

Small Grant Report
Boulder County Nature Association

2022 Butterfly Inventory
Following the October 2020 Fire
Geer Meadow, Heil Valley Ranch
Boulder County Open Space

By Janet Chu with Ethan Stoner



Cabbage White



Common Checkered-skipper



Variegated Fritillary

Front Page Photos:

Cabbage White *Pieris rapae*

Common Checkered-skipper *Burnsius communis*

Variegated Fritillary *Euptoieta claudia*

The most common butterflies following the 2020 Calwood Fire

In Geer Meadow, Heil Valley Ranch

2022

Boulder County Open Spaces,

Boulder County, Colorado.

by Janet Chu 2chuhouse2@gmail.com ph. 303-494-1108

with Ethan Stoner ethan.stoner@western.edu ph. 303-682-0900

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I. Acknowledgments

Our sincere thanks go to Boulder County Nature Association for the generous grant awarded for this Butterfly Research following the Calwood Fire. The grant was forwarded to Ethan Stoner, freshman student at Western State College who completed the required six-week field work. Ethan presented an illustrated talk to Frasier Meadows Senior Apartments on March 13. The recorded program was being shown on the inhouse tv for one week.

We appreciate the County Research Permitted Butterfly researchers Sue Hirschfeld, Chris Friedman, Linda Hardesty, Richard Holmes, Dan Fosco, Cathy Cook, Cathy Comstock, Pam Piombino, and experienced naturalists Steve Armstead, Bev Postmus, Burton Stoner for their field observations. Sue Hirschfeld had special permission from the County to perform a fourth-year survey in the Heil Ranch, Geer Watershed, from the barn into the meadows and streamlets.

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.

Mentors continued to provide professional support and encouragement. We thank Dr. Paul A. Opler, C.P. Gillette Museum of Arthropod Diversity, Colorado State University, Ft. Collins for his patience and respected information on changes in Lepidoptery. Mike Fisher and Christian Nunes have been very helpful in verifying identification of species of butterflies.

Daniel Ziskin, an NCAR programmer, designed 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.

II. Objectives

- 1) Continue Butterfly Inventories for the 19th consecutive year within Boulder County Open Space properties with special attention following the Calwood Fire in Geer Watershed, Heil Valley Ranch.
- 2) Record both numbers of individuals and species of butterflies.
- 3) Determine trends using Individuals/Research Hour (I/RH) for the Open Spaces surveyed.

III. Abstract

Geer Watershed, Heil Ranch, showed an increase in the population trend in Geer especially because of the increase in Cabbage Whites. Common Checkered-skippers and Variegated Fritillaries also had an anomaly of an increase in 2021 following the fire. In the Geer Meadow study seven volunteers worked within Geer for 29 RH. In 2022 the species richness was greater than 13 previous years. The trend of Individual Butterflies per Research Hour inn Geer shows a 1.4% increase annually over 17 years, this trend affected by the increase in 2021.

The inventory of Butterflies in seven of the Boulder County Open Space properties took place for the nineteenth year. The trend in the seven Open Spaces studied, shows an annual loss of 1.3 % per year which is fewer I/RH annual loss than was determined in 2021 of 3%. Eleven regular volunteers carried on this project for the 19th year with 164 Research Hours in the Open Space properties. Volunteer hours for the County totaled 411.

IV. Results

A. Heil Valley Ranch – Geer Watershed

The Geer Watershed was visited thirteen times in 2022. Five species of *Papilio* made a good showing in May 29-July 10, Anise Swallowtails, Indra Swallowtails *P. indra*, Western Tiger Swallowtails, Pale Swallowtails, and the Two-tailed Swallowtails *P. multicaudata*. As has been found other years, the Cabbage Whites greatly outnumbered any other species. The Variegated Fritillaries *Euptoieta claudia* and Aphrodite Fritillaries were present all season and are known to fly into this area during summer months. Common Wood-Nymphs *Cercyonis pegala* and the Small Wood-Nymphs flew July 10 - August 9 second in numbers only to the

Cabbage Whites. Field Crescents had two broods, one in May-June and the second emerging in August-September. Some Painted Ladies *Vanessa cardui* appeared all season, while the Common Checkered-skippers *Burnsius communis* were common in August and September. There were few skippers identified except for the Taxiles Skippers *Poanes taxiles* and the Dun Skippers *Euphyes vestries* which appeared in small numbers.

