Argynnis nausicaa capitanensis (Capitan Mountains Nausicaa Fritillary)

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Taxonomy

- **Class**: INSECTA
- **Order**: LEPIDOPTERA
- **Family**: NYMPHALIDAE
- **Genus**: Argynnis
- **Scientific Name**: *Argynnis nausicaa capitanensis* (R. Holland, 1988)
- **Common Name**: Capitan Mountains Nausicaa Fritillary
- **Synonyms**: Speyeria atlantis ssp. capitanensis R. Holland, 1988
- **Taxonomic Name Source**:Pelham, J. P. 2008. A catalogue of the butterflies of the United States and Canada with a complete bibliography of the descriptive and systematic literature. The Journal of Research on the Lepidoptera. Volume 40. 658 pp. Revised 14 February, 2012.

Agency Status

- **NMDGF**:
- **Federal Status**:
- **BLM Sensitive**:
- **USFS**:
- **IUCN Red List**: Not Evaluated
- **Nature Serve Global**: TNR
- **NHNM State**: S4
- **NM Endemic**:YES

Description

Southwestern Fritillary is of medium size. Dorsally males are bright orange with black lines, spots and chevrons; females are less bright. Underneath, the hindwing is red-brown in the discal region with a narrow post-discal blond band, all decorated by silvered white spots. Compared to Northwestern Fritillary, black markings are heavier on the upperside, particularly along DFW veins. Populations in north-central mountains have gray-blue eyes, unlike sympatric Aphrodite or Great Spangled. Populations south of I-40 and in the Sandia Mountains have amber-tan eyes. Both eye color morphs may occur in some areas. The ID challenge is simplified in southern populations where nausicaa is the only Argynnis species. The Capitan, Sierra Blanca and Sacramento Mountains (counties: Li,Ot) of south-central New Mexico host Argynnis nausicaa capitanensis (R. Holland 1988). This is our darkest race on the upper side, darker even than A. n. dorothea. It also has tan/amber eyes.

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

Habitat and Ecology

This species is found mostly in montane meadows however, has also been found in other mesic habitats including around riparian areas and stream sides often being observed along the forest edge (Pittenger and Cary 2001, Dunford 2009, Cary and Toliver 2024). The host plants for this butterfly are Violets (*Viola spp.*) although specific species have not been reported (Dunford 2009). This butterfly has been observed nectaring on Common Dandelion (*Taraxacum officinale*), Cutleaf Coneflower (*Rudbeckia laciniata*), Orange Sneezeweed (*Hymenoxys hoopesii*), both native and exotic thistles (*Cirsium spp.*) and Spike Verbena (*Verbena macdougalii*) adults also feed on dung and wet soil (Pittenger and Cary 2001). The parent species the Nausicaa Fritillary (*Argynnis nausicaa*) utilizes a wide variety of nectar plants and are regularly seen nectaring on Blanket flowers (Gaillardia), Rabbitbrush (Chrysothamnus), Mints (Lamiaceae), and shrub Cinquefoils (Potentilla) (Dunford 2009, Lotts and Naberhaus 2021, Cary and Toliver 2024). Dunford (2009) remarks that in their studying of this butterfly that adults were active from mid morning to early afternoon (Dunford 2009). Males can frequently be seen patrolling for females along streamsides, meadows, or forest edges (Pittenger and Cary 2001). However, this species also seems to hilltop when mates are difficult to find (Pittenger and Cary 2001).

Females oviposit near host violets with eggs being laid on twigs, leaves, stones, or other substrates near their hosts (Pittenger and Cary 2001). Eggs hatch in a few days and without feeding first instar larvae enter into diapause (Pittenger and Cary 2001). *Argynnis* larvae tend to feed at night and hide in host plants during the day which can make finding them difficult (Ferris and Brown 1981, Pittenger and Cary 2001).

Known host plants for the parent species include Dog Violet (*Viola adunca*), Canada Violet (*Viola canadensis*), Goosefoot Violet (*Viola purpurea*), Nuttallâ€™s Violet (*Viola nuttallii*), and Northern Bog Violet (*Viola nephrophylla*) Canada Violet is suspected to be the preferred host plant for this butterfly (Scott 1986, 1992; Opler and Wright 1999; Pittenger and Cary 2001; Cary and Toliver 2024). However, of these only Canada Violet, Dog Violet, and Northern Bog Violet are known to grow in the Sacramento Mountains and as such serve as potential host plants. These represent three of the four known violets that reside within the Sacramento Mountains with the fourth species being *Viola sororia* which is only known from one observation in 1969 (SEINET 2024). All of these violets grow in moist soils in meadows or forest and as such this is assumed to be the habitat for this butterfly.

