Callophrys affinis albipalpus (Sacramento Mountains Western Green Hairstreak)

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Taxonomy

- **Class**: INSECTA
- **Order**: LEPIDOPTERA
- **Family**: LYCAENIDAE
- **Genus**: Callophrys
- **Scientific Name**: *Callophrys affinis albipalpis* Gorelick, 2005
- **Common Name**: Sacramento Mountains Western Green Hairstreak
- **Synonyms**:
- **Taxonomic Name Source**:Pelham, J.P. 2023. A catalogue of the butterflies of the United States and Canada. Revised 15 February 2023. http://butterfliesofamerica.com/US-Can-Cat.htm.

Agency Status

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

Description

Bramble Hairstreaks are green below and rust-brown above, compared to the gray of Sheridan's (see comparison at https://peecnature.org/butterflies-of-new-mexico/hairstreaks-lycaenidae-theclinae/#affinis). An irregular band of brown-edged, white spots crosses the tailless ventral hindwing. The ventral white spots (when present) tend to be more disconnected in affinis compared to sheridanii, although the Sacramento Mountains version of sheridanii approaches the apama version of affinis in this character. Since the two species are distinct in that mountain range, observers should be able to tell them apart (see comparison figure to be sure, https://peecnature.org/butterflies-of-new-mexico/hairstreaks-lycaenidae-theclinae/#affinis). Gorelick (2005) showed that Callophrys apama (W. H. Edwards) is a subspecies of Callophrys affinis. Western New Mexico has Callophrys affinis apama (W. H. Edwards 1882) with a prominent white hindwing band. South-central New Mexico (Li,Ot) adults have a nearly immaculate hindwing and are Callophrys affinis albipalpus Gorelick 2005. The two forms converge in our north-central mountains where the hindwing spot band is variable and adults are placed with subspecies Callophrys affinis homoperplexa W. Barnes & Benjamin

1923.

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

Habitat and Ecology

The Sacramento Mountains Western Green Hairstreak is a specialist on early successional habitats and can be found in sun exposed meadows, canyons, and in disturbed areas at or above 2100 m (Gorelick 2005, Cary and Toliver 2024). Fendler's Buckbrush (*Ceanothus fendleri*) is a major host plant but larvae also use buckwheats (*Eriogonum spp.*), especially Winged Buckwheat (*Eriogonum alatum*)(Gorelick 2005, Cary and Toliver 2024). All of this butterfly's host plants thrive in landscapes with frequent fires and as such, it is considered a fire climax species. Fire is likely a crucial component in maintaining suitable habitat, though it seems other disturbance can sometimes suffice (Cary and Toliver 2024). The larvae are tended by ants, as is the case with many hairstreaks and blues (Cary and Toliver 2024). This butterfly is bivoltine in most years and both broods nectar especially on Annual Yellow Sweetclover (*Melilotus indicus*) and James' Buckwheat (*Eriogonum jamesii*)(Gorelick 2005).

Geographic Range:

This subspecies is endemic to the Sacramento Mountains Complex, in southern New Mexico, where it has likely been isolated from other Western Green Hairstreaks (*Callophrys affinis*) for around 8,000 years (Holland 2010). Few records of this butterfly have ever been made. It is known from two males collected around the Cedar Creek Campground area, 10 kilometers north of Ruidoso at around 2,134 m, in 1982 (Gorelick 2005). Gorelick (2005) also suggested historically it was recorded around New Mexico state highways 37 and 48, above 2,100 m in elevation (Gorelick 2005). The species was not recorded again until 2004, when two records were made near Cienega Canyon, south of Cloudcroft. As far as we can tell, it has not been observed in the last twenty years, though there has been little if any survey effort. The species is a specialist on early successional habitats, so historical collection localities may no longer have suitable habitat.

Conservation Considerations:

There are no conservation actions in place for this species. Additional research on the subspecies is urgently needed to resurvey historical localities and seek out any other extant occurrences. It is likely that habitat management is needed and possible that steps should be taken to conserve all known populations. This is an early successional species, as the host plants are dependent on regular fire to create appropriate habitats. Therefore, habitat restoration strategies might include controlled burning. Additional research is urgently needed on the population size and trend, habitat trends, life history and ecology of this taxa, distribution, and threats.

Threats:

Threats to this subspecies are not well understood, though as this is an early succession habitat specialist, it has likely declined substantially over the last century due to fire suppression. All known larval host plants favor natural fire cycles, so this butterfly is considered a fire climax species (Cary and Toliver 2024). 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). Without regular fire to clear these dense forests and create early successional habitats, the forest openings the species relies on have been lost or have become fragmented.

In addition, the increased fuel load resulting from fire suppression increases the likelihood of catastrophic wildfires in

the area; 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 2004). The impacts of catastrophic 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 habitat is burnt, but adjacent forests are cleared, larval host and nectar plants may benefit from the disturbance caused by fire. However, if a fire that is 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 Bluegrass (*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 2004).

As a mountaintop endemic at the southern extreme of its range, climate change is likely another main threat to this butterfly (Holland 2010). Many butterflies respond to climate change by moving to higher elevations or latitudes. However, this may not be an option for this species as there are few higher elevation areas to move into (Forister *et al.* 2010, Holland 2010, Rödder *et al.* 2021). This threat is expected to increase, as the western United States becomes 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. 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 available to adults, as has been seen in the sympatric, endangered Sacramento Mountains Checkerspot Butterfly (*Euphydryas anicia cloudcrofti*) (Hughes 2020). Phenological mismatch with the host plant or nectar sources is also a potential consequence of climate warming (Singer and Parmesan 2010, Patterson *et al.* 2019).

Pesticide use may also have adversely impacted this subspecies across its known range (Holland 2010). In 1983 and 1984, during June and July when this butterfly is active, carbaryl pesticides were sprayed using aerial application over 240,900 acres of the Sacramento Mountains, at elevations between 1,828 and 3,353 meters (6,000 and 11,000 feet). This was done 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).

It is likely that this subspecies has been isolated from any other Western Green Hairstreaks, in the Sacramento Mountains, for around 8,000 years (Holland 2010). Due to its reliance on early successional habitat which has become fragmented, it is possible colonies of this butterfly are also isolated from each other. This can lead to an accumulation of deleterious alleles and reduction in heterozygosity, which has 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. More information is urgently needed on the genetic health of these butterfly populations.

Population:

The population size and trend are not known for this subspecies. 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). Due to the rarity of this butterfly and the threats posed by climate change, fire suppression, and catastrophic wildfire, Holland (2010) suggests the continued existence until 2100 is very unlikely without conservation intervention.

References:

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More Information