

**WILD CONNECTIONS
PAWNEE MONTANE SKIPPER
(*HESPERIA LEONARDUS MONTANA*)
SURVEY**



NOVEMBER 1, 2011

Prepared for: **Wild Connections**

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Knowledge to Go Places



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Cover photograph: While *Hesperia leonardus montana* prefer *Liatris punctata* for nectaring, in the early morning they will sunbath on any flat, warm surface such as offered by this oriental clematis, *Clematis orientalis*.

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Cover photograph: While *Hesperia leonardus montana* prefer *Liatrix punctata*, they are known to nectar on other species such as this *Heterotheca* sp.

WILD CONNECTIONS PAWNEE MONTANE SKIPPER (*HESPERIA LEONARDUS MONTANA*) SURVEY

CONDUCTED 1 SEPTEMBER 2011

FOR WILD CONNECTIONS

Wild Connections, with financial support from the Cheyenne Mountain Zoo contracted with Colorado State University - Colorado Natural Heritage Program (CSU-CNHP) to provide a survey for the Pawnee montane skipper (*Hesperia leonardus montana*) butterfly. The intended location was along two trail corridors adjacent to Trout Creek in the Pike National Forest, Douglas County, Colorado. Wild Connections has performed restoration work on one of the trail corridors where off road vehicle use has caused excessive erosion. Unfortunately, the Trout Creek area was closed to recreation by the US Forest Service due to criminal activity and the Trout Creek transects were not accessible in September when the 2011 survey work was scheduled for completion. Fearing the area would not reopen prior to termination of the butterflies short flight period, approximately 2 weeks in length, a decision was made to instead survey a second area where Wild Connections was also involved in restoration work. This second area is a tributary of Pine Creek, situated approximately 7 miles west of the Trout Creek study site (Figure 1). The Pine Creek survey site is within a high severity burn area of the 2002 Hayman Fire and has been monitored annually since 2002 as Transect 522 of the "Post Hayman Fire Pawnee Montane Skipper Habitat Assessment." This assessment is being funded by the U.S. Forest Service (USFS), U.S. Fish and Wildlife Service (USFWS), and Denver Water and is being conducted with assistance from John Sovell of the Colorado Natural Heritage Program and Boyce Drummond of Natural Perspectives.

The objectives of the original Trout Creek study were to understand how restoration of the eroded trail corridor impacts habitat for the federally threatened Pawnee montane skipper butterfly, identify if a Pawnee butterfly population inhabits the study site, and document the relative frequency of blue grama (*Bouteloua gracilis*) and relative abundance of prairie gayfeather (*Liatris punctata*), the butterflies larval host plant and primary adult nectar source, respectively, on each of the two trail corridors.

The purpose of the Post Hayman Fire Pawnee Montane Skipper Habitat Assessment was to implement a monitoring program documenting Pawnee montane skipper habitat condition and trends of population abundance, in both burned and unburned Pawnee montane skipper habitat within the Hayman fire area in 2002 and subsequent years. Assessing the habitat requirements, trends in abundance, and recolonization dynamics of Pawnee montane skipper in burned areas will reveal the conservation status of this butterfly over the entire extent of its known distribution within the South Platte River drainage.

METHODS

The methods of the 2011 survey differed slightly from that of 2010. In 2010, two linear 800-meter (m)-long belt transects were located along the corridor of the Trout Creek Trail. In 2011 however, Transect 522 of the Hayman Fire monitoring project was sampled and transects of this project consist of one 800

m-long belt transect with four segments forming a diamond 200 m to a side. The survey area width for the belt transect, like in 2010, was again 10 m (5 m on either side of the transect center line). As in 2010, the effective area surveyed per transect was 8,000 m² (800 m x 10 m), but only one 800 m transect was surveyed in 2011, while two were surveyed in 2010. An area of 8000 m² is equivalent to 1.98 acres. Transect 522 runs north of Pine Creek and due to the diamond shape bisects the same tributary of the creek in two locations (Figure 2). The steep terrain and impacts of the fire have caused moderate erosion at those portions of the tributary that are crossed by the transect.

Transect 522 consists of four legs (A through D) of 200 m length creating four separate transect stations; one each starting at 0 m, 200 m, 400m, and 600m (Figure 2). Starting at station A, the survey team using orientation skills, maps a pathway clockwise around the diamond to each of the four stations (A through D). Depending upon the orientation skills of the surveyors, the transect ends back at or near station A (effectively station E) after covering 800 m of ground. Each 200 m leg was further divided into 10, 20 m sub-segments resulting in 40 separate sampling segments along the 800 m belt transect.