The Calwood Fire blew across 600 acres of the Heil Ranch completely burning the Geer Watershed on October 17, 2020. Comparisons are being made about the butterfly populations and the residual effects because of the fire and meadow regrowth. Of the 102 species sighted by this team during 16 years of observations the following butterflies were chosen because of their large populations overall.

A. Individuals per Research Hour (I/RH) 2016-2022 Geer Watershed

Geer Watershed I/RH	2016	2017	2018	2019	2020	2021	2022	Mean Pre-fire	STDEV Pre -Fire	2021 Anomaly	2022 Anomaly
Cabbage White	7.4	2.8	5.3	0.5	0.7	40.0	25.6	3.34	2.99	12.28	7.46
Orange Sulphur	3.4	0.1	0.7	0.7	1.1	5.6	0.4	1.2	1.28	3.44	-0.62
Common Wood-Nymph	3.1	8.6	2.7	0.4	0.3	11.7	4.1	3.02	3.37	2.57	0.32
Common Checkered-skipper	0.7	0	0.3	0	0.1	10.8	1.2	0.22	0.29	35.87	3.32
Small Wood-Nymph	0	0	0.5	0.1	0	0	5.0	0.12	0.22	-0.55	22.51
Field Crescent	0	0	0.2	0.1	0.1	1.2	1.8	0.08	0.08	13.39	20.56
Variegated Fritillary	0.5	0	0.4	0.2	0.5	25.2	1.5	0.32	0.22	114.76	5.44

In this table, which is the subset of observed species, we define the years 2016 through 2020 as Pre-Fire and 2021 and 2022 as Post-Fire years. We calculate the mean and standard deviation of each species for the Pre-Fire years. We calculate the significance of the Post-Fire population relative to its Pre-Fire occurrences. See Table A.

Based on these calculations, three patterns of response emerge. One pattern shows a peak in abundance in 2021, followed in 2022 by fewer butterflies than in 2021 but still significantly larger than the Pre-Fire population.

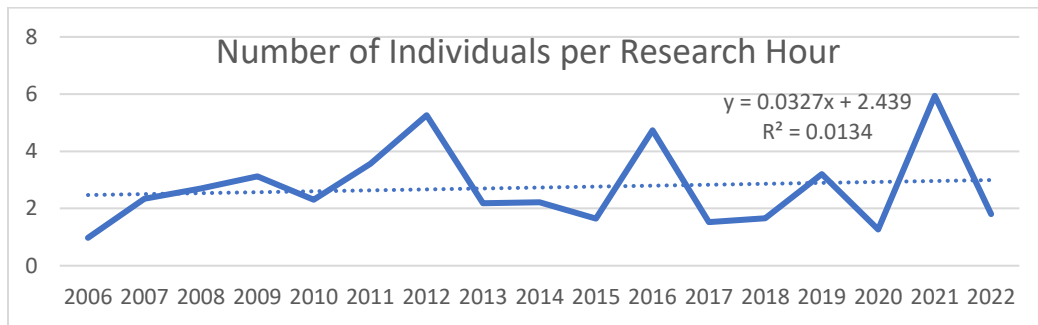
This pattern includes the species Cabbage White, Common Checkered-skipper and Variegated Fritillary, color-coded yellow in the table. The second pattern shows either no-effect or modestly elevated population in 2021

and an even higher population in 2022. This pattern is seen in Small Wood Nymph and Field Crescent and are color coded pale green in the table. The third pattern shows a significant but smaller population boost in essentially no-effect in 2022. This pattern includes Orange Sulfur and Common Wood-Nymph and is colored pink in the table.

