

Hermes Copper Butterfly Translocation, Reintroduction, and Surveys

TASK 1.3: *HERMES COPPER TRANSLOCATION*
19 August 2018



Prepared for: United States Fish and Wildlife Service

Contract: F17AC00963

Contract Manager: Alison Anderson

Prepared by: Department of Biology, San Diego State University

Dr. Daniel Marschalek and Dr. Douglas Deutschman, PI

Executive Summary

The Hermes copper, *Lycaena hermes*, is a rare butterfly endemic to San Diego County and northern Baja California. This species is threatened by recent urbanization and wildfires throughout its range in the United States (Marschalek et al. 2018). In April of 2011 the United States Fish and Wildlife Service (USFWS) issued a 12-month finding which concluded that listing the Hermes copper butterfly as threatened or endangered was warranted, and is currently on the USFWS list of candidate species (USFWS 2011).

Our research has documented several extirpations due to the 2003 and 2007 wildfires, but few recolonizations despite what appears to be suitable habitat. Although a few small populations exist within and north of the city of San Diego, the majority of Hermes copper individuals are found to the east and south east of the city between the fire footprints of 2003 and 2007. Due to the extremely restricted distribution, the species is a high risk of extinction and one more large fire could push the species to the brink of extinction. Recolonization into post-wildfire habitats is essential for the long-term persistence of Hermes copper; however, it appears that habitat fragmentation is limiting dispersal and preventing recolonizations from occurring.

For these reasons, we are monitoring four sentinel sites which are well spaced geographically. The spacing provides a range of Hermes copper climatic conditions and reduces the likelihood of being lost in a single wildfire. These data provide information regarding the correlation between annual climate and annual adult population sizes. Also, these data provide important standards to interpret counts from other Hermes copper monitoring and management activities.

Due to the low rate of post-wildfire recolonization rates, we also initiated a project to evaluate translocation as a management tool for establishing self-sustaining Hermes copper populations. If successful, this could be a potential management tool to mitigate the impacts of wildfire. We translocated Hermes copper from larger populations (San Diego National Wildlife Refuge-McGinty Mountain, a property on Skyline Truck Trail, and Sycuan Peak Ecological Reserve) to an area of suitable habitat at Hollenbeck Canyon Wildlife Area in 2014. Due to a continuing drought that has suppressed adult butterfly numbers, the 2014 release numbers were lower than desired and we were unable to conduct releases in 2015-2018.

The drought and well below average rainfall continued through 2018, which suppressed butterfly numbers regardless of species. Hermes copper adults were not detected at Sycuan Peak or Lawson Peak, and a maximum count of only one Hermes copper occurred at Roberts Ranch North. Counts were also low at Boulder Creek Road, with a maximum count of seven individuals. During the 2018 Hermes copper flight season, only a few males were observed at potential source sites so translocation of eggs or females was not attempted. Weather

stochastic events, such as drought, can hinder reintroduction efforts. Translocation efforts should be continued to capitalize on a year with higher precipitation and more butterflies.

Table of Contents

Executive Summary	i
Table of Contents	iii
List of Figures	iv
List of Tables	iv
Introduction	1
Methods	2
Sentinel Sites	2
Translocation	3
Results	4
Sentinel Sites	4
Translocation	5
Discussion.....	5
Acknowledgements.....	6
Literature Cited	6
Appendix: Hermes copper observations at sentinel sites, 2018.	7

List of Figures

- Figure 1.** Detections of Hermes copper butterflies on conserved lands, 2010-2013.. 2
- Figure 2.** Map of southern Hermes copper populations with an inset of San Diego County. 3
- Figure 3.** Maximum daily counts of Hermes copper adults at four sentinel sites, 2010-2018. 4

List of Tables

- Table 1.** Maximum counts of Hermes copper adults at four sentinel sites and an additional site that received frequent visits, 2010-2017. 5

Introduction

The Hermes copper, *Lycaena hermes*, is a rare butterfly endemic to San Diego County and northern Baja California. This species is threatened by recent urbanization and wildfires throughout its range in the United States (Marschalek et al. 2016). In April of 2011 the United States Fish and Wildlife Service (USFWS) issued a 12-month finding which concluded that listing the Hermes copper butterfly as threatened or endangered was warranted, and is currently on the USFWS list of candidate species (USFWS 2011). A proposed rule, including designated critical habitat, will be developed.

