Icaricia icarioides nigrafem (Raton Mesa Boisduval's Blue)

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Taxonomy

- **Class**: INSECTA
- **Order**: LEPIDOPTERA
- **Family**: LYCAENIDAE
- **Genus**: Icaricia
- **Scientific Name**: *Icaricia icarioides nigrafem* (R. Holland, 2011)
- **Common Name**: Raton Mesa Boisduval's Blue
- **Synonyms**: Plebejus icarioides ssp. nigrafem R. Holland, 2011
- **Taxonomic Name Source**:Holland, R. 2011. Lepidoptera of North America 10. Review of *Plebejus icarioides* and *Glaucopsyche lygdamus* in New Mexico with four new subspecies (Lycaenidae, Lycaeninae, Polyommatini). Contributions of the C.P. Gillette Museum of Arthropod Diversity Colorado State University, Fort Collins, Colorado. 29 pp.

Agency Status

- **NMDGF**:
- **Federal Status**:
- **BLM Sensitive**:
- **USFS**:
- **IUCN Red List**: Not Evaluated
- **Nature Serve Global**: TNR
- **NHNM State**: S1
- **NM Endemic**:NO

Description

Boisduval's is our largest blue, but still not very big. Males are iridescent sky blue above with black edging. Females are dark gray above with blue basal scaling. Beneath, the forewing has a bold postmedian band of white-ringed black spots and a similar cell-end bar. The hindwing underside is gray with small, dark submarginal chevrons and a postmedian band of white-ringed black spots. There is a gap between submarginal chevrons and postmedian band. **Comments.** Great geographic variation in this species has resulted in proliferation of named subspecies by taxonomists (25, by our last count). Most New Mexico populations are grouped with central Rocky Mountains race Icaricia icarioides lycea (W. H. Edwards 1864), which has bold ventral hindwing black cell spots. Populations in the Raton Mesa Complex (Co,Un) has females that are glossy black above, with few if any basal blue scales, and are

subspecies I. i. nigrafem (R. Holland 2011).

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

Habitat and Ecology

There is little specific life history information for this subspecies however, the parent species the Boisduval's Blue (*I. icarioides*) is known to utilize higher elevation montane meadows and savannahs as its habitat (Cary and Toliver 2024). As a result, of this and being towards the south of the parent species distribution this butterfly is most likely utilizing the meadows and savannahs on the wind swept mesa tops and volcanic peaks of the Raton Mesa Complex. All of the subspecies of the Boisduval's Blue feed on Lupine species (*Lupinus spp.*) and many of them are quite host specific such as the Sacred Boisduval's Blue (*I. i sacre*) which only uses a single endemic lupine (Cary and Toliver 2024). It has not been reported specifically which lupine species are hosts for this butterfly although Butterflies of New Mexico reports observations of oviposition on Silvery Lupine (L. argenteus) and as such this is almost certainly a host plant for butterfly (Cary and Toliver 2024). However, there are currently records of four other lupine species within the Raton Mesa Complex all of which could serve as potentially hosts these are Sand Lupine *(L. ammophilus*), Tailcup Lupine (*L. caudatus*), Lodgepole Lupine (*L. parviflorus*), and Nebraska Lupine (*L. plattensis*) (SEINET 2023).

In New Mexico the Boisduval's Blue is univoltine and extreme flight dates for the parent species in New Mexico range from May 6th and August 20th (Cary and Toliver 2024). The few records of this butterfly we could find from GBIF.org are all from June or July which may represent the peak of this butterfly's flight time (GBIF.org 2024). In the parent species partially grown larvae overwinter (Cary and Toliver 2024).

Geographic Range:

The Raton Mesa Boisduval's Blue is endemic to the Raton Mesa Complex, in northeastern New Mexico (Colfax and Union Counties) and adjacent Colorado (Las Animas County) (Holland 2011, Cary and Toliver 2024). The Raton Mesa Complex is a group of high mesa and volcanic peaks, isolated from other high elevation habitats. As a result, it has become an area of high endemism, with several endemic butterflies only being found in this area; such taxa include the Raton Mesa Northwestern Fritillary (*Argynnis nausicaa ratonensis*), Raton Mesa Boisduval's Blue (*Icaricia icarioides nigrafem*), Western Hobomok Skipper (*Lon hobomok wetona*), and Capulin Mountain Alberta Arctic (*Oeneis alberta capulinensis*) (Holland 2011).

Conservation Considerations:

There are no known conservation actions being taken for this butterfly and no previous conservation assessments that we know of. Two other Boisduval's Blue subspecies have already made it onto the United States Endangered Species list with federal protections due to similar threats to the ones facing this butterfly including habitat loss, climate change, and ecological succession (USFWS 2020).

Due to the many threats to this butterfly as well as its very small range and the fragile metapopulation dynamics of this butterfly it is unlikely that this subspecies will persist without direct conservation intervention. These efforts should include additional research on this butterfly's life history, ecology, the threats to it and its population size and trend. Additionally, habitat restoration focusing on making populations more resilient or reconnecting isolated metapopulations will be crucial for this butterflies long term survival. In order to combat inbreeding depression of this isolated butterfly, manually crossing genetic lines and breeding isolated metapopulations may be required.

Threats:

This butterfly is a very narrow and range restricted high elevation endemic as a result climate change is likely the main threat to this butterfly. While there are further south populations the Raton Mesa Boisduval's Blue sits towards the south of its parents wide distribution and is probably somewhat heat stressed as a result. 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 already isolated on mesa tops and the tops of volcanic peaks this is not an option for this butterfly and climate change threats to push this taxa into thin air (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, 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 which has been observed in other host specific lupine feeding blues (Singer and Parmesan 2010, Patterson *et al.* 2019).

This subspecies could also be highly affected by fire either by it or the lack of it. With such small population numbers in such small areas one fire controlled or wild could wipe out a large percentage of what's left of this subspecies and potentially cause its extinction (Cary *et al.* 2004). However, at the same time with no fire these grasslands may grow senescent or be succeeded which will also drive the taxa towards potential extinction (Cary *et al.* 2004). Because the population is so small and it's so restricted drought, and severe weather also pose large challenges to the taxa; hailstorms and late snows during the flight period could kill off a large number of individuals plummeting the genetic diversity of the population (Cary *et al.* 2004).

Another major threat to this butterfly is inbreeding depression which is magnified by the likely metapopulation dynamics of this taxa. This can affect the butterfly in two ways first off in a metapopulation dynamic these mesa top and mountain top colonies frequently go extinct and are recolonized by other populations however, as this butterfly is pushed to higher elevations by climate change and as grasslands in the area begin to fall to succession there is less opportunity for recolonization of these sites extirpated by environmental stochasticity. This butterfly also being univoltine, and having a small wingspan as well as being short lived likely has somewhat limited dispersal capabilities which can further stress this butterfly (Lotts and Naberhaus 2021). Metapopulations are also at additional risk of inbreeding depression as in these small isolated populations deleterious alleles can begin to allele along with a 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).

Determination of the specific host plants for this butterfly is needed in order to more properly analyze the threats to them however, feasibly replacement by invasive species is likely a threat to this butterflyâ€™s host lupines as it is for most other Boisduval's Blue subspecies (USFWS 2020). Additionally, two other Boisduval's Blue subspecies have been listed as federally endangered and one of the threats listed for these butterflies is *Colletotrichum lupini* a fungal pathogen that can kill lupine species however, especially seems to be a threat to Silvery Lupine which is the only known host plant for this butterfly (USFWS 2020, Cary and Toliver 2024).

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).

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More Information