2020	Mean 2016-2020	2021 Individuals
Cabbage White	74	59	106	23	13	55	718
Orange Sulphur	34	2	14	30	19	20	100
Gray Hairstreak	13	0	1	0	1	3	72
Common Wood-nymph	31	181	53	16	5	57	210
Common Checkered-skipper	7	0	6	1	2	3	194
Research Hours	10	21	20	43	17		18

Compare the number of individuals sighted from 2016-2020 with the number of individuals counted in 2021. The numbers of these species in 2021 is greater than the mean of each during 2016-2020. In 2021 Cabbage Whites had around a seven times greater population than during the highest numbers 2018. Common Checkered-skippers were more numerous in 2021 than in any year from 2016-2020. The year 2016 had only 10 Research hours (RH) in the field, but the highest number of adult Checkered-skippers between 2016 and 2020. Orange Sulphurs, Gray Hairstreaks, and Common Wood-nymphs had greater populations in 2021.

The trend line for the I/RH for the Geer Watershed was quite affected in 2021 giving it a positive result. The counts in 2020 were made by the butterfly team members during the usual season

June 10-September 12 and yet the I/RH were much lower. The several species' emergences affected the I/RH April 29-September 19, 2021.

B. Individuals per Research Hour (I/RH) for Geer Watershed



Series 1 is the annual I/RH for Geer Watershed, Heil Ranch

There are numerous potential reasons why these species butterflies were successful. A few are likely that following the burn of ground cover, there may have been an added degree of soil minerals resulting in added fertility. There was a long-wet spring which may have provided the extra growth of their host plants. Caterpillars would have increased availability on host plants; parasites might have died in the long winter. And observationally, birds and other predators seemed less prevalent. (See Table D for reference.)

E. Walker Ranch – Meyer’s Homestead Trail

The Meyer’s Homestead Trail is a single trail with a turnaround point. The trailhead begins in Ponderosa Pine and small meadows, passes through a wet meadow then rises higher into Aspen and Douglas-fir. On May 26 three elfin species were flying – the Brown Elfins (*Callophrys augustinus*), Hoary Elfins (*C. polios*), Western Pine Elfins (*C. eryphon*). There are usually few elfins, and it is not often three *Callophrys* are found on the same day. Also, Western Green Hairstreaks (*C. affinis*) were observed that day and became more numerous in June.

On June 16 fifteen Julia Orangetips were flying portending the season to have more than usual numbers of Julias. Pairs of Silvery Blues (*Glycopsyche lygdamus*) and Orange Sulphurs were mating with their own species. Echo Azures (*Celastrina echo sidara*) were numerous on June 16 along with several Arrowhead Blues (*G. piasus*) and Boisduval's Blues (*Plebejus icarioides*).

Noted on June 23 more than 50 Rocky Mountain Dotted-blues (*Euphilotes ancilla*) were nectaring on their host the Sulfur flowers. Common Alpines (*Erebia epipsodea*) were mating. Indra Swallowtails (*Papilio indra*), Pale Swallowtails (*P. eurymedon*) and Western Tiger Swallowtails (*P. rutulus*) were puddling and soaring over the moist streamlets. Two Sulphur alba-type females were noticed among 18 other sulphur species.

By July 19 there were signs of weather damage and wear on the butterflies. Common Ringlets (*Coenonympha tullia ochracea*) and Uhler's Arctic (*Oeneis uhleri*) were numerous among the grasses. By August 27 the Small Wood-nymph and Western Branded-skippers (*Hesperia colorado*) were nectaring. Dainty Sulphurs emigrated from the eastern plains and low foothills where their larval hosts are available, thus, they can build up large numbers. On that day resident Western Branded-skippers were flying. There were no puddling areas and butterflies were sparse except for Small Wood-nymphs (*Cercyonis oetus*) which scattered as we walked through the short and dehydrated grasses. (See Table E for reference.)

F. Reynold's Ranch – 'West Trail' and Giggey Lake

The North Bog was not explored by the researchers in 2021 because of lack of time and cattle having grazed this area recently and too completely which reduces the blossoms.

The Western Trail was surveyed by Cathy Cook on June 14 past the wet area to a dead tree in the trail surrounded by aspens. We had for many years surveyed this valley beginning at the Magnolia Road entrance, thinking this was part of Reynold's Ranch. Now with property signs posted we know it is National Forest land adjacent to and west of the North Bog. Eight Julia Orangetips were flying; Five Brown Elfins flew over their host plant Kinnikinnick. One Weidemeyer's Admiral (*Limenitis weidemeyerii*) was seen by Cathy near the moist trail.

Within the Giggey Lake meadow we have repeatedly noticed the flowers are outstanding and varied. We welcomed Bev Postmus, County Volunteer botanist who listed the variety in blossoms on July 21. On this date the Sulphurs were noticeable including four Clouded Sulphurs, five Orange Sulphurs and one alba-form female: five Queen Alexandra's Sulphur (*C. alexandra*) and two Dainty Sulphurs. The most often sighted near Giggey, the Greenish Blue (*Plebejus saepiolus*) was located along with Reakirt's Blue (*Echinargus isola*), Rocky Mountain Dotted Blue (*Euphilotes ancilla*), and Lupine Blue (*Plebejus lupini lutzi*). An unusually large number of Weidemeyer's Admirals (*Limenitis weidemeyerii*) and Northern Crescents (*Phyciodes cocyta*) were flying over the blossoms. (See Table F for reference.)

G. Caribou Ranch– Sherwood Transect, Meadows, Blue Bird Mine, and Mud Lake

The Caribou Ranch Open Space areas that were surveyed for butterflies include Sherwood Transect, the Caribou Meadows, Blue Bird Mine area and the adjacent Mud Lake. The 2021 butterfly season began slowly with late snowstorms and long periods of cold in the mountains. Plants that the butterflies and other insects use, were also slower growing and blossoming. The butterflies were slow to emerge.

On April 26th, two Mourning Cloaks (*Nymphalis antiopa*) became active on the Sherwood Transect. Toward the end of May, more species and individuals became active. I am always excited when I see my first Julia Orangetip and Two Banded Checkered-skipper (*Pyrgus ruralis*) of the year, noted Venice Kelly. This checkered-skipper is not common but I see at least one each year. This year there were 23! There were 74 Julia's. A good year for both species. Hoary Commas (*Polygonia gracilis*) and Mourning Cloaks made a good showing too. They are usually the first sightings of the year along with Sheridan's Hairstreak (*Callophrys sheridanii*).

In June, the butterflies continued to increase in numbers as more flowers were blooming. Towards the end of June, however, the ground was drier. Still, I was seeing 20 species during a day and a fair number of individuals. Northern Checkerspots (*Chlosyne palla*) were in high numbers during their flight time from end of June through July. Surprisingly, only a few Large Marbles were flying. Usually, these lovely butterflies are quite abundant. Persius Duskywings (*Erynnis persius*) were also sparse. There were no Edith Coppers (*Lycaena editha*). It seemed like they had established a presence in three different locations in the Caribou area, but they were absent in 2021. Ruddy Coppers (*Lycaena rubidus*) were also in very low numbers.

Pine Whites began to fly in August. Fifty-six were sighted by Venice on one day August 22! and there were more on subsequent days as well. An irruption, such as this, was quite exciting to see.

There were late September cold snaps, which slowed the butterfly flights. However, when it warmed up again, Reakirt's Blues (*Echinargus isola*), Dainty Sulphurs and Queen Alexandra's Sulphurs (*Colias alexandra*) made their appearances.

Overall, I think it was a fair year for most of the common species. In October the warm day air was extended, and I found a Marine Blue (*Leptotes marina*) on the Sherwood Transect. This is a new species for the transect, so this is very exciting. (See Table G for reference)

VIII. Conclusion

The Butterfly Inventory was completed by research volunteers in 2021 including: John Barr, Amy Chu, Janet Chu, Larry Crowley, Chris Friedman, Linda Hardesty, Sue Hirschfeld, Richard Holmes, Venice Kelly, Wynne Whyman for the 18th consecutive year within Boulder County Open Space properties. 148 Research Hours were spent on the land while 446 Volunteer Hours were performed by the team members for the County.

The numbers of individuals and species of butterflies were recorded within the following areas: Southeast Grassland Buffer, Anne U. White Trail, Heil Valley Ranch, Walker Ranch, Reynolds Ranch, Caribou Ranch, and Mud Lake. Of the known butterfly species 203 species in Boulder County, 95 were counted in the Open Spaces in 2021. There is an average of 88 species being inventoried the Open Spaces per year. (See Appendix II). Within the Open Space records 129 species have been recorded by the inventories from 2004 through 2021.

Special attention was paid to the meadow and streamlets in the Geer Watershed, Heil Ranch by Sue Hirschfeld and Chris Friedman because this followed the October 2020 Calwood Fire. A greater number of species was counted in 2021 than in the previous 10 years in the Geer Watershed.

The Sherwood Transect in the Caribou Ranch area was surveyed twenty-three times between April 9 and September 22, 2021, by Venice Kelly. This transect was completed for the third

consecutive year. Venice has excellent photographic records which will add to archive of references for further studies.

Of special note in 2021 was the numerous emergences of certain species. In the Caribou area and Anne U. White Trail it was unusually large numbers of Julia Orangetips; Dainty Sulphurs and Common Checkered-skippers in the Southeast Grassland and Geer; Gray Hairstreaks and Common Wood-nymphs in Geer; Northern Checkerspots and Small Wood-nymphs in the Caribou area. There was a late, wet, and cold spring, which may have moved the emergence of certain species, especially the blues to later or an absence as adults. On the other hand, August was extremely dry and hot. Neither Dainty Sulphurs nor Variegated Fritillaries overwinter here, so these immigrated in large numbers into several open Spaces.

Photos and locations of rare butterflies as noted by the Colorado Natural Heritage Program Watch List were sought: Arogos Skippers, (*Atrytone arogos*), Hops Azure, (*Celastrina humulus*), and Moss' Elfin (*Callophrys mossii schryveri*). Not one of these was recorded by any team member within the Open Spaces in 2020 or 2021.

Butterfly inventories should continue as they have been shown to consistently provide valuable data used for education, conservation, recreation, and land resource management.

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X. Data Tables

Every table continues to preserve the name of each species that has been found in that Open Space area. It is important to carry the sightings from one year to the next, even if the species had not been observed in 2021. These Data Tables contain a compilation of information from both the Inventory Method and Transect Method.

Names of genera have been updated in 2021 according to the Pelham [Catalogue of the Butterflies of the United States](#).

