

Lotus dendroideus var. *traskiae*
(San Clemente Island lotus)

**5-Year Review:
Summary and Evaluation**

**U. S. Fish and Wildlife Service
Carlsbad Fish and Wildlife Office
Carlsbad, California**

September 2007

5-YEAR REVIEW

Species reviewed: *Lotus dendroideus* var. *traskiae* (San Clemente Island lotus)

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5-YEAR REVIEW
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I. GENERAL INFORMATION

I.A. Methodology used to complete the review: This review was compiled by Christine Beck of the Carlsbad Fish and Wildlife Office (CFWO) and considered office files, available literature, new survey information, and interviews of individuals involved with surveying, research, and management of this species.

I.B. Reviewers

Lead Region: Diane Elam and Mary Grim, California/Nevada Operations Office, 916-414-6464.

Lead Field Office: Karen Goebel and Christine Beck, Carlsbad Fish and Wildlife Office, 760-431-9440.

I.C. Background

I.C.1. FR Notice citation announcing initiation of this review: On July 7, 2005, the U.S. Fish and Wildlife Service announced initiation of the 5-year review and asked for information from the public regarding the status of *Lotus dendroideus* var. *traskiae* (70 FR 39327). A second notice announcing the 5-year review and extending the request for information until January 3, 2006, was published on November 3, 2005 (70 FR 66842). No information was received.

I.C.2. Species status: In the 2005 Recovery Data Call for the Carlsbad Fish and Wildlife Office, the status of *Lotus dendroideus* var. *traskiae* was described as “Improving.”

I.C.3. Recovery achieved: In the 2005 Recovery Data Call for the Carlsbad Fish and Wildlife Office, 26-50 percent of the overall progress towards the recovery goals had been made.

I.C.4. Listing history

Original Listing

FR notice: 42 FR 40682

Date listed: The final rule was published on August 11, 1977, and became effective September 12, 1977.

Entity listed: Subspecies, *Lotus scoparius* (Nutt.) Ottley ssp. *traskiae* (Abrams) Raven, a flowering plant.

Classification: Endangered.

I.C.5. Associated rulemakings: None.

I.C.6. Review History: No status reviews have been completed since the time of listing.

I.C.7. Species' Recovery Priority Number at start of review: In the 2005 Recovery Data Call for the Carlsbad Fish and Wildlife Office, *Lotus dendroideus* var. *traskiae* was assigned a recovery priority of "9," indicating that the species faces a moderate degree of threat but also has a high potential for recovery.

I.C.8. Recovery Plan or Outline:

Name of plan: Recovery Plan for the Endangered and Threatened Species of the California Channel Islands

Date issued: January 26, 1984

Dates of previous revisions: No previous plans exist.

II. REVIEW ANALYSIS

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

II.A.1. Is the species under review listed as a DPS? No. The Endangered Species 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 listing as DPS to only vertebrate species of fish and wildlife. Because the species under review is a plant and the DPS policy is not applicable, the application of the DPS policy to the species listing is not addressed further in this review.

II.B. Recovery Criteria

II.B.1. Does the species have a final, approved recovery plan containing objective, measurable criteria? No. Although there is a recovery plan that identifies general goals and objectives towards attaining recovery, one of the objectives of the plan (No. 4, pp. 111-112) is to develop specific criteria for reclassifying or delisting the species (*e.g.*, the size of populations and/or amount of suitable habitat needed).

II.C. Updated Information and Current Species Status

II.C.1. Biology and Habitat

Lotus dendroideus var. *traskiae* was one of the first plant species to be listed pursuant to the Endangered Species Act. Many of the early plant listings were made on the basis of the species' inclusion in a report to Congress on January 9, 1975, by the Secretary of the Smithsonian Institution (House Document No. 94-51 of the 94th Congress, 1st Session). That report was primarily comprised of a list of over 3,100 U.S. vascular plant taxa that the scientists who compiled it considered to be endangered, threatened, or possibly extinct. The Smithsonian report and the proposed rule to list *Lotus dendroideus* var. *traskiae* (41 FR 24523,

42 FR 40682), however, did not include specific information regarding the ecology, demographics, or natural history of the species.

