

2023 Harbison's Dun Skipper Adult Surveys

Hermes Copper Butterfly Surveys and Translocation Efforts (Task 12)

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Executive Summary

The Harbison's dun skipper (*Euphyes vestris harbisoni*) has a very restricted distribution in southern California and northern Mexico and entomologists have expressed concern that threats will lead to the extirpation of populations. The larvae of this skipper feed only on San Diego sedge (*Carex spissa*) and are generally associated with riparian oak woodlands.

In 2023, surveys for Harbison's dun skipper adults were conducted to collect non-lethal genetic samples for a landscape genetics project as well as further update the status of populations in San Diego County. Surveys started in a relatively small geographic area where skippers were observed in past years, but expanded to surrounding areas if skippers were not detected. A total of 9 males and 3 females were counted, with adults detected at 5 of 16 sites. Non-lethal genetic samples were collected from all individuals except one male.

The low number of skippers observed in 2023 was likely due to heavy rains during the 2022 – 2023 winter and subsequent streambed scouring and San Diego sedge removal. There were small sedge plants establishing in many areas so skipper numbers may increase over the next year or two. It is important to continue surveying these sites to further assess the impact of disturbances (drought, wildfire, and now heavy rains) to assess resiliency. To facilitate monitoring annual population sizes, surveys should shift to larval and pupal stages as they may be easier to detect. An initial comparison with adult counts should be part of this transition.

Introduction

The Harbison's dun skipper (*Euphyes vestris harbisoni*) is restricted to southern Orange County, extreme western Riverside County, and San Diego County (Brown and McGuire 1983, Marschalek et al. 2019), with one record from Mexico (Marschalek et al. 2019). Entomologists have expressed concern that the skipper is rare and may be negatively impacted by habitat loss and degradation (Brown 1991, Glassberg 2001). In 1989, the United States Fish and Wildlife Service (USFWS) issued a notice of review, on which Harbison's dun skipper was listed as a Category 2 species (USFWS 1989).

Prior to our initial efforts in 2013, nearly all of the known information about this skipper was restricted to descriptions in two published papers (Brown 1982, Brown and McGuire 1983). These papers identified this subspecies as morphologically different from the other subspecies, and described its biology (life history and nectaring sources) and distribution. The larvae of this skipper feed only on San Diego sedge (*Carex spissa*) and are generally associated with oak woodlands. The known distribution of the skipper at that time included southern Orange County and San Diego County, with the skipper present in nearly all areas containing considerable numbers of the sedge. Brown and McGuire (1983) also mentioned that the skipper appears to be facing several threats related to urbanization and development. They recorded a local extirpation at Adobe Falls in San Diego due to development, pollution, and subsequent invasion of the riparian area by non-native plants.

Further information about the skipper was obtained by conducting surveys as part of a project funded by a CDFW Local Assistance Grant (Marschalek and Deutschman 2015) and a previous SANDAG contract (Marschalek and Deutschman 2016, 2017a,b). Based on these surveys for larvae and adults in 2013-2017, the current Harbison's dun skipper distribution includes the foothills in the northern and southern parts of San Diego County, extreme western Riverside County, and southern Orange County (Marschalek et al. 2019). In San Diego County, there appears to be a substantial gap near Poway due to local extirpations likely resulting from wildfires. It is unclear whether the skipper currently occupies Silverado Canyon, its northernmost location, following the 1987 Silverado Fire. Extirpation from Silverado Canyon would represent a substantial range contraction based on historic localities. To the south, the Harbison's dun skipper has been documented in northern Baja California, Mexico. There are a number of threats to the Harbison's dun skipper, including recent extirpations further reducing its distribution, habitat alteration/loss, wildfires, drought, climate change, grazing, and habitat degradation associated with the spread of the goldspotted oak borer (*Agrilus auroguttatus*).

Following surveys in 2021, the status of local populations in San Diego County was updated. Although the previous year (2020-2021 winter) had been relatively dry, there were a couple winters (2018-2019, 2019-2020) that experienced greater precipitation compared to the

extreme drought in 2015-2017 (Williams et al. 2020). The increased precipitation could have provided the opportunity for the skipper to increase population sizes and expand to new areas since the 2017 surveys. Adult Harbison's dun skippers were detected at 6 of 12 sites as well as the north side of Otay Mountain. Substantial changes to the specific locations of the sedge at some sites was unexpected and provided challenges with locating skippers, and recent fires likely caused extirpations at other sites. In 2022, a marking study demonstrated relatively small local population while a habitat preference analysis using GIS environmental variables found that warm but wetter areas were preferred over cooler (lowest and highest elevations in San Diego County) (Lyons and Marschalek 2022, Lyons 2023). The objective of surveys in 2023 was to collect non-lethal genetic samples for a landscape genetics project as well as further update the status of populations in San Diego County.