Wildfires continue to greatly influence the distribution of Hermes copper, as Wildwood Glen Lane and Boulder Creek Road are the only documented recolonizations following the large wildfires of 2003 and 2007 (Figure 1). The mortality resulting from wildfires, lack of post-wildfire recolonizations, and evidence of restricted dispersal places the Hermes copper at increased risk of extinction. Assisted dispersal achieved by translocation of individuals has the potential to mitigate wildfires impacts. The risk of extinction will decrease as the number of populations and the extent of populations increases.

Previous efforts to translocate Hermes copper from larger populations (San Diego National Wildlife Refuge-McGinty Mountain, a property on Skyline Truck Trail, and Sycuan Peak Ecological Reserve) to an area of suitable habitat at Hollenbeck Canyon Wildlife Area had promising results (Marschalek and Deutschman 2016). In 2014, we translocated 11 adults (6 males and 5 females) to an unoccupied, but suitable patch of habitat. In 2015, of the 14 translocated eggs, 3 were missing from the original clipping and lost prior to the first survey date, 9 eggs exhibited signs consistent with larval eclosion, and 2 eggs remained intact. During the 2015 and 2016 Hermes copper flight season, only one male was detected during surveys at both the egg and adult release sites. This male was observed at the adult release site. This project extends the previous SANDAG funded project (Marschalek and Deutschman 2016, 2018), continuing translocation efforts and monitoring sentinel sites.