Lotus dendroideus var. *traskiae* is a semi-woody, short-lived (less than 5 years), subshrub in the legume family (Fabaceae). It is endemic to San Clemente Island (Isely 1993) and is one of five representatives of the genus *Lotus* found on the island (U. S. Department of the Navy, Southwest Division 2002). *Lotus dendroideus* var. *traskiae* is typically less than 4 feet in height with slender, erect green branches (Munz 1974). Its leaves have 3 to 5 leaflets, each approximately ¼ inch long. *Lotus dendroideus* var. *traskiae* has relatively small, yellow, bisexual flowers that radiate in 1 to 5 flowered groupings from flower stalks that arise from the leaf axils (between the stem and leaf) of terminal shoots (Junak and Wilken 1998). Pistils (female reproductive structures of the flower including an ovary and pollen receiving structure) are initially yellow but with age, turn orange then red (U. S. Fish and Wildlife Service 1984). Flowers are present from March through May, and in several locations, halictid bees, bumblebees, and small beetles have been observed foraging on the flowers (Allan 1999; Junak and Wilken 1998). This variety differs from other varieties of *Lotus dendroideus* in having greatly elongated fruits (Allan 1999). The fruits do not split open to release their seeds at maturity (Isely 1993).

Lotus dendroideus var. *traskiae* has been known to hybridize with the more common, native island lotus, *Lotus argophyllus* var. *adsurgens*, but only in disturbed areas in Wilson Cove (Liston *et al.* 1990; Allan 1999). No documented evidence of hybridization has been recorded in either disturbed or undisturbed areas on other portions of the island.

A study by Junak and Wilken (1998) found that, on average, a single *Lotus dendroideus* var. *traskiae* individual can produce approximately 36 to 64 flowering shoots, 118 to 144 flowers per shoot, and 4 to 6 seeds per fruit. These data suggest that under ideal conditions, an individual *Lotus dendroideus* var. *traskiae* can produce a high volume of seeds (16,000 or more). Because individual plants have a life span of less than 5 years, it is suspected that populations persist through periodic recruitment from the soil seed bank (M. Wall pers. com. 2006).

Like most legumes, *Lotus dendroideus* var. *traskiae* seeds require some sort of scarification or gradual seed coat degradation for germination to take place (M. Wall pers. comm. 2006). Although germination is enhanced by hot water to soften the seed coat, this may not be true for dry heat (*e.g.*, fire). In fact, experiments conducted on other species at the Rancho Santa Ana Botanical Gardens indicate that heat above 200 degrees F can be detrimental to seeds (M. Wall pers. comm. 2006).

Distribution

The original range and distribution of *Lotus dendroideus* var. *traskiae* on San Clemente Island are speculative because its decline began before thorough botanical studies of the island were completed. Published reports also provide conflicting information on this topic. For example, the California Channel Islands Species Recovery Plan states that “essential habitat for this taxon includes most of the island” because it can grow in a wide variety of soils, elevations, and aspects (U. S. Fish and Wildlife Service 1984). The San Clemente Island Integrated Natural Resources Management Plan (INRMP), however, states that *Lotus dendroideus* var. *traskiae* was described as rare in early accounts, even before sheep ranching or browsing by goats was at its peak (U. S. Department of the Navy, Southwest Division 2002).

Since the 1970s, the distribution of *Lotus dendroideus* var. *traskiae* has been documented, and its range includes north-facing slopes over most of the eastern and western sides of the island (U. S. Fish and Wildlife Service 1984; U. S. Department of the Navy, Southwest Division 2002; Junak and Wilken 1998; Junak 2006). Occurrence data (as defined by the reporters, not equivalent to CNDDDB occurrences) for this species also spans the entire length of the island, with several occurrences documented in Wilson Cove, and one occurrence documented at the southern tip of the island east of Pyramid Cove; a distance of approximately 19 miles (Junak and Wilken 1998; Junak 2006). The majority of the remaining occurrences tend to be clustered on north-facing slopes on the eastern side of the island. Its distribution overlaps the boundary of the shore bombardment area (SHOBA) at the southern end of the island; with 20 of its occurrences falling within and 85 of its occurrences falling outside of SHOBA (Junak and Wilken 1998; Junak 2006).

Abundance

The earliest published information regarding population size for *Lotus dendroideus* var. *traskiae* can be found in the San Clemente INRMP, which states that 9 occurrences and 1,340 individuals were present on the island in 1980 (U. S. Department of the Navy, Southwest Division 2002). The source of these data is unknown, and a distribution map is not provided. According to the California Channel Island Recovery Plan (U.S. Fish and Wildlife Service 1984), by 1984 only six populations of *Lotus dendroideus* var. *traskiae* were known, and each was generally associated with rocky areas. The largest numbers of individuals were growing in the vicinity of Wilson Cove, which is located on the northwest side of the island. No specific abundance estimates were given.