A. Southeast Buffer - Rock Creek

Southeast Buffer	2021	4/26	8/9	Total
<i>Papilio polyxenes</i>	Black Swallowtail		1	1
<i>P. zelicaon</i>	Anise Swallowtail			
<i>P. rutulus</i>	W. Tiger Swallowtail			
<i>P. multicaudata</i>	Two-tailed Swallowtail			
yellow swallowtail sp.		1		1
<i>Pontia protodice</i>	Checkered White		1	1
<i>P. occidentalis</i>	Western White		1	1
<i>Pieris rapae</i>	Cabbage White		19	19
<i>Euchloe olympia</i>	Olympia Marble	1		1
<i>E. ausonides</i>	Large Marble			
white sp.			12	12
<i>Colias philodice</i>	Clouded Sulphur	1	4	5
<i>C. eurytheme</i>	Orange Sulphur		28	28
sulphur sp.			22	22
<i>Zerene cesonia</i>	Southern Dogface			
<i>Abaeis nicippe</i>	Sleepy Orange			
<i>Kricogonia lyside</i>	Lyside Sulphur			
<i>Nathalis iole</i>	Dainty Sulphur		191 +	191
<i>Tharsalea dione</i>	Gray Copper			
<i>Strymon melinus</i>	Gray Hairstreak			
<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		3	3
<i>Plebejus melissa</i>	Melissa Blue		2	2
blue sp.			3	3
<i>Danaus plexippus</i>	Monarch		1	1
<i>Agraulis vanilla</i>	Gulf Fritillary			
<i>Euptoieta claudia</i>	Variegated Fritillary		75	75
<i>Argynnis aphrodite</i>	Aphrodite Fritillary			
<i>A. edwardsii</i>	Edwards' Fritillary			
fritillary sp.			1	1
<i>Chlosyne fulvia</i>	Fulvia Checkerspot			
<i>C. gorgone</i>	Gorgone Checkerspot			
<i>Phyciodes tharos</i>	Pearl Crescent			
<i>P. pulchella</i>	Field Crescent		3	3
checkersp/crescent sp.				
<i>Aglais milberti</i>	Milbert's Tortoiseshell			
<i>Nymphalis antiopa</i>	Mourning Cloak			
<i>Vanessa cardui</i>	Painted Lady			
<i>Limenitis weidemeyerii</i>	Weidemeyer's Admiral		1	1
<i>Coenonympha tullia ochracea</i>	Common (Ochre) Ringlet			
<i>Cercyonis pegala</i>	Common Wood-nymph		6	6
<i>Erynnis afranius</i>	Afranius Duskywing			
<i>E. persius</i>	Persius Duskywing			
<i>Burnsius communis</i>	Common Checkered-skipper		101	101
<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			
Orange skipper sp.				

A. Southeast Buffer (Continued)

Date, Conditions	Location within	Butterfly Activity	Researcher
4/26/2021 10:00-12:30 pm Sky mostly blue, wind 0-5 mph 1.5 x7 h Persons =10.5	Hwy 128 gate to Swallowtail Hill	Swallowtail Ridge has yellow Swallowtail flying	Chris Friedman Jan Chu Larry Crowley Linda Hardesty Pam Piombino Richard Holmes Sue Hirschfeld
8/9/2021 9:30-11:30 am 21-25 °C, heavy haze, smoke, ozone sky, 0-5 mph wind 2 x6 = 12hrs	1)Coalton Parking lot onto trail and into meadow and 2) Southeast Buffer off 128 to gully and hilltop	Orange sulphur nectaring on Liatris. Flowers very poor along Coalton. No Swallowtails on Swallowtail Ridge. Many Dainty Sulphurs	1)Jean Morgan Joe Krieg Jan Chu 2)Dan Fosco Chris Friedman Linda Hardesty (upper)

3.5 Research hours 30.5 Volunteer Hours for Boulder County

A. Southeast Buffer (Concluded)

Southeast Buffer	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
# Species identified during the year in Southeast Buffer	25	20	21	24	19	18	20	15	23	13	16	18	12	17	16
Cumulative # Species 2007-2021 sighted in Southeast Buffer	21	23	33	37	41	44	44	44	46	46	47	47	47	47	47
Research Hours on Site	5	21	9	7.7	11.5	9	12	8	12	4.5	8	9	5.5	6.5	3.5
# Individual Butterflies Counted	256	373	353	443	160	227	169	178	294	121	119	271	39	57	478
# Individuals / Research Hour	51	18	39	40	14	25	14	22	24.5	27	15	30	7	8.8	139
# Species / Research Hour	5	0.9	2	3	2	2	1.6	2	2	3	2	2	2	2.6	4.2

B. Anne U. White Trail

Anne U. White Trail	2021	6/3	6/17	6/21	6/24	9/4	9/18	Total 2021
<i>Parnassius smintheus</i>	Rocky Mountain Parnassian							
<i>Papilio polyxenes</i>	Black Swallowtail							
<i>P. zelicaon</i>	Anise Swallowtail	1						1
<i>P. indra</i>	Indra Swallowtail	1	1		1			3
<i>Papilio rutulus</i>	W. Tiger Swallowtail	3			3			6
<i>P. eurymedon</i>	Pale Swallowtail	2						2
<i>P. multicaudata</i>	Two-tailed Swallowtail	2						2
black swallowtail sp.		1						1
<i>Pontia protodice</i>	Checkered White							
<i>P. occidentalis</i>	Western White							
<i>P. sisymbrii</i>	Spring White							
<i>Pieris rapae</i>	Cabbage White					2	1	3
<i>Euchloe ausonides</i>	Large Marble	11	4		1			16
<i>E. olympia</i>	Olympia Marble							
white sp.	white sp.	15						15
<i>Anthocharis julia</i>	Julia Orangetip	22	18					40
<i>Colias philodice</i>	Clouded Sulphur							
<i>C. eurytheme</i>	Orange Sulphur					1	6	7
<i>Nathalis iole</i>	Dainty Sulphur							
sulphur sp.	sulphur sp.				1			1
<i>Callophrys affinis homoperplexa</i>	W. Green (Bramble) Hairstreak	3						3
<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	11						11
<i>Satyrrium titus</i>	Coral Hairstreak							
<i>Strymon melinus</i>	Gray Hairstreak							
<i>Cupido amyntula</i>	Western Tailed-Blue	1	2					3
<i>Celastrina echo sidara</i>	Echo Azure	10						10
<i>Glaucopsyche piasus</i>	Arrowhead Blue							
<i>G. lygdamus</i>	Silvery Blue	2						2
<i>Euphilotes ancilla</i>	Rocky Mountain Dotted-Blue							
<i>Echinargus isola</i>	Reakirt's Blue							
<i>Plebejus saepiolus</i>	Greenish Blue							
<i>P. melissa</i>	Melissa Blue		3				1	4
<i>P. icarioides</i>	Boisduval's Blue		1					1
<i>P. lupini lutzi</i>	Lupine Blue							
<i>P. glandon rustica</i>	Arctic Blue							
blue sp.	blue sp.	15					1	16
<i>Apodemia nais</i>	Nais Metalmark							
<i>Danaus plexippus</i>	Monarch							
* <i>Libytheana carinenta</i>	American Snout					1ph		1
<i>Euptoieta claudia</i>	Variegated Fritillary						1	1
<i>Argynnis aphrodite</i>	Aphrodite Fritillary					6		6
<i>A. edwardsii</i>	Edwards' Fritillary					1		1
<i>A. coronis</i>	Coronis Fritillary							
<i>A. callippe</i>	Callippe Fritillary							
<i>A. hesperis</i>	Northwestern Fritillary					1		1
<i>A. mormonia</i>	Mormon Fritillary							
fritillary sp.	fritillary sp.					8	5	13
<i>Chlosyne gorgone</i>	Gorgone Checkerspot							
<i>C. palla</i>	Northern Checkerspot							

Anne U. White Trail	2021	6/3	6/17	6/21	6/24	9/4	9/18	Total 2021
<i>Phyciodes pallida</i>	Pallid (Pale) Crescent							
<i>P. tharos</i>	Pearl Crescent							
<i>P. cocyta</i>	Northern Crescent		1					1
<i>P. pulchella</i>	Field Crescent	2				3	1	6
* <i>Polygonia gracilis</i>	Hoary Comma	1						1
<i>Polygonia satyrus</i>	Satyr Comma		1					1
comma sp.							1	1
<i>Junonia coenia</i>	Common Buckeye							
<i>Nymphalis antiopa</i>	Milbert's Tortoiseshell							
<i>N. californica</i>	California Tortoiseshell							
<i>N. antiopa</i>	Mourning Cloak							
<i>Vanessa atalanta</i>	Red Admiral		1					1
<i>V. cardui</i>	Painted Lady							
<i>V. virginensis</i>	American Lady							
<i>Limenitis weidemeyerii</i>	Weidemeyer's Admiral		6		3			9
<i>Coenonympha tullia ochracea</i>	Common (Ochre) Ringlet		3					3
<i>Cercyonis pegala</i>	Common Wood-nymph							
<i>C. oetus</i>	Small Wood-nymph							
<i>Oeneis uhleri</i>	Uhler's Arctic	2						2
<i>Epargyreus clarus</i>	Silver-spotted Skipper							
<i>Pholisora catullus</i>	Common Sootywing							
<i>Erynnis persius</i>	Pacuvius Duskywing							
<i>E. persius</i>	Persius Duskywing	1ph						1
<i>E. icelus</i>	Dreamy Duskywing							
<i>Burnsius communis</i>	Common Checkered-Skipper							
<i>Piruna pirus</i>	Russet Skipperling							
<i>Hesperia juba</i>	Juba Skipper	1						1
<i>H. colorado</i>	W. Branded-skipper					2		2
<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					8		8
<i>Polites peckius</i>	Peck's Skipper							
<i>Lon taxiles</i>	Taxiles Skipper							
<i>Euphyes vestris</i>	Dun Skipper							
<i>Atrytonopsis hianna</i>	Dusted Skipper							
skipper sp.							8	8

*First time sighted on this trail

B. Anne U. White Trail (Continued)

Date, Conditions	Location within Anne U White	Butterfly Activity	Researcher
6/3/2021 9:00 – 12:00pm 20-22 °C, Clear sky; no wind. 3 hrs.	Parking lot to Stream crossing. Chris to trail's end, meadows	Many Orangetips, White, two swallowtails flying. Azures nectaring on sm. White blossoms.	Amy Chu Cathy Comstock Chris Friedman Dan Fosco Jan Chu Richard Holmes Sue Hirschfeld Sue Olmstead