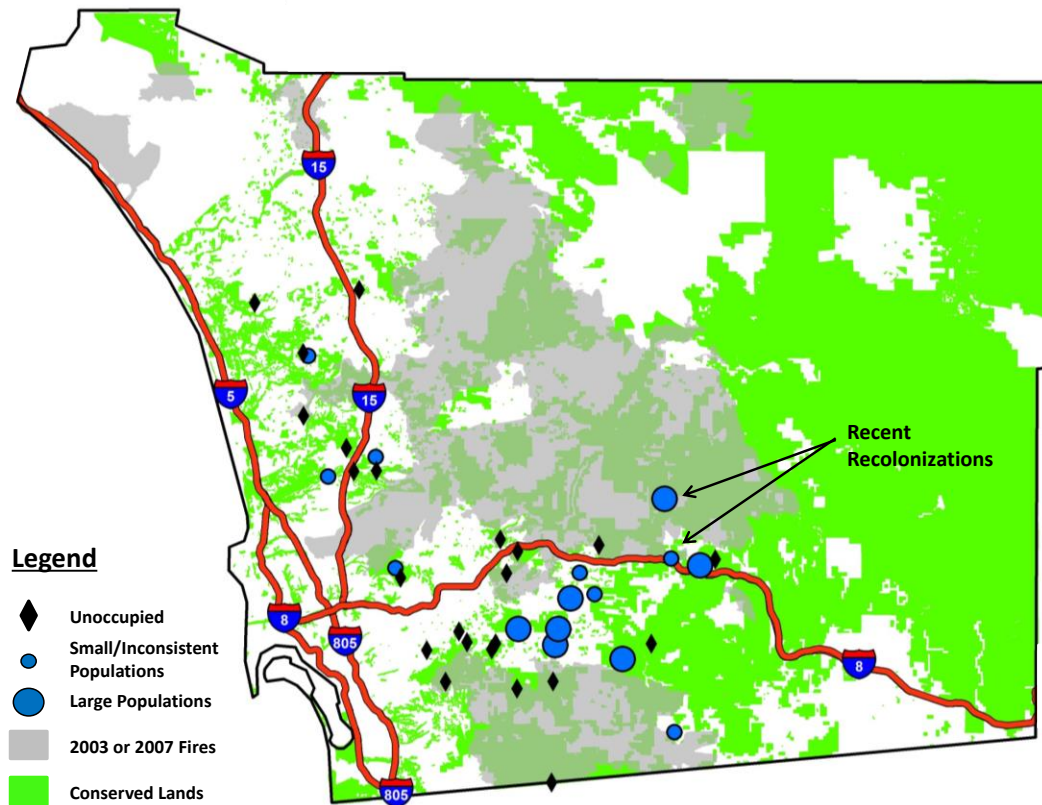


Figure 1. Detections of Hermes copper butterflies on conserved lands, 2010-2013. Sampling locations where Hermes copper was not detected are represented by black diamonds. Small and large Hermes copper populations are indicated by different sized circles.

Methods

Sentinel Sites

In 2018, we conducted surveys for Hermes copper adults at four sites we previously designated as sentinel sites (Boulder Creek Road, Lawson Peak, Roberts Ranch North, and Sycuan Peak Ecological Reserve) (Figure 2). They are relatively widely spaced across the landscape. This captures a range of climatic conditions throughout much of the Hermes copper range and decreases the likelihood of a single wildfire extirpating all four populations. Our goal was to record the maximum number of Hermes copper adults present on a single day at each site (***maximum count***). All surveys were conducted during periods of appropriate weather (sunny or partly sunny, 20 to 35 degrees C, and modest wind speeds) unless stated otherwise. Initial surveys occurred about one time per week and started on 15 May at Sycuan Peak and Boulder Creek Road. Sycuan Peak was chosen because past survey efforts have shown this area to regularly produce the first adults of the season. However, we did not detect Hermes copper adults at this site in 2017 (Marschalek and Deutschman 2017) so we closely monitored Boulder Creek Road, another site with early emergence. Once Hermes copper adults were found, we started surveys at

the other sentinel sites. Sampling occurred at shorter intervals (weather dependent) as counts increased. Once counts started to decline markedly, we stopped surveys at that site.

