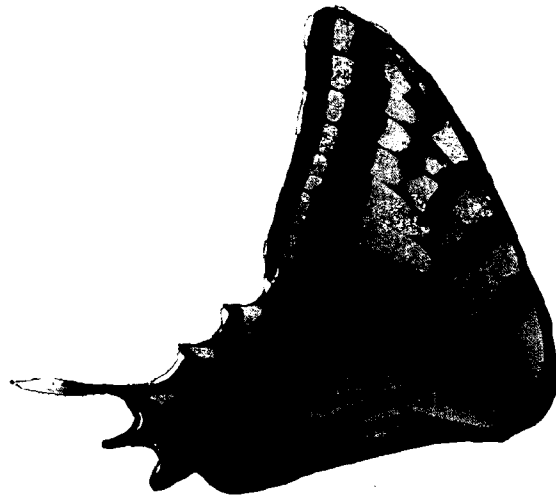










Open Space and Mountain Parks Butterfly Monitoring Program Protocols



November 25, 2003

Contents

	Overview.....	3
	Transect Locations	4
	Transect Descriptions.....	6
	Monitoring Protocols.....	12
	Documentation Forms.....	13
	Butterfly List and Species Code.....	15

Overview

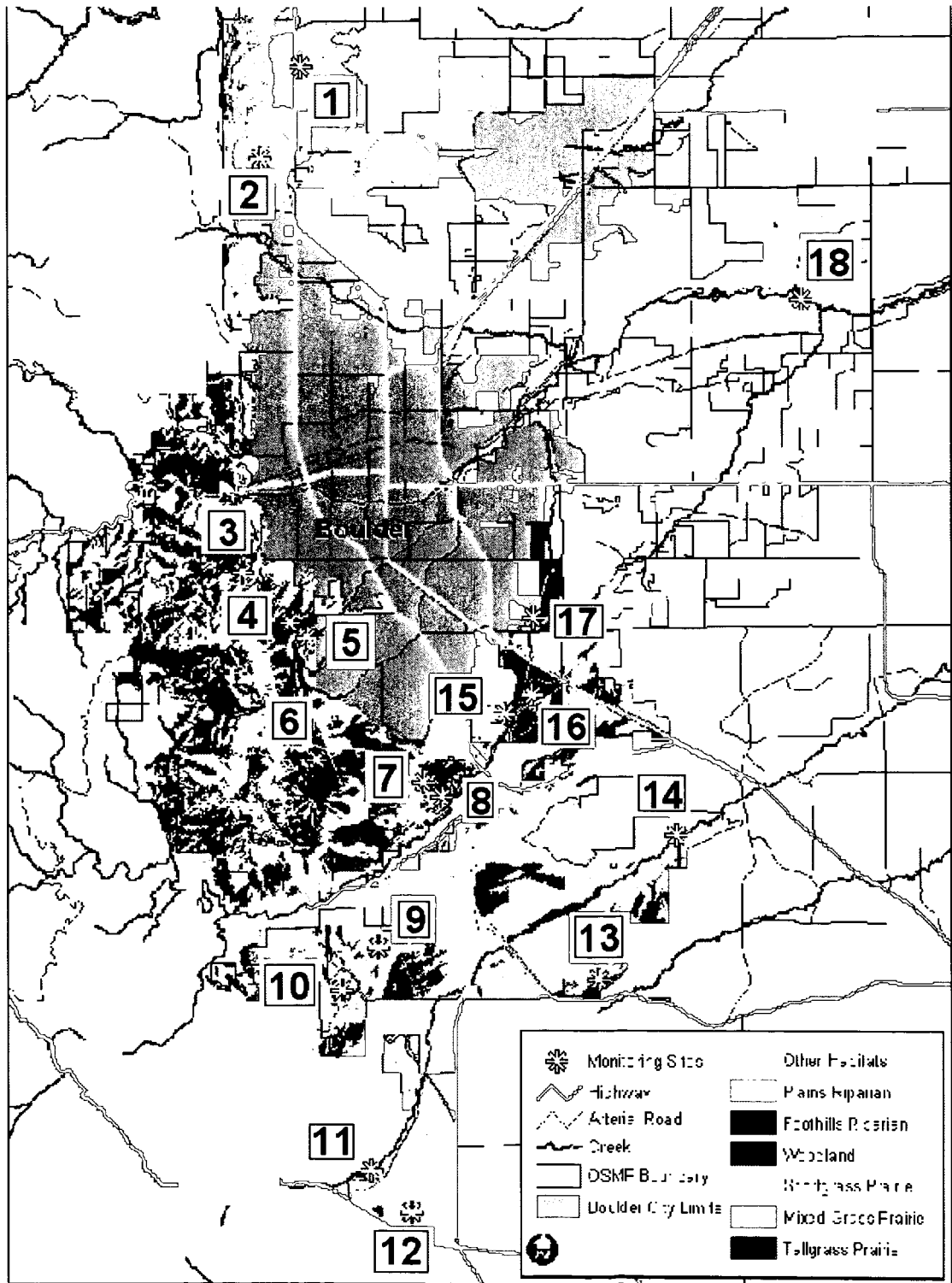
Land managers responsible for the conservation of natural areas require information about the animals that inhabit and more importantly are dependent upon the areas under their stewardship. Butterflies are excellent organisms to survey and include in monitoring programs. They are well studied, easily observed and recognized, and can be sensitive to changes in vegetation and management practices. Patterns in butterfly distribution and abundance respond in the short-term to variations in weather, while longer-term they may respond to alterations and disturbances in habitat availability and quality. Consistent methods for surveying butterflies have been developed and applied in many settings and are often based on samples collected during standardized walking transects. The City of Boulder manages a large open space system with many different habitats including short grass and tallgrass prairies, foothills grasslands, woodlands, and stream riparian corridors. These mixes of habitats along with previous surveys of butterflies in the Boulder area suggest that there are many areas suitable on Open Space and Mountain Parks for diverse butterfly populations.