6/17/2021 8:30-11:30 a.m. 20-22 °C, Clear sky; no wind. 3 hrs	Parking lot to Stream crossing	Numerous flying butterflies	Jan Chu Jean Morgan
6/21/2021 8:30-11:00 am 15 °C, Cloudy, rain night before 2.5 hrs	Parking lot to stream crossing	No butterflies sighted	Dan Fosco Jan Chu Jean Morgan
6/24/2021 9-10:30 am 1.5 hrs.	Parking lot to stream crossing		Bev Postmus Jan Chu
9/4/2021 10:30-12:30pm 21-23 °C, Mostly sunny 2 hrs		Butterflies tattered; some skippers newly emerged	Venice Kelly
9/18/2021 12:00-2:45 pm 25 °C, Mostly clear, 0- 5 mph breeze 3 hrs	½ way to top of Trail, returned at Smokey Bear sign	Orange Sulphurs interacting	Chris Friedman

15 RH 45.5 Volunteer Hours for Boulder County

B. Anne U. White Trail (Concluded)

Anne U. White Trail	2007	2008	2009	2010	2011	2012	2013	2014	2015		2017	2018	2019	2020	2021
# Species Identified during the year 2021	44	45	35	31	47	50	29	17	10		24	32	23	4	33
# Research Hours on Site	9.5	16	10	10.5	19.5	13.5	11	6	3		3.5	18.5	10	1	15
# Individual Butterflies Counted	366	536	217	112	773	509	334	105	33		96	319	216	22	215
# Individuals / Research Hour	38.5	33.5	21.7	10.7	39.6	37.7	30	17.5	11		27.4	24	21.6	22	14
# 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	4	2.7
Total # species 2007-2021															83

C. Heil Valley Ranch- North Pointe, Red Gulch

Heil Valley Ranch North Pointe, Red Gulch	2021	5/1	5/24	8/16	Total
<i>Parnassius smintheus</i>	Rocky Mountain Parnassian				
<i>Papilio polyxenes</i>	Black Swallowtail			1	1
<i>P. zelicaon</i>	Anise Swallowtail	1	2		3
<i>P. indra</i>	Indra Swallowtail				
<i>P. rutulus</i>	Western Tiger Swallowtail	1			1
<i>P. eurymedon</i>	Pale Swallowtail				
<i>P. multicaudata</i>	Two-tailed Swallowtail		2		2
swallowtail yel.				1	1
<i>Neophasia menapia</i>	Pine White				
<i>Pontia protodice</i>	Checkered White			1	1
<i>P. occidentalis</i>	Western White				
<i>P. sisymbrii</i>	Spring White				
<i>Pieris rapae</i>	Cabbage White		3	66	69
white sp.	white sp.	2	10		12
<i>Euchloe ausonides</i>	Large Marble	1	33		34
<i>E. olympia</i>	Olympia Marble				
<i>Anthocharis julia</i>	Julia Orangetip				
<i>Colias philodice</i>	Clouded Sulphur		1	10	11
alba form	alba form			1	1
<i>C. eurytheme</i>	Orange Sulphur		2	23	25
<i>C. alexandra</i>	Queen Alexandra's Sulphur				
<i>Nathalis iole</i>	Dainty Sulphur			10	10
sulphur sp.	sulphur sp		4	12	16
<i>Tharsalea dione</i>	Gray Copper				
<i>T. heteronea</i>	Blue Copper				
<i>Lycaena helloides</i>	Purplish Copper				
<i>Callophrys affinis</i>	Western Green Hairstreak				
<i>C. gryneus</i>	Siva Juniper Hairstreak				
<i>C. sheredanii</i>	White-lined Green Hairstreak	1			1
<i>C. eryphon</i>	Western Pine Elfin	1			1
<i>Satyrium behrii</i>	Behr's Hairstreak				
<i>S. titus</i>	Coral Hairstreak				
<i>Strymon melinus</i>	Gray Hairstreak			4	4
<i>Leptotes marina</i>	Marine Blue				
<i>Cupido amyntula</i>	Western Tailed-blue				
<i>Celastrina echo sidara</i>	Echo Azure		4		4
<i>Glaucopsyche piasus</i>	Arrowhead Blue				
<i>G. lygdamus</i>	Silvery Blue		2		2
<i>Euphilotes ancilla</i>	Rocky Mountain Dotted-blue				
<i>Echinargus isola</i>	Reakirt's Blue				
<i>Plebejus melissa</i>	Melissa Blue			40	40
<i>P. icarioides</i>	Boisduval's Blue				
<i>P. lupini lutzii</i>	Lupine Blue				
<i>P. glandon rustica</i>	Arctic Blue				
blue sp.	blue sp.		34	32	66
<i>Libytheana carinenta</i>	American Snout				
<i>Danaus plexippus</i>	Monarch				
<i>Limenitis archippus</i>	Viceroy			1	1
<i>Euptoieta claudia</i>	Variegated Fritillary			24	24
<i>Argynnis aphrodite</i>	Aphrodite Fritillary			17	17
<i>A. edwardsii</i>	Edwards' Fritillary				
<i>A. coronis</i>	Coronis Fritillary				
<i>A. callippe</i>	Callippe Fritillary				
<i>A. hesperis</i>	Northwestern Frit			11	11
<i>A. mormonia</i>	Mormon Fritillary				

North Pointe, Red Gulch, Heil Valley Ranch	2021	5/1/	5/24	8/16	Total
fritillary sp.				146+	146
<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				
<i>P. cocyta</i>	Northern Crescent				
<i>P. pulchella</i>	Field Crescent			4	4
<i>Polygonia satyrus</i>	Satyr Comma				
<i>P. gracilis</i>	Hoary Comma	3			3
<i>Nymphalis antiopa</i>	Mourning Cloak	7	3		10
<i>Junonia coenia</i>	Buckeye, Common				
<i>N. californica</i>	California Tortoiseshell				
<i>Vanessa atalanta</i>	Red Admiral				
<i>Aglais milberti</i>	Milbert's Tortoiseshell				
<i>V. cardui</i>	Painted Lady			1	1
<i>V. virginiensis</i>	American Lady				
<i>Limenitis weidemeyerii</i>	Weidemeyer's Admiral			3	3
<i>Asterocampa celtis</i>	Hackberry Emperor			3	3
<i>Coenonympha tullia ochracea</i>	Ochre (Common) Ringlet				
<i>Cercyonis pegala</i>	Common Wood-nymph			70	70
<i>C. oetus</i>	Small Wood-nymph				
<i>Erebia epipsodea</i>	Common Alpine				
<i>Epargyreus clarus</i>	Silver-spotted Skipper				
<i>E. pacuvius</i>	Pacuvius Duskywing				
<i>E. persius</i>	Persius Duskywing		2		2
<i>E. icelus</i>	Dreamy Duskywing				
<i>Burnsius communis</i>	Common Checkered-skipper		1	62	63
<i>Pholisora catullus</i>	Common Sootywing			5	5
<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			3	3
<i>Lon taxiles</i>	Taxiles Skipper				
<i>Euphyes vestris</i>	Dun Skipper				
<i>Atrytonopsis hianna</i>	Dusted Skipper				
skipper sp.				4	4

C. Heil Valley Ranch- North Pointe, Red Gulch (Continued)

Date, Conditions	Location	Butterfly Behavior	Researchers
5/1/2021 9:30-11:00 pond 12:15pm out 20° - 25 C, Sunny sky, 0- 5mph wind	North Pointe to pond.	Few flying	Amy Chu Chris Friedman Dan Fosco Eric Olson Jan Chu Joe Krieg Linda Hardesty Richard Holmes

1.5 hours			Sue Hirschfeld Wynne Whyman
5/24/2021 9:45-12:30p.m. 19-21 ° C Clear sky, no wind	Red Gulch	Marbles scattered and flying fast, blues gathered on a warm muddy bank or flying downstream	Cathy Comstock Chris Friedman Dan Fosco Jan Chu Joe Krieg Larry Crowley Venice Kelly
3hrs			
8/16/2021 9:15-11:45 am 27-30 ° C No clouds, smoke haze No wind	Red Gulch	Fritillaries flying down the gulch continuously from 9:15-11:00. Com- checkered skippers mating. Melissas drinking from dripping clay drainage pipe.	Chris Friedman Linda Hardesty Jean Morgan Bev Postmus Jan Chu
3.5 hrs			

C. Heil Valley Ranch- North Pointe, Red Gulch (Concluded)

Years of Counts in Heil North, Red Gulch	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
# of Species Identified During 2021	34	45	41	40	33	24	30	50	38	31	33	50	35	32	31
Cumulative # Species 2007-2021 Sighted in Heil-North, Red Gulch	50	62	77	81	81	85	86	89	90	91	91	92	93	93	93
Research Hours on Site	8	17	12.5	11.5	11.5	6.5	12	27	32	13	7.5	13.5	12	8	8
# Individual Butterflies Counted 2021	579	654	488	429	272	188	402	1077	508	246	204	442	359	298	675
# Individuals / Research Hour	72	38	39	37	24	29	36	40	16	19	27	33	29	37	84
# 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	4.7	3.9

D. Heil Valley-Geer Watershed

Heil Valley- Geer Watershed	2021	5/28	7/11	7/18	8/8	8/22	9/5	9/19	Total 2021
<i>Papilio polyxenes</i>	Black Swallowtail					2		1	3
<i>P. zelicaon</i>	Anise Swallowtail								
<i>P. indra</i>	Indra Swallowtail								
<i>P. rutulus</i>	Western Tiger Swallowtail					1			1
<i>P. eurymedon</i>	Pale Swallowtail		1	1					2
<i>P. multicaudata</i>	Two-tailed Swallowtail		4	3	3				10
	swallowtail yel sp.			1					1
	swallowtail dark sp.			2					2
<i>Neophasia menapia</i>	Pine White								
<i>Pontia sisymbrii</i>	Spring White								
<i>P. protodice</i>	Checkered White		3p	3	2			2	10
<i>P. occidentalis</i>	Western White								
<i>Pieris rapae</i>	Cabbage White	2	50+p	85+	200+	258+	60+	143	798
<i>P. marginalis</i>	Margined White								
<i>Euchloe ausonides</i>	Large Marble	4ph							4
<i>E. olympia</i>	Olympia Marble								
<i>Anthocharis julia</i>	Julia Orangetip								
	white sp.	6	2	36	16	15			75
<i>Colias philodice</i>	Clouded Sulphur			12	2			9	23
<i>C. eurytheme</i>	Orange Sulphur		12p	20	16	28	15	35	126
<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	1?	2	2	4	3	2	10	24
	sulphur sp.		11	16	8	18	1	7	61
<i>Tharsalea dione</i>	Gray Copper								
<i>T. heteronea</i>	Blue Copper								
* <i>Tharsalea hyllus</i>	Bronze Copper					1			1
* <i>Lycaena helloides</i>	Purplish Copper			3		1		14	18
<i>Callophrys affinis</i>									
<i>homoperplexa</i>	Western Green Hairstreak								
<i>C. gryneus</i>	Siva Juniper Hairstreak								
<i>C. sheridanii</i>	White-lined Green Hairstreak								
<i>C. augustinus</i>	Brown Elfin								
<i>C. eryphon</i>	Western Pine Elfin								
	elfin sp.								
<i>Satyrium titus</i>	Coral Hairstreak								
<i>S. liparops</i>	Striped Hairstreak								
<i>S. saepium</i>	Hedgerow Hairstreak								
<i>Strymon melinus</i>	Gray Hairstreak			6	5	5	5	51	72
<i>Leptotes marina</i>	Marine Blue			2		1			3
<i>Cupido amyntula</i>	Western Tailed-Blue	1ph	1	6		1		1	10
<i>Celastrina echo sidara</i>	Echo Azure								
<i>Glaucopsyche piasus</i>	Arrowhead Blue								
<i>G. lygdamus</i>	Silvery Blue	2ph							2
<i>Euphilotes ancilla</i>	Rocky Mountain Dotted-Blue								
<i>Echinargus isola</i>	Reakirt's Blue				2			5	7
<i>Plebejus melissa</i>	Melissa Blue		2p	3	2	3	1	3	14
<i>P. saepiolus</i>	Greenish Blue	1ph							1
<i>P. icarioides</i>	Boisduval's Blue			2				1	3
<i>P. lupini lutzi</i>	Lupine Blue								
<i>P. glandon rustica</i>	Arctic Blue					1			1
	blue sp.	8	3		4	3		3	21