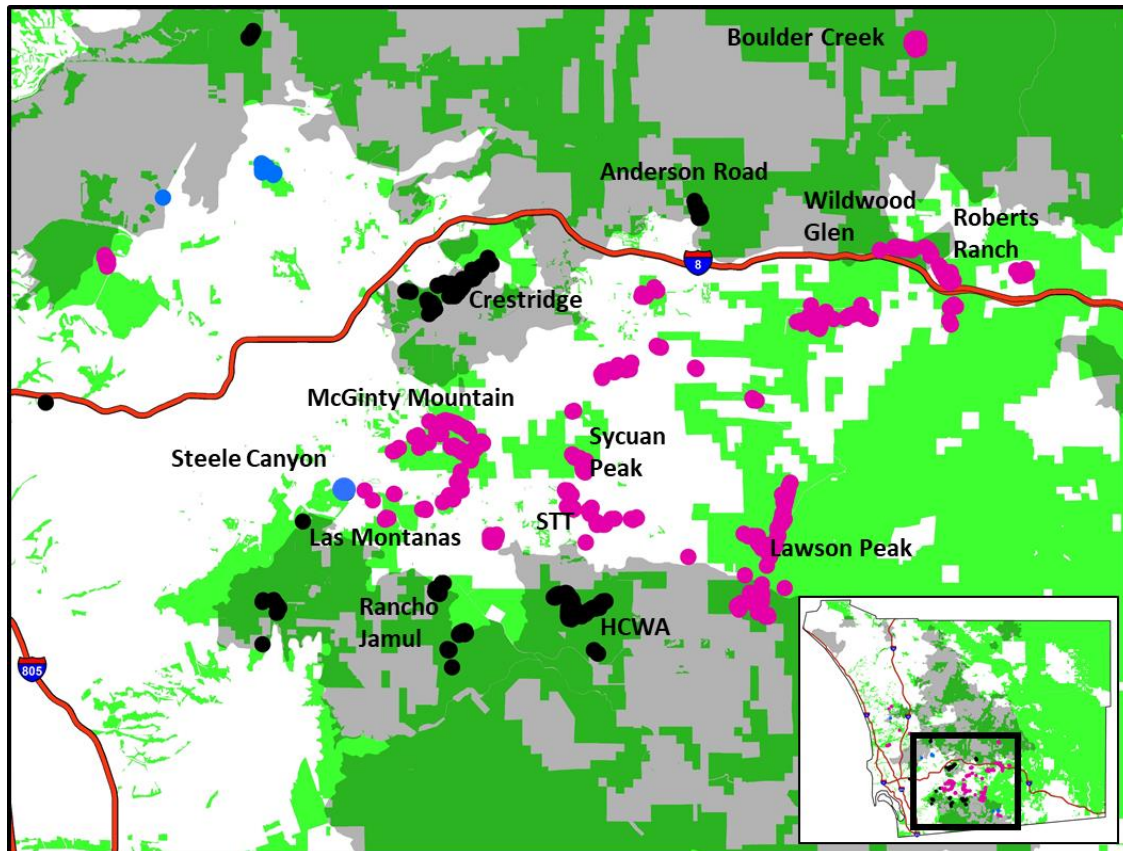


Figure 2. Map of southern Hermes copper populations with an inset of San Diego County. Included on the map are the four sentinel sites (Boulder Creek Road, Lawson Peak, Roberts Ranch North, and Sycuan Peak). Also includes are three potential translocation source sites (McGinty Mountain, Skyline Truck Trail [STT], and Sycuan Peak) and the release site (Hollenbeck Canyon Wildlife Area [HCWA]). Purple and black circles represent extant populations and extirpated populations, respectively. Blue circles denote sites of unknown status. Green shading is conserved lands (SANDAG) and dark gray shading maps the footprints of the 2003 and 2007 wildfires.

Translocation

Surveys for Hermes copper adults occurred at larger populations (San Diego National Wildlife Refuge-McGinty Mountain, a property on Skyline Truck Trail, and Sycuan Peak Ecological Reserve) in an attempt to capture individuals for translocation (Figure 2). We used the same protocols described above. The continued dry conditions in 2015-2017 resulted in only a few observations of male Hermes copper adults and precluded us from translocating additional adults or eggs. The same was true for the 2018 flight season.

Surveys for Hermes copper adults are planned for May –June 2019 at the egg and adult release sites. Searches will focus on the dirt roads that transverse these two areas as well as areas with dense flowering buckwheat. The monitoring for adults is the primary metric of success for the 2014 translocation efforts.

Results

Sentinel Sites

The first Hermes copper adult we observed was on 1 June along Boulder Creek Road but not on our established Boulder Creek Road transect. This was likely the same individual observed on 31 May (G. Huffman pers. comm.). When observed on 4 June, we estimated the age at about five days based on slight wear on the wing and fading of the color. This would put the emergence date at 30-31 May.

No Hermes copper adults were detected at Sycuan Peak Ecological Reserve or Lawson Peak (Figure 3). This is the second consecutive year we did not detect adults at the Sycuan Peak transect and the first year without a detection at Lawson Peak since we started regular monitoring in 2010. Although Roberts Ranch counts have been low over the years, one individual in 2018 is the lowest maximum count we have recorded since regular monitoring started in 2010. At Boulder Creek Road, we recorded a maximum count of seven Hermes copper adults. The flight season was about three weeks in length at this site.