Each 200-m leg was walked, and data were recorded for each of the 10, 20-m sub-segments along each of four 200-m transect legs. The following data were collected along each 20-m sub-segment:

- Tree counts. Live trees greater than 6 inches diameter at breast height (DBH) within the belt transect (5 m on each side of the transect center point) were counted to document the larger living trees along the transect in both burned and unburned areas. Also, dead standing trees greater than 6 inches DBH were counted and recorded in a separate category (particularly pertinent to Transect 522, which is in the Hayman Fire area).
- Blue grama (*Bouteloua gracilis*) (Bogr) frequency. The presence or absence of blue grama was documented within a visually estimated 0.5-m-square rectangular quadrant that extended 0.5 m on either side of the observer's toe, and 0.5 m in front of the toe at the endpoint of each 20-m interval along the transect (10 recordings per 200-m segment). The observer marked + or √ for presence, 0 for absence in the appropriate space on the data sheet.
- Prairie gayfeather (*Liatris punctata*) (Lipu) stem counts. Stems of blooming Prairie gayfeather were counted in each 20-m segment within the 10-m wide belt of the transect. Commonly there were multiple blooming stems emanating from the crown of an individual *Liatris* plant. Each stem was counted as a separate occurrence.
- Adult skipper butterfly counts (*Hesperia leonardus montana* [Hlm] and *Hesperia colorado* [Hco]). Individual skipper butterflies of either the Pawnee montane skipper or the western branded skipper were counted in each 20 m segment within the 10-m wide belt of the transect. The sex of the skipper was recorded if it was ascertainable. If the skipper species was unknown, its occurrence was entered as an unknown skipper, and the sex was recorded if it was ascertainable.

RESULTS

The amount of precipitation received during the 2011 growing season (March to August) was 1.85 inches below the 25 year mean (1985-2009) (Figure 1) of data from the Cheesman weather station, located approximately 2 miles south of Transect 522. [Cheesman, Douglas County, Colorado: National Weather Service (NWS), National Climate Data Center Station (NCDC) #05252].

The field survey counted five Pawnee montane skipper butterflies along portions of legs B, C, and D (Table 1 and Figure 4) of Transect 522. In addition, nine skippers unidentified because of their fast flight and the short time they remained visible were documented in legs A, B, C, and D of Transect 522 (Table 1 and Figure 4). Of the five Pawnee montane skippers recorded, two were male, two were a female, and the sex of one was indeterminable (Table 1). The five Pawnee montane skippers represents a relative abundance of 2.5 skippers/acre and the 14 *Hesperia* skippers (Pawnee plus unknown skippers) counted in total, represents a relative abundance of 7.1 skippers/acre at Transect 522 in 2011.

Transect 522, because it is within a high severity burn area of the Hayman Fire contained 0 live trees while 127 dead trees were counted on the transect (Table 1). Blue grama occurred at 29 of 40 points, a frequency of 73%, and prairie gayfeather was abundant at the transect with 452 stems counted (Table 1), a density of 228 stems/acre.

Table 1. The data collected from Transect 522 at the Pine Creek tributary.

Transect	Burn Intensity	Date	UTME	UTMN	Leg	Start Time	End Time	Sample Segment (meters)	Live Trees	Dead Trees	Bogr	Lipu	Hlm Male	Hlm Female	Hlm?	Hco Male	Hco Female	Hco?	UNK male	UNK female	UNK ?
522	high	9/9/2011	476604	4343751	A	10:20	10:50	0-20	0	0	0	0	0	0	0	0	0	0	0	0	0
522	intensity							20-40	0	0	0	0	0	0	0	0	0	0	0	0	0
522	burn							40-60	0	0	0	0	0	0	0	0	0	0	0	0	0
522								60-80	0	0	0	0	0	0	0	0	0	0	0	0	1
522								80-100	0	1	0	0	0	0	0	0	0	0	0	0	0
522								100-120	0	0	√	38	0	0	0	0	0	0	0	0	0
522								120-140	0	1	√	40	0	0	0	0	0	0	0	0	0
522								140-160	0	0	√	34	0	0	0	0	0	0	0	0	0
522								160-180	0	1	√	17	0	0	0	0	0	0	0	0	0
522								180-200	0	2	0	0	0	0	0	0	0	0	0	0	0
522			476469	4343895	B	10:55	11:23	0-20	0	1	√	2	0	0	0	0	0	0	0	0	3
522								20-40	0	0	√	97	✓	2	0	0	0	0	0	0	2
522								40-60	0	3	√	5	0	0	0	0	0	0	0	0	0
522								60-80	0	0	√	9	0	0	0	0	0	0	0	0	0
522								80-100	0	1	√	1	0	0	0	0	0	0	0	0	0
522								100-120	0	0	√	0	0	0	0	0	0	0	0	0	0
522								120-140	0	0	0	0	0	0	0	0	0	0	0	0	0
522								140-160	0	1	0	2	0	0	0	0	0	0	0	0	0
522								160-180	0	1	0	0	0	0	0	0	0	0	0	0	0
522								180-200	0	3	√	5	0	0	0	0	0	0	0	0	1
522			476608	4344037	C	11:26	11:45	0-20	0	0	0	0	0	0	0	0	0	0	0	0	0
522								20-40	0	3	√	7	0	0	0	0	0	0	0	0	0
522								40-60	0	2	√	29	0	0	0	0	0	0	0	0	0
522								60-80	0	0	√	14	0	0	0	0	0	0	0	0	0
522								80-100	0	1	√	14	0	0	0	0	0	0	0	0	0
522								100-120	0	0	√	53	0	0	0	0	0	0	0	0	0
522								120-140	0	0	√	27	0	0	0	0	0	0	0	0	0
522								140-160	0	2	√	13	0	0	0	0	0	0	0	0	0
522								160-180	0	0	√	14	0	0	0	0	0	0	0	0	0
522								180-200	0	0	√	31	0	✓	1	0	0	0	0	0	1
522			486775	4340379	D	11:39	11:48	0-20	0	0	√	0	0	0	0	0	0	0	0	0	0
522								20-40	0	2	√	0	0	0	0	0	0	0	0	0	0
522								40-60	0	32	√	0	0	0	0	0	0	0	0	0	0
522								60-80	0	0	√	0	0	0	0	0	0	0	0	0	0
522								80-100	0	0	0	0	0	0	0	0	0	0	0	0	0
522								100-120	0	12	√	0	0	0	0	0	0	0	0	0	0
522								120-140	0	4	√	0	0	✓	1	0	0	0	0	0	0
522								140-160	0	23	√	0	0	0	✓	1	0	0	0	0	1
522								160-180	0	8	√	0	0	0	0	0	0	0	0	0	0
522								160-180	0	23	√	0	0	0	0	0	0	0	0	0	0
								Totals	0	127	29	452	2	2	1	0	0	0	0	0	9

