Lotis Blue Butterfly
(*Lycaeides argyrognomon lotis*)

5-Year Review:
Summary and Evaluation

U.S. Fish and Wildlife Service
Arcata Fish and Wildlife Office
Arcata, California

December 2007

5-YEAR REVIEW
Lotis Blue Butterfly (*Lycaeides argyrognomon lotis*)

1. GENERAL INFORMATION

1.1. Reviewers

Lead Region – Region 8, California and Nevada; Diane Elam, (916) 414-6464

Lead Field Office – Arcata Fish and Wildlife Office; Jim Watkins, (707) 822-7201

1.2. Methodology used to complete the review:

This review was conducted by Jim Watkins, Fish and Wildlife Biologist, with the Arcata Field Office of the U.S. Fish and Wildlife Service (Service), based on all information contained in files at that office. No information was provided by the public in response to the Federal Register Notice.

1.3. Background:

1.3.1. FR Notice citation announcing initiation of this review:

The FR notice initiating this review was published on March 22, 2006 (71 FR 14538). This notice opened a 60-day request for information period, which closed on May 22, 2006. A second FR notice was published on April 3, 2006 (71 FR 16584), which corrected an error in a mailing address provided in the March notice.

1.3.2. Listing history

Original Listing
FR notice: 41 FR 22041
Date listed: June 1, 1976
Entity listed: Subspecies – Lotis Blue Butterfly (*Lycaeides argyrognomon lotis*)
Classification: Endangered

1.3.3. Associated rulemakings

No associated rulemakings have been completed for this species.

1.3.4. Review History

No status reviews have been conducted since the listing in 1976.

1.3.5. Species' Recovery Priority Number at start of 5-year review

The recovery priority number for lotis blue butterfly is 6C (based on a 1-18 ranking system where 1 is the highest-ranked recovery priority and 1 is the lowest). The priority is based on the lotis blue being a subspecies (rather than a full species) with a high degree of threat, low recovery potential, and existing conflict between the species' conservation and development (utilities, residential, and agricultural).

1.3.6. Recovery Plan or Outline

Recovery Plan for Lotis Blue Butterfly (*Lycaeides argyrognomon lotis*), December 26, 1985

2. REVIEW ANALYSIS

2.1. Application of the 1996 Distinct Population Segment (DPS) policy

2.1.1. Is the species under review a vertebrate?

No. The Endangered Species Act (Act) defines species as including any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate wildlife. This definition limits listings as distinct population segments (DPS) only to vertebrate species of fish and wildlife. Because the species under review is a butterfly and the DPS policy is not applicable, the application of the DPS policy to the species listing is not addressed further in this review.

2.2. Recovery Criteria

2.2.1. Does the species have a final, approved recovery plan containing objective, measurable criteria?

The Recovery Plan was finalized and approved December 26, 1985. The Recovery Plan does not contain downlisting and delisting criteria. Its recovery strategy was designed to address habitat loss and modification. The plan also recommends improving landowner and public awareness, thereby potentially reducing overutilization related to commercial, recreational, scientific, and educational purposes.

Landowners, and public utility companies, have been made aware of the lotis blue's last known site and endangered status. The lotis blue has not been observed since 1983 (Pratt 2004, Arnold. 1991). The Pacific Gas and Electric Company monitored the last known site relative to their adjacent powerline maintenance (Arnold 1991). The Arcata Fish and Wildlife Office contracted multiple-year surveys within the suspected range of the subspecies (Pratt. 2004). However, neither Arnold or Pratt observed lotis blue butterflies or larvae (Arnold. 1991, Pratt. 2004). Landowners adjacent to the last known site have been contacted relative to projects on their land that could potentially affect lotis blue habitat, and for the purpose of surveying their property for butterflies and habitat assessment. The Mendocino County planning department has also been contacted by the Arcata FWO and made aware of the lotis blue's last known location, and their review and permitting of projects within potential lotis blue habitat.

The recovery strategy in the plan is:

a. Preserve and protect the known lotis blue butterfly populations and any newly discovered and/or reestablished sites.
b. Establish three new, self-sustaining, viable populations each on at least 2 hectares of suitable, secure habitat.
c. Conduct ecological studies to develop additional management recommendations and to determine criteria for reclassification and delisting.
d. Develop public awareness of the lotis blue butterfly.
e. Utilize existing laws and regulations protecting the lotis blue butterfly.

2.3. Updated Information and Current Species Status

2.3.1. Biology and Habitat

Taxonomy – The species *Lycaeides argyrognomon* (Lintner 1876), which includes the lotis blue butterfly and 12 other subspecies or forms, is also referred to *Lycaeides idas*, or *Plebejus argyrognomon*, and as the northern blue butterfly (dos Passos 1964, Downey 1975). The northern blue butterfly occurs across northern North America. The lotis blue occurs at the southwestern edge of the northern blue butterfly's range.