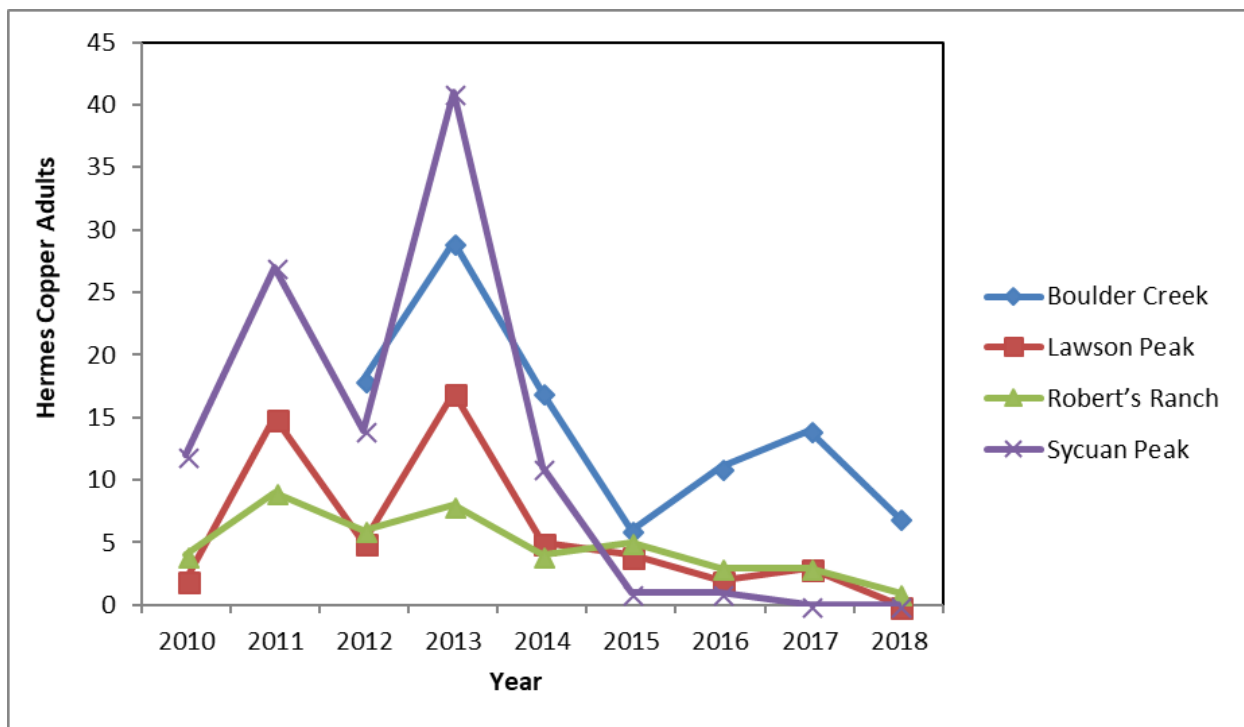


Figure 3. Maximum daily counts of Hermes copper adults at four sentinel sites, 2010-2018.

Table 1. Maximum counts of Hermes copper adults at four sentinel sites and an additional site that received frequent visits, 2010-2018. Sampling at sentinel sites consisted of repeated transects to obtain an accurate maximum count. Sampling at the Skyline Truck Trail site was focused on locating females and did not follow a strict protocol for determining the number of Hermes copper present.

Sentinel Sites	2010	2011	2012	2013	2014	2015	2016	2017	2018
Boulder Creek	---	---	18	29	17	6	11	14	7
Lawson Peak	2	15	5	17	5	4	2	3	0
Roberts Ranch North	4	9	6	8	4	5	3	3	1
Sycuan Peak	12	27	14	41	11	1	1	0	0
Other Visited Site	2010	2011	2012	2013	2014	2015	2016	2017	2017
Skyline Truck Trail 1	9	---	7	6	7	1	0	3	1
Skyline Truck Trail 2	---	---	12	27	9	2	1	2	2

" --- " indicates no survey

Translocation

We did not detect Hermes copper adults at two potential source sites (San Diego National Wildlife Refuge-McGinty Mountain and Sycuan Peak Ecological Reserve), and had a high count of two adults (both males) at the Skyline Truck Trail property in 2018. Due to the lack of female observations and overall low Hermes copper counts in the Jamul area, we did not attempt translocations. It has always been our goal to reestablish a population at Hollenbeck Canyon Wildlife Area without substantially compromising the viability of the source populations.