Methods

We conducted surveys for Harbison's dun skipper adults at sites where we had previously detected adults (Marschalek et al. 2019; Figure 1). Visual surveys consisted of systematic searches around San Diego sedge patches conducted during periods of appropriate weather (sunny or partly sunny, 24° to 35°C, and modest wind speeds). If skippers were not detected in the immediate area of past observations, a wider area was searched. These surveys provide an index of population size and describe the adult flight season phenology, behavior, and nectar sources. After an initial visual assessment and count of adult skippers, skippers were captured to collect non-lethal genetic samples. After capture, a single leg was removed, and each skipper was released.

Results

Compared to previous years, it was much more difficult to find Harbison's dun skipper adults. A total of 9 male and 3 female observations were made (resightings possible for one male), and adults were detected at 5 of 16 sites with surveys (Table 1). One male was not captured, but non-lethal genetic samples were collected from all other individuals. Likely due to above average rainfall that preceded the 2023 flight season, much of the larger San Diego sedge plants had been washed out. Smaller plants were observed, including a female using these smaller plants to deposit eggs.

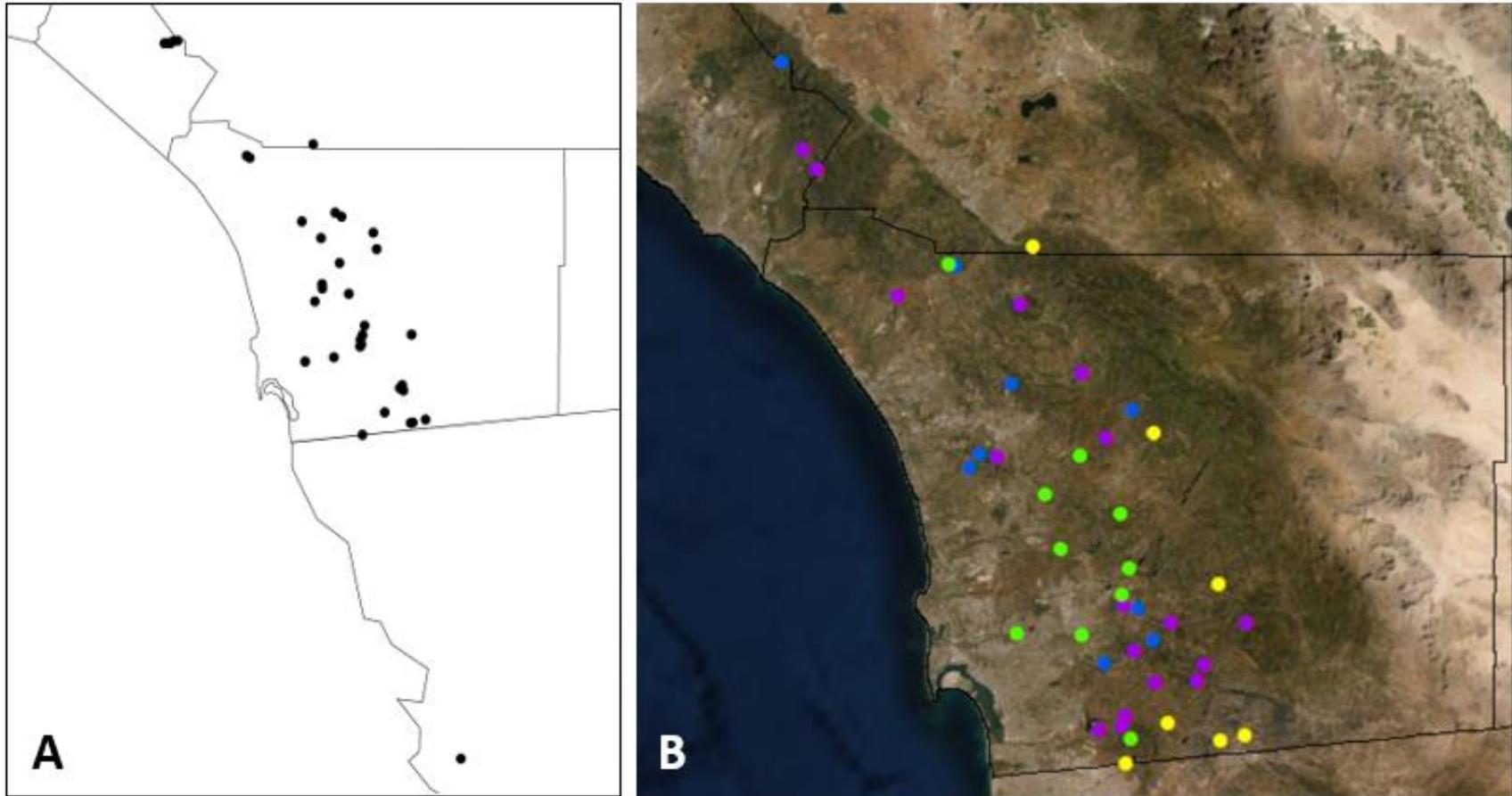


Figure 1. Harbison's dun skipper distribution in 2022. A: Map shows all known locations regardless of current status. B: Map of all known locations in the United States with the most recent status as of April 2023 (purple = extant, blue = probably extant but uncertainty exists, green = extirpated, yellow = not surveyed).

