http://fwie.fw.vt.edu/WWW/esis/lists/e501011.htm

(DRAFT) - Taxonomy

Species BUTTERFLY, BLUE, MISSION
Species Id ESIS501011
Date 13 MAR 96

TAXONOMY

NAME - BUTTERFLY, BLUE, MISSION

OTHER COMMON NAMES - BUTTERFLY, BLUE, MISSION; BLUE and MISSION

ELEMENT CODE -

CATEGORY - Terrestrial Insects

PHYLUM AND SUBPHYLUM - ARTHROPODA,

CLASS AND SUBCLASS - INSECTA,

ORDER AND SUBORDER - LEPIDOPTERA,

FAMILY AND SUBFAMILY - LYCAENIDAE,

GENUS AND SUBGENUS - ICARICIA,

SPECIES AND SSP - ICARIOIDES, MISSIONENSIS

SCIENTIFIC NAME - ICARICIA ICARIOIDES MISSIONENSIS

AUTHORITY -

TAXONOMY REFERENCES -

COMMENTS ON TAXONOMY -
Mission Blue Butterfly

Icaricia icarioides missionensis (Hovanitz, 1937)

KINGDOM:	Animal	GROUP:	Insect
PHYLUM:	Arthropoda	CLASS:	Insecta
ORDER:	Lepidoptera	FAMILY:	Lycaenidae

The taxon Icaricia (Plebejus) icarioides missionensis appears to be a phenotypic intermediate between darkly marked "inland" populations referred to as subspecies I. i. pardalis and populations on the immediate coast which sport extremely pale ventral wing surfaces called subspecies I. i. pheres. Because pardalis phenotypes effectively surround the original distribution of I. i. pheres (now

extinct in San Francisco), the subspecies I. i. missionensis may well be polyphylectic in origin, having arisen independently north and south of the center of I. i. pheres distribution. Thus the present "continuous" distribution of the Mission blue is an artifact of the disappearance of I. i. pheres.

This taxon may be identified by comparison with illustrations of Icaricia (Plebejus) icarioides missionensis on Plate 59 (Fig.1 and 2) of "The butterflies of North America" (03). The black spotting of the ventral aspect of the male is slightly more intense than average. The

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following is the original description of the Mission blue butterfly (02,04):

> "Upper surface of wings: Male, blue with black border and white fringes; anal angle and body clothed with white hair. Female, identical with pheres [ground color largely brownish-gray] except for the slightly greater restriction of the blue towards the base of the wings; marginal row of black or slightly blue spots at lower end of outer margin of secondaries. Under side: Male and female almost identical; ground color of darker shade than in pheres; two rows of black spots on both primaries and secondaries, those on primaries much the same as in pheres but outer row darker; secondaries differing from pheres in having inner row of spots round, black and encircled with white; outer row smaller and not encircled with shite.
>
> Missionensis differs from pheres in having black instead of white spots on the under side secondaries, from pardalis (Behr) in having smaller black spots and with blue suffusion in the female, from icarioides (Bdv.) in having greater hairiness of the average size, and from moroensis Sternitzky in having larger black spots on the under side of secondaries. No genetalic study has yet been made of these races.
>
> Holotype male Twin Peaks, San Francisco, California Elevation 700 ft. April 10, 1934. Collected by the author. Placed in the collection of the Calif. Acad. Sci. Allotype female (No. 4527, C.A.S. Ent.). Same locality, date and disposition made."

(DRAFT) - Status
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STATUS

Coded Status

E: Federal Endangered

Non-consumptive recreational

COMMENTS ON STATUS -
U.S. STATUSES AND LAWS:

The Mission blue butterfly is listed as Endangered pursuant to the Endangered Species Act of 1973, as amended (50 CFR 17.11). The species is presently known only from Marin, San Francisco and San Mateo Counties, CA, but is protected wherever found.

This subspecies is protected by the Lacey Act (P.L. 97-79, as amended; 16 U.S.C. 3371 et seq.) which makes it unlawful to import, export, transport, sell, receive, acquire, or purchase any wild animal (alive or dead including parts, products, eggs, or offspring):

(1) in interstate or foreign commerce if taken, possessed, transported or sold in violation of any State law or regulation; or
(2) if taken or possessed in violation of any U.S. law, treaty, or regulation or in violation of Indian tribal law.