Heil Valley– Geer Watershed	2021	5/28	7/11	7/18	8/8	8/22	9/5	9/19	Total 2021
<i>Danaus plexippus</i>	Monarch		7p	1	3	2			13
<i>Apodemia nais</i>	Nais Metalmark								
<i>Euptoieta claudia</i>	Variegated Fritillary	3ph	220+p	184+	34	5	3	4	453
<i>Argynnis aphrodite</i>	Aphrodite Fritillary						3	7	10
<i>A. edwardsii</i>	Edwards' Fritillary					1	1	2	4
<i>A. coronis</i>	Coronis Fritillary								
<i>A. callippe</i>	Callippe Fritillary								
<i>A. hesperis</i>	Northwestern Fritillary								
<i>A. mormonia</i>	Mormon Fritillary								
fritillary sp.				4	8	9		11	32
<i>Chlosyne gorgone</i>	Gorgone Checkerspot			4					4
<i>C. nycteis</i>	Silvery Checkerspot						2		2
<i>C. palla</i>	Northern Checkerspot						1		1
<i>Phyciodes pallida</i>	Pallid (Pale) Crescent								
<i>P. tharos</i>	Pearl Crescent						1	1	2
<i>P. cocyta</i>	Northern Crescent			4					4
<i>P. pulchella</i>	Field Crescent				2	7	4	9	22
crescent/checkerspot	crescent/checkerspot						2	2	4
<i>Polygonia satyrus</i>	Satyr Comma								
<i>P. gracilis</i>	Hoary Comma		1p	1	2	2	1	2	9
<i>Junonia coenia</i>	Common Buckeye							1	1
<i>Aglais milberti</i>	Milbert's Tortoiseshell								
<i>Nymphalis antiopa</i>	Mourning Cloak					1			1
<i>N. californica</i>	California Tortoiseshell								
<i>Vanessa atalanta</i>	Red Admiral		2p	7		2			11
<i>V. cardui</i>	Painted Lady			3	1	1		2	7
<i>V. virginensis</i>	American Lady			1			1	6	8
lady sp.	lady sp.							1	1
<i>Limenitis weidemeyerii</i>	Weidemeyer's Admiral		1		3	7	1	5	17
* <i>L. archippus</i>	Viceroy					2	1	5	8
<i>Asterocampa celtis</i>	Hackberry Emperor								
<i>Coenonympha tullia ochracea</i>	Ochre (Common) Ringlet								
<i>Cercyonis pegala</i>	Common Wood-nymph		40+p	104+	28	37	1		210
<i>C. oetus</i>	Small Wood-nymph								
<i>Erebia epipsodea</i>	Common Alpine							1	1
<i>Oeneis chryxus</i>	Chryxus Arctic								
<i>O. uhleri</i>	Uhler's Arctic								
<i>Epargyreus clarus</i>	Silver-spotted Skipper								
<i>Cecropterus pylades</i>	N. Cloudywing								
<i>Erynnis icelus</i>	Dreamy Duskywing								
<i>E. pacuvius</i>	Pacuvius Duskywing								
<i>E. persius</i>	Persius Duskywing				1				1
duskywing sp.	duskywing sp.			1		1			2
<i>Burnsius communis</i>	Common Checkered-skipper		2p	1	90+	69	8	24	194
<i>Pholisora catullus</i>	Common Sootywing								
<i>Piruna pirus</i>	Russet Skipperling								
<i>Oarisma garita</i>	Garita Skipperling								
* <i>Hesperia leonardus pawnee</i>	Leonard's Skipper							1p	1
<i>Hesperia juba</i>	Juba Skipper			1				41	42
<i>H. colorado</i>	Western Branded-skipper								
<i>H. nevada</i>	Nevada skipper								
<i>Polites themistocles</i>	Tawny-edged Skipper								
<i>Ochlodes sylvanoides</i>	Woodland Skipper					1		2	3
<i>Lon taxiles</i>	Taxiles Skipper								
<i>Euphyes vestris</i>	Dun Skipper				2				2
<i>Atrytonopsis hianna</i>	Dusted Skipper								
<i>Polites mystic</i>	Long Dash skipper								
skipper sp.				1	1	4	2	6	14

* Newly recorded in Geer Watershed 2021 p=photo record is available

D. Heil Valley-Geer Watershed (Continued)

Date, Conditions	Location within Heil - Geer	Butterfly Activity	Researchers
5/28/2021 9:10-12:30 p.m. 18-22 °C sky 90% clear to cloudy with intermittent Wind 0-5 mph 3 hr/20 min	Geer Watershed – barn streamlet, west meadow	Cool, slow at first, with 2 butterflies, then it warmed	Chris Friedman Sue Hirschfeld
7/11/2021 9:10-12:20 pm 21-26 °C No clouds, hazy, light breeze 3 hrs 10 min	Geer Watershed From Barn into west meadow		Chris Friedman Linda Hardesty Sue Hirschfeld
7/18/2021 9:00-12:00 pm 21-27 °C, Clear sky, slight breeze 3hrs	Gate to barn, Barn near streamlet across meadow.		Chris Friedman Jan Chu Pam Piombino Sue Hirschfeld
8/8/2021 9:45-12:30 pm 23-32°C, Clear shy, hazy smoke. Light breeze 2hrs 45	Geer Canyon	Recent heavy rains at Geer. Notable ash buildup.	Chris Friedman Linda Hardesty Richard Holmes Sue Hirschfeld
8/22/2021 8:50-11:30 pm 20-28 °C, 50% stratus clouds. 5-25 mph 2 hrs 40 min.	Geer Watershed Barn to North Creek across western meadow	New Purplish and Bronze Coppers that Susan and Bev found on goldenrod.	Amy Chu Bev Postmus Chris Friedman Dan Fosco Jan Chu Jean Morgan Linda Hardesty Sue Hirschfeld Susan Spaulding
9/5/2021 9:30-11:30 am 19-29° C, Cloudless, gentle breeze. 2hrs	Geer Watershed		Chris Friedman Joe Krieg Sue Hirschfeld
9/19/2021 8:30-12:30 pm 23-29 ° C, Cloudless, breeze 0-25 mph 4hrs	Geer Watershed, downstream, meadows upper water course, cliff	Busy on only few white asters, thistles, rabbit brush- low in the wind	Bev Postmus Chris Friedman Jan Chu Jean Morgan Jeff MacLachlan Linda Hardesty Richard Holmes Venice Kelly

21 RH

91 Volunteer Hours for Boulder County

D. Heil Valley-Geer Watershed (Concluded)

Heil-Geer Watershed	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
# Of Species Identified Annually in Geer Watershed	42	56	44	49	36	38	38	42	22	43	30	40	44	40	46
Cumulative # of Species Sighted in Geer Watershed 2007-2021	81	87	90	91	91	91	91	92	92	92	93	93	94	94	100
Research Hours at Site	15.5	21	12.5	14	14	10	11	18	11	10	21	20	13.5	16.5	21
# Individual Butterflies Counted	569	1225	492	419	436	530	264	738	200	488	628	665	584	346	2375
# Individuals / Research Hour	37	58	39	30	31	53	24	41	18	29	39	33	43	21	119
# 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	2.5	2.3

E. Walker Ranch – Meyer’s Homestead Trail

Walker Ranch-Meyer’s Homestead Trail	2021	5/26	6/4	6/16	6/23	6/30	7/19	8/27	Total 2021
<i>Parnassius smintheus</i>	Rocky Mountain Parnassian			1	3				4
<i>Papilio polyxenes</i>	Black Swallowtail								
<i>P. zelicaon</i>	Anise Swallowtail								
<i>P. indra</i>	Indra Swallowtail				1				1
<i>P. rutulus</i>	Western Tiger Swallowtail				1				1
<i>P. eurymedon</i>	Pale Swallowtail			2ph	1				3
<i>P. multicaudata</i>	Two-tailed Swallowtail			2ph					2
swallowtail sp.	swallowtail sp.			3					3
<i>Neophasia menapia</i>	Pine White								
<i>Pontia protodice</i>	Checkered White								
<i>P. sisymbrii</i>	Spring White								
<i>P. occidentalis</i>	Western White								1
<i>Pieris rapae</i>	Cabbage White			1			1		2
white sp.	white sp.		11	14	15			2	32
<i>Euchloe ausonides</i>	Large Marble				1				1
<i>Anthocharis julia</i>	Julia Orangetip		1	15	0				16
<i>Colias philodice</i>	Clouded Sulphur			1			1		2
<i>Alba form female</i>	alba form			1ph					1
<i>C. eurytheme</i>	Orange Sulphur			6	18			7	31
<i>C. alexandra</i>	Queen Alexandra’s Sulphur					2	3		5
<i>Nathalis iole</i>	Dainty Sulphur			2				6	8
sulphur sp.	sulphur		3	10		4	2		19
<i>Tharsalea heteronea</i>	Blue Copper								
<i>Satyrrium saepium</i>	Hedgerow Hairstreak								