In the second year after the fire, none of these species included in this subset have shown a significant decline relative to their Pre-Fire abundance. One explanation is that fires have a beneficial impact on butterfly habitat by stimulating new plant growth or discouraging predators. Another explanation is that it is easier to see and identify butterflies in Post-Fire terrain. A third explanation is that the fire diminished the extent of available habitat and so we are seeing a concentration of the surviving population. Unfortunately, our survey is unable to discern between these or other possible explanations.

The trend of Individuals per Research hours is gradually increasing in the Geer Watershed, likely influenced by the large numbers of individuals in 2021. The trend of Individual Butterflies per Research Hour in the Geer Watershed shows a 1.4% increase annually over 17 years.

B. Trend of Number of Individuals per Research Hour (I/RH) in Geer



Butterfly Individuals per Research Hour 2006-2022

C. Species Richness in Geer Watershed

Heil-Geer Watershed	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
# Species each year	42	56	44	49	36	38	38	42	22	43	30	40	44	40	46	55

Numbers of species noted in Geer Watershed from 2007-2022

Species richness or the number of different species noted each year shows an increase in richness during 2022, only one-year 2008 had a similar number of species. All other years had a low of 30-49 species; in 2015 two years after the catastrophic flood of 2013 numbers of individuals remained low.

Special attention was paid to the meadow and streamlets in the Geer Watershed, Heil Ranch by Sue Hirschfeld, Chris Friedman, and Ethan Stoner because this followed the October 2020 Calwood Fire. A greater number of individuals was counted in 2021-2022 than in the previous 10 years in the Geer Watershed.

Of special note in 2022 was the numerous emergences of certain species. The Western Pygmy-Blue *Brephidium exile* was noted in Heil for the first time and found commonly in several other Boulder County areas which seem to have many host saltbushes and Russian thistles.

V. Conclusion

The Calwood Fire did change some species populations that became increased for at least two seasons. Follow-up studies should occur to note how long this effect continues.

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

VI. References

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Boulder County Open Space

< www.bouldercounty.gov/open-space/education/research/>

Butterflies and Moths of North America. < www.butterfliesandmoths.org>

North American Butterfly Association < www.naba.org>

VII. 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 species sightings from one year to the next, even if the individuals had not been observed in 2022 because they might be observed again.

