

# Satyrium titus carrizozo (Sacramento Mountains Coral Hairstreak)

---



Simon Doneski,

## Taxonomy

- **Class:** INSECTA
- **Order:** LEPIDOPTERA
- **Family:** LYCAENIDAE
- **Genus:** *Satyrium*
- **Scientific Name:** *Satyrium titus ssp. carrizozo* R. Holland, 2010
- **Common Name:** Sacramento Mountains Coral Hairstreak
- **Synonyms:**
- **Taxonomic Name Source:** Holland, R. 2010. A new subspecies of *Satyrium titus* (Lycaenidae: Theclinae) from south central New Mexico. *Journal of the Lepidopterists' Society*. 64(3): 166-171.

## Agency Status

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

## Description

*Satyrium titus* resembles its congeners in general size and markings, but in place of a hindwing false head of spots and tails it sports only a pronounced lobe, making it yet another of our tailless hairstreaks. It is gray-tan with a row of orange-coral spots along the hindwing margin, making it unique among our hairstreaks. **Comments.** Members of relict colonies on Nogal Peak and Carrizo Peak (both Li) are recently described subspecies *Satyrium titus carrizozo* (R. Holland 2010).

Description courtesy of Steven J. Cary, [Butterflies of New Mexico](#), 2024

## Habitat and Ecology

Little is known about the life history of this recently described subspecies. However, it appears to be mostly on mountain tops or at least has been driven there by its host plant and climate change with all known populations being

on peaks and above 2682 meters (8800 feet) in elevation (Holland 2010). This butterfly also appears to like its parent species have just a single host plant, Chokecherry (*Prunus melanocarpa*) (Holland 2010, Cary and Toliver 2024). However, besides this association with Chokecherry little is known about the ecology of this taxa and more research is needed.

The parent species is univoltine in New Mexico with its flight occurring from mid July to mid August (Holland 2010). Known records for this subspecies stretch from July 11th to August 9th (Holland 2010).

## Geographic Range:

This subspecies is endemic to the Sacramento Mountains in southern New Mexico, where it has likely been isolated from other Coral Hairstreaks (*Satyrium titus*) for around 8,000 years (Holland 2010). The Sacramento Mountains Coral Hairstreak sits at the southern extreme of the range of the parent species, and historically it was known from just two colonies (Holland 2010, Cary and Toliver 2024), one on Nogal peak and one on Carrizo peak. These are both high elevation sites, with the colony at Carrizozo Peak being found at around 3,050 meters (10,000 feet) and the one on Nogal Peak being found around 2,682 meters (8,800 feet) (Holland 2010). These two known populations are both very isolated on mountain tops and it is thought that they have been separated from each other for around 4,100 years (Holland 2010). There is a chance the subspecies can no longer be found on Carrizo Peak; within the last ten years, efforts to document the species at this site on three separate occasions have failed (S. Cary pers. comm. 2024).

## Conservation Considerations:

There are no conservation actions in place for this species. Steps should be taken to conserve all known populations and to try to seek out additional extant populations. Habitat restoration in order to increase the patch size and make populations more resilient to environmental stressors will also be crucial in order to ensure the survival of this taxon. Research is needed on the population size and trend, as well as the life history and ecology of this species including its ant associations. Genetic research on population health may also be needed to properly conserve this species. More 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:

More research is needed on the threats to this butterfly however it is probably one of the rarest Sacramento Mountains endemics and has only ever been observed eight times in two different populations (Holland 2010). 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 where there are no higher elevation habitats to shift to and as a result just a small amount of warming could push this taxa into thin air driving it to extinction (Forister *et al.* 2010, Holland 2010, RÅ¶dder *et al.* 2021). As such the likelihood that this butterfly survives until 2100 is very poor 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). Phenological mismatch with the host plant or nectar sources is also a potential consequence of climate warming which could easily extirpate one of the two known populations (Singer and Parmesan 2010, Patterson *et al.* 2019).