Walker Ranch- Meyer's Homestead	2021	5/26	6/4	6/16	6/23	6/30	7/19	8/27	Total 2021
<i>Callophrys affinis</i>	W. Green Hairstreak	1	4	12ph	14	10			41
<i>C. sheridanii</i>	White-line Green Hairstreak								
<i>C. gyrneus siva</i>	Siva Juniper Hairstreak					3			3
<i>C. spinetorum</i>	Thicket Hairstreak				2				2
<i>C. augustinus</i>	Brown Elfin	2ph	3						5
<i>C. polios</i>	Hoary Elfin	1ph	8	4					13
<i>C. eryphon</i>	Western Pine Elfin	1ph			1				2
elfin sp.	elfin sp.		4	15	5				24
<i>Strymon melinus</i>	Gray Hairstreak			1					1
<i>Cupido amyntula</i>	Western Tailed-Blue				1				1
<i>Celestrina echo sidara</i>	Echo Azure		18	4	1				24
<i>Glaucopsyche piasus</i>	Arrowhead Blue			5p	4	2			11
<i>G. lygdamus</i>	Silvery Blue		1	8ph	2				11
<i>Euphilotes ancilla</i>	Rocky Mountain Dotted-Blue			7ph	50+	150+	3		210
<i>Echinargus isola</i>	Reakirt's Blue				2			2	4
<i>Plebejus melissa</i>	Melissa Blue							1	1
<i>P. saepiolus</i>	Greenish Blue								
<i>P. icarioides</i>	Boisduval's Blue			12	40	15			67
<i>P. lupini lutzi</i>	Lupine Blue								
<i>Agriades glandon rustica</i>	Arctic Blue								
blue sp.	blue sp.					10+	6		16
<i>Danaus plexippus</i>	Monarch								
<i>Apodemia nais</i>	Nais Metalmark								
<i>Euptoieta claudia</i>	Variegated Fritillary			3	2	1	3		9
<i>Argynnis aphrodite</i>	Aphrodite Fritillary								
<i>A. edwardsii</i>	Edwards' Fritillary			1			1	2	4
<i>A. callippe</i>	Callippe Fritillary						1		1
<i>A. hesperis</i>	Northwestern Fritillary						1		1
<i>A. mormonia</i>	Mormon Fritillary								
fritillary sp.					3	1	1	3	8
<i>Chlosyne gorgone</i>	Gorgone Checkerspot			1	1				2
<i>C. nycteis</i>	Silvery Checkerspot					3			3
<i>C. palla</i>	Northern Checkerspot								
<i>Phyciodes cocyta</i>	Northern Crescent			1		4	4		9
<i>P. pulchella</i>	Field Crescent			6	11			2	19
<i>Phyciodes pallida</i>	Pallid (Pale) Crescent								
<i>Polydryas arachne</i>	Arachne Checkerspot								
<i>Euphydryas anicia</i>	Variable Checkerspot			2	15	4	3		24
<i>Polygonia satyrus</i>	Satyr Comma								
<i>Polygonia gracilis</i>	Hoary Comma			3	2	3	2	2	12
Comma sp.	comma		3						3
<i>Aglais milberti</i>	Milbert's Tortoiseshell				1				1
<i>Nymphalis antiopa</i>	Mourning Cloak		1	1			2	1	5
<i>N. californica</i>	California Tortoiseshell								

Walker Ranch- Meyer's Homestead	2021	5/26	6/4	6/16	6/23	6/30	7/19	8/27	Total 2021
<i>Vanessa atalanta</i>	Red Admiral			3		1			4
<i>V. cardui</i>	Painted Lady						4	2	6
<i>V. virginiensis</i>	American Lady								
<i>Limenitis weidemeyerii</i>	Weidemeyer's Admiral				4	4			8
<i>Coenonympha tullia ochracea</i>	Ochre (Common) Ringlet			35	35	8			78
<i>Cercyonis pegala</i>	Common Wood-nymph								
<i>C. oetus</i>	Small Wood-nymph						2	25	27
<i>Erebia epipsodea</i>	Common Alpine			1ph	5				6
<i>Oeneis chryxus</i>	Chryxus Arctic								
<i>O. uhleri</i>	Uhler's Arctic			16	20				36
<i>Erynnis icelus</i>	Dreamy Duskywing								
<i>E. pacuvius</i>	Pacuvius Duskywing			3	3	1			7
<i>E. persius</i>	Persius Duskywing			2	2				4
duskywing sp.	duskywing			12	12	1			25
<i>Burnsius communis</i>	Common Checkered-skipper							9	9
<i>Pholisora catullus</i>	Common Sootywing								
<i>Piruna pirus</i>	Russet Skipperling				3		2		5
<i>Oarisma garita</i>	Garita Skipperling								
* <i>Hesperia uncas</i>	Uncas Skipper						1		1
<i>H. juba</i>	Juba Skipper			1					6
<i>H. colorado</i>	Western Branded-skipper							5ph	5
<i>Polites themistocles</i>	Tawny-edged Skipper								
<i>P. mystic</i>	Long Dash								
<i>Ochlodes sylvanoides</i>	Woodland Skipper					2		5	7
<i>Lon taxiles</i>	Taxiles Skipper								
<i>Euphyes vestris</i>	Dun Skipper						1		1
skippers								2	2

*Newly sighted in this area

ph=photo available

E. Walker Ranch – Meyer's Homestead Trail (Continued)

Date Conditions	Location Walker	Butterfly Behavior
5/13/2021 9:30-11:30 am 2 hrs	Meyer's Homestead Trail and associated meadows	
5/26/2021 1 hour	Meyer's Gulch	3 Elfin species
6/4/2021 9:40-2:25 pm 21 °C, Clear t. No wind. 4.5 hrs	Meyer's Homestead Trail to transmission lines.	Butterflies puddling

6-16-2021 9:45 am – 2pm Intermittent Clouds and Sun. Temp 20-22°C, Slight breeze 4 hrs	Meyer's Gulch	Scarce puddling, Silvery Blues and Orange Sulphur mating
6/23/2021 10:30-2:15 pm 27-32 °C, Clouds, Sun, Smoky. Breezy 4hrs	Meyer's. Beyond power lines, up fire trail starting at the stand of aspens	Puddling, Common Alpines mating. New Thicket HS, Northern Dr, Indra and Tiger Sw, 2 female alba Orange Sulphurs
6/30/2021 10-2:40 pm 19-25 °C, Clear, slight breeze 4.45 hr	Meyer's Gulch	
7/19/2021 22-32°C, 9:40-1:15 pm Clear, calm 5 hrs	Meyers Gulch	Show sign of wear and old age.
8/27/2021 12:00-3:00 pm Mostly sunny, windy to mostly cloudy 28-22 °C, 3hrs	West beyond powerlines to fire trail at stand of Aspens	Butterflies sparse, many flowers still blooming No puddling areas

22 RH 41.5 Volunteer Hours for Boulder County

E. Walker Ranch – Meyer's Homestead Trail (Concluded)

Walker Ranch, Meyer's Homestead Trail	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
# Species Identified during 2021 in Walker	30	35	45	35	50	47	62	43	45	43	31	58	47	37	55
# Species Sighted in Walker Ranch 2007-2021	33	38	60	70	75*	78*	79*	80*	81*	81*	83*	84*	84*	84*	85
# Research Hours on Site	5	4	18	16	16.5	7	14.5	11	29	17	13.5	53	27	6	28
# Individual Butterflies Counted	160	203	1144	437	472	399	394	322	351	549	299	759	449	305	905
# Individual Butterflies / Research Hour	32	54	64	27	29	57	27	29	12	32	22	14	16	51	32
# 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	6.1	2.0

*Corrected for 2011-2020

F. Reynold's Ranch – Giggey Lake, West Trail

Reynold's Ranch Giggey Lake, West Trail	6/14	7/21	Total 2021
<i>Parnassius smintheus</i>			
<i>Papilio polyxenes</i>			
<i>P. zelicaon</i>			
<i>P. rutulus</i>		1	1
<i>P. eurymedon</i>			
<i>P. multicaudata</i>			
yellow swallowtail sp.		3	3
<i>Neophasia menapia</i>			
<i>Pieris rapae</i>			
<i>Pontia protodice</i>			
<i>P. occidentalis</i>			
white sp.		3	3
<i>Euchloe ausonides</i>			
<i>Anthocharis julia</i>	8		8
<i>Colias philodice</i>		4	4
<i>C. eurytheme</i>	1	5p	6
Sulphur sp.		1	1
<i>C. alexandra</i>		5p	5
<i>Nathalis iole</i> .		2p	2
sulphur sp.		6	6
<i>Lycaena rubidus</i>			
<i>Tharsalea heteronea</i>			
<i>Lycaena helloides</i>			
<i>Callophrys affinis</i>			
<i>C. spinetorum</i>		1p	1
<i>C. eryphon</i>			
<i>C. polios</i>			
<i>C. augustinus</i>	5		5
<i>Satyrium saepium</i>			
<i>Strymon melinus</i>		1	1
<i>Celastrina echo sidara</i>			
<i>Glaucopsyche lygdamus</i>			
<i>Echinargus isola</i>		3p	3
<i>Plebejus melissa</i>			
<i>Euphilotes ancilla</i>		1	1
<i>Plebejus saepiolus</i>		3	3
* <i>Plebejus lupini lutzii</i>		1p	1
<i>P. icarioides</i>			
<i>P. glandon rustica</i>			
<i>Glaucopsyche piasus</i>			
blue sp.	4	2	6
<i>Danaus plexippus</i>			
<i>Limenitis weidemeyerii</i>	1	7	8
<i>Euptoieta claudia</i>			
<i>Argynnis aphrodite</i>			
<i>A. edwardsii</i>			
<i>A. coronis</i>			
<i>A. callippe</i>			
<i>A. hesperis</i>			
<i>A. mormonia</i>			
<i>Boloria selene</i>			
fritillary sp.			
<i>Chlosyne palla</i>			
<i>Phyciodes pallida</i>			
<i>P. tharos</i>			
<i>P. coccyta</i>		3	3
crescent/checkerspot sp.		3	3

Reynold's Ranch 2021 Giggey Lake, West Trail	6/14/	7/21	Total 2021
<i>P. pulchella</i>			
<i>Polygonia gracilis</i>			
<i>Vanessa cardui</i>			
<i>Aglais milberti</i>			
<i>Nymphalis antiopa</i>			
<i>Coenonympha tullia ochracea</i>		1	1
<i>Vanessa atalanta</i>			
<i>Cercyonis oetus</i>			
<i>C. pegala</i>			
wood-nymph sp.			
<i>Erebia epipsodea</i>			
<i>Oeneis chryxus</i>			
<i>Erynnis icelus</i>			
<i>E. pacuvius</i>			
<i>E. persius</i>			
duskywing sp.			
<i>Oarisma garita</i>		1p	1
<i>Hesperia colorado</i>			
<i>Polites draco</i>			
** <i>P. mystic</i>		2p	2
<i>Ochlodes sylvanoides</i>			
<i>Burnsius communis</i>		1p	1
<i>Euphyes vestris</i>			
skipper sp.		3	3
			82