The parent species is univoltine with a single midsummer flight occurring from June to September extreme flight dates for the parent species in New Mexico stretch from June 5th to September 10th with peak flight in July (Pittenger and Cary 2001, Cary and Toliver 2024). Extreme flight dates from GBIF.org range for the Capitan Mountains Fritillary range from June 10th to August 16th (GBIF.org 2024).

Geographic Range:

The Capitan Nausicaa Fritillary resides in the Sacramento Mountain Complex, in southern New Mexico. This Complex includes the Capitan, Sierra Blanca, and Sacramento Mountains (Cary and Toliver 2024). This butterfly exists at high elevations with a 2001 study on the species finding that 83% of known occurrences were found above 2,289 m (7,500 feet) (Pittenger and Cary 2001).

Conservation Considerations:

There are no known conservation actions being taken for this butterfly and no known prior conservation assessments of this butterfly either. The most pressing conservation action needed for this taxa is undoubtedly more research. Determination of population size, structure, and trend as well as trying to determine the genetic health of these

populations in regards to how isolated they are and how much inbreeding depression might potentially be affecting them. More research on the specific threats to this butterfly and how they are affecting the taxa is also needed. With all of this information planning of potential conservation actions can occur although likely protection of habitat will be an important first step.

Threats:

As a narrow alpine endemic to the Sacramento and Capitan mountains in southern New Mexico, the main threat to this butterfly is climate change. The Sacramento Mountains sit at the southern extreme of the parent species range and thus the warmest portion of its range. It has been documented that many butterfly species respond to climate change by moving to higher elevations or higher latitudes however, as this butterfly is isolated in the Sacramento and Capitan mountains this is not an option and climate change threatens to push this taxa into thin air (Forister *et al.* 2010, Holland 2010, RÃ¶dder *et al.* 2021). As the western United States is expected to continue to get hotter and drier over the next century things are looking dire for this mountaintop resident (Cook *et al.* 2009, Forister *et al.* 2010, Cook *et al.* 2015, Williams *et al.* 2022). Climate change also threatens this subspecies with phenological mismatch with both host and nectar sources which could result in steady declines in population numbers or in the event of an extreme phenological mismatch the extirpation of entire populations (Singer and Parmesan 2010, Patterson *et al.* 2019).

Another credible threat to this subspecies is catastrophic wildfire. Fire suppression has been a key component of forest management in this area since the early 1900s which has resulted in dense conifer growth and increased fuel loads (Kaufmann *et al.* 1998, Pittenger and Cary 2001). 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 subspecies' host plant causing mass mortality, in adults, larvae, or eggs and easily extirpating the remaining colonies (Pittenger and Cary 2001, Holland 2010). Additionally, pesticide use has also likely adversely impacted this subspecies across its known range (Pittenger and Cary 2001, 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 potentially quite threatened by inbreeding depression although little is known about the specific population level dynamics of this butterfly. However, the Sacramento mountains have been isolated from the Sangre de Cristos which represent the closest population of the Nausicaa fritillary for around 8000 years and at this point there is likely very little to no genetic exchange between these two populations (Holland 2010). On top of this the populations of the Capitan Nausicaa Fritillary in the Sacramento Mountains and the populations in the Capitan mountains has been determined to be somewhat distinct from one another although at the time of the analysis they were determined to be be not quite distinct enough for the Sacramento Mountains population to be a different subspecies (Holland 1988). However, this is a sign that these two populations are relatively isolated from each other and may be drifting further apart. In isolated populations like that of the Capitan Nausicaa Fritillary inbreeding depression can start to arise where slightly deleterious alleles can accumulate in these 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.

Recreational disturbances are also a potential threat to this taxa. As the Sacramento Mountains are the site of many recreational activities including camping, hunting, hiking, mountain biking, and off-highway vehicle (OHV) use. Additionally, 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). Additionally, timber harvesting which removes a large amount of canopy cover could cause drying in understory soils which may negatively affect violets (Pittenger and Cary 2001).

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. However, several previous studies on the insect have found despite it being such a narrow endemic that it is highly abundant with Hager and Stafford (1999) finding it to be the second most abundant species at their plot in the Sacramento Mountains behind the Painted Lady (*Vanessa cardui*). However, no recent monitoring has been done and efforts to do so are more important than ever as several widespread, relatively common species of butterflies are in decline across the western United States and with other Sacramento Mountain endemic butterflies being found to be in steep decline recently (Forister *et al.* 2021, USFWS 2023).

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More Information