

TAXONOMY

NAME - BUTTERFLY, LANGE'S METALMARK

OTHER COMMON NAMES - BUTTERFLY, LANGE'S METALMARK; METALMARK,
LANGE'S; METALMARK and LANGE

ELEMENT CODE -

CATEGORY - Terrestrial Insects

PHYLUM AND SUBPHYLUM - ARTHROPODA,

CLASS AND SUBCLASS - INSECTA,

ORDER AND SUBORDER - LEPIDOPTERA,

FAMILY AND SUBFAMILY - LYCAENIDAE,

GENUS AND SUBGENUS - APODEMIA,

SPECIES AND SSP - MORMO, LANGEI

SCIENTIFIC NAME - APODEMIA MORMO LANGEI

AUTHORITY -

TAXONOMY REFERENCES -

COMMENTS ON TAXONOMY -

Lange's Metalmark Butterfly

Apodemia mormo langei Comstock, 1938

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

This is a small brightly colored butterfly with a wing span of about one inch. The upper surfaces of the forewings have coal-black to ash-gray edges with three rows of black-bordered irregular white marks along the outer margins. The ground color of the inner surfaces of the forewings is russet-orange with four centrally located black-bordered white markings. The ground color of the smaller hindwings are dark brown with some splashes of orange near the wing

base. The hindwings have similar markings as the forewings, especially in the females. The markings and color of the male hindwings are reduced so that a concolorous brown is present. The marginal markings are similar to those of the forewings with the exception of being reduced in size. The undersides of the forewings are orange with a tan outer margin and markings similar to that of the upper wing surfaces only muted. Tan is the ground color of the undersides of the hind wings with similar markings as the upper

Taxonomy - 1

(DRAFT) - Taxonomy

Species BUTTERFLY, LANGE'S METALMARK

Species Id ESIS501008

Date 13 MAR 96

surfaces. The sexes have a similar coloration and are difficult to distinguish. The dorsal and ventral wing surfaces of this butterfly are illustrated in Howe (01), on plate #48.

These markings readily distinguish the Lange's metalmark from the eight other subspecies known from North America. Other subspecies may occur in Mexico. The variations, Lange metalmark and Lange's metalmark are synonyms to the common name, Lange's metalmark butterfly. There are no scientific name synonyms.

Apodemia mormo langei was described in 1938 by John Adams Comstock (03). The holotype is deposited in the entomological collection of the Los Angeles County Museum of Natural History (02). The type locality is Antioch, Contra Costa Co., CA (02). No synonyms are known (02).

Taxonomy - 2

(DRAFT) - Status
Species BUTTERFLY, LANGE'S METALMARK
Species Id ESIS501008
Date 13 MAR 96

STATUS

Coded Status

E: Federal Endangered
Non-consumptive recreational

COMMENTS ON STATUS -

U.S. STATUSES AND LAWS:

The Lange's metalmark butterfly (*Apodemia mormo langei*) has been designated an Endangered species pursuant to the Endangered Species Act of 1973 (50 CFR 17.11; P.L. 93-205, 87 Stat. 884; 16 U.S.C. 1531-1540), as amended. The subspecies has this status wherever found including the State of California.

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.

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:

The California Endangered Species Act does not protect this species. The California Environmental Quality Act (PRC 2100 et seq.) recognizes Federally listed Threatened and Endangered species as among those species requiring that environmental impact assessments be made for actions that may detrimentally affect them. See: Guidelines for Implementation of the California Environmental Quality Act, California Administrative Code, Chapter 3, Section 15380.

Status - 1

(DRAFT) - Status
Species BUTTERFLY, LANGE'S METALMARK
Species Id ESIS501008
Date 13 MAR 96

INTERNATIONAL STATUSES, TREATIES, AND AGREEMENTS:
None.

ECONOMIC STATUSES:
Lange's metalmark butterfly has aesthetic value.

75/03/20:40 FR 01269/ - 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
77/02/08:42 FR 07973/07976 - Proposed Critical Habitat
79/03/06:44 FR 12382/12384 - Withdrawal of proposal for CH
81/02/27:46 FR 14652/14658 - Five year review
87/07/07:52 FR 25523/25528 - Notice of review

Status - 2

HABITAT ASSOCIATIONS

HABITAT - TERRESTRIAL
TERRESTRIAL

LAND USE -
Industrial
Transportation, communications, and Util
Orchards, Groves, Vineyards, Nurseries,
Sandy Areas other than Beaches
Strip Mines, Quarries, and Gravel Pits
Transitional Areas