* Newly found in this area p= photo available

F. Reynold's Ranch – Giggey Lake, West Trail (Continued)

Date, Conditions	Location within Reynold's	Butterfly Activity	Researchers
6/14/2021 10:00-11:30 am 21-23°C, Full sun 1.5 hrs	Western Trail. Past wet area in aspens to dead tree in trail	Orangetips didn't land. No water on trail by swampy area	Cathy Cook
7/21/2021 9:30-2:30 pm 22 °C, Cloudy to sunny, slight breeze 5 hrs	Giggey Lake and the western trail	Moisture aplenty	Bev Postmus Carol Cushman Chris Freidman Jan Chu Jofrid Sodal Linda Hardesty Richard Holmes Venice Kelly Wynne Whyman

6.5 RH

46.5 Volunteer Hours for Boulder County

F. Reynold's Ranch – Giggey Lake, West Trail (Concluded)

Reynold's Ranch, Giggey Lake, West Trail	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
# Species Identified during 2021 in Reynold's	32	46	36	9	26	32	26	29	25	12	19
# Species Sighted in Reynold's 2011-2021	35	55	55	55	57	57	63*	66*	67*	69*	72
# Research Hours on Site	13	11.5	10.5	4	6	11	10	10	5	3	6.5
# Individual Butterflies Counted	541	635	395	47	183	612	171	199	237	92	87
# Individuals / Research Hour	41.6	55	37.6	12	3	5.6	17	20	47	30	12.6
# Species / Research Hour	2.5	4	3.4	2.1	4	3	2.6	2.9	5	4	3

G. Caribou Ranch - Sherwood Transect, Mud Lake

(Page 41)

Caribou, Sherwood Road	2021	4/ 2 6	4/2 9	5/7	5/1 3	5/14	5/20	5/25	5/27	6/4	6/7	6/12	6/17	6/23	6/30	7/3	7/9	7/10	7/11
<i>Callophrys affinis homoperplexa</i>	Western Green Hairstreak													1			1		
<i>C. sheridanii</i>	White-lined Green Hairstreak				1		1												
<i>C. spinetorum</i>	Thicket Hairstreak													2				1	
<i>C. augustinus</i>	Brown Elfin					1			1		2								
<i>C. polios</i>	Hoary Elfin							4	4	9	6	7							
<i>C. eryphon</i>	Western Pine Elfin									1		3		4					
elfin sp.						1		1											
<i>Satyrrium saepium</i>	Hedgerow Hairstreak																		
<i>Strymon melinus</i>	Gray Hairstreak																		1
<i>Cupido amyntula</i>	Western Tailed-Blue										2		2	2					
<i>Celastrina echo sidara</i>	Echo Azure									2	5	2	1						
<i>marginata</i>	Echo Azure Marginata										2								
<i>Glaucopsyche piasus</i>	Arrowhead Blue																		
<i>G. lygdamus</i>	Silvery Blue												4						
<i>Euphilotes ancilla</i>	Rocky Mountain Dotted-Blue													1	11	1	16	4	
<i>Echinarxus isola</i>	Reakirt's Blue													2	3				
<i>Plebejus melissa</i>	Melissa Blue																		
<i>P. saepiolus</i>	Greenish Blue													2		1			
<i>P. icarioides</i>	Boisduval's Blue													2		2		4	
<i>P. lupini lutzi</i>	Lupine Blue													5	3	4	5	2	4
<i>P. glandon rustica</i>	Arctic Blue																		
blue sp.										1	5	11	1	8	6	3	10	2	8
<i>Euptoieta claudia</i>	Variiegated Fritillary								1			1ph	1	6	1		1		2
<i>Argynnis aphrodite</i>	Aphrodite Fritillary																		
<i>A. atlantis</i>	Atlantis Fritillary																		
<i>A. edwardsii</i>	Edwards' Fritillary																		
<i>A. coronis</i>	Coronis Fritillary																		
<i>A. hesperis</i>	Northwestern Fritillary																		
<i>A. mormonia</i>	Mormon Fritillary																		

Caribou, Sherwood Road	2021	4/ 2 6	4/2 9	5/7	5/1 3	5/14	5/20	5/25	5/27	6/4	6/7	6/12	6/17	6/23	6/30	7/3	7/9	7/10	7/11	
fritillary sp.									1	1				1		3		2		
<i>Poladryas arachne</i>	Arachne Checkerspot																			
<i>Chlosyne gorgone</i>	Gorgone Checkerspot																			
<i>C. nycteis</i>	Silvery Checkerspot														4		1			
<i>C. palla</i>	Northern Checkerspot												2	6	17	5	30	4	5	
<i>Phyciodes pallida</i>	Pallid Crescent																			
<i>P. tharos</i>	Pearl Crescent																			
<i>P. cocyta</i>	Northern Crescent													1	2		8	1	1	
<i>P. pulchella</i>	Field Crescent													2						
<i>Euphydry- as anicia</i>	Variable Checkerspot																			
<i>Polygonia faunus</i>	Green Comma			1		1														
<i>P. gracilis</i>	Hoary Comma			2		1	1	2		2		1				3	2	1	1	
<i>P. satyrus</i>	Satyr Comma																			
comma sp.						1	1										1			
<i>Junonia coenia</i>	Common Buckeye																			
* <i>Nymph- alis californica</i>	California Tortoiseshell																	1		
<i>Aglais milberti</i>	Milbert's Tortoiseshell																			
<i>Nymphalis antiopa</i>	Mourning Cloak	2	2	3	2	4	2	4	1	1	1		2							
<i>Vanessa atalanta</i>	Red Admiral																	1		
<i>V. cardui</i>	Painted Lady	1 ?											1							
<i>V. virgin- iensis</i>	American Lady																			
<i>Danaus plexippus</i>	Monarch																			
<i>Limenitis weidemeye rii</i>	Weidemeyer's Admiral																	4	1	3
<i>Coenonym pha tullia ochracea</i>	Common (Ochre) Ringlet												3	8	5	7	20	1	1	
<i>Cercyonis pegala</i>	Common Wood- nymph																			
<i>C. oetus</i>	Small Wood- nymph																			
<i>Erebia episodesea</i>	Common Alpine																			
<i>Oeneis chryxus</i>	Chryxus Arctic																			
<i>O. uhleri</i>	Uhler's Arctic																			

Caribou, Sherwood Road	2021	4/ 2 6	4/2 9	5/7	5/1 3	5/14	5/20	5/25	5/27	6/4	6/7	6/12	6/17	6/23	6/30	7/3	7/9	7/10	7/11
<i>Cecropterus pylades</i>	Northern Cloudywing																		
<i>Erynnis icelus</i>	Dreamy Duskywing									1		1	2	1					
<i>E. pacuvius</i>	Pacuvius Duskywing																		
<i>E. persius</i>	Persius Duskywing											1	2	3	4	1	1	3	2
duskywing sp.												1							
<i>Pyrgus ruralis</i>	Two-banded Checkered-Skipper					1	1	2		6	5		1	2					
<i>Burnsius communis</i>	Common Checkered-Skipper											2		1			1		
<i>Piruna pirus</i>	Russet Skipperling																		1
<i>Oarisma garita</i>	Garita Skipperling													1					
<i>Hesperia juba</i>	Juba Skipper																		
<i>H. colorado</i>	Western Branded - skipper																		
<i>H. colorado ochracea</i>	Ochre Branded-skipper																		
<i>H. pahaska</i>	Pahaska Skipper																		
<i>H. viridis</i>	Green Skipper																		
<i>H. nevada</i>	Nevada Skipper												1		2		3	2	
<i>Polites draco</i>	Draco Skipper															1			
<i>P. mystic</i>	Long Dash																		
<i>Lon taxiles</i>	Taxiles Skipper																		
<i>Ochlodes sylvanoides</i>	Woodland Skipper																		
<i>Euphyes vestris</i>	Dun Skipper																		
skipper sp.																1			

*Newly found in this area

G. Caribou Ranch - Sherwood Transect, Mud Lake (Continued 7/16-9/22)

Caribou, Sherwood Road	2021	7/ 1 6	7/18	7/2 6	7/29	7/29	8/6	8/12	8/22	8/23	8/25	8/28	8/30	8/3 0 pm	9/ 6	9/16	9/ 2 2
<i>Parnassius smintheus</i>	Rocky Mountain Parnassian	2	7	1	6		4	2									
<i>Battus philenor</i>	Pipevine Swallowtail																
<i>Papilio polyxenes</i>	Black Swallowtail																
<i>P. zelicaon</i>	Anise Swallowtail																
<i>P. rutulus</i>	W. Tiger Swallowtail		1														
<i>P. eurymedon</i>	Pale Swallowtail	2	2														
<i>P. multi-caudata</i>	Two-tailed Swallowtail																
<i>Neophasia menapia</i>	Pine White						4		56	13	19	14	26	4	8		
<i>Pontia protodice</i>	Checkered White	2		2			2										
<i>P. occidentalis</i>	Western White																
<i>Pieris rapae</i>	Cabbage White		2	3			3	6	1				1				
<i>P. marginalis</i>	Margined White	1															
<i>Euchloe ausonides</i>	Large Marble																
<i>Anthocharis julia</i>	Julia Orangetip																
white sp.				2											1		
<i>Colias philodice</i>	Clouded Sulphur		1	2	2	0	1										1
<i>C. eurytheme</i>	Orange Sulphur	2	8	10			7		9	3	4	10	4	4	17	14	5
alba						1											
<i>C. alexandra</i>	Queen Alexandra's Sulphur	22	34	18	10	7	12	5	3		4	8					
<i>Phoebis sennae eubule</i>	Cloudless Sulphur																
sulphur sp.													1				1
<i>Eurema mexicana</i>	Mexican Sulphur																
<i>Abaeis nicippe</i>	Sleepy Orange																
<i>Nathalis iole</i>	Dainty Sulphur		1	3	1	1	13	9	9	1	5	5	2	1	7	6	2
<i>Tharsalea editha</i>	Edith's Copper																
<i>Lycaena rubidus</i>	Ruddy Copper						1		1								
<i>T. heteronea</i>	Blue Copper			2	3	5	1	2	1								