However, other credible threats to this subspecies include catastrophic wildfire and fire suppression (Holland 2010). Fire suppression has been a key component of forest management in the Sacramento Mountains since the early 1900s which has resulted in dense conifer growth and increased fuel loads (Kaufmann *et al.* 1998). 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).

These fires could easily knock out this species' host plant causing mass mortality, in adults, larvae, or eggs and easily extirpating the remaining colonies (Holland 2010). Additionally, 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 these two colonies with Holland (2010) estimating that these two colonies have likely been separated from each other for 4100 years and from other Coral Hairstreaks for 8000 years (Holland 2010). Inbreeding depression can result in these isolated 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.

This taxa also has a single host plant and host specificity has been shown to be a key indicator of extinction risk in butterflies as with only one host plant any declines or threats facing the host plant will also result in butterfly declines (Kotiaho *et al.* 2005, Palash *et al.* 2022, Forister *et al.* 2023). On top of that this subspecies is univoltine which puts it at a higher risk of extinction as it reduces the subspecies dispersal range and increases its risk of phenological mismatch making the taxa less adaptable to and more threatened by climate change (Eskildsen *et al.* 2015, Patterson *et al.* 2019, Forister *et al.* 2023).

## 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 American west (Forister *et al.* 2021).

## References:

- [Cook, E.R., Seager, R., Heim, R.R., Vose, R.S., Herweijer, C. and Woodhouse, C.. 2009. Megadroughts in North America: Placing IPCC projections of hydroclimatic change in a long-term paleoclimate context.. \*Journal of Quaternary Science\* 25: \(48-61\). <https://doi.org/10.1002/jqs.1303>](https://doi.org/10.1002/jqs.1303)
- Lynch, M., Conery, J. and Burger, R.. 1995. Mutation accumulation and the extinction of small populations. *American Society of Naturalists* 146: (489-518).
- [Pelham, J.P.. 2021. A catalogue of the butterflies of the United States and Canada. 2021. <http://butterfliesofamerica.com/US-Can-Cat.htm>](http://butterfliesofamerica.com/US-Can-Cat.htm)
- Forister, M.L., McCall, A.C., Sanders, N.J., Fordyce, J.A., Thorne, J.H., O'Brien, J., Waetjen, D.P. and Shapiro, A.M.. 2010. Compounded effects of climate change and habitat alteration shift patterns of butterfly