Discussion

Since 2010, when we started regularly monitoring Hermes copper at sentinel sites (2012 for Boulder Creek Road), the annual population sizes have decreased. This decline in numbers is associated with several years of well below average precipitation. The lack of precipitation is not only reflected in the low numbers of Hermes copper adults, but other butterfly and skipper species as well. Spiny redberry plants are also exhibiting signs of water stress as most individuals have had very little growth each of the last five years. It is on the newly growing branches that new leaves form. And these newly growing leaves, rather than the older leaves, are likely required for larval feeding. In addition, most redberry individuals had lost over half of their leaves by 1 June.

Due to the continued drought we were unable to fully assess the success of the initial translocation efforts. The availability of monitoring data from sentinel sites has demonstrated to be crucial for interpreting survey data related to this translocation study. It shows that the conditions were so unfavorable that the lack of adults detected at our translocation sites cannot be taken as evidence that the methods will not work.

We were also unable to augment the translocation efforts as had been originally proposed. Despite these challenging conditions, larval emergence and an observation of a single male are promising results from 2015 and 2016 (Marschalek and Deutschman 2016). This suggests that translocations can be an effective management tool; however, the continuing dry conditions are a substantial hinderance to the

translocation efforts. Without a year, or consecutive years, of at least average precipitation, the Hermes copper annual adult populations are unlikely to increase. We suspect that late winter to spring rainfall is particularly important to Hermes and possibly other summer flying butterflies.

Acknowledgements

We would like to thank many people for assistance with this project, including permits and access to reserves. These include, but are not limited to (alphabetically): California Department of Fish & Wildlife, Endangered Habitats League, and United States Fish and Wildlife Service.

Also, much appreciation to our field crew (Jen Blackhall, Cory Blackwelder, Kimberly Cole, Emily Dunlap, Halia Eastburn, David Faulkner, Gabriel Greenberg-Pines, Brandon Grubaugh, Julia Hoopes, Sam O'Dell, Hannah Ogden, Sophia Smith, Dalton Whittle), volunteers (Jenille Daly, Ekaterina Gracheva, Lance Heinemann, Amanda Miller, Karina Ornelas, Heather Hough), and Elyse Levy (CDFW) and Eric Hollenbeck (CDFW) for assistance conducting butterfly surveys.

Literature Cited

- Marschalek, D.A. and D.H. Deutschman. 2016. Rare butterfly management studies on conserved lands in San Diego County: Hermes copper (*Lycaena hermes*) Translocation Final Report. Final Report for San Diego Association of Governments. 14 pp.
- Marschalek, D.A. and D.H. Deutschman. 2017. Rare butterfly monitoring and translocation: Hermes copper (*Lycaena hermes*) adult surveys at north county and sentinel sites. Final Report for San Diego Association of Governments. 17 pp.
- Marschalek, D.A. and D.H. Deutschman. 2018. Rare butterfly monitoring and translocation: Hermes copper (*Lycaena hermes*) Translocation Final Report. Final Report for San Diego Association of Governments. 4 pp.
- Marschalek, D.A., D.H. Deutschman, S. Strahm and M.E. Berres. 2016. Dynamic landscapes shape post-wildfire recolonization and genetic structure of the endangered Hermes copper (*Lycaena hermes*) butterfly. *Ecological Entomology*. 41:327-337.
- United States Fish and Wildlife Service. 2011. Endangered and threatened wildlife and plants; 12-Month finding on a petition to list Hermes copper butterfly as endangered or threatened. Federal Register 50 CFR(17): 20918-20939. <http://federalregister.gov/a/2011-9028>.

Appendix: Hermes copper observations at sentinel sites, 2018.