A. Individuals Counted

B. Field Notes

C. Summary 2007-2022

Appendix A. Photo of the Study Site

Appendix B. Actual Route

A. Butterfly Individuals Counted - 2022

Heil Valley Geer Watershed		2022													Total
		5/29	6/11	6/12	7/10	7/22	7/24	7/25	7/30	7/31	8/1	8/5	8/9	8/16	
<i>Papilio polyxenes</i>	Black Swallowtail														0
<i>P. zelicaon</i>	Anise Swallowtail		2	2	1										5
<i>P. indra</i>	Indra Swallowtail	3	3	2											8
<i>P. rutulus</i>	Western Tiger Swallowtail	1?		3		4		4	3		1	1			16
<i>P. eurymedon</i>	Pale Swallowtail	6	7	6	9										28
<i>P. multicaudata</i>	Two-tailed Swallowtail			1	8										9
swallowtail yel sp.		4	6		5		3			1			1		20
swallowtail dark sp.		1											1		2
<i>Neophasia menapia</i>	Pine White														0
<i>Pontia sisymbrii</i>	Spring White														0
<i>P. protodice</i>	Checkered White				4								1	2	7
<i>P. occidentalis</i>	Western White														0
<i>Pieris rapae</i>	Cabbage White	20	4	7	34 0	22	17	42	38	43	3 1	3 7	11 3	28	742
<i>P. marginalis</i>	Margined White														0
<i>Euchloe ausonides</i>	Large Marble		2	1		2									5
<i>E. olympia</i>	Olympia Marble														0
<i>Anthocharis sara julia</i>	Julia Orangetip														0
white sp.		11	17	12		4		6	6		2	3		6	67
<i>Colias philodice</i>	Clouded Sulphur				5				1				3		9
<i>C. eurytheme</i>	Orange Sulphur				7		2			1			1	2	13
<i>C. alexandra</i>	Queen Alexandra's Sulphur					3									3
<i>C. cesonia</i>	Southern Dogface														0
<i>Eurema mexicana</i>	Mexican Sulphur														0
<i>Nathalis iole</i>	Dainty Sulphur								1			1			2
sulphur sp.		1	1		7					1			2	1	13
<i>Lycaena dione</i>	Gray Copper														0
<i>L. heteronea</i>	Blue Copper					1		1							2
<i>Tharsalea hyllus</i>	Bronze Copper														0
<i>Lycaena helloides</i>	Purplish Copper	3	4				1						1		9
<i>Callophrys affinis homoperplexa</i>	Western Green Hairstreak														0
<i>C. gryneus</i>	Siva Juniper Hairstreak														0
<i>C. sheridanii</i>	White-lined Green Hairstreak														0
<i>C. augustinus</i>	Brown Elfin														0
<i>C. eryphon</i>	Western Pine Elfin														0
elfin sp.															0
<i>Satyrium titus</i>	Coral Hairstreak														0

Heil Valley Geer Watershed	2022	5/2 9	6/1 1	6/1 2	7/1 0	7/2 2	7/2 4	7/2 5	7/3 0	7/3 1	8/ 1	8/ 5	8/ 9	8/1 6	Tot al
<i>S. liparops</i>	Striped Hairstreak														0
<i>S. saepium</i>	Hedgerow Hairstreak														0
<i>Strymon melinus</i>	Gray Hairstreak				1									2	3
hairstreak sp.	hairstreak sp.												1		1
<i>Leptotes marina</i>	Marine Blue														
<i>*Brephidium exile</i>	Western Pygmy-Blue													7	7
<i>Cupido amyntula</i>	Western Tailed-Blue	11	3												14
<i>Celastrina echo sidara</i>	Echo Azure														0
<i>C. echo lucia</i>	“ Lucia type														0
<i>Glaucopsyche piasus</i>	Arrowhead Blue	1			1										2
<i>G. lygdamus</i>	Silvery Blue	12	5		1										18
<i>Euphilotes ancilla</i>	Rocky Mountain Dotted-Blue			1	4										5
<i>Echinargus isola</i>	Reakirt's Blue				2		1						3		6
<i>Plebejus melissa</i>	Melissa Blue	3	2	1	1	1									8
<i>P. saepiolus</i>	Greenish Blue	2													2
<i>P. icarioides</i>	Boisduval's Blue	1	6	7		4		3	1		1				23
<i>P. lupini lutzi</i>	Lupine Blue														0
<i>P. glandon rustica</i>	Arctic Blue														0
blue sp.		25	23	18	5	7		2	4		2	3	3	3	95
<i>Danaus plexippus</i>	Monarch		3		1										4
<i>Apodemia nais</i>	Nais Metalmark														0
<i>Euptoieta claudia</i>	Variegated Fritillary				16	4	1	9	6	1		3		2	42
<i>Speyeria aphrodite</i>	Aphrodite Fritillary		2		2	2	1	1	1					11	20
<i>S. edwardsii</i>	Edward's Fritillary														0
<i>S. coronis</i>	Coronis Fritillary				2										2
<i>S. callippe</i>	Callippe Fritillary														0
<i>S. hesperis</i>	Northwestern Fritillary				3										3
<i>S. mormonia</i>	Mormon Fritillary														0
fritillary sp.			13	11	53	5		2	7	2		1	6	1	101
<i>Chlosyne gorgone</i>	Gorgone Checkerspot	3											1		4
<i>C. nycteis</i>	Silvery Checkerspot														0
<i>C. palla</i>	Northern Checkerspot														0
<i>Phyciodes pallida</i>	Pallid (Pale) Crescent			1											1
<i>P. tharos</i>	Pearl Crescent			1											1
<i>P. cocyta</i>	Northern Crescent			1		1									2
<i>P. pulchella</i>	Field Crescent	15	22	7	1			1					2	3	51
Crescent/checkerspot		5		1	1	2			3						12
<i>Polygonia satyrus</i>	Satyr Comma														0
<i>P. gracilis</i>	Hoary Comma				1										1
<i>Junonia coenia</i>	Common Buckeye														0