Later surveys conducted in 1996 and 1997 documented a total of 64 occurrences of *Lotus dendroideus* var. *traskiae*, collectively comprising more than 3,000 individuals (Junak and Wilken 1998). Approximately 50 percent (1,492 of 3,064) of these individuals were found in Wilson Cove. Island-wide occurrences ranged from isolated plants to populations of 5 to 750 individuals. Individuals were found primarily on north-facing slopes, ridges (Junak 1996), or among large

boulders situated in grassland areas (Allan 1999) between 25 and 1,400 feet elevation. Eighty-three percent (53 of 64) of these occurrences were scattered along the eastern side of the island where, due to prevailing winds and associated cloud cover and isolation, humidity is likely higher (U. S. Department of the Navy, Southwest Division 2002.). The remaining locations were clustered in the middle, western portion of the island.

More recent surveys for *Lotus dendroideus* var. *traskiae* were conducted in 2003 and 2004. Surveyors mapped an additional 40 locations and an additional 4,900 individuals (Junak 2006). Occurrences ranged from isolated plants to a single population with 2,300 individuals. At a majority of the sites, plants had either flowers or fruits, suggesting that this taxon has adequate resources for reproduction (Junak 2006). These new occurrences were mainly concentrated on north-facing slopes in the middle of the island, both on the eastern and western sides. These newer occurrences were often in proximity to individuals detected during the 1996 and 1997 surveys. For example, an additional 3 populations comprising 538 individuals were observed at Wilson Cove in July of 2004 in proximity to individuals found in 1996. As of 2004, approximately 25 percent (2,030 of 7,900) of the *Lotus dendroideus* var. *traskiae* individuals could be found at Wilson Cove.

When combined, the 1996/1997 surveys and the 2003/2004 surveys suggest that *Lotus dendroideus* var. *traskiae* can currently be found in over 100 locations and may number as high as 7,900 individuals. This is a significant increase from the original population estimates in 1980 of 9 occurrences and 1,340 individuals.

Habitat

Lotus dendroideus var. *traskiae* occurs on north-facing slopes, canyon bottoms, or ridgelines (Junak 2006). It grows somewhat colonially around rock outcrops in grassy areas or along the interface between grassland and maritime sage scrub (Allan 1999; U. S. Department of the Navy, Southwest Division 2002). It occurs below 1,300 feet elevation in well-drained soils, but where more soil moisture is available. Based on vegetation mapping for the San Clemente Island INRMP (U.S. Department of the Navy, Southwest Division 2002), *Lotus dendroideus* var. *traskiae* is associated with two habitats on the island: canyon woodland (696.2 acres) and maritime desert scrub along the northeast escarpment (6,228.2 acres). According to Junak and Wilken (1998), it is associated with numerous plant species; an abbreviated list includes *Artemisia californica*, *Avena fatua*, *Bromus* spp., *Calystegia macrostegia amplissima*, *Dichelostemma capitatum*, *Gnaphalium bicolor*, *Hemizonia clementina*, *Opuntia* spp., *Nassella pulchra*, and *Quercus tomentella*.

The current habitat conditions for *Lotus dendroideus* var. *traskiae* on San Clemente Island are the result of historic land use practices. From 1850 until 1934, San Clemente Island was used legally and illegally for sheep ranching, cattle ranching, goat grazing, and pig farming (U. S. Department of the Navy,

Southwest Division 2002). These non-native herbivores greatly changed the vegetative landscape of San Clemente Island and were cited in the final rule (42 FR 40863) for the listing of *Lotus dendroideus* var. *traskiae* as the main cause of this species' decline. Sheep were removed from the island in the 1930s, but feral goats and pigs were not completely eradicated until 1992. Since their removal, the vegetation on San Clemente Island has rebounded, and the health of many rare plant populations has improved (S. Junak pers. comm. 2006).

Overgrazing also led to the creation of bare trails, denuded areas, and severe erosion. Severe erosion has likely been exacerbated by periods of drought and fire, leading to stripping of vegetation and soil, similar to that observed on the other Channel Islands (Johnson 1980). As noted in the listing rule for two additional species found on San Clemente Island, San Clemente Island woodland star (*Lithophragma maximum*) and Santa Cruz Island rockcress (*Sibara filifolia*), the increase in erosion has caused the loss of topsoil, loss of soil organic matter, and the reduction of soil nutrient cycling, and water holding capacity (62 FR 42697). This may have led to the loss of the soil seed bank as well as the degradation and loss of suitable habitat. Erosion has been identified as a threat to both the canyon woodland and maritime desert scrub habitats where *Lotus dendroideus* var. *traskiae* is currently found (U. S. Department of the Navy, Southwest Division 2002). Because *Lotus dendroideus* var. *traskiae* is short-lived and likely relies on the soil seed bank for population persistence, erosion and soil compaction from feral grazers likely hindered the expansion and distribution of this species over much of the island.