The Colorado Front Range is well-known and well-documented for its biological diversity of invertebrates, especially the butterflies. Approximately 176 resident or regular colonist butterflies have been documented in this region, representing one of the richest butterfly regions in the United States. The butterfly fauna of Boulder County is perhaps the best sampled part of the Front Range. Its butterfly fauna is a mix of northern arctic, boreal, Rocky Mountain, southwestern desert, Great Plains, and eastern species, as well as regional endemics that reside or wander into the Boulder area. Some of the butterflies present on Open Space and Mountain Parks (OSMP) lands are rare and sensitive species, including several local endemics and species at the periphery of their range. It is possible that as many as 150 butterfly species may occur on OSMP lands. Butterflies of highest conservation interest occurring on OSMP include the hops blue (*Celestrina humulus*) family Lycaenidae, Ottoe skipper (*Hesperia ottoe*) and arogos skipper (*Atrytone arogos*) family Hesperidae, and the regal fritillary (*Speyeria idalia*) family Nymphalidae. Any walk along hiking trails on a sunny spring or summer day will be filled with butterflies seeking nectar, perches, and mates and this incredible butterfly richness is important to document and understand.

Due to the variability of butterfly populations with their mobility and response to changing weather conditions, only long-term standardized monitoring can provide an accurate picture of the distribution and abundance of the butterflies dependent on the City of Boulder's Open Space and Mountain Parks natural areas. This long-term monitoring program provides the foundation for improved understanding of what butterflies occur on Open Space and Mountain Parks lands and provides relative butterfly density information that can assist managers understand how changes in the system either favorable or not might affect the quality of habitats for butterfly populations.

Transect Locations

#	Site Name	Habitat Type					
		Grassland	Foothills Grassland	Tallgrass	Montane Woodland	Plains Riparian	Foothills Riparian
1	East Beech	X					
2	North Foothills		X				
3	Gregory Canyon						X
4	Enchanted Mesa				X		
5	Lower Skunk						X
6	Shanahan				X		
7	Big Bluestem		X				
8	Big Bluestem Tallgrass			X			
9	Doudy Draw		X				
10	Lindsay				X		
11	Coal Creek Foothills						X
12	Jewel Mountain	X					
13	Superior	X					
14	Coal Creek Plains					X	
15	S. Boulder Creek Tallgrass			X			
16	Church			X			
17	S. Boulder Creek					X	
18	White Rocks					X	



Transect Descriptions

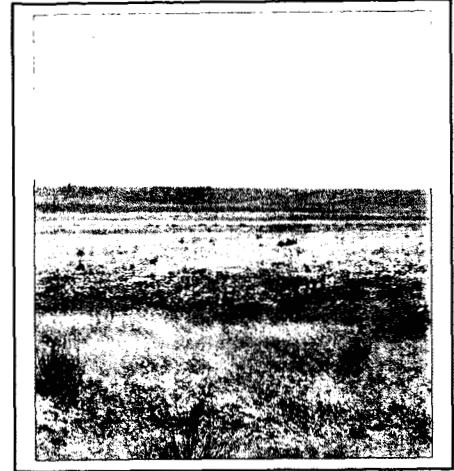
East Beech

Site Access

Site is accessed by parking on highway 36 across from Beech Business Park and walking two track east to starting point. Small shrub on south side of two track marks the starting point.