Date	Site	Latitude	Longitude
1-Jun-18	Boulder Creek	32.929608	-116.636217
4-Jun-18	Boulder Creek	32.929341	-116.635315
8-Jun-18	Roberts Ranch North	32.827884	-116.614336
11-Jun-18	Boulder Creek	32.925844	-116.632295
11-Jun-18	Boulder Creek	32.926001	-116.632086
11-Jun-18	Boulder Creek	32.926125	-116.631948
11-Jun-18	Boulder Creek	32.926192	-116.631147
11-Jun-18	Boulder Creek	32.926319	-116.631384
11-Jun-18	Boulder Creek	32.92713	-116.631982
11-Jun-18	Boulder Creek	32.928995	-116.63479
11-Jun-18	Roberts Ranch North	32.828008	-116.614083
11-Jun-18	Skyline Truck Trail 2	32.730574	-116.79759
11-Jun-18	Skyline Truck Trail 2	32.73081	-116.797103
13-Jun-18	Boulder Creek	32.925833	-116.633702
13-Jun-18	Boulder Creek	32.926346	-116.631317
13-Jun-18	Boulder Creek	32.926623	-116.631413
13-Jun-18	Boulder Creek	32.926802	-116.631548
13-Jun-18	Boulder Creek	32.926862	-116.631537
13-Jun-18	Boulder Creek	32.927073	-116.631597
13-Jun-18	Boulder Creek	32.928067	-116.634926
13-Jun-18	Boulder Creek	32.928381	-116.634865
13-Jun-18	Boulder Creek	32.929244	-116.634767
13-Jun-18	Boulder Creek	32.929398	-116.635054
13-Jun-18	Boulder Creek	32.929944	-116.634075
13-Jun-18	Boulder Creek	32.930066	-116.631221
13-Jun-18	Roberts Ranch North	32.828182	-116.613837
15-Jun-18	Boulder Creek	32.925437	-116.633065
15-Jun-18	Boulder Creek	32.926187	-116.631855
15-Jun-18	Boulder Creek	32.926193	-116.631282
15-Jun-18	Boulder Creek	32.926205	-116.63185
15-Jun-18	Boulder Creek	32.926373	-116.631241
15-Jun-18	Boulder Creek	32.926738	-116.631647

Appendix: Hermes copper observations at sentinel sites, 2018 continued.

Date	Site	Latitude	Longitude
15-Jun-18	Boulder Creek	32.927125	-116.631588
15-Jun-18	Boulder Creek	32.927648	-116.635029
15-Jun-18	Boulder Creek	32.928065	-116.634908
15-Jun-18	Boulder Creek	32.928069	-116.634909
15-Jun-18	Boulder Creek	32.92935	-116.631014
15-Jun-18	Boulder Creek	32.929391	-116.635051
15-Jun-18	Boulder Creek	32.929942	-116.634046
18-Jun-18	Boulder Creek	32.928047	-116.634925
18-Jun-18	Boulder Creek	32.928063	-116.631298
18-Jun-18	Boulder Creek	32.928617	-116.634833
18-Jun-18	Boulder Creek	32.929283	-116.634746
18-Jun-18	Boulder Creek	32.929283	-116.634742
18-Jun-18	Boulder Creek	32.929402	-116.634721
18-Jun-18	Boulder Creek	32.929476	-116.634702
18-Jun-18	Boulder Creek	32.930967	-116.632676
19-Jun-18	Skyline Truck Trail 1	32.731944	-116.805959
19-Jun-18	Skyline Truck Trail 1	32.732046	-116.805986
19-Jun-18	Skyline Truck Trail 1 (near)	32.730682	-116.803036
20-Jun-18	Boulder Creek	32.929286	-116.634762
20-Jun-18	Boulder Creek	32.929451	-116.634747
20-Jun-18	Boulder Creek	32.929859	-116.634233
20-Jun-18	Boulder Creek	32.929909	-116.634128
20-Jun-18	Boulder Creek	32.930194	-116.633742
22-Jun-18	Boulder Creek	32.759279	-117.062835
22-Jun-18	Boulder Creek	32.925428	-116.632975
22-Jun-18	Boulder Creek	32.925442	-116.633035
22-Jun-18	Boulder Creek	32.925776	-116.632391
22-Jun-18	Boulder Creek	32.925982	-116.632026
22-Jun-18	Boulder Creek	32.926213	-116.631157
26-Jun-18	Boulder Creek	32.92669	-116.63464
28-Jun-18	Boulder Creek	32.926341	-116.631163