COMMENTS ON HABITAT ASSOCIATIONS -

The Antioch sand dunes comprised a unique ecological area from several standpoints, although they have been largely decimated by industrialization. Biologically Antioch Dunes was a kind of "island" that contained the northern extension of many plants and animals of desert affinities; a biogeographic element that probably extended along the western margin of the Central Valley in prehistoric times. Later natural processes reduced this biota to a few small islands of sand dunes, the largest of which was at Antioch. Although the dunes resemble coastal dunes, such as at Pt. Reyes, the plants and animals were quite different, being desert species. The long isolation from relatives in the Mojave resulted in considerable local differentiation, or endemism, with the occurrence of species or races peculiar to the one area (08). The dunes once encompassed about 500 acres with elevations to ca. 100 ft above sea level but were reduced to about 60 acres with elevations ca. 30 ft above sea level. *Apodemia mormo langei* is found only on remnant sand dunes near the confluence of the Sacramento and San Joaquin Rivers in eastern Contra Costa County, CA. This is the only place its larval and primary adult foodplant the buckwheat, *Eriogonum nudum* var. *auriculatum* (Benth.) S. Stokes, grows. Native vegetation at these dune remnants consists of perennial shrubs and semi-shrubs. In recent years, the numbers and cover-abundance of weedy species has increased,

thereby out competing and limiting seedling growth of some native plants. Characteristic native plants include *Lupinus albifrons*, *Quercus agrifolia*, *Lotus scoparius*, *Erysimum capitatum*, *Senecio douglasii*, *Gutierrezia californica*, and *Oenothera deltoides* var. *howelli* (04,05).

Specific physical and environmental parameters required by the metalmark are unknown at this time.

Currently dune habitat is adjacent to a sewage treatment facility, sand quarrying areas, a vineyard, the Domtar gypsum plant, the Atchison/Topeka and Santa Fe Railroad tracks, the Fulton shipyard road, and traversed by Pacific Gas & Electric power transmission towers.

(DRAFT) - Food Habits

Species BUTTERFLY, LANGE'S METALMARK

Species Id ESIS501008

Date 13 MAR 96

FOOD HABITS

TROPHIC LEVEL -
HERBIVORE

<u>LIFESTAGE</u>	<u>FOOD</u>	<u>FOOD PART</u>
General	Deciduous Shrubs-Leaves/Twigs	
General	Deciduous Shrubs-Flowers/Fruit/Seed	

Food Habits - 1

(DRAFT) - Environment Associations
Species BUTTERFLY, LANGE'S METALMARK
Species Id ESIS501008
Date 13 MAR 96

ENVIRONMENTAL ASSOCIATIONS

G	=	General	A	=	Adult
LIM	=	Limiting	RA	=	Resting Adult
J	=	Juvenile	FA	=	Feeding Adult
RJ	=	Resting Juvenile	BA	=	Breeding Adult
FJ	=	Feeding Juvenile	P	=	Pupae
L	=	Larvae	E	=	Egg
RL	=	Resting Larvae			
FL	=	Feeding Larvae			

LIFESTAGE ENVIRONMENTAL ASSOCIATIONS

G

Environment Associations - 1

LIFE HISTORY

FOOD HABITS:

Adult metalmarks feed on nectar produced by several flowers. The primary nectar plant is *Eriogonum nudum* var. *auriculatum* (05). Secondary nectar plants include *Gettierrezia californica*, *Senecio douglasii*, *Chrysopsis villosa*, and *Heterotheca grandiflora* (05). Other plants on which metalmarks have been observed feeding on include *Croton californicus*, *Centaurea solstitialis*, and *Aster chilensis* var. *lentus* (05).

Larvae of the Lange's metalmark feed only on the buckwheat, *Eriogonum nudum* var. *auriculatum* (05). In the winter, spring and early summer months, larvae feed on the upper surface of the foliage. Later instar (stage) larvae complete their development by foraging on the flower stalks and developing flowers.

The egg and pupal stages of butterflies do not feed.

HOME RANGE/TERRITORY:

Strictly speaking, this butterfly is not territorial, although a few features of its behavior might be loosely interpreted as territorial. The home range of both sexes is no more than a few acres in size. Results of capture-recapture studies indicate that the home range varies from 1 to about 20 acres in size (05). Both male and female adults are solitary perchers, i.e., they perch on vegetation that offers them a good vantage point for locating mates. Typical adult perches are leaves and flowers of *Eriogonum nudum* var. *auriculatum*, *Lupinus albifrons*, *Lotus scoparius*, dead vegetation, and various inanimate objects (05).

PERIODICITY:

The adult flight season is generally in late summer, from mid-August to mid-September (05). Most daily activities, nectaring, perching, dispersal, mate-location, oviposition, etc., occur during the daytime, particularly between 1100-1800 Pacific Daylight Time (05). Some matings may extend into crepuscular hours (05). Adults perch and are inactive at night. Larvae are thought to feed during the evening and into the night (05).