Site Description

Transect runs parallel to highway 36 across field with a narrow gully cutting across the transect. Dominant plants include yucca, cheat grass, and western wheatgrass.



North Foothills

Site Access

Site is accessed by parking at North Foothills Trailhead off of highway 36. Walk Foothills Trail west to an old railroad grade and then follow railroad grade north to start point. Start point is on slope above railroad grade west of fence and northwest of very large rock.

Site Description

Transect runs at an angle down slope across east facing aspect of foothill hogback crossing over old railroad grade. Dominant plants consist of cheat grass, big bluestem, yucca, and needle and thread grass.



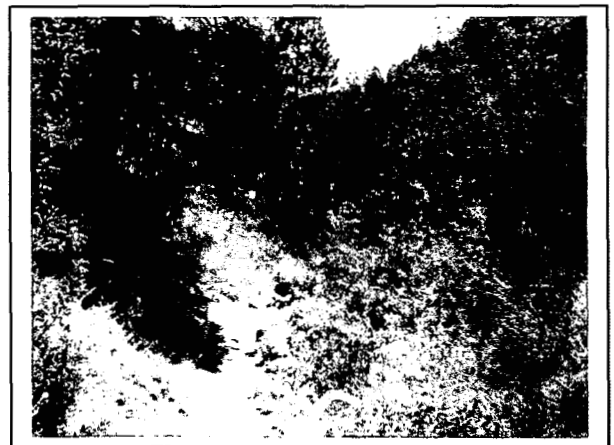
Gregory Canyon

Site Access

Site is accessed by parking at the Gregory Canyon Trailhead at the west end of Baseline Road. Hike Gregory Canyon Trail to the junction of Saddlerock Trail which is the start point.

Site Description

Transect runs up the Gregory Canyon Trail to a small trail that cuts down to the creek and continues west up the creek winding through the vegetation. Dominant plants include choke cherry, wild plum, cottonwood, poison ivy, horse mint, and willow.



Enchanted Mesa

Site Access

Site is accessed by parking at the Enchanted Mesa Trailhead out of Chautauqua and hiking up Enchanted Mesa trail to the starting point. The starting point is on the west side of the trail by a large rock adjacent to the trail.

Site Description

Transect runs south through pine woodland crossing over Enchanted Mesa Trail as it curves west. Dominant plants include ponderosa pine, smooth brome, bluegrass, holly-grape and sun sedge.



Lower Skunk

Site Access

Site is accessed by parking at the junction of Deer Valley and Holly Berry drives and walking along the access road to the fenced pump station. On the west side of the fenced pump station is a utility clearing angling up slope. Start point is on the west side of clearing along the south side of thick shrub vegetation near cement man hole.

Site Description

Transect runs west up the south side of the stream crossing over to the north side along an old trail. Dominant plants include hawthorne, choke cherry, skunkbrush, cottonwood and boxelder.



Shanahan

Site Access

Site is accessed by parking on Cragmore Drive and hiking trail to North Shannahan Trail going west to the junction of Mesa Trail. Follow Mesa Trail south to the start point on the east side of trail.

Site Description

Transect runs east down slope through the ponderosa woodland. Transect crosses through a small meadow over South Shannahan Trail. Dominant plants include ponderosa pine, smooth brome, orchard grass, holly grape, wild rose and blazing star.



Big Bluestem

Site Access

Site is accessed by parking in the South Boulder Creek trailhead on the west side of highway 93. Hike Big Bluestem Trail to corral area for cattle and follow fence line that runs south from the corral. Start point is at the next fence junction with a west oriented fence line.

Site Description

Transect runs west toward livestock water tank in the distance. Dominant plants include blue grama, bluegrass, blazing star, and June grass.