- diversity. *Proceedings of the National Academy of Sciences* 107: (2088-2092).
- Singer, M.C. and Ehrlich, P.R.. 1979. Population dynamics of the checkerspot butterfly *Euphydryas editha*. *Population Ecology* 35: (53-60).
  - [Holland, R.. 2010. A New Subspecies of \*Satyrium titus\* \(Lycaenidae: Theclinae\) from South Central New Mexico. \*The Journal of the Lepidopterists' Society\* 64: \(166-171\). <https://doi.org/10.18473/lepi.v64i3.a6>](#)
  - Cary S.J. . 2024. Personal Communication.
  - [Cary, S.J. and Toliver, M.E. . 2024. Butterflies of New Mexico.. Pajarito Environmental Education Center \(PEEC\). <https://peechnature.org/butterflies-of-new-mexico/>](#)
  - Eskildsen, A., Carvalheiro, L.G., Kissling, W.D., Biesmeijer, J.C., Schweiger, O. and HÅ, ye, T.T.. 2015. Ecological specialization matters: long-term trends in butterfly species richness and assemblage composition depend on multiple functional traits. *Diversity and Distributions* 21: (792-802).
  - [Patterson, T. A., Grundel, R., Dzurisin, J. D., Knutson, R. L., & Hellmann, J. J.. 2019. Evidence of an extreme weatherâ€induced phenological mismatch and a local extirpation of the endangered Karner Blue butterfly.. \*Conservation Science and Practice\* 2. <https://doi.org/10.1111/csp2.147>](#)
  - [Cook, B.I., Ault, T.R. and Smerdon, J.E.. 2015. Unprecedented 21st century drought risk in the American Southwest and Central Plains.. \*Science Advances\* 1. <https://doi.org/10.1126/sciadv.1400082>](#)
  - [Kotiaho, J. S., Kaitala, V., Komonen, A. and PÃivinen, J.. 2005. Predicting the risk of extinction from shared ecological characteristics. \*Proceedings of the National Academy of Sciences\* 102: \(1963-1967\). <https://doi.org/10.1073/pnas.0406718102>](#)
  - Forister, M.L., Grames, E.M., Halsch, C.A., Burls, K.J., Carroll, C.F., Bell, K.L., Jahner, J.P., Bradfod, T., Zhang, J., Cong, Q., Grishin, N.V., Glassberg, K., Shapiro, A.M. and Riecke, T.V.. 2023. Assessing risk for butterflies in the context of climate change, demographic uncertainty, and heterogenous data sources. *Ecological Monographs* 93: (e1584).
  - Hedrick, P.W.. 1994. Purging inbreeding depression and the probability of extinction: full-sib mating. *Heredity* 73: (363-372).
  - Nieminen, M., Singer, M.C., Fortelius, W., Schlops, K. and Hanski, I.. 2001. Confirmation that inbreeding depression increases extinction risk in butterfly populations. *The American Naturalist* 157: (237-244).
  - Saccheri, I., Kuussaari, M., Kankare, M., Vikman, P., Fortelius, W. and Hanski, I. . 1998. Inbreeding and extinction in a butterfly metapopulation. *Nature* 392: (491-494).
  - [Holland, R.. 2007. SMCB Holland Letter. \*Wild Earth Guardians, Albuquerque 2021\*. \[https://pdf.wildearthguardians.org/support\\\_docs/letter\\\_checkerspot-butterfly\\\_10-16-07.pdf\]\(https://pdf.wildearthguardians.org/support\_docs/letter\_checkerspot-butterfly\_10-16-07.pdf\)](#)
  - Bennett, D.D. and Linnane, J.P.. 1985. Western Spruce Budworm Suppression Project- 1984. USDA Forest Service, Albuquerque, NM : (42).
  - Forister, M.L., Halsch, C.A., Nice, C.C., Fordyce, J.A., Dilts, T.E., Oliver, J.C., Prudic, K.L., Shapiro, A.M., Wilson, J.K. and Glassberg, J. . 2021. Fewer butterflies seen by community scientists across the warming and drying landscapes of the American West. *Science* 371: (1042-1045).
  - Williams, A.P., Cook, B.I. and Smerdon, J.E. . 2022. Rapid intensification of the emerging southwestern North American megadrought in 2020â€2021. *Nature Climate Change* 12: (232-234).
  - RÃdder, D., Schmitt, T., Gros, P., Ulrich, W. and Habel, J.C.. 2021. Climate change drives mountain butterflies towards the summits. *Scientific Reports* 11: (45303).
  - Singer, M.C. and Parmesan, C.. 2010. Phenological asynchrony between herbivorous insects and their hosts: signal of climate change or pre-existing adaptive strategy?. *Philosophical Transactions of the Royal Society B Biological Sciences* 365: (3161-3176).
  - Kaufmann, M.R., Huckaby, L.S., Regan, C.M. and Popp, J.. 1998. Forest reference conditions for ecosystem management in the Sacramento Mountains, New Mexico. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO : (87).
  - U.S. Fish and Wildlife Service (USFWS), Otero County, The Village of Cloudcroft, and U.S. Forest Service. 2004. Conservation Plan for the Sacramento Mountains Checkerspot Butterfly (*Euphydryas anicia cloudcrofti*). Albuquerque, NM : (80).
  - [Palash, A., Paul, S., Resha, S. K. & Khan, M. K.. 2022. Body size and diet breadth drive local extinction risk in butterflies. \*Helicon\* 8. <https://doi.org/10.1016/j.helicon.2022.e10290>](#)

## More Information