Caribou, Sherwood Road	2021	7/ 1 6	7/18	7/2 6	7/29	7/29	8/6	8/12	8/22	8/23	8/25	8/28	8/30	8/3 0 pm	9/ 6	9/16	9/ 2 2
<i>L. helloides</i>	Purplish Copper	1	6	15	1	5	8	10	5								
<i>Callophrys affinis homo- perplexa</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																
elfin sp.																	
<i>Satyrium saepium</i>	Hedgerow Hairstreak						1	1	1						2		
<i>Strymon melinus</i>	Gray Hairstreak		2					1								1	
<i>Cupido amytula</i>	Western Tailed-Blue		2					1			1						
<i>Celastrina echo sidara</i>	Echo Azure																
" "	Echo Azure																
<i>marginata</i>	Marginata																
<i>Glaucopsyche piasus</i>	Arrowhead Blue																
<i>G. lygdamus</i>	Silvery Blue																
<i>Euphilotes ancilla</i>	Rocky Mountain Dotted-Blue	8	11	7	3	2	1	2									
<i>Echinargus isola</i>	Reakirt's Blue			1	1			1				1					1
<i>Plebejus melissa</i>	Melissa Blue														1		
<i>P. saepiolus</i>	Greenish Blue				1			3			1	1					
<i>P. icarioides</i>	Boisduval's Blue	12	2	1	4	4		1									
<i>P. lupini lutzi</i>	Lupine Blue	3	9	4		3	1	1									
<i>P. glandon rustica</i>	Arctic Blue	1	1		0	4	1						2				
blue sp.		6	8	7	5	3	5	2	1	1		1					
<i>Euptoieta claudia</i>	Variegated Fritillary	1	4	5		5	3	4	1	1	1	2	6		1		1
<i>Argynnis aphrodite</i>	Aphrodite Fritillary								1								
<i>A. atlantis</i>	Atlantis Fritillary																
<i>A. edwardsii</i>	Edwards' Fritillary											1					
<i>A. coronis</i>	Coronis Fritillary																
<i>A. hesperis</i>	Northwestern Fritillary	2		2	3	1	5	4	3		4	2			1		
<i>A. mormonia</i>	Mormon Fritillary										1		5		2	2	

Caribou, Sherwood Road	2021	7/ 1 6	7/18	7/2 6	7/29	7/29	8/6	8/12	8/22	8/23	8/25	8/28	8/30	8/3 0 pm	9/ 6	9/16	9/ 2 2
fritillary sp.		6	1	1	4	1		4	5		2	2	5		2	1	
<i>Poladryas arachne</i>	Arachne Checkerspot		1														
<i>Chlosyne gorgone</i>	Gorgone Checkerspot																
<i>C. nycteis</i>	Silvery Checkerspot		1														
<i>C. palla</i>	Northern Checkerspot	35	29	15	1	3	5										
<i>Phyciodes pallida</i>	Pallid Crescent																
<i>P. tharos</i>	Pearl Crescent																
<i>P. cocyta</i>	Northern Crescent	3	6	6		2	5	1									
<i>P. pulchella</i>	Field Crescent								3		4	1	1		11	7	
<i>Euphydryas ancia</i>	Variable Checkerspot			1													
<i>Polygonia faunus</i>	Green Comma							1	2				2		1		
<i>P. gracilis</i>	Hoary Comma	4	2	2		3	1	2	2	1	1	3				6	2
<i>P. satyrus</i>	Satyr Comma																
comma sp.													1		1	1	
<i>Junonia coenia</i>	Common Buckeye																
* <i>Nymphalis californica</i>	California Tortoiseshell					1											
<i>Aglais milberti</i>	Milbert's Tortoiseshell																
<i>Nymphalis antiopa</i>	Mourning Cloak						2	6	4				3		1	2	2
<i>Vanessa atalanta</i>	Red Admiral			1											2	3	2
<i>V. cardui</i>	Painted Lady			1							1					1	
<i>V. virginiensis</i>	American Lady				1												
<i>Danaus plexippus</i>	Monarch																
<i>Limenitis weidemeyeri</i>	Weidemeyer 's Admiral	6	3	4		2	1		1			1	1				
<i>Coenonympha tullia ochracea</i>	Common (Ochre) Ringlet	6		1		3											
<i>Cercyonis pegala</i>	Common Wood- nymph																
<i>C. oetus</i>	Small Wood- nymph			18	25	10	33	60	35	11	42	22	15	13	5	2	
<i>Erebia epipsodea</i>	Common Alpine																
<i>Oeneis chryxus</i>	Chryxus Arctic																
<i>O. uhleri</i>	Uhler's Arctic																

Caribou, Sherwood Road	2021	7/ 1 6	7/18	7/2 6	7/29	7/29	8/6	8/12	8/22	8/23	8/25	8/28	8/30	8/3 0 pm	9/ 6	9/16	9/ 2 2
<i>Cecropterus pylades</i>	Northern Cloudywing																
<i>Erynnis icelus</i>	Dreamy Duskywing	1															
<i>E. pacuvius</i>	Pacuvius Duskywing																
<i>E. persius</i>	Persius Duskywing	2	1														
duskywing		4															
<i>Pyrgus ruralis</i>	Two-banded Checkered-Skipper																
<i>Burnsius communis</i>	Common Checkered-Skipper			1				1					2				
<i>Piruna pirus</i>	Russet Skipperling	1	1	2		3											
<i>Oarisma garita</i>	Garita Skipperling																
<i>Hesperia juba</i>	Juba Skipper												1	1			
<i>H. colorado</i>	Western Branded-skipper							1		1			1			1	
<i>H. colorado ochracea</i>	Ochre Branded-skipper																
<i>H. pahaska</i>	Pahaska Skipper																
<i>H. viridis</i>	Green Skipper																
<i>H. nevada</i>	Nevada Skipper																
<i>Polites draco</i>	Draco Skipper				1												
<i>P. mystic</i>	Long Dash																
<i>Lon taxiles</i>	Taxiles Skipper																
<i>Ochlodes sylvanoides</i>	Woodland Skipper						2	3	7		6	5				2	
<i>Euphyes vestris</i>	Dun Skipper																
skipper sp.									1								

Total individual butterflies sighted in 2021 Caribou, Sherwood Road

Caribou, Sherwood Road	2021	Total Individuals
<i>Parnassius smintheus</i>	Rocky Mountain Parnassian	42
<i>Papilio polyxenes</i>	Black Swallowtail	1
<i>P. zelicaon</i>	Anise Swallowtail	2
<i>P. rutulus</i>	W. Tiger Swallowtail	2
<i>P. eurymedon</i>	Pale Swallowtail	6
<i>Neophasia menapia</i>	Pine White	144

<i>Pontia protodice</i>	Checkered White	6
<i>Pieris rapae</i>	Cabbage White	18
<i>Euchloe ausonides</i>	Large Marble	23
<i>Anthocharis julia</i>	Julia Orangetip	54
white sp.		10
<i>Colias philodice</i>	Clouded Sulphur	8
<i>C. eurytheme</i>	Orange Sulphur	130
alba		4
<i>C. alexandra</i>	Queen Alexandra's Sulphur	182
sulphur sp.		9
<i>Nathalis iole</i>	Dainty Sulphur	67
<i>Lycaena rubidus</i>	Ruddy Copper	2
<i>T. heteronea</i>	Blue Copper	14
<i>L. helloides</i>	Purplish Copper	51
<i>Callophrys affinis homoperplexa</i>	Western Green Hairstreak	2
<i>C. sheridanii</i>	White-lined Green Hairstreak	2
<i>C. spinetorum</i>	Thicket Hairstreak	3
<i>C. augustinus</i>	Brown Elfin	4
<i>C. polios</i>	Hoary Elfin	30
<i>C. eryphon</i>	Western Pine Elfin	8
elfin sp.		2
<i>Satyrium saepium</i>	Hedgerow Hairstreak	5
<i>Strymon melinus</i>	Gray Hairstreak	5
<i>Cupido amyntula</i>	Western Tailed-Blue	10
<i>Celastrina echo sidara</i>	Echo Azure	10
“ ” <i>marginata</i>	Echo Azure Marginata	2
<i>Glaucopsyche piasus</i>	Arrowhead Blue	
<i>G. lygdamus</i>	Silvery Blue	4
<i>Euphilotes ancilla</i>	Rocky Mountain Dotted-Blue	67
<i>Echinargus isola</i>	Reakirt's Blue	10
<i>Plebejus melissa</i>	Melissa Blue	1
<i>P. saepiolus</i>	Greenish Blue	9
<i>P. icarioides</i>	Boisduval's Blue	32
<i>P. lupini luzzi</i>	Lupine Blue	44
<i>P. glandon rustica</i>	Arctic Blue	9
blue sp.		94
<i>Euptoieta claudia</i>	Variiegated Fritillary	48
<i>Argynnis aphrodite</i>	Aphrodite Fritillary	
<i>A. atlantis</i>	Atlantis Fritillary	1

<i>A. edwardsii</i>	Edwards' Fritillary	1
<i>A. coronis</i>	Coronis Fritillary	
<i>A. hesperis</i>	Northwestern Fritillary	27
<i>A. mormonia</i>	Mormon Fritillary	
fritillary sp.		42
<i>Poladryas arachne</i>	Arachne Checkerspot	1
<i>C. nycteis</i>	Silvery Checkerspot	6
<i>C. palla</i>	Northern Checkerspot	157
<i>P. cocyta</i>	Northern Crescent	36
<i>P. pulchella</i>	Field Crescent	29
<i>Euphydryas anicia</i>	Variable Checkerspot	1
<i>Polygonia faunus</i>	Green Comma	8
<i>P. gracilis</i>	Hoary Comma	45
Comma sp.		6
* <i>Nymphalis californica</i>	California Tortoiseshell	2
<i>Nymphalis antiopa</i>	Mourning Cloak	44
<i>Vanessa atalanta</i>	Red Admiral	9
<i>V. cardui</i>	Painted Lady	3
<i>V. virginiensis</i>	American Lady	1
<i>Limenitis weidemeyerii</i>	Weidemeyer's Admiral	30
<i>Coenonympha tullia ochracea</i>	Common (Ochre) Ringlet	55
<i>C. oetus</i>	Small Wood-nymph	291
<i>Erynnis icelus</i>	Dreamy Duskywing	6
<i>E. persius</i>	Persius Duskywing	20
duskywing sp.		5
<i>Pyrgus ruralis</i>	Two-banded Checkered-Skipper	18
<i>Burnsius communis</i>	Common Checkered-Skipper	8
<i>Piruna pirus</i>	Russet Skipperling	8
<i>Oarisma garita</i>	Garita Skipperling	1
<i>Hesperia juba</i>	Juba Skipper	2
<i>H. colorado</i>	Western Branded-skipper	4
<i>H. nevada</i>	Nevada Skipper	8
<i>Polites draco</i>	Draco Skipper	2
<i>Ochlodes sylvanoides</i>	Woodland Skipper	25
<i>Euphyes vestris</i>	Dun Skipper	
skipper sp.		2