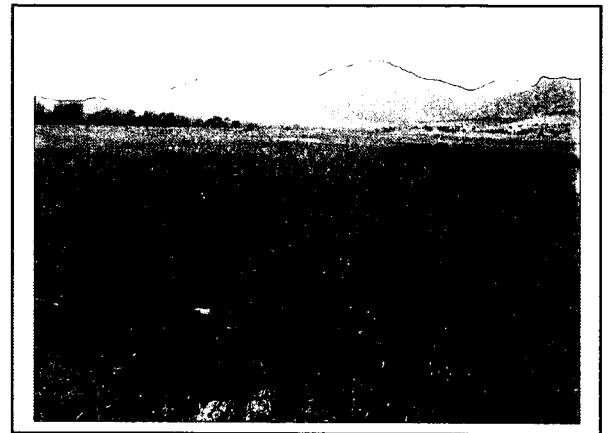
Big Bluestem Tallgrass

Site Access

Site is accessed by parking in the South Boulder Creek trailhead on the west side of highway 93. Hike South Boulder Creek trail through trailhead gate and a second gate. At the junction of a west fence with the fence line paralleling the trail, hike west along the west oriented fence to broken fence stay which is the start point.

Site Description

Transect runs southwest through tallgrass protection area. Dominant plants include big bluestem, prairie chord grass, switchgrass, and plantain.



Doudy Draw

Site Access

Site is accessed by parking in the Doudy Draw trailhead on highway 170 west of highway 93. Hike Doudy Draw trail south up draw going to the north west corner of the private property with a house. Cross over fence to large spread out skunkbrush shrub that sits low to the ground. Start point is on the south side of bush.

Site Description

Transect runs south up ridge and through small drainage concluding at narrow foot trail. Dominant plants include cheat grass, smooth brome, skunk brush, blazing star, and prairie sage.



Lindsay

Site Access

Site is accessed by parking at the gate off of County Road 67 south of Highway 170. Hike the access roadway to a junction going south (left) along the ditch road. After road crosses over ditch on wooden bridge, follow two-track to the west (right) to start point.



Site Description

Transect runs west towards Mickey Mouse rock through woodland. Dominant plants include ponderosa pine, blue grass, blazing star, arnica, and sun sedge.

Coal Creek Foothills

Site Access

Site is accessed from Plainsview Road off of Highway 72. Park on the south side of the road Near the bridge over Coal Creek to access start point. Follow stream down to the fence line where it crosses over the stream. Start point is on the south side of the stream.



Site Description

Transect runs west up the stream crossing over the stream several times. Dominant plants include cottonwood, hawthorne, choke cherry, willow, skunkbrush, and smooth brome.

Jewel Mountain

Site Access

Site is accessed directly off of Highway 72 one half mile west of Highway 93. Hike north to start point which is at the base of the utility pole.

Site Description

Transect runs north toward the Third Flatiron ending on a faint two track. Dominant plants include blue grama, buffalo grass, little bluestem, sulfur flower and blazing star.



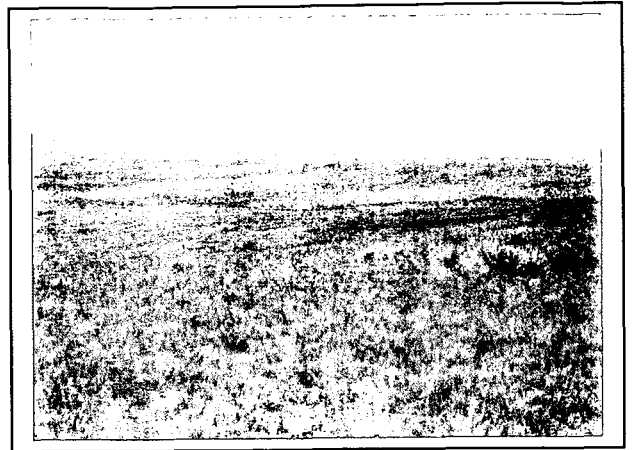
Superior

Site Access

Access site off of Highway 128 east of Highway 93. Park at the entry into Coalton Trail and hike northeast to start point at the edge of the mesa on the north side of large clump of yucca.

Site Description

Transect runs northeast down slope and ends near power poles and developing prairie dog colony. Dominant plants include yucca, blue gramma, cheat grass, blazing star, and wavy leaf thistle.