Bogr = *Boteloua gracilis*, Lipu = *Liatris punctata*, Hlm = *Hesperia leonardus montana*, and Hco = *Hesperia colorado*.

DISCUSSION/RECOMMENDATIONS

Topography at Transect 522 includes a steep ravine associated with the tributary of Pine Creek and fairly steep to moderately sloped hillsides (Photo 1). The topography is rugged and is difficult to hike. The transect is located in a high severity burn area of the Hayman fire and as such is completely open without any canopy cover (Photo 1). The lack of canopy results in high solar radiation at the transect and although precipitation was below normal during the 2011 growing season the profuse sunlight resulted in abundant blue grama grass (Photo 2) and prairie gayfeather. There exists a possibility that high snow pack and late melt out in the South Platte River Valley in 2011 afforded for high soil moisture levels at Transect 522 during much of early summer, which may have compensated for low precipitation levels. However, snowfall and melt out data for 2011 have not yet been entered at the NWS, NCDC internet site so it is impossible to make that conclusion. Blue grama frequencies at unburned, low severity, and high severity transects averaged 33%, 32%, and 30%, respectively, over nine years of monitoring while frequency of blue grama was 73% at Transect 522 in 2011, over two times the average. The relative abundance of gayfeather at unburned, low severity, and high severity burn transects averaged 61, 65, and 94 stems/acre, respectively, over nine years of monitoring while there were 228 stems/acre at Transect 522 in 2011, nearly 3 times the average. Both of these features combine to make Transect 522 highly suitable for Pawnee montane skippers in 2011 from the standpoint of availability of butterfly larval host plants and adult nectar resources.



Photo 1. The view looking back from Station C to Station B showing the steep topography of Transect 522.

The survey documented a moderately abundant population of both Pawnee montane skipper and *Hesperia* skippers at transect 522 in a high severity burn area of the Hayman Fire. The 14 *Hesperia* skippers counted at Transect 522 in 2011 was the 28th highest total counted from 2002 to 2010 (Figure 5). This is out of the 205 surveyed transects where *Hesperia* skippers were recorded during that time period. When considering only Pawnee montane skippers the five counted at Transect 522 in 2011 was the 25th highest total out of 146 surveyed transects where Pawnee montane skippers were recorded (Figure 6). The five Pawnee montane skippers counted in 2011 at Transect 522 was the 4th highest total out of 33 surveyed high severity burn transects where Pawnee montane skippers were recorded (Figure 7). But this is fewer Pawnee montane skippers than were recorded at Transect 522 in 2007 and 2010 when 12 and 9 were counted, respectively (Figure 7). The relative abundance of Pawnee montane skippers at unburned, low severity burn, and high severity burn transects was 1.07/acre, 0.85/acre, and 0.32/acre, respectively, over nine years of monitoring. The 2.53/acre counted at Transect 522 in 2011 was over 3 times the average count. Over nine years of monitoring the number of Pawnee montane skippers counted at Transect 522 averaged 1.46/acre suggesting that since skippers recolonized the transect in 2006 it has remained highly suitable habitat for Pawnee montane skippers, even in the complete absence of live tree cover (Photo 2).

The most significant factor having a positive impact on the recolonization of high severity burn areas by Pawnee montane skippers is the transect's distance to low severity and unburned suitable Pawnee montane skipper habitat (Sovell 2011, 2010, 2009). Out of the 15 high severity burn transects most frequently monitored, Transect 522 at 376 m is the 4th closest to unburned suitable skipper habitat and the transect is located only 37 m from low severity burned suitable skipper habitat.

Continuing to monitor Transect 522 will supply data on the persistence of Pawnee montane skippers at a high severity burn transect where live trees are absent. Monitoring variation in populations of the butterfly's larval host plant and adult nectar source at Transect 522 will assist in identifying the population sizes required of these two important components of skipper ecology to sustain Pawnee montane skippers in a habitat where live tree cover is absent. Currently, Transect 522 has been monitored every year since the Hayman fire in 2002 and it is recommended that annual monitoring of this transect continue.