Heil Valley Geer Watershed	2022	5/2 9	6/1 1	6/1 2	7/1 0	7/2 2	7/2 4	7/2 5	7/3 0	7/3 1	8/ 1	8/ 5	8/ 9	8/1 6	Tot al
<i>Aglaia milberti</i>	Milbert's Tortoiseshell														0
<i>Nymphalis antiopa</i>	Mourning Cloak							2							2
<i>N. californica</i>	California Tortoiseshell														0
<i>Vanessa atalanta</i>	Red Admiral														0
<i>V. cardui</i>	Painted Lady	1	2	2	14	4		4	1				7	1	36
<i>V. virginensis</i>	American Lady				1										1
<i>Limenitis weidemeyerii</i>	Weidemeyer's Admiral		3	5	6	3			5	1			1		25
<i>L. archippus</i>	Viceroy				1		1	1							3
<i>Asterocampa celtis</i>	Hackberry Emperor														0
<i>Coenonympha tullia ochracea</i>	Common Ringlet	25	5	7	3										40
<i>Cercyonis pegala</i>	Common Wood-Nymph				4	5		20	21	33		1	4	22	119
<i>C. oetus</i>	Small Wood-Nymph				10 7	7	17	7	1			1	4		144
<i>wood nymph sp.</i>													5		5
<i>Oeneis chryxus</i>	Chryxus Arctic														0
<i>O. uhleri</i>	Uhler's Arctic														0
<i>Epargyreus clarus</i>	Silver-spotted Skipper			2	1										3
<i>Thorybes pylades</i>	N. Cloudywing														0
<i>Erynnis icelus</i>	Dreamy Duskywing	1													1
<i>E. pacuvius</i>	Pacuvius Duskywing														0
<i>E. afranius</i>	Afranius Duskywing														0
<i>E. persius</i>	Persius Duskywing	2	2	4	2	1									11
<i>duskywing sp.</i>		1	1												2
<i>Burnsius communis</i>	Common Checkered-skipper	1			3							5	10	15	34
<i>Pholisora catullus</i>	Common Sootywing	4	1												5
<i>Piruna pirus</i>	Russet Skipperling	2													2
<i>Oarisma garita</i>	Garita Skipperling				1										1
<i>Hesperia leonardus pawnee</i>	Leonard's Skipper														0
<i>Hesperia juba</i>	Juba Skipper													5	5
<i>H. colorado</i>	Western Branded Skipper														0
<i>H. nevada</i>	Nevada skipper														0
<i>Polites themistocles</i>	Tawny-edged Skipper														0
<i>*P. peckius</i>	Peck's Slipper				1										1
<i>Ochlodes sylvanoides</i>	Woodland Skipper													4	4
<i>Poanes taxiles</i>	Taxiles Skipper				1			1	3				1		6
<i>Euphyes vestries</i>	Dun Skipper			1	6										7
<i>Atrytonopsis hianna</i>	Dusted Skipper														0
<i>Polites mystic</i>	Long Dash skipper														0
<i>skipper sp.</i>					1										1