Coal Creek Plains

Site Access

Site is accessed by parking on Coalton Road where cemented irrigation ditch goes beneath the roadway. On the east side of the bridge, south side of the roadway is a gate and a two track. Proceed southeast through a prairie dog colony. Follow two-track to its end and hike to east fence line. Start point is where fence line crosses creek.

Site Description

Transect runs west upstream crossing over several times and ending at large bend near big willow tree. Dominant plants include willow, cottonwood, hawthorne, choke cherry, snowberry, and smooth brome



S. Boulder Creek Tallgrass

Site Access

Site is accessed by parking on Marshall Road at the West end of South Boulder Creek trail as it ends at Marshall Road. Hike east on South Boulder Creek trail to a long wooden boardwalk. The northwest corner of the boardwalk is the start point.

Site Description

Transect runs northeast toward very large cottonwood. Dominant plants include big bluestem, prairie cord grass, Canadian thistle, smooth brome and redtop.



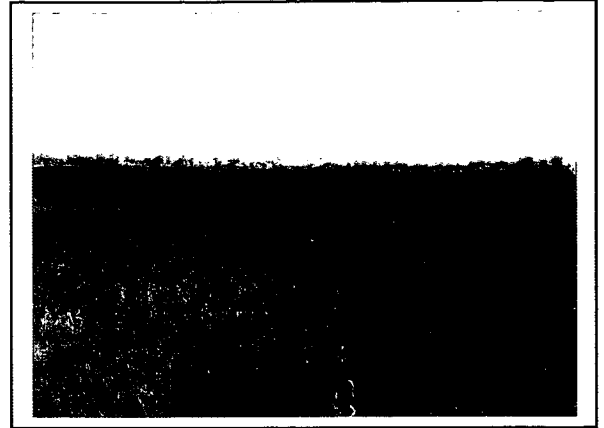
Church

Site Access

Access site by parking on side of Cherryvale Road and hiking two track west over cement bridge crossing irrigation ditch to start point. Start point is the crooked fence post on fence south side of the two-track.

Site Description

Transect runs north toward large red barn in the distance. Dominant plants include big bluestem, smooth brome, wild licorice, thistle, and switchgrass.



S. Boulder Creek

Site Access

Access site by parking at the East Boulder Recreation center and hiking along South Boulder Creek Trail over bridge and follow south (right) to start point where irrigation culvert crosses over creek.

Site Description

Transect runs north along the east bank of the creek. Dominant plants include willow, cotton wood, smooth brome, bluegrass and



White Rocks

Site Access

Access site only with permission. Access is from Teller Farm North Trailhead and hiking the East Boulder Trail towards White Rocks. After crossing the bridge over Boulder Creek, start point can be found following north bank of river west.

Site Description

Transect runs west along north bank of creek ending shortly after stream turns north. Dominant plants include willow, cottonwood, smooth brome, thistle and milk weed.



Monitoring Protocols

Transect Run Criteria

Each transect should be surveyed once per month from May through August. Surveys should begin no earlier than 9:00 A.M. and end before 3:00 P.M. to insure butterfly observations occur during peak activity periods. The order for running the transects should be randomly determined.

Weather conditions and sun exposure are to be documented to detail weather-related effects which might alter butterfly activity. Weather characteristics including temperature, wind, cloud cover, and barometric pressure are recorded both at the beginning and at the end of transect surveys. Routes are only to be surveyed on days that meet the following weather requirements:

- Less than 30% cloud cover
- Less than 15 mph winds
- Temperatures above 75 degrees Fahrenheit (24° C), and below 100 degrees Fahrenheit (38° C)

If weather conditions changed while a survey is in progress and conditions no longer meet weather criteria, the transect is to be halted and run again in its entirety on the next available day.

Transect Run Procedures

Each transect should begin at the designate start point as determined by a silver survey cap placed in the ground located with the assistance of GPS coordinates and available maps and site descriptions. Transects are walked at a slow and steady pace by the observer who records all butterflies within a five meter space around the observer as they proceed along the transect. Only one observer should record butterfly observations, but other individuals can follow observer so long as they do not alert the observer to any missed butterflies. Any additional butterflies noted not by the observer, but someone assisting should be documented in the comments section for presence information, but not included as occurring on the transect survey. The observer can stop and look with binoculars, photograph, or net unknown butterflies that are in the transect sampling space to identify the butterfly. During the pauses incurred when attempting to identify a butterfly, all other butterflies observed can only be recorded as occurring off transect. Butterflies requiring chase and capture and requiring the observer to leave the transect area (more than 10 meters) should not be followed. After the capture, identification, and release of butterflies, the survey resumes with butterflies being recorded as occurring on transect. Observations of butterflies outside the five meter boundary are recorded as occurring off transect and need documented only if the species is not otherwise observed on the transect. Butterflies observed within the five meter sampling space are identified to species or the lowest taxonomic level possible. Some skippers are difficult to field identify to species and may be only classified to a genus complex.