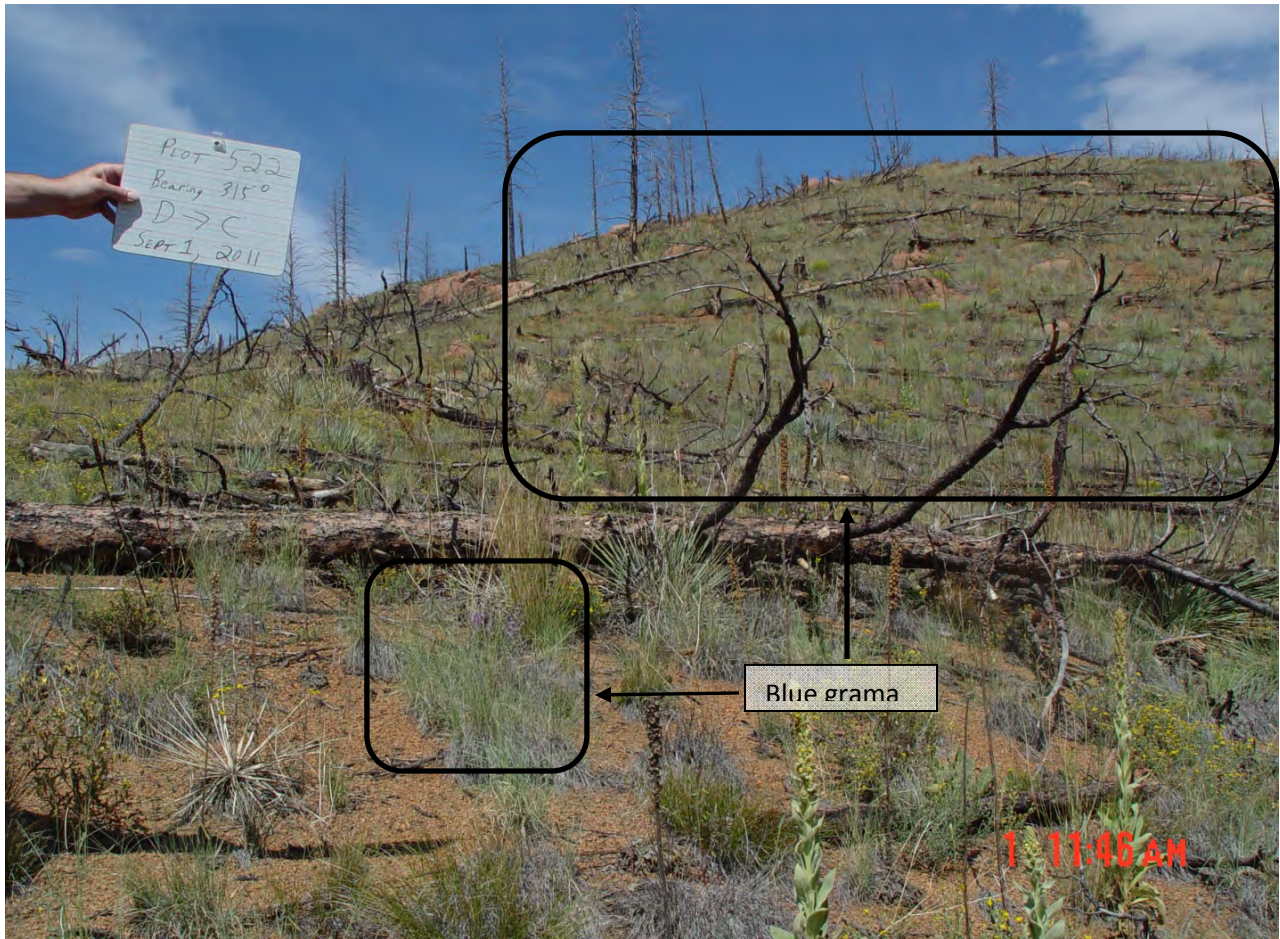


Photo 2. The view looking back from Station D to Station C showing abundant blue grama (*Bouteloua gracilis*) and the absence of live and standing dead trees at Transect 522.