It is also unlawful to possess any wild animal (alive or dead including parts, products, eggs, and offspring) within the U.S. territorial or special maritime jurisdiction (as defined in 18 U.S.C. 7) that is taken, possessed, transported, or sold in violation of any State law or regulation, foreign law, or Indian tribal law.

RESPONSIBLE FEDERAL AGENCIES:

USFWS -Responsible for the management/recovery, listing, and law enforcement/protection of this species.

NPS -Responsible for the law enforcement/protection of this species with applicable State and Federal laws on public lands under their control. Also responsible for conservation (Nat. Park System Organic Act - 16 U.S.C. 1, 2-3)/management/recovery on National Park Service lands. Taking, possessing, or disturbing of Federally listed species is prohibited on NPS lands (36 CFR 2.1, 2.2, and 2.3).

All Federal agencies have responsibility to ensure that any action authorized, funded, or carried out by that agency is not likely to jeopardize the continued existence of the species or result in the destruction or adverse modification of Critical Habitat (50 CFR 402), and to utilize their authorities to carry out programs for the conservation of the species.

STATE STATUSES AND LAWS:

Status - 1

(DRAFT) - Status

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STATE: California

DESIGNATED STATUS: None.

The California Environmental Quality Control Act (CEQA) (PRC 2100 et seq.) recognizes Federally listed Threatened and Endangered species as among those species requiring environmental impact assessments be made for actions that may detrimentally affect them. See: Guidelines for Implementation of CEQA, CA Admin. Code, Ch. 3, Sec. 15380.

INTERNATIONAL STATUSES, TREATIES, AND AGREEMENTS:

Although the species is not individually listed in the IUCN Invertebrate Red Data Book (1983) it is included under the designated San Bruno Mountain Threatened Community.

ECONOMIC STATUSES:

The Mission blue butterfly is valued as a rare species by butterfly enthusiasts.

75/03/20:40 FR 12691/ - Notice of review
75/10/14:40 FR 48139/48140 - Proposed rule, listing as Endangered
76/06/01:41 FR 22041/22044 - Final rule, listed as Endangered
81/02/27:46 FR 14652/14658 - Five year review
82/07/26:47 FR 32208/32209 - Notice of draft EA/EIR, for 10(a) permit
82/12/02:47 FR 54366/ - Receipt of application for 10(a) permit
83/03/10:48 FR 10136/10137 - Issuance of 10(a) permit (PRT2-9818)
85/09/01:50 FR 37059/ - Issuance of amendment to PRT2-9818
86/01/07:51 FR 00690/ - Issuance of amendment to PRT2-9818
86/01/21:51 FR 02767/ - Denial of amend. (#2) to take E/T species
87/07/07:52 FR 25523/25528 - Notice of Review

HABITAT ASSOCIATIONS

HABITAT - TERRESTRIAL
TERRESTRIAL

LAND USE -
Residential
Industrial
Transportation, communications, and Util
Mixed Urban or Built-up Land
Mixed Rangeland
Strip Mines, Quarries, and Gravel Pits

COMMENTS ON HABITAT ASSOCIATIONS -
The Mission blue butterfly is largely restricted to grassland areas in which any one of its 3 known host plants (lupine) grow. Given in apparent order of oviposition preference by the butterfly, these are Lupinus albifrons, L. variicolor and L. formosus. While the host plants may be found in grassland environments varying widely in slope, aspect, soil components and community structure, the primary host clearly does best in moderately to highly disturbed habitats on nutrient poor soils where competing ground cover is sparse. This includes unstable areas that manifest slides, rocky outcrops with highly weathered soils, and areas disturbed as a by-product of human activities, such as roadcuts.

Like most herbivorous insects of California native grassland, this species has likely been negatively affected by non-native annual grassland species, which now dominate this community type. Aerial photographs also clearly show that non-native brush species, particularly gorse, have invaded and replaced substantial portions of San Bruno Mountain grassland habitat in recent decades.