Documentation Forms

Observation forms are available for documenting weather and sunlight conditions and field observations. The first side of the form is to document transect location, comments about blooming plants, conditions of the habitat (i.e. water in ditches, recent precipitation, cattle presence, site disturbances), and the start and end time weather conditions. The other side of the form is for recording butterfly observations. Each species observed is documented by its butterfly code, the number observed, the butterfly's behavior (nectaring, perching/basking, chasing, mating, flying), on/off transect, and any plants associated to the butterfly's activity.

side one

Transect Name _____	Number _____
Date _____	
<u>Start</u>	<u>End</u>
Temp _____	Temp _____
Wind _____	Wind _____
Sun _____	Sun _____
time _____	time _____
Pressure _____	Pressure _____
Comments _____	

Butterfly List and Species Code

Common Name	Scientific Name	Species Code
Bronze Roadside Skipper	<i>Amblyscirtes aenus</i>	amae
Orange-headed Roadside Skipper	<i>Amblyscirtes phylace</i>	amph
Common Roadside Skipper	<i>Amblyscirtes vialis</i>	amvi
Rocky Mountain Orangetip	<i>Anthocharis julia</i>	anju
Hackberry Emperor	<i>Asterocampa celtis</i>	asce
Sachem	<i>atalopedes campestris</i>	atca
Arogos Skipper	<i>Atrytone arogos</i>	atca
Green Hairstreak	<i>Callophrys apama</i>	caap
Western Pine Elfin	<i>Callophrys eryphon</i>	caer
Hops Blue	<i>Celestrina humulus</i>	cehu
Spring Azure	<i>Celestrina ladon</i>	cela
Small Wood Nymph	<i>Cercyonis oetus</i>	ceoe
Wood Nymph	<i>Cercyonis pegala</i>	cepe
Gorgone Checkerspot	<i>Chlosyne gorgone</i>	chgo
Ringlet	<i>Coenonympha tulliea</i>	cotu
Orange Sulfur	<i>Colias eurytheme</i>	coeu
Common Sulfur	<i>Colias philodice</i>	coph
Monarch	<i>Danaus plexippus</i>	dapl
Silver-Spotted Skipper	<i>Epargyreus clarus</i>	epcl
Afranius Duskywing	<i>Erynnis afranius</i>	eraf
Sleepy Duskywing	<i>Erynnis brizo</i>	erbr
Funereal Duskywing	<i>Erynnis funeralis</i>	erfu
Mottled Duskywing	<i>Erynnis martialis</i>	erma
Pacuvius Duskywing	<i>Erynnis pacuvius</i>	erpa
Persius Duskywing	<i>Erynnis persius complex</i>	erpe
Large Marble	<i>Euchloe ausonides</i>	euau
Dotted Blue	<i>Euphilotes ancilla</i>	euan
Two-Spotted Skipper	<i>Euphyes bimacula</i>	eubi
Dun Skipper	<i>Euphyes vestris</i>	euve
Variegated Fritillary	<i>Euptoieta claudia</i>	eucl
Tailed Blue	<i>Everes comyntas</i>	evco
Silvery Blue	<i>Glaucopsyche lygdamus</i>	gily
Arrowhead Blue	<i>Glaucopsyche piasus</i>	glpi
Reakirt's Blue	<i>Hemiargus isola</i>	heis
Western Branded Skipper	<i>Hesperia Comma complex</i>	heco
Juba Skipper	<i>Hesperia juba</i>	heju
Blazing-Star Skipper	<i>Hesperia leonardus pawnee</i>	hele
Nevada Skipper	<i>Hesperia nevada</i>	hene
Ottoo Skipper	<i>Hesperia ottoe</i>	heot
Uncas Skipper	<i>Hesperia uncas</i>	heun
Green Skipper	<i>Hesperia viridis</i>	hevi
Buckeye	<i>Junonia coenia</i>	juco
Marine Blue	<i>Leptotes marina</i>	leme
Viceroy	<i>Limenitis archippus</i>	liar
Weidemeyer's Admiral	<i>Limenitis weidemeyerii</i>	liwe
Orange-Margined Blue	<i>Lycaeides melissa</i>	lyme