REFERENCES

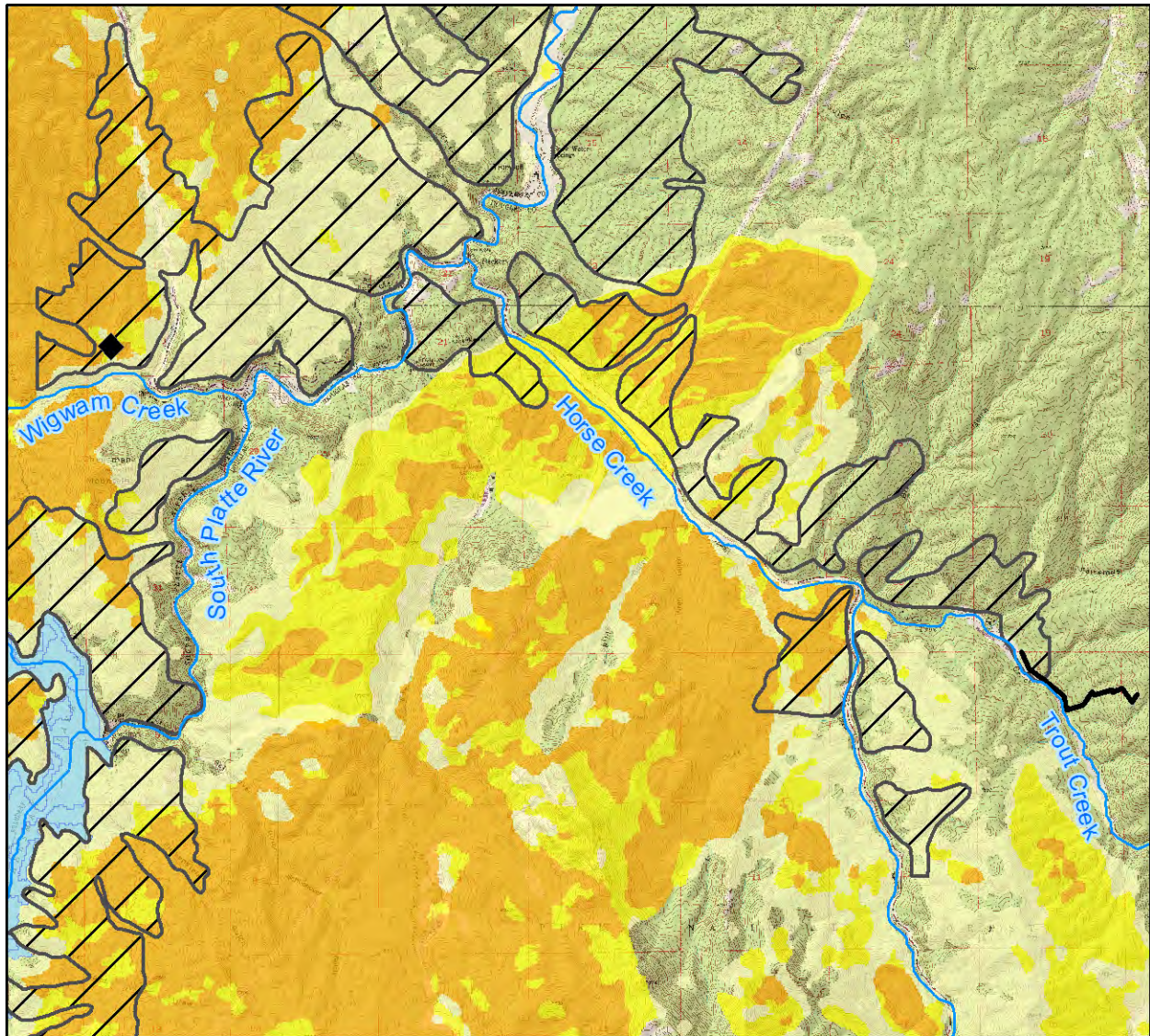
Sovell, J. R. 2009. Pawnee montane skipper post fire habitat assessment survey – August/September 2008. Colorado Natural Heritage program, Colorado State University.

Sovell, J. R. 2010. Pawnee Montane Skipper Post-fire Habitat Assessment Survey – August/September 2009. Colorado Natural Heritage program, Colorado State University.

Sovell, J. R. 2011. Pawnee Montane Skipper Post-fire Habitat Assessment Survey – August/September 2010. Colorado Natural Heritage program, Colorado State University.

FIGURES 1 through 7

Figure 1. The Locations of the Trout Creek transects and Transect 522. The Hayman Fire and estimated suitable habitat for the Pawnee montane skipper (*Hesperia leonardus montana*) are also mapped.










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Cheesman Lake, 39105-B2
 7.5 Minute Digital Raster
 Graphic produced by the
 U.S. Geological Survey

Legend

-  Trout Creek Transects
 -  Transect 522
 -  Pawnee montane skipper suitable habitat
- Hayman Fire Burn Severity Classification
-  High
 -  Moderate
 -  Low
 -  Unburned