G. Caribou Ranch - Sherwood Transect, Mud Lake (Continued)

Caribou Ranch Date, time, temp, sky, wind	Location	Butterfly Behavior	Researchers
April 26, 2021 1:30. – 2:30 p.m. 19 °C, windy	County Rd 103 Overlooking Caribou	sheridanii flying around	Venice Kelly
April 29, 2021 12:00 – 1:00 p.m. 20 °C, High clouds with sun	Sherwood Transect	Mourning Cloak at seep flying back and forth.	Venice Kelly
May 7, 2021 11:00-12:30 p.m. 22°C, full sun	Sherwood Transect		Venice Kelly Jeff MacLachlan
May 13, 2021 11:00-12:30 p.m. 10 °C, Sunny, 30% clouds	Sherwood Transect		Venice Kelly
5/14/ 2021 9:30-11:40 a.m. 13-20° C, Sunny, Cloudy No wind	Sherwood Transect		Venice Kelly Jeff MacLachlan
5/20/2021 10-12:00 p.m. 20 °C, 60% clouds	Sherwood Transect		Venice Kelly Jeff MacLachlan
5/25/2021 11:00-1:00 pm 13 °C, windy	Sherwood Transect		Venice Kelly Jeff MacLachlan
5/27/2021 11:00-12:30 pm 19 °C, mostly sunny	Sherwood Transect		Venice Kelly
6/4/2021 11:00-12:30 p.m. 20-21°C, sunny	Sherwood Transect	Skippers nectaring on kinnikinnick	Venice Kelly
6/7/2021 10:00-12:15p.m. 21-22°C, blue sky, windy.	Sherwood Transect	Female Julia checking tower mustards (oviposit) Wind blowing making them hang on. 2-banded ch sk nectaring on spring beauty	Venice Kelly
6/12/2021 9:00-11:30 a.m. 20-21 °C, clear sky, no wind	Caribou, inside locked gate down to streamlet, bog to road	Few butterflies flying low.	Venice Kelly Chris Friedman Dan Fosco Jan Chu
6/17/2021 9:10-11:30 a.m. 28-26 °C hazy atmosphere, sunny	Sherwood Transect		Venice Kelly
6/23/2021 9:45-12:30 pm 23-25 °C, hazy ,smoky, little sun, breezy.	Transect to Bridge Meadow	Two-banded still flying, Variegated flying low.	Venice Kelly
6/30/2021 9:30-12:00pm 16 °C, sun to clouds	Transect		Venice Kelly

7/3/2021 10:00-12:00 pm 21 °C,	Caribou Open Space- parking lot to trail to meadows		Venice Kelly Jeff MacLachlan
7/10/2021 10:30-12:00 pm 20 °C, sunny	Mud Lake- Meadows east, south, Around lake	Dotted blue was ovipositing as many as 20 sulfur flowers	Venice Kelly
7/11/2021 10:10-1:45 pm 20 °C, Clear, Breeze	Sherwood Road		Richard Holmes
7/16/2021 9:30-11:30 am 22 °C, sunny with clouds rolling in	Bluebird Mine		Venice Kelly Jeff MacLachlan
7/18/2021 9:30-11:45 am 20-26 °C, Sunny	Sherwood Transect		Venice Kelly Jeff MacLachlan
7/26/2021 9:30-12:30 pm 21-26 °C, Sunny	Sherwood Road Transect	Purplish Coppers and Small Wood-nymphs showing.	Venice Kelly Wynne Whyman
7/29/2021 9:40-1:38 pm 20-26 °C,	Caribou Open Space, Upper meadow then to Blue Bird.		Venice Kelly Wynne Whyman Richard Holmes
8/6/2021 9:30 – 12:00 pm 20° - 26 °C, Partial sun with haze	Sherwood Transect	Ruddy Copper flying, Mourning Cloak	Venice Kelly Jeff MacLachlan
8/12/2021 9:30- 2:00 pm 22 °C, breezy, sunny, some haze	Sherwood Transect	Many small Wood- nymphs and cabbages, pine white	Venice Kelly Richard Holmes
8/22/2021 10:30-12:45 pm 16-22° C, 50% to 25% clouds Wind 15-15 mph	Sherwood Transect	Many pine whites, some nectaring; oetus also.	Venice Kelly Jeff MacLachlan
8/23/2021 10:30-12:30 pm 21 °C, 90% clouds, Some rain	Mud Lake to Bridge Meadow	Pine Whites and Small Wood-nymphs flew even when the sun was covered.	Venice Kelly Galen Moser
8/25/2021 2:15-3:33 pm 22 °C, mostly cloudy	Sherwood Transect		Venice Kelly
8/28/2021 10:30-12:00 pm 22 °C, sunny, very breezy	Sherwood Transect	Butterflies getting blown around esp Edward's Frit.	Venice Kelly Jeff MacLachlan
8/30/2021 9:45-12:15 pm 22-26 °C, Clear sky with haze	Bluebird Mine to falls	Blossoms were drying but butterflies still working on these	Bev Postmus Chris Friedman Dan Fosco Jean Morgan Richard Holmes Venice Kelly
8:30/2021 12L40-2:25 pm 25 °C, increasing clouds, Light breeze	Mud Lake Trail		Chris Friedman
9/6/2021 11:10 - 1:00 pm 20°C, breezy	Sherwood Transect	Wind made it difficult to photograph. White asters attractive to crescents and others	Venice Kelly Jeff MacLachlan

9/16/2021 11:30-1:15 pm 20-22 °C, breezy			Venice Kelly Jeff MacLachlan
9/22/2021 11: -1:45 pm 15 °C, Clear sky	Sherwood Transect	Much flying, not landing. Cloak, admiral, Commas use sap.	Venice Kelly

52 hrs on transect 72 hrs in Caribou area 137 Volunteer hours for Boulder County

G. Caribou Ranch - Sherwood Transect, Mud Lake (Concluded)

Caribou Ranch- Sherwood Road	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
# Species Identified in Caribou Ranch this year	48	48	40	20	46	28	38	47	55	50	59	61	65	64	71
Cumulative # Species Sighted in Caribou 2007-2021	75	75	80	80	81	82	83	83	84	85	86	88	88	95	97
# Research Hours on Site	10	12	8.5	6	12.5	8	8	14	15	10	27.5	43	53	57.5	71.5
# Individual Butterflies Counted	358	647	278	145	488	304	361	752	587	657	770	1071	2336	1692	2080
# Individuals /Research Hour	36	54	33	24	39	38	45	54	39	65	28	25	44	29	29
#Species/Research Hour	4.8	4.0	4.7	3.3	3.7	3.5	4.8	3.4	3.6	5.0	2.0	1.0	1.2	1.1	1.0

Appendix I. Butterflies Observed During Boulder County Open Space Surveys - 2004-2021

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, Clouded	<i>Colias philodice</i>	Godart
Sulphur, Orange	<i>C. eurytheme</i>	Boisduval
Sulphur, Queen Alexandra's	<i>C. alexandra</i>	W.H. Edwards
Dogface, Southern	<i>Zerene cesonia</i>	(Stoll)
Orange, Sleepy	<i>Abaeis nicippe</i>	(Cramer) Sulphur,
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>Tharsalea dione</i>	(Scudder)
Copper, Edith's	<i>T. editha</i>	(Mead)
Copper, Blue	<i>T. heteronea</i>	(Boisduval)

Copper, Bronze	<i>T. hyllus</i>	(Cramer)
Copper, Ruddy	<i>Lycaena 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>Satyrium saepium</i>	(Boisduval)
Hairstreak, Behr's	<i>S. behrii</i>	(W.H. Edwards)
Hairstreak, Coral	<i>S. titus</i>	(Fabricius)
Hairstreak, Striped	<i>S. liparops</i>	(LeConte)
Hairstreak, 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 sidara</i>	(Clench)
Azure, Hops	<i>C. humulus</i>	Scott & D. Wright
Blue, Arrowhead	<i>Glaucopsyche piasus</i>	(Boisduval)
Blue, Silvery	<i>G. lygdamus</i>	(E. Doubleday)
Dotted-Blue, Rocky Mountain	<i>Euphilotes ancilla</i>	(W. Barnes & McDunnough)
Blue, Reakirt's	<i>Echinargus isola</i>	(Reakirt)
Blue, Melissa	<i>Plebejus melissa</i>	(W.H. Edwards)
Blue, Greenish	<i>P. saepiolus</i>	(Boisduval)
Blue, Boisduval's	<i>P. icarioides</i>	(Boisduval)
Blue, Lupine	<i>P. lupini lutzi</i>	P. dos Passos
Blue, Arctic	<i>Agriades glandon rustica</i>	(W.H. Edwards)

Metalmarks

Riodinidae Family

Metalmark, Nais	<i>Apodemia nais</i>	(W.H. Edwards)
Brushfoot	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>Argynnis aphrodite</i>	(Fabricius)
Fritillary, Edwards'	<i>A. edwardsii</i>	(Reakirt)
Fritillary, Coronis	<i>A. coronis</i>	(Behr)
Fritillary, Callippe	<i>A. callippe</i>	(Boisduval)
Fritillary, Atlantis	<i>A. atlantis</i>	(W.H. Edwards)
Fritillary, Northwestern	<i>A. hesperis</i>	(W.H. Edwards)
Fritillary, Mormon	<i>A. 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. virginiensis</i>	(Drury) Admiral
Weidemeyer's Admiral	<i>Limenitis weidemeyerii</i>	(W.H. Edwards)
Viceroy	<i>L. archippus</i>	(Cramer)
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>Cecropterus 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, Peck's	<i>P. peckius</i>	(Scott)
Skipper, Delaware	<i>Atrytone logan</i>	(W.H. Edwards)
Skipper, Arogos	<i>A. arogos</i>	(Boisduval & LeConte)
Skipper, Woodland	<i>Ochlodes sylvanoides</i>	(Boisduval)
Skipper, Taxiles	<i>Lon taxiles</i>	(W.H. Edwards)
Skipper, Dun	<i>Euphyes vestris</i>	(Boisduval)
Skipper, Dusted	<i>Atrytonopsis hianna</i>	(Scudder)

Appendix II.

Total # of Species in Each Open Space Area

Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Mean for Area
Open Space Areas																
Southeast Buffer	25	20	21	24	19	18	20	15	23	13	16	18	12	17	16	18
Anne U. White	44	45	35	31	47	50	29	17	10		24	32	23	4	33	28
Heil Valley - North	34	45	41	40	33	24	30	50	38	31	33	50	35	32	31	36
Heil Valley - Geer	42	56	44	49	36	38	38	42	22	43	30	40	44	40	46	40
Walker Ranch	30	35	45	35	50	47	62	43	45	43	31	58	47	37	55	44
Reynold's Ranch					32	46	36	9	26	32	26	29	25	12	19	26
Caribou Ranch	48	48	40	20	46	28	38	47	55	50	59	61	65	64	71	49
Total # of Species Each Year												97	76	84	95	
Average Number of Species over the Years Within the Open Spaces																88

By Janet Chu, February 2022