Grazing animals also facilitate the spread of non-native plant taxa. A 1992 flora for San Clemente Island listed 380 species, 99 of which were non-native, 4 listed as endangered, and 2 believed to be extinct (Kellogg and Kellogg 1994). Although most of the invasive species likely came to the island while it was being ranched, invasions by previously undocumented non-native grasses continue to be found on San Clemente Island with the recent discoveries of *Schismus* sp. and *Brachypodium distachyon* (S. Junak pers. comm. 2006, J. Dunn pers. comm. 2006).

A brief review of the occurrence data collected in 1996 and 1997 reveals that *Lotus dendroideus* var. *traskiae* was associated with non-native annual grasses in 69 percent of its locations (45 of 65) (Junak and Wilken 1998). Associated species were not provided to us with the 2003 and 2004 data. As previously stated, *Lotus dendroideus* var. *traskiae* occurs in two habitat types on San Clemente Island, canyon woodland and maritime desert scrub/terrace complex. Percent cover data were collected in 1992 and 1993 for these two vegetation communities. Data (percent cover) for the 10 most abundant species were provided in the INRMP (U. S. Department of the Navy, Southwest Division 2002). For the canyon woodland habitat, 3 of the 10 most abundant species were non-native annual grasses (*Bromus diandrus*, *Avena barbata*, and *Bromus madritensis rubens*). Together these three species accounted for 46 percent of the

cover in the canyon woodland habitat. For the maritime desert scrub community, three of the four most abundant species were non-native annual grasses (*Vulpia myuros*, *Bromus madritensis rubens*, and *Avena barbata*), and they accounted for 39 percent of the vegetative cover.

The past and current fire regimes have also influenced the distribution of native and non-native flora on San Clemente Island. While the island was used for ranching, fires were set intermittently to increase the cover of forbs and grasses. After the island was purchased by the U. S. Department of the Navy in 1934, however, fire from military training activities became a more common occurrence throughout much of the island. Fire history for the island has been documented since 1979. Since that time over 50 percent of the island has experienced at least one wildfire and some areas have burned multiple times with very short intervals between fires (U. S. Department of the Navy, Southwest Division 2002). The majority of these fires have been caused by military training exercises that employ live ordnance in the SHOBA portion of the island (described in Section III.c.2.a). Due to the potential for unexploded live ordnance to occur within SHOBA, unless a fire threatens human life or facilities, it typically is allowed to burn itself out (U. S. Department of the Navy, Southwest Division 2002; E. Kellogg pers. comm. 2006). This contrasts with the northern portion of the island where wildfires are typically suppressed (E. Kellogg pers. comm. 2006).

Based on its growth characteristics, its population increase, and the fire-adaptedness of other plants in the genus, it is likely that *Lotus dendroideus* var. *traskiae* is resilient to, and may benefit from, occasional fire. Because it is short-lived and likely relies on its seed bank for recruitment, fire may benefit this species by opening up large areas of bare ground for seedling germination. This is suggested by its ready occupation of disturbed areas close to buildings, roads, and pipelines (U. S. Department of the Navy, Southwest Division 2002). However, fires that are spaced at close intervals, as is the pattern in much of SHOBA, could exceed its tolerance threshold and exhaust the seed bank in this portion of its range. Although only anecdotal in nature, it is notable that of 40 new occurrences documented during the 2003 and 2004 surveys only three were documented in SHOBA (Junak 2006).

In summary, current habitat conditions for *Lotus dendroideus* var. *traskiae* on San Clemente Island are the result of historic and current land use practices including ranching and military training activities. Although *Lotus dendroideus* var. *traskiae* populations have rebounded with the removal of feral grazers, its habitat remains degraded as a result of erosion, the invasion of non-native grass species, and possibly frequent and intense fires in the southern portion of its range.

Genetics

As part of his Ph.D. dissertation on the molecular studies of the Loteae tribe, Allan (1999) conducted enzyme electrophoresis analyses of 10 California mainland and Channel Island varieties of *Lotus*, including *Lotus dendroideus* var.

traskiae. A total of 150 *Lotus dendroideus* var. *traskiae* individuals were sampled with 30 plants taken from each of 5 populations in the Wilson Cove area. No other populations on the island were sampled.

The enzyme analyses revealed that *Lotus* island populations, regardless of species assignment, tended to have lower