Map Date: 10/21/2011

Location in Colorado

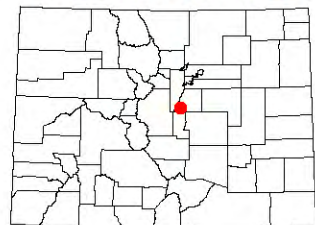
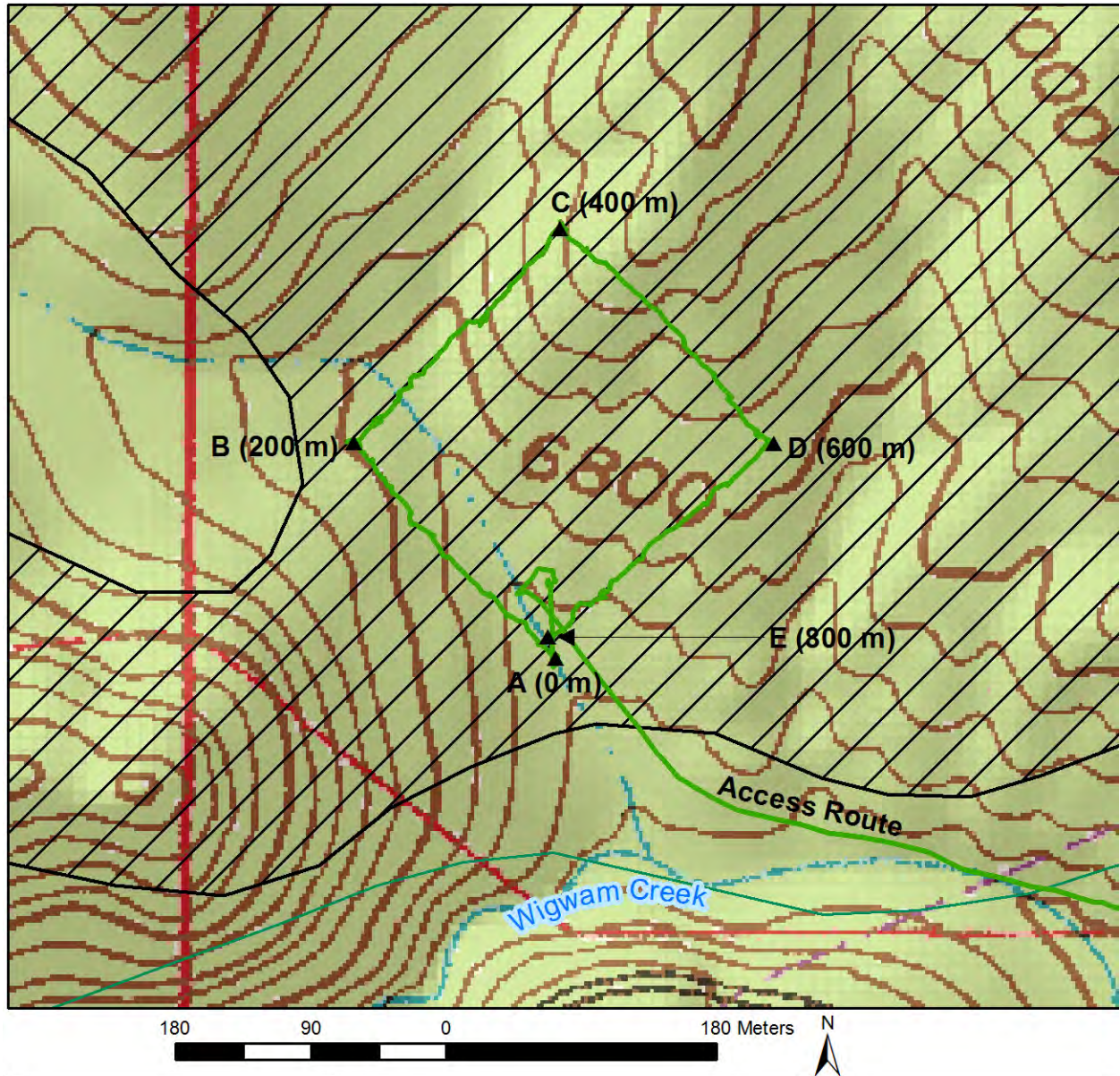


Figure 2. The layout of Transect 522 with the actual GPS track that surveyors walked while completing the survey. The hiking route used to access the transect and estimated suitable habitat for the Pawnee montane skipper (*Hesperia leonardus montana*) are also mapped.



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Figure 3. Deviation from the mean values of growing season precipitation (inches) for each year of the post Hayman Fire habitat assessment monitoring study. Means were calculated on 25 years (1985-2009) of data from the Cheesman weather station (Cheesman, Douglas County, Colorado: National Weather Service, National Climate Data Center Station #052528) for the growing season (March – August) of each year. The 25-year mean is shown on the graph as 0.00.