Table 1. Sites and dates for Harbison’s dun skipper adult surveys in 2023, including the highest daily count (Max Count) and all observations across the year. A non-lethal genetic sample was collected from each individual except the male observed on 8 June at Barrett Lake.

Site	Max Count	HDS Observations	Survey Dates
Barrett Lake (2 sites)	3	3 males, 2 females	14 June, 11 July, 21 July
Boden Canyon Ecological Reserve	0		2 July, 21 July
Canada San de Vicente Ecological Reserve	0		16 July
Crestridge Ecological Reserve	3	3 males	15 June, 30 June, 15 July
Daley Ranch (west boundary)	0		20 June, 29 June, 7 July
Elfin Forest	0		13 June, 24 June
Hellhole Canyon County Park	0		8 June, 17 June, 5 July
Hollenbeck Canyon Wildlife Area	0		8 June, 17 June, 5 July
Lake Hodges	2	1 male, 1 female	13 June, 20 June, 24 June, 7 July
Pamo Valley	0		29 June, 16 July
Red Mountain	0		4 June, 25 June
Santa Margarita River	0		4 June, 25 June
SDNWR - Beaver Hollow	0		5 July, 15 July
SDNWR - Las Montanas	0		8 June
Skye Valley Road	2	2 males	14 June, 11 July
Sycuan Peak Ecological Reserve	0		15 June, 30 June

Discussion

Counts of Harbison's dun skippers and observations of large San Diego sedge patches (both size of plants and numbers of plants) were limited in 2023. It is likely that heavy rains washed out of certain woodlands many of the sedge plants and the larvae and/or pupae on the plants (Figure 2). There were signs of smaller San Diego sedge plants getting established and female oviposition on these sedges, so we feel the many of the local population of adult skippers will increase in numbers as early as the 2024 flight season. However, there is the possibility that all sedge plants and associated skippers were washed out of a particular woodland.



Figure 2. Lake Hodges in June 2023. A) Water level about one meter lower than during the 2022 Harbison's dun skipper flight season. B) Stream. C) Dead San Diego sedge.

It is important to continue surveying these sites to further assess the impact of disturbances (drought, wildfire, and now heavy rains). With habitat loss and fragmentation, remaining habitat patches (i.e. riparian oak woodlands) may not be as resilient as they were historically. To facilitate monitoring, surveys should incorporate larval and pupal stages as they may be easier to detect when the riparian vegetation has reduced foliage. A comparison of larval/pupal counts with adult counts should be part of the transition to, possibly, larval surveys for monitoring local population sizes.

Acknowledgements

We would like to thank many people for assistance with this project, including sharing their knowledge of the Harbison's dun skipper, San Diego sedge, permits, and access to reserves. These include, but are not limited to (alphabetically): California Department of Fish & Wildlife, City of San Diego, Cleveland National Forest, County of San Diego, Endangered Habitats League, Sweetwater Authority, and Escondido Creek Conservancy, United States Fish and Wildlife Service.

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Appendix A: 2023 adult Harbison's dun skipper observations

Date	Site	Latitude	Longitude	Sex
8-Jun-23	Barrett Lake North	32.71320	-116.70258	male
14-Jun-23	Barrett Lake North	32.71320	-116.70258	male
30-Jun-23	Crestridge Ecological Reserve	32.82615	-116.86056	male
30-Jun-23	Crestridge Ecological Reserve	32.82622	-116.86056	male
30-Jun-23	Crestridge Ecological Reserve	32.82898	-116.85890	male
3-Jul-23	Lake Hodges	33.08283	-117.11398	male
3-Jul-23	Lake Hodges	33.08285	-117.11384	female
11-Jul-23	Barrett Lake	32.69693	-116.70338	female
11-Jul-23	Barrett Lake North	32.71242	-116.70229	female
11-Jul-23	Barrett Lake North	32.71242	-116.70229	male
11-Jul-23	Skye Valley Road	32.72793	-116.69420	male
11-Jul-23	Skye Valley Road	32.72793	-116.69420	male