MIGRATION PATTERNS:

Lange's metalmark is non-migratory. Capture-recapture studies suggest that most individual movements are short, 100-250 feet, although a few individuals have been observed to move as far as 2,000 feet during their lifetime (05,06,07).

COVER/SHELTER REQUIREMENTS:

The primary requirement for this butterfly is the presence of *Eriogonum nudum* var. *auriculatum*. Mature plants provide more leaves and flowers for the metalmark's larvae and adults to forage on and can support more individuals than younger plants (05).

REPRODUCTIVE SITE REQUIREMENTS:

Mate location usually occurs on or near the buckwheat (05). If both sexes are receptive to mating, the adults often will fly around

Life History - 1

(DRAFT) - Life History
Species BUTTERFLY, LANGE'S METALMARK
Species Id ESIS501008
Date 13 MAR 96

for a few minutes touching their wings and briefly landing on the ground or vegetation with rapid wing fluttering and contact (05). Presumably a pheromone is released from the wings during this time. Copulation often occurs on *Lotus scoparius*, but has occasionally been observed on other plants (06,07). Eggs are laid on withered leaves and stems of the buckwheat (05).

REPRODUCTIVE CHARACTERISTICS:

Adult metalmarks are sexually mature when they emerge from their pupa in August and September. They produce one generation per year. Adults may mate once their wings have expanded and hardened, often within a few hours after emergence. Metalmarks may mate several times during their adult lifespan, which can be as long as two weeks (05). Females lay eggs throughout their adult lifespan (05). Mating may last 3-4 hours, but there is no mate pair bonding formed (05).

PARENTAL CARE:

None.

POPULATION BIOLOGY:

Primary limiting factors are the small amount of available habitat and decreasing food supply, i.e., buckwheat (05,06,07). Capture-recapture studies since 1977 at both remaining metalmark sites indicate that population numbers have declined about 80% during this 8-year period (06,07). Loss and alteration of habitat, factors that reduce the buckwheat biomass, are believed to be responsible for the dramatic decline in butterfly numbers.

Recovery potential of the metalmark is dependent upon a substantially increased biomass of its foodplant (05,06,07). Since population sizes at both remaining sites have been below 500 adults per generation for the past several years, it is possible the deleterious genetic factors, such as drift, loss of heterozygosity, etc., may also be factors that could limit the metalmark's recovery (05,06,07).

SPECIES INTERRELATIONSHIPS:

An insect and host plant relationship exists with the sole larval foodplant, *Eriogonum nudum* var. *auriculatum*, commonly known as buckwheat.

OTHER LIFE HISTORY DESCRIPTORS:

None.

Life History - 2

MANAGEMENT PRACTICES

RESULT	MANAGEMENT PRACTICE
Beneficial	Suppressing wildfire
Beneficial	Controlling/Restricting Off-Road Vehicles
Beneficial	Restricting/regulating human disturbance of populations
Beneficial	Controlling/Restricting Mining
Beneficial	Maintaining undisturbed/undeveloped areas
Beneficial	Land Acquisition
Beneficial	Reforestation
Beneficial	Controlling/Removing Nonnative Vegetation
Beneficial	Stocking captive-reared wild-strain animals
Beneficial	Transplanting wild animals
Adverse	Poaching
Existing	Poaching
Adverse	Off Road Vehicles
Existing	Off Road Vehicles
Adverse	Low Gene Pool
Existing	Low Gene Pool
Adverse	Surface Mines
Existing	Surface Mines
Adverse	Rural Residential/Industrial Areas
Existing	Rural Residential/Industrial Areas
Adverse	Transmission Lines/Towers
Existing	Transmission Lines/Towers
Adverse	Soil compaction by heavy equipment in mine areas
Existing	Soil compaction by heavy equipment in mine areas
Adverse	Exotic/Feral/Introduced Species
Existing	Exotic/Feral/Introduced 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 -

Since the turn of the century loss and alteration of habitat at the Antioch Dunes has occurred primarily by agriculture (grazing

and viticulture), sand-mining, industrialization, and urbanization (04,05). More recently, annual discing for fire-control has destroyed the metalmark's larval foodplant, *Eriogonum nudum* var. *auriculatum*, commonly known as buckwheat. Off-road vehicles were a serious problem, especially for about one year after acquisition of a portion of the dunes by the U.S. Fish and Wildlife Service. The growth of weeds, annual grasses, ice plant, and non-native trees continues to out compete native dune plants, like the buckwheat (05). Management

Management Practices - 1

(DRAFT) - Management Practices
Species BUTTERFLY, LANGE'S METALMARK
Species Id ESIS501008
Date 13 MAR 96

efforts to control and eradicate these unwanted plants have had only limited success. Since 1976, incendiary fires have annually burned a significant amount of the remaining habitat (05,06,07).