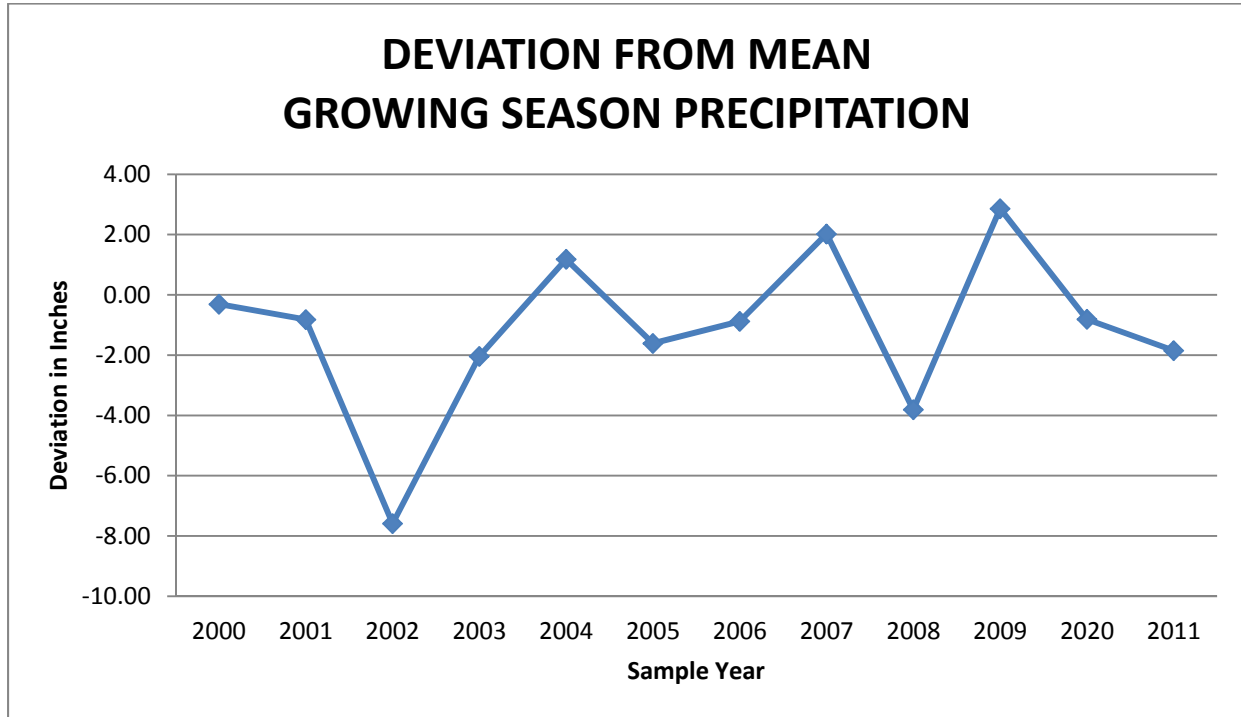
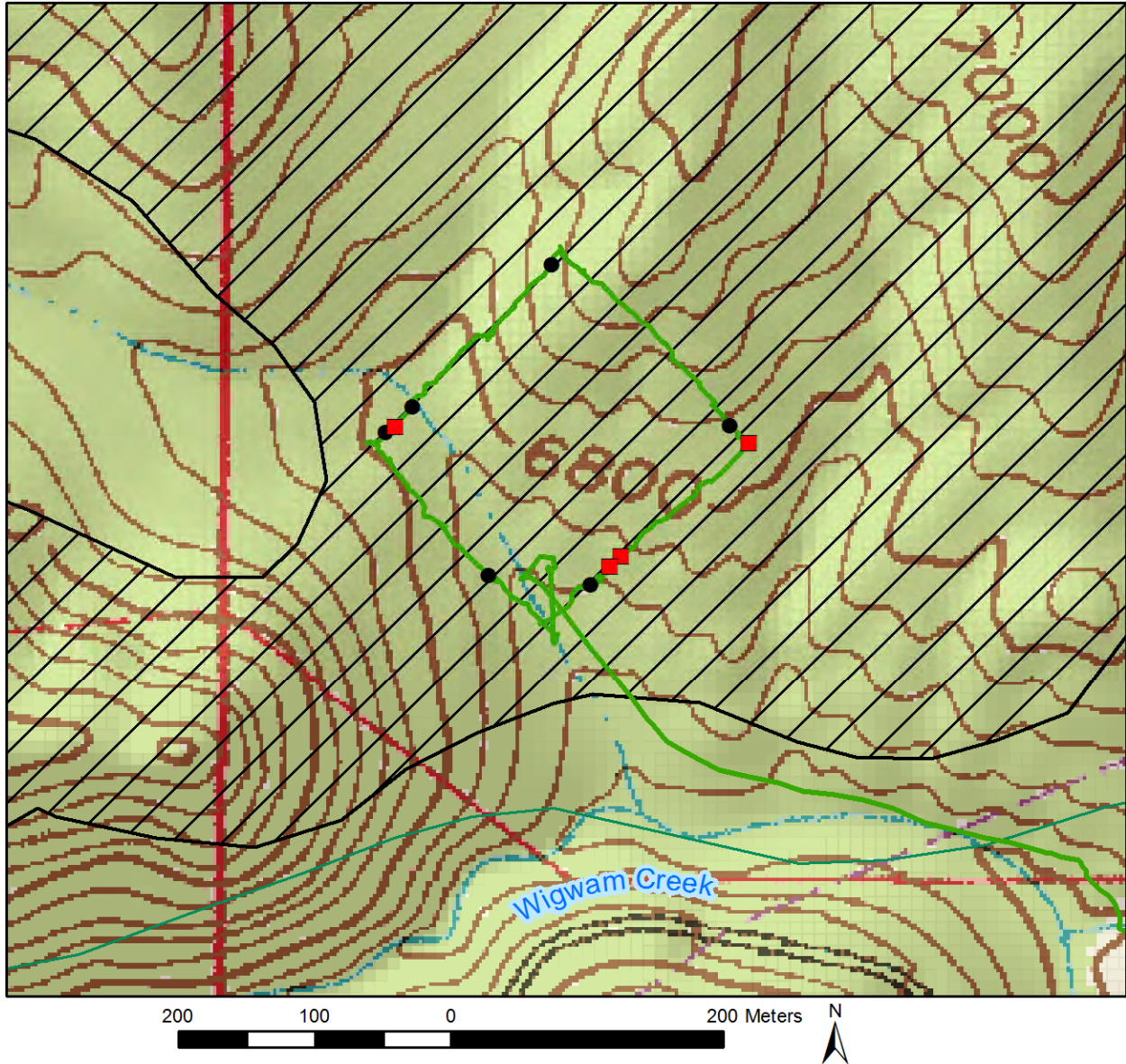


Figure 4. The locations of Pawnee montane skippers (*Hesperia leonardus montana*) and unidentified *Hesperia* skippers documented at Transect 522, a high intensity burn transect of the post Hayman Fire habitat monitoring project. Estimated suitable habitat for the Pawnee montane skipper is also shown. More than one butterfly was observed at some locations (see Table 1).