Chapparal is the primary vegetative community adjacent to the grasslands. Mission blue butterflies are only infrequently observed in chapparal in small open portions. However, some actions affecting the chapparal could prove detrimental to the Mission blue, such as spraying herbicides that might affect the butterfly's host plant. On the other hand, actions resulting in conversion of chapparal to native grassland could prove beneficial.

The Mission blue butterfly occurs in and around urban areas of San Francisco, CA and Pacifica, CA. A large rock quarry is located on San Bruno Mountain on the main ridge, and a sand quarry-landfill is on the southwestern flank of the mountain. Expansion of the rock quarry in 1978 usurped habitat for the Mission blue butterfly (06).

Butterflies fitting the description of Mission blue butterflies are found in the San Francisco watershed (part of the Golden Gate National Recreation Area) along the U.S. 280 corridor as far south as Crystal Springs Reservoir.

(DRAFT) - Food Habits
Species BUTTERFLY, BLUE, MISSION
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FOOD HABITS

TROPHIC LEVEL -
HERBIVORE

LIFESTAGE	FOOD	FOOD PART
General	Forb	Leaves/Stems
General	Forb	Flowers/Fruit/Seed

(DRAFT) - Environment Associations
Species BUTTERFLY, BLUE, MISSION
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ENVIRONMENTAL ASSOCIATIONS

G = General
LIM = Limiting
J = Juvenile
RJ = Resting Juvenile
FJ = Feeding Juvenile
L = Larvae
RL = Resting Larvae
FL = Feeding Larvae

A = Adult
RA = Resting Adult
FA = Feeding Adult
BA = Breeding Adult
P = Pupae
E = Egg

LIFESTAGE	ENVIRONMENTAL ASSOCIATIONS
G	Terrestrial Features: Rock outcrops
G	Human Association: Public residential parks

(DRAFT) - Life History
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LIFE HISTORY

FOOD HABITS:

The Mission blue butterfly oviposits on three known lupine host plants: Lupinus albifrons, L. variicolor, and L. formosus. Eggs are laid on green parts of the plants, particularly on young growth such as flowers and leaf tips. Young larvae effectively skeletonize leaf tissues until diapause. Diapausing larvae are, for the most part, found in leaf litter at the base of the host plants.

HOME RANGE/TERRITORY:

This butterfly is not, by strict definition, territorial. Males perch on elevated parts of host plants and surrounding vegetation, from which they fly out and encounter passing objects, presumably seeking receptive females. Females are rather habitat specific. Most appear to live out their adult reproductive lifespans within the same patches of host plants. However, although most adults freely move within habitats, long distance movements are rarely recorded. (Due to the necessity of distance movements, one might conclude that studies to date have underestimated such movements.)

PERIODICITY:

The Mission blue butterfly is diurnally active and univoltine. The great variety of microhabitats used by the butterfly, coupled with widely varying rates of development to adulthood, lead to an extended flight period beginning in late spring each year. On San Bruno Mountain the entire flight period can last more than 12 weeks, from early April on south facing slopes to late June on sheltered north faces.

Butterflies emerging from pupae within circumscribed habitat areas exhibit protandry of sorts (that is, on average males appear to emerge slightly before females).

MIGRATION PATTERNS:

The Mission blue butterfly is non-migratory. Mark-recapture studies indicate that most recorded movements are quite small - on the order of dozens to a few hundred meters. Relatively long distance movements, greater than a kilometer, have been documented, although rarely (01,05).

COVER/SHELTER REQUIREMENTS:

Cover and shelter requirements of the Mission blue butterfly are limited to the larval host plant (lupine) itself and the immediate surrounding area. Eggs are laid on terminal plant parts, particularly flowers and leaves on which larvae feed to diapause. They then

descend to diapause at the plant base among litter. Post-diapause larval feeding and resting also occurs on the plant, while pupation again takes place about the plant base.

REPRODUCTIVE SITE REQUIREMENTS:

Reproductive site requirements are met on and about the larval host plants (Lupinus species). Males fly about host plants and perch on host plants and surrounding vegetation apparently seeking receptive

females for mating. Females require any of three larval host plant species, Lupinus albifrons, L. variicolor, or L. formosus, on which they lay eggs.