*Newly sighted in Geer Watershed

B. Field Notes

Heil Valley – Geer Watershed 2022			
Date, Conditions	Location within Heil - Geer	Butterfly Activity	Researchers
5/29/2022	Kevin's home up canyon near Transect.	Some flying during intermittent sunlight	Chris Friedman
9:00-11:00 am	downstream a short distance		Dan Fosco
22-24 °C			Jan Chu
Sun to cloudy;			Linda Hardesty
0-30 mph wind			Richard Holmes
			Sue Hirschfeld
6/11/2022	Kevin's home, up canyon near Transect, across meadow, crest of hill to north	Many flying	Cathy Comstock
8:15-11:45 am			Chris Friedman
22-25 °C,			Dan Fosco
Clear, slight breeze			Jan Chu
			Linda Hardesty
			Pam Piombino
6/12/2022	Past Grady's, past large culvert, west,	Weidemeyer's followed	Ethan Stoner
9:15-11:31 am	meadow	us	Steve Armstead
28 °C, 10% clouds, no wind			
Heil Valley	Geer Watershed 2022		
7/10/2022	Kevin's home across meadow,	Common Wood-nymphs mating	Bev Postmus
	streamlet to cliff		Cathy Comstock
	stream banks, downhill south		Chris Friedman
7:30-11:45 am			Jan Chu
23-34 °C, clear to clouds			Sue Hirschfeld
7/22/2022	Past Grady's, past large culvert, west,		Ethan Stoner
8:07-9:40 am	meadow		
28 °C, 60% clouds,			
5-10 mph wind			
7/24/2022	Meadow above drainage		Sue Hirschfeld
8:30-10:30 am			
to 24 °C,			
Filtered high clouds			
7/25/2022			Ethan Stoner
8:10-10:03 am			
24 °C, 5% cloud cover, 0-5 wind			
7/30/2022	Past Grady's, past large culvert, west,		Ethan Stoner
9:50-11:53 am	meadow		
25 °C, few clouds, 0-5 wind			
7/31/2022	Meadow above drainage		Sue Hirschfeld
8:15-9:45 am			
23-34 °C, bright sky to high clouds to overcast			
8/1/2022	Past Grady's, past large culvert, west,		Ethan Stoner

8:15-10:11 am	meadow		Burton Stoner
24 °C, 10% clouds			
0-5 wind			
8/5/2022	Past Grady's, past large culvert, west,		Ethan Stoner
8:02-9:40 am	meadow		
26 °C, 12% clouds			
5-10 wind			
8/9/2022	Meadow above culvert, south along pines, lower streamside	Tiny blues, checkered skipper, new Painted Lady	Chris Friedman
8:45-10:45 am			Jan Chu
21-26 °C, clear, no wind			Jean Morgan
			Linda Hardesty
			Sue Hirschfeld
9/16/2022	Streamside, meadow west,		Chris Friedman
10:00-11:30 am			Linda Hardesty
22-23 °C, clear, slight breeze			Sue Hirschfeld
9/16/2022	Parking Schoolhouse, Overland Loop Trailheads		Chris Friedman
11:55-12:40 pm			Linda Hardesty
32 Research Hours	93 Volunteer Hours for the County		

C. Summary 2007-2022

Heil-Geer Watershed	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
# Species Identified Annually	42	56	44	49	36	38	38	42	22	43	30	40	44	40	46	55
Cumulative #Species 2007-2022	81	87	90	91	91	91	91	92	92	92	93	93	94	94	100	102
Research Hours at Site	15.5	21	12.5	14	14	10	11	18	11	10	21	20	13.5	16.5	20	29
# Individual Butterflies	569	1225	492	419	436	530	264	738	200	488	628	665	584	346	2375	1847
Individuals / Research Hour	37	58	39	30	31	53	24	41	18	29	39	33	43	21	119	64
# 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	1.9

Appendix A. Photo of the Study Site in Geer photo by Ethan



Appendix B. Actual Route by Ethan

