Callophrys sheridanii sacramento (Sacramento Mountains White-lined Hairstreak)

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Taxonomy

- **Class**: INSECTA
- **Order**: LEPIDOPTERA
- **Family**: LYCAENIDAE
- **Genus**: Callophrys
- **Scientific Name**: *Callophrys sheridanii sacramento* Scott, 2006
- **Common Name**: Sacramento Mountains White-lined Hairstreak
- **Synonyms**:
- **Taxonomic Name Source**:Scott, J.A, M.S. Fisher, N.G. Kondla, S. Kohler, C.S. Guppy, S.M. Spomer, and B.C. Schmidt. 2006. Taxonomic studies and new taxa of North American butterflies. Papilio (New Series) 12:1-74.

Agency Status

- **NMDGF**:
- **Federal Status**:
- **BLM Sensitive**:
- **USFS**:
- **IUCN Red List**: Not Evaluated
- **Nature Serve Global**: TNR
- **NHNM State**: S1
- **NM Endemic**:YES

Description

Sheridan’s Hairstreak is emerald green below, fading to gray as it wears over time. The hindwing white line is regular and nearly continuous. This fingernail-sized butterfly is gray above, not brown as is Bramble Hairstreak (see chart at https://peecnature.org/butterflies-of-new-mexico/hairstreaks-lycaenidae-theclinae/?highlight=%22Callophrys%20affinis%20apama%22#sheridanii). Northern New Mexico has the nominate race. Our other population is Callophrys sheridanii sacramento Scott 2006, which is larger with a narrower hindwing white band and with more extensive ventral gray (Scott 2006). Our oldest specimen is in the US National Museum from Cloudcroft (Ot), taken on 11 May 1902 by Henry L. Viereck.

Description courtesy of Steven J. Cary, Butterflies of New Mexico, 2024

Habitat and Ecology

This butterfly lives on mountain slopes and in small openings in montane coniferous forests at high elevations, over 2,135 meters (7,000 feet) (Sivinski 2007, Cary and Toliver 2024). This butterfly is univoltine with extreme flight records stretching from April 9th to July 5th, and with numbers peaking in May and June (Cary and Toliver 2024). This butterfly's sole known larval host plant is Wooton's Wild Buckwheat (*Eriogonum wootonii*) (formerly *Eriogonum jamesii var wootonii*) (Sivinski 2007, Cary and Toliver 2024). As adults this butterfly feeds on nectar and on wet soil, though specific records for which plants it nectars on are not available (Cary and Toliver 2024). Adults lay eggs on the leaves of Wooton's Wild Buckwheat (Cary and Toliver 2024). More information is needed on the life history and ecology of this taxa.

Geographic Range:

This butterfly is endemic to the Sacramento Mountains Complex, in southern New Mexico, where it occurs between 2,135 and 3,050 meters (7,000 and 10,000 feet) (Scott 2006, Holland 2010, Cary and Toliver 2024). The colony here is isolated from other colonies of Sheridan's Hairstreak (*Callophrys sheridanii*), which occur further north, and likely has been for around 8,000 years since the glaciers retreated (Scott 2006, Holland 2010, Cary and Toliver 2024). This colony is also at the extreme southern extent of Sheridan's Hairstreak's distribution (Scott 2006).

Conservation Considerations:

Due to the rarity of this butterfly and the large threat posed by climate change, its continued existence until 2100 is very unlikely without conservation intervention (Holland 2010). Firstly steps should be taken to conserve all known populations and to try to seek out any more extant populations. Habitat restoration, in order to increase the habitat size and make populations more resilient, will also be crucial in order to ensure the survival of this taxa. More research is needed on life history and ecology, distribution, population size and trend, and the impact of presumed threats. Additional research on what conservation actions may best benefit this butterfly and how best to restore its habitat and promote its resilience will also be crucial.

Threats:

As a mountaintop endemic at the southern extreme of its range, climate change is the primary threat to this taxa (Holland 2010). Many butterflies respond to climate change by moving to higher elevations or latitudes. However, this is not an option for this taxa, as there are no higher elevation habitats to shift to. As a result, even a small amount of warming could push this taxa into thin air driving it to extinction (Forister *et al.* 2010, Holland 2010, Rödder *et al.* 2021). It is unlikely that this butterfly survives until 2100, as the western United States is expected to continue to get hotter and drier over the next century (Cook *et al.* 2009, Holland 2010, Cook *et al.* 2015, Williams *et al.* 2022). The Southwestern U.S. already saw its driest 22-year period from 2000 to 2021 since at least 800 CE (the time period used in previous climatic reconstructions) (Williams *et al.* 2022). Drought conditions can severely limit larval food and the quality and amount of nectar for adults (Hughes 2020). Phenological mismatch with the host plant or nectar sources is also a potential consequence of climate warming which could easily extirpate this butterfly (Singer and Parmesan 2010, Patterson *et al.* 2019).