REPRODUCTIVE CHARACTERISTICS:

All reproductive activities are carried out among patches of host plants (Lupinus species). Males fly (patrol) about host plants or perch on elevated host plant stalks or those of the surrounding vegetation. They fly out to encounter passing objects, and so contact receptive females. Females are mated probably less than 24 hours after emergence and after a relatively brief courtship. Matings are said to occur on the periphery of the mate location area from late morning to late afternoon and last on the order of one to several hours (01). Females lay eggs singly through the duration of their lives at the rate of several dozen a day.

PARENTAL CARE:

Parental care is limited to the placement of eggs on plants by females. Males play no parental role after courtship and copulation.

POPULATION BIOLOGY:

No evidence exists indicating that the Mission blue is food limited, nor that density dependent mortality factors regulate population size. Population size appears to vary locally less than an order of magnitude from year to year in undisturbed habitats. Mortality among early stages is high; females can lay up to several hundred eggs. Sex ratio in mark-recapture studies is male-biased, although not greatly so (01). In light of the more cryptic coloration and behavior of females, which reduces their visibility, and hence, their catchability, the sex ratio in nature is probably close to 1:1.

The larval host plants of the Mission blue are Lupinus species which respond with increased density to local events which might be described as catastrophic (e.g., fire, landslides, and environmental phenomena that threaten many other biotic elements in its habitat).

SPECIES INTERRELATIONSHIPS:

The only unequivocal relationship between the Mission blue and other species is that with their larval host plants. The butterfly is only found where one or more of its three lupine host plants (Lupinus albifrons, L. variicolor, and/or L. formosus) are found. More mature larvae of the Mission blue butterfly appear to have a facultative symbiotic relationship with ants (to which they probably provide honeydew-like carbohydrate secretions, perhaps in "exchange" for protection from predators).

OTHER LIFE HISTORY DESCRIPTORS:

None.

(DRAFT) - Management Practices
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MANAGEMENT PRACTICES

RESULT	MANAGEMENT PRACTICE
Beneficial	Controlling/Restricting Off-Road Vehicles
Beneficial	Maintaining undisturbed/undeveloped areas
Beneficial	Land Acquisition
Beneficial	Controlling pollution [thermal, chemical, physical]
Beneficial	Controlling/Restricting Pesticide Use
Beneficial	Controlling/Restricting Herbicide Use
Beneficial	Reforestation
Beneficial	Controlling/Removing Nonnative Vegetation
Beneficial	Stocking captive-reared wild-strain animals
Beneficial	Transplanting wild animals
Adverse	Food Supply Reduction
Existing	Food Supply Reduction
Adverse	Surface Mines
Existing	Surface Mines
Adverse	Rural Residential/Industrial Areas
Existing	Rural Residential/Industrial Areas
Adverse	Highway/Railroads
Existing	Highway/Railroads
Adverse	Exotic/Feral/Introducted Species
Existing	Exotic/Feral/Introducted Species
Adverse	Grazing
Existing	Grazing
Adverse	
Existing	
Adverse	Vegetation Composition Changes
Existing	Vegetation Composition Changes
Adverse	Suppressing wildfire
Existing	Suppressing wildfire
Adverse	Fire
Existing	Fire

COMMENTS ON MANAGEMENT PRACTICES -

The Mission blue butterfly is a narrowly distributed taxon, and probably was narrowly distributed historically. While some populations and habitats have probably been extirpated by urban and suburban growth in the upper San Francisco peninsula, the historic distribution is probably largely intact.

Indeed, recent studies (03) have extended the known distribution substantially to the south and southwest of the published distribution - along the U.S. Highway 280 corridor nearly to Highway

92 and to within the city limits of Pacifica (all in San Mateo County).

Threats are for the most part of two types. Most important is the conversion of grassland habitats where the lupine larval host plant of the Mission blue butterfly live. San Bruno Mountain is an island of habitat encompassed by urbanization. Habitat loss has resulted from roadway, utility, home, industrial, and commercial construction, and agricultural development. A large rock quarry is

located on San Bruno Mountain on the main ridge, and a sand quarry-landfill is on the southwestern flank of the mountain. Expansion of the rock quarry in 1978 usurped habitat for the Mission blue butterfly (06).