Biology – The life history of the lotis blue butterfly, like so much about this butterfly, is based on the known life history of closely related subspecies of the northern blue butterfly. The lotis blue probably has a single generation per year, with a relatively long adult flight period, extending from mid-April to early July (Downey 1975). Eggs are likely laid during the adult flight season. Newly hatched larvae begin to feed immediately, then overwinter in dormancy (diapause) as small larvae, then resume feeding the next spring. The larvae (caterpillars) probably feed for about 4-6 weeks in the spring before pupating (Downey 1975). Lotis blue larvae have apparently not been observed; therefore we do not know what plants the larvae require for food. Based on closely related species, native plants in the pea family (Fabaceae) are likely candidates. The coast trefoil (also known as seaside bird's-foot trefoil) (*Lotus formosissimus*) is thought to be a larval food plant (Pratt 2004). The coast trefoil is a small perennial plant that generally occurs in damp areas in meadows, roadside ditches, and forest edges and clearings. This plant grew at the last known lotis blue site, and there is a report of a lotis blue butterfly showing egg-laying behavior on coast trefoil, although no eggs were observed. Other possible food plants include herbaceous species of lupine (Pratt 2004).

Distribution and Abundance – Historically, the lotis blue butterfly was found at several coastal locations in California, primarily in Mendocino County, but also in northern Sonoma County, and possibly northern Marin County (Tilden 1965). Unfortunately, location information for most of the historical lotis blue butterfly sites is vague, and is based on specimens collected prior to the 1950s. The one exception is a population discovered in 1935, north of the town of Mendocino. Over the years, this site was visited by many lepidopterists and was the only certain location for the species from the 1950s until the last confirmed observation in 1983 (Pratt 2004, Arnold 1991). The subspecies has not been observed since 1983 (Pratt 2004, Arnold 1991, Arnold 2006).

Habitat – The lotis blue butterfly likely inhabits wet meadows and sphagnum willow bogs. As noted above, the suspected food plant for larvae is the coast trefoil, which is relatively common along the Mendocino coast in damp coastal prairie. Although the last known location of the lotis blue butterfly was a sphagnum bog within pygmy forest, the coast trefoil is not normally found in bogs within the historical range of the lotis blue butterfly (Pratt 2004). The importance of bogs to lotis blue butterflies is unclear. The last known site for the species was located in a sphagnum bog surrounded by pygmy forest dominated by Bishop pine (*Pinus muricata*) with an understory of species in the heath family. This suggests that such bogs may be lotis blue habitat; although other habitat types may exist that are not bogs. A recent extensive survey for lotis blue butterflies found that pygmy forest bogs did not provide many potential larval food plants, and suggested that bogs may not be typical habitat for the lotis blue (Pratt 2004). Also, a powerline corridor ran through the last known lotis blue site, thus it may not have been a typical, natural bog. Without knowing the larval food plant with certainty, the specific habitat characteristics for the species will remain something of a mystery (Pratt 2004, Arnold 1991).

2.3.2. Five-Factor Analysis (threats, conservation measures, and regulatory mechanisms)

2.3.2.1. Present or threatened destruction, modification or curtailment of its habitat or range:

When the lotis blue butterfly was listed in 1976 (41 FR 22041), the only threat identified was loss of habitat through destruction or modification. Habitat modification remains a threat, although the habitat requirements are not well known given our limited knowledge of the lotis blue. The butterfly may have been naturally rare, and may have further declined due to natural factors such as a drying climate trend, or vegetation community changes over long time periods (Pratt 2004). Changes in land use and management in historical times have contributed to vegetation changes within the historical range of the subspecies, and may have affected the subspecies. Suppression of fires and other changes that reduced natural disturbance regimes are suspected to have led to the transition of more open habitats, such as meadows, forest openings, and coastal prairie, to areas dominated by forest and other taller, denser vegetation (Pratt 2004, de Becker, et al. 1991). Development for housing and associated road-building has increased in recent decades, leading to loss and degradation of native habitats, and fragmentation of remaining habitat areas. Because the butterfly may be associated with bogs and other wetland habitats, actions which affect groundwater may also affect the habitat for the subspecies. Global warming may affect butterfly distribution; however, in the case of the lotis blue, very little information regarding the butterfly's historical range and current habitat exists, making an analysis difficult (Arnold 2002).

2.3.2.2. Overutilization for commercial, recreational, scientific, or educational purposes:

Butterfly collection continues to be a concern, as it was when the species was listed. There are accounts of collection (Arnold 1991, de Becker et al. 1991). We believe that the lotis blue is particularly vulnerable to the collection trade because of its endangered status, limited distribution, and presumed small population size. Although overutilization for commercial, recreational, scientific, or education purposes was identified as a threat at the time of listing or during development of the Recovery Plan (41 FR 22041, U.S. Fish and Wildlife Service 1985), the lotis blue has not been observed since 1983 (Pratt 2004, Arnold 1991). Consequently, any specimens taken from the field that do not directly contribute towards conservation (e.g., propagation) would only likely contribute towards the decline of the subspecies.

2.3.2.3. Disease or predation:

We do not know what effect, if any, disease and predation may have on the lotis blue butterfly's range-wide population, or on isolated metapopulations. Birds and other predators likely consume individual butterflies on an opportunistic basis; however, because lotis blue butterfly populations appear to be low, it is difficult to determine if predation is limiting the range-wide population or site-specific metapopulations. Disease or predation was not identified as a threat in the listing or Recovery Plan (41 FR 22041, U.S. Fish and Wildlife Service 1985).