Blue Copper	<i>Lycaena heteronea</i>	<i>lyhe</i>
Bronze Copper	<i>Lycaena hyllus</i>	<i>lyhy</i>
Dainty Sulfur	<i>Nathalis iole</i>	<i>naio</i>
Mourning Cloak	<i>Nymphalis antiopa</i>	<i>nyan</i>
Western Skipperling	<i>Oarisma garita</i>	<i>oaga</i>
Woodland Skipper	<i>Ochlodes sylvanoides</i>	<i>ocsy</i>
Chryxus Arctic	<i>Oeneis chryxus</i>	<i>oech</i>
Pale Swallowtail	<i>Papilio eurymedon</i>	<i>paeu</i>
Indra Swallowtail	<i>Papilio indra</i>	<i>pain</i>
Two-Tailed Swallowtail	<i>Papilio multicaudatus</i>	<i>pamu</i>
Black Swallowtail	<i>Papilio polyxenes</i>	<i>papo</i>
Tiger Swallowtail	<i>Papilio rutulus</i>	<i>paru</i>
Anise Swallowtail	<i>Papilio zelicon</i>	<i>paze</i>
Snow's Skipper	<i>Paratrytone snowi</i>	<i>pasn</i>
Rocky Mountain Parnassian	<i>Parnassius smintheus</i>	<i>pasm</i>
Cabbage White	<i>Peries rapae</i>	<i>pera</i>
Common Sootywing	<i>Pholisora catullus</i>	<i>pcat</i>
Field Crescent	<i>Phyciodes campestris camilla</i>	<i>phca</i>
Nothern Crescent	<i>Phyciodes cocyta</i>	<i>phco</i>
Pearl Crescent	<i>Phyciodes tharos</i>	<i>phth</i>
Russet Skipperling	<i>Piruna pirus</i>	<i>pipi</i>
Silver-Studded Blue	<i>Plebejus acmon</i>	<i>plac</i>
Boisduval's Blue	<i>Plebejus icarioides</i>	<i>plic</i>
Lupine Blue	<i>Plebejus lupini</i>	<i>pllu</i>
Taxiles Skipper	<i>Poanes taxiles</i>	<i>pota</i>
Draco Skipper	<i>Polites draco</i>	<i>podr</i>
Long Dash	<i>Polites mystic dacotah</i>	<i>pomy</i>
Peck's Skipper	<i>Polites peckius</i>	<i>pope</i>
Rhesus Skipper	<i>Polites rhesus</i>	<i>porh</i>
Tawney Edged Skipper	<i>Polites thermistocles</i>	<i>poth</i>
Hoary Comma	<i>Polygonia gracilis</i>	<i>pogr</i>
Western White	<i>Pontia occidentalis</i>	<i>pooc</i>
Checkered White	<i>Pontia protodice</i>	<i>popr</i>
Spring White	<i>Pontia sisymbrii</i>	<i>posi</i>
Checkered Skipper	<i>Pyrgus communis</i>	<i>pyco</i>
Two-banded Checkered Skipper	<i>Pyrgus ruralis</i>	<i>pyru</i>
Acadian Hairstreak	<i>Satyrium acadica</i>	<i>saac</i>
Hedgerow Hairstreak	<i>Satyrium saepium</i>	<i>sasa</i>
Aphrodite Fritillary	<i>Speyeria aphrodite ethne</i>	<i>spap</i>
Atlantis Fritillary	<i>Speyeria atlanta</i>	<i>spat</i>
Callippe Fritillary	<i>Speyeria callippe</i>	<i>spca</i>
Edward's Fritillary	<i>Speyeria edwardsii</i>	<i>sped</i>
Gray Hairstreak	<i>Strymon melinus</i>	<i>stme</i>
Mexican Cloudywing	<i>Thorybes mexicana</i>	<i>thme</i>
Northern Cloudywing	<i>Thorybes pylades</i>	<i>thpy</i>
Red Admiral	<i>Vanessa atalanta</i>	<i>vaat</i>
Painted Lady	<i>Vanessa cardui</i>	<i>vaca</i>