The other threat includes the invasion of Mission blue butterfly habitat by brush species of native and, of more concern, alien origin (notably gorse, Ulex europaeas). Fire suppression may be facilitating some adverse changes for the Mission blue on San Bruno Mountain. The Mission blue is considered to be primarily a grassland species. It's host plants, Lupinus spp., appear to prefer areas that are irregularly burned. Over time, fire supression on San Bruno Mountain has possibly encouraged the invasion of chapparal vegetation into grassland habitats, possibly causing a decline in the number of host plants (07). In other localities the transition from native perennial bunch grasses to introduced annuals is attibuted to grazing and to an increased frequency of fires (06).

Both of these threats have been and will continue to be the foci of attention in the key area of the Mission blue distribution on San Bruno Mountain. There the San Bruno Mountain Habitat Conservation Plan has set aside substantial habitat areas and provides for the reconversion of alien broom- and gorse-dominated brushland to grassland.

APPROVED PLAN:
U.S. Fish and Wildlife Service. 1984. Recovery Plan for the San Bruno Elfin and Mission Blue Butterflies. U.S. Fish and Wildlife Service, Portland, OR. 81 pp.

The Recovery Plan for the Mission blue butterfly also includes the San Bruno elfin butterfly. The primary objective of the recovery plan is to protect, maintain, and enhance existing populations. The Mission blue butterfly may be reclassified to Threatened when secure, self-sustaining colonies are established or reestablished on two identified sites and the San Bruno Mountain populations are secure. Delisting is contingent upon protection, maintenance, and/or expansion of current colonies and establishment of additional colonies.

In order to meet the above recovery criteria, the following activities must be classified:

1. Protection of essential habitat from adverse development on and outside of San Bruno Mountain through cooperative agreements, easements, and other strategies;
2. Prevention of further habitat degradation from herbicides, pesticides, other toxicants, and off-road vehicle use. Habitat should be enhanced when possible by the removal of exotic plants and transplanting native flora.
3. Development and implementation of management plans for existing colonies of butterflies after gathering information on bionomics, determining reclassification and habitat criteria necessary for

reclassifying and delisting, and evaluating management data for long term planning for butterfly management at all locations;

4. Reestablishment of populations in restored or rehabilitated

habitats within historic range. If recolonization does not occur naturally, then butterflies from a nearby colony should be reintroduced. If natural colonies are greatly depleted, propagation of captive individuals will be necessary to obtain stock for reintroduction.

5. Enforcement of laws and regulations to protect these butterflies and their habitats; and
6. Development and implementation of an information and educational program.

References

***** REFERENCES FOR ALL NARRATIVES EXCEPT N-OCCURRENCE *****

01 Arnold, R.A. 1983. Ecological studies of six endangered butterflies (Lepidoptera,Lycaenidae): Island biogeography, patch dynamics, and the design of habitat preserves. Univ. Calif. Pub. Entomol. Vol. 99.

02 Hovanitz, W. 1937. Concerning the Plebejus icarioides rassenkreiss. Pan-Pac. Ent. 13:184-189.

03 Howe, W.H. 1975. The butterflies of North America. Doubleday, New York.

04 Miller, L.D. and F.M. Brown. 1981. A catalogue/checklist of the butterflies of America north of Mexico. Lepid. Soc. Mem. 2.

05 Murphy, D.D. 1985. Report on the status of Plebejus icariodes missionensis in the Skyline College vicinity of San Mateo County, California. U.S. Fish and Wildlife Service Contract # 11310-0133-5.

06 U.S. Fish and Wildlife Service. 1984. Recovery Plan for the San Bruno Elfin and Mission Blue Butterflies. U.S. Fish and Wildlife Service, Portland, OR. 81 pp.

07 Murphy, D. January 1987. Personal communication. Department of Biological Sciences, Stanford University, Stanford, CA 94305.

***** REFERENCES FOR N-OCCURRENCE NARRATIVE ONLY *****

01 Murphy, D.D. 1985. Report on the status of Plebejus icariodes missionensis in the Skyline College vicinity of San Mateo County, California. U.S. Fish and Wildlife Service Contract # 11310-0133-5.

References - 1