Pacific Gas & Electric Co. maintains transmission lines on two parcels that it owns. Routine maintenance procedures generally cause little damage to the habitat, but downed power lines and their repair have caused several fires and trampling of the native vegetation by heavy equipment (06,07). Poaching by butterfly collectors has been a minor problem (07).

Weeds will continue to be the major threat to the Lange's metalmark in the immediate future, since they are at least partially responsible for the declining numbers of buckwheat plants (05,06,07). Fires will also continue to be a problem as long as the general public is allowed access to the refuge property. Poaching may continue to be a minor problem.

Annual census estimates since 1977 indicate that population numbers at both remaining colonies, the Stamm and Little Corral, have dropped to below 500 individuals per annual generation (05,06,07). Natural exchange of adult metalmarks between both colonies at the Antioch Dunes is rare or non-existent (05,06,07). Thus, both colonies are susceptible to loss of genetic variation due to the reduced gene pool (05,06,07).

APPROVED PLAN:

U.S. Fish and Wildlife Service. 1984. Revised Recovery Plan for Three Endangered Species Endemic to the Antioch Dunes, California (Lange's Metalmark Butterfly, Contra Costa Wallflower, and Antioch Dunes Evening Primrose). U.S. Fish and Wildlife Service, Portland, OR. 66 pp.

The Recovery Plan for the Lange's metalmark butterfly recommends:

- 1) Acquisition of more key habitats.
- 2) Continued restoration of habitats (which may include removal of exotic vegetation).
- 3) Maintenance of habitats including restricting development and mining.
- 4) Control or management of public use (e.g., restricting excessive foot travel, off-road vehicle use, and campfires).
- 5) Measures to control or manage fuelbreaks and other fire prevention activities.
- 6) A limited program of captive breeding (and possibly transplanting individuals) and planting of larvae food plants, if necessary.

Further losses of habitat at Antioch Dunes (e.g. to development, mining, etc.) must be prevented. Habitat has been protected through acquisition of key lands into the Fish and Wildlife Service's National Wildlife Refuge system. The Antioch Dune ecosystem is being restored to improve habitat and increase populations of the Lange's metalmark

butterfly.

Management Practices - 2

References

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

- 01 Howe, W.H. 1975. The butterflies of North America. Doubleday
& Co., Inc., Garden City, NY. 633 pp.
- 02 Miller, L.D. and F.M. Brown. 1981. A catalogue/checklist of
the butterflies of America north of Mexico. Lep. Soc. Memoir #2.
280 pp.
- 03 Comstock, J.A. 1938. A new Apodemia from California. Bull.
So. Calif. Acad. Sci. 37:129-131.
- 04 Howard, A.Q. and R.A. Arnold. 1980. The Antioch Dunes -- Safe
at last? Fremontia 8(3):3-12.
- 05 Arnold, R.A. and J.A. Powell. 1983. Apodemia mormo langei.
Chapter 6. IN: Ecological studies of six endangered
butterflies (Lepidoptera, Lycaenidae): Island biogeography, patch
dynamics, and the design of habitat preserves. R.A. Arnold. Univ.
Calif. Publ. Entomol. 99:1-161.
- 06 Arnold, R.A. 1984. Unpublished report. Monitoring of the
endangered Lange's metalmark butterfly in 1983 at the Antioch
Dunes. Annual Rept. to San Francisco Bay NWR.
- 07 Arnold, R.A. 1985. Unpublished report. Ecological studies of
the endangered Lange's metalmark butterfly at the Antioch Dunes.
Annual Rept. to San Francisco Bay NWR.
- 08 Powell, J.A. and R.A. Arnold. 1977. Status of certain insect
and plant survivors of the Antioch sand dunes. Unpublished report
on file at: Office of Endangered Species, Washington, D.C. 3 pp.

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

- 01 Howard, A.Q. and R.A. Arnold. 1980. The Antioch Dunes -- Safe
at last? Fremontia 8(3):3-12.

02 Arnold, R.A. and J.A. Powell. 1983. *Apodemia mormo langei*.
Chapter 6. IN: Ecological studies of six endangered
butterflies
(Lepidoptera, Lycaenidae): Island biogeography, patch
dynamics,
and the design of habitat preserves. R.A. Arnold. Univ.
Calif.
Publ. Entomol. 99:1-161.

References - 1