2.3.2.4. Inadequacy of existing regulatory mechanisms:

There has been no change in the imminence of this threat factor since listing. The inadequacy of existing regulatory mechanisms was not identified as a threat during listing or during development of the Recovery Plan (41 FR 22041, U.S. Fish and Wildlife Service 1985).

The California Environmental Quality Act (CEQA) (chapter 2, section 21050 *et seq.* of the California Public Resources Code) affords limited protection for the subspecies under state law, due to its status as a federally endangered species. The California Coastal Act of 1976 (Division 20, section 30000 *et seq*.) applies when habitat is located in the coastal zone. Projects within the coastal zone are reviewed by either the California Coastal Commission, or local government by virtue of their Local Coastal Plan, when a project occurs within their jurisdiction. Commission review for compliance with approved Coastal Plans ensures that protective provisions of the Coastal Zone Management Act are considered when impacts to coastal resources, such as the butterfly, may be affected by proposed projects. However, the Coastal Zone Management and the California Coastal Acts do not address the injury or death of butterflies, and only reduce loss or degradation of habitat. These Acts do not necessarily prevent a net loss of habitat or loss of individual butterflies.

Federal projects are subject to the National Environmental Policy Act. Butterflies and habitat on non-federal lands are subject to provisions of the California Environmental Quality Act (state law). Neither of these laws requires that mitigation for impacts to endangered species habitat be implemented, only that impacts and mitigation alternatives be considered and disclosed for public review.

2.3.2.5. Other natural or manmade factors affecting its continued existence:

There are no other known factors that affect the continued existence of the butterfly. Although this factor was not identified as a threat in the listing or during development of the Recovery Plan (41 FR 22041, U.S. Fish and Wildlife Service 1985), the potential for climate change to affect the lotis blue's distribution exists (Arnold 2002). Very little information regarding the butterfly's historical range and current habitat exists, making an analysis difficult (Arnold 2002). The mild, coastal climate where the lotis blue is known, may somewhat buffer the effects of climate change. None-the-less, climate change may affect vegetation growth and flowering periods, and cause important habitat features to shift northward as temperatures increase (Arnold 2002).

2.4. Synthesis

We know that habitat management at the last known site for the lotis blue butterfly has changed under PG&E's management since listing, partly at the request and guidance of the Service (Arnold 1991, de Becker et al. 1991). Subsequent surveys have not detected the lotis blue's presence at the PG& E site (Arnold 1991, Arnold 2006, Pratt 2004). Pratt (2004) conducted extensive surveys for lotis blue under contract from the Arcata Fish and Wildlife Office; however, no butterflies, eggs, or larvae were detected. In 1996, Arnold surveyed the lotis blue's last known remaining site under contract with PG&E, and looked for lotis blue where appropriate habitat overlapped with the Behrens' silverspot butterfly (Arnold 2006). Again, no lotis blue butterflies, eggs, or larvae were detected. This survey was limited to mostly State-owned lands where permission to access site was easily obtained. Most sites on private property where suitable habitat might be found were not surveyed (Pratt 2004, Arnold 2006). Since the existence of this subspecies is in question, access is needed to all suitable, and potentially suitable habitat to adequately assess the status of the lotis blue butterfly.

Based on the available information, we conclude that the lotis blue butterfly continues to meet the Act's definition of endangered; therefore, no status change is recommended at this time.

3. RESULTS

3.1. Recommended Classification

____ Downlist to Threatened

____ Uplist to Endangered

____ Delist (Indicate reasons for delisting per 50 CFR 424.11):

____ Extinction

____ Recovery

____ Original data for classification in error

_X__ No change is needed

3.2. New Recovery Priority Number: 6C (no change)

4.0 RECOMMENDATIONS FOR FUTURE ACTIONS

Recovery criteria for the lotis blue butterfly (*Lycaeides argyrognomon lotis*) contain generalized goals with respect to habitat conservation and needed research. Additional surveys need to be conducted to assess the status on private lands, and if appropriate to initiate conservation planning and implement recovery actions.

If populations are located, monitoring is needed to determine the size of the range-wide population, and site-specific metapopulations and threats. Planning should stress management actions that increase or sustain butterfly populations, and remove threats that may limit population expansion or recovery.

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U.S. FISH AND WILDLIFE SERVICE
5-YEAR REVIEW of Lotis Blue Butterfly (*Lycaeides argyrognomon lotis*)

Current Classification: Endangered

Recommendation resulting from the 5-Year Review:

____ Downlist to Threatened

____ Uplist to Endangered

____ Delist

__X__ No change needed

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FIELD OFFICE APPROVAL:
Lead Field Supervisor, Fish and Wildlife Service

Approved Acting Paul A. Henson Date 1/2/08

REGIONAL OFFICE APPROVAL:
Lead Regional Director, Fish and Wildlife Service

Approved Paul Henson Date 1/10/08