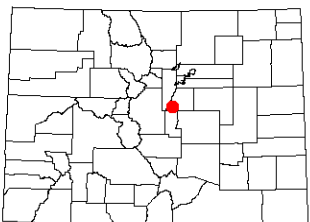
<p>Colorado Natural Heritage Program Colorado State University 254 General Services Building 1474 Campus Delivery Fort Collins, CO 80523-1474</p> <p>Ph (970) 491-7331 Fax (970) 491-3349 www.cnhp.colostate.edu</p> <p>Map Date: 10/21/2011</p>	<p>Legend</p> <ul style="list-style-type: none"> ■ Pawnee montane skipper butterfly <i>Hesperia leonardus montana</i> ● Unknown skipper butterfly <i>Hesperia</i> species  Pawnee montane skipper suitable habitat <p>Cheesman Lake, 39105-B2 7.5 Minute Digital Raster Graphic produced by the U.S. Geological Survey</p>	<p>Location in Colorado</p> 
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Figure 5. Abundance of all *Hesperia* skippers for all the individual transects where skippers occurred from 2002 to 2010 with Transect 522, year 2011 added and highlighted.

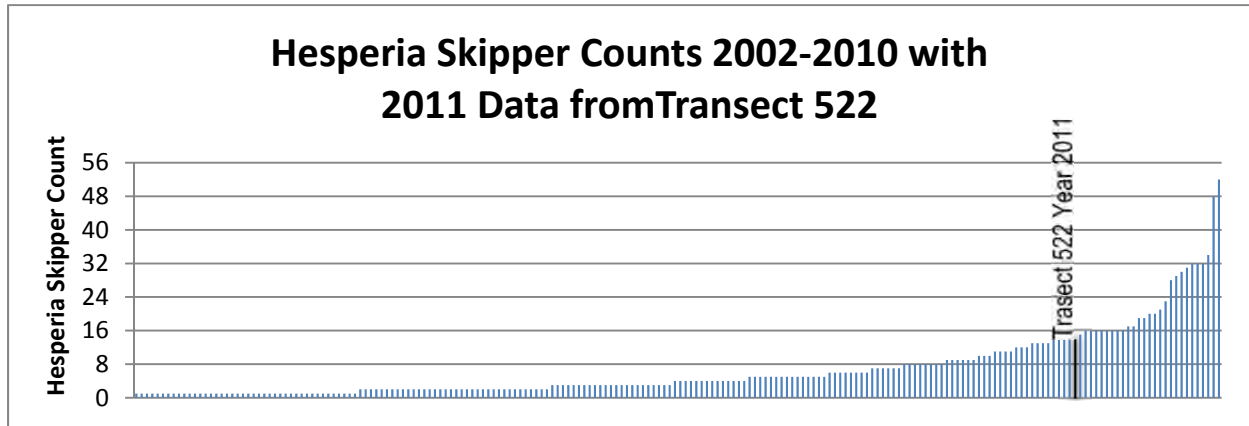


Figure 6. Abundance of all Pawnee montane skippers for all individual transects where they occurred from 2002 to 2010 with Transect 522, year 2011 added and highlighted.

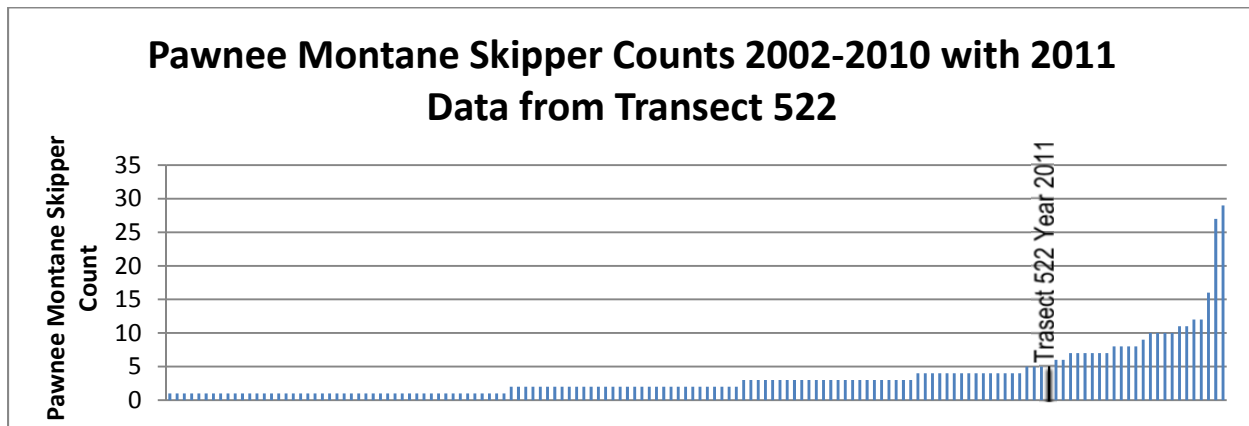


Figure 7. Abundance at individual high severity burn transects where Pawnee montane skippers occurred from 2002 to 2010 with Transect 522, year 2011 added and highlighted.