In addition, as this taxa relies on just one larval host plant, it is more vulnerable to habitat changes. Host plant specificity is a key indicator of extinction risk, as with just one host plant any host plant declines will result in population declines for this butterfly (Kotiaho *et al.* 2005, Palash *et al.* 2022, Forister *et al.* 2023). This butterfly's sole host plant is

also rare in New Mexico, with a globally imperiled NatureServe rank (S2) and a spot on the New Mexico Rare Plants list (Sivinski 2007). A rare host plant severely limits the dispersion ability and potential population size of this butterfly.

Residential and commercial development have likely historically contributed substantially to habitat loss, degradation, and fragmentation, as both Cloudcroft and Ruidoso have expanded significantly since 2000 (USFWS *et al.* 2004). This remains a threat to the subspecies although now that climate change has pushed it to such high elevations it is unlikely to be affected by much further expansion. However, if colonies still persist at lower elevations these would be highly at risk to development.

Another major threat to this subspecies is the potential occurrence of catastrophic wildfire. Fire suppression has been a key component of forest management in the Sacramento Mountains since the early 1900s, resulting in dense conifer growth and increased fuel loads (Kaufmann *et al.* 1998). Not only has this likely fragmented the subspecies and resulted in a steep decrease in numbers due its reliance on forest openings, but catastrophic wildfires have also worsened in the area as a result. At least nine large fires have burned over 34,000 acres of land in the Sacramento Mountains in the last 50 years (Kaufmann *et al.* 1998, USFWS *et al.* 2004). The impacts of fire on this subspecies may depend on the intensity and size of the fire, as well as seasonal timing. For example, if a small amount of meadow habitat was burnt, but adjacent forests were cleared, larval host and nectar plants may benefit from the disturbance caused by the fire as this will create larger forest openings, and butterflies may be able to disperse more readily between meadows. Such disturbances are necessary to support the metapopulation dynamics that this subspecies seems to be engaging in where small, discrete sub-populations rely on regular recolonization from neighboring patches. However, if a fire that was too hot or too widespread were to burn in the area, direct impacts may include mortality of adults, pupae, larvae, or eggs, depending on the time of year, and indirect effects might include loss of host plants and nectar sources. Invasive species introduced through grazing such as Kentucky Blue Grass (*Poa pratensis*) which is now prominent in this area may also cause fires to burn deeper and hotter than normal resulting in additional mortality (USFWS *et al.* 2004).

Recreational disturbances are also a threat to this taxa. The forest opening meadow habitats that this butterfly relies on are attractive areas for recreational activities such as camping, hunting, hiking, mountain biking, and off-highway vehicle (OHV) use. Grazing by cattle historically and now by elk and feral horses may also be a threat to this butterfly as elk and feral horses are rampant in the Sacramento Mountains however, currently the effect of grazing on this subspecies is unknown and requires further research (USFWS *et al.* 2004).

Pesticide use has also likely adversely impacted this subspecies across its known range (Holland 2010). In 1983 and 1984 during June and July when this taxa is active and overlapping with its flight period carbaryl pesticides were sprayed using aerial application over 240,900 acres of the Sacramento Mountains at elevations between 1828 and 3353 meters (6,000 and 11,000 feet), to control an outbreak of Western Spruce Budworm (*Choristoneura freemani*)(Bennett and Linnea 1985). Most of the inhabited areas and waterways were instead sprayed with *Bacillus thuringiensis* (Bt). In another example, in 2007, the Village of Cloudcroft again sprayed Bt *var. kurstaki*, which targets lepidopterans, to control a Janet Fir Looper (*Nepytia janetae*) outbreak (Holland 2007). This subspecies is also likely very threatened by inbreeding depression due to the extreme isolation of the remaining known colonies. It is likely that this subspecies has been isolated in the Sacramento Mountains for around 8000 years from any other Sheridan's Hairstreak (Holland 2010). On top of this as this subspecies now is just living at high elevation mountain tops each population is isolated from others by a large distance this isolation can result in inbreeding depression in these populations when slightly deleterious alleles accumulate in small populations, reducing the likelihood of population persistence (Hedrick 1994, Lynch *et al.* 1995). The accumulation of deleterious alleles and reduction in heterozygosity have been shown to reduce survival rates at several important life stages in butterflies, including those that have an effect on population stability and persistence, even after just one generation of mating between full-siblings (Saccheri *et al.* 1998, Nieminen *et al.* 2001). Nieminen *et al.* (2001) also suggests that inbreeding depression may pose an even greater problem in populations currently experiencing rapid habitat fragmentation but with minimal inbreeding in the past. A reduction in fitness resulting from the loss of genetic diversity significantly increases the risk of extinction when populations are subject to environmental stress. Saccheri *et al.* (1998) found that microclimatic conditions combined

with inbreeding caused the extinction of a checkerspot population in Finland, while Singer and Ehrlich (1979) found a combination of drought, fragmented habitat, and low dispersal rates contributed to the extinction of several butterfly populations in California.

Population:

The population size and trend are not known for this species. Determination of population size and monitoring of population trends is necessary to ensure the population is stable. Especially as several widespread, relatively common species of butterfly are in decline across the western United States (Forister *et al.* 2021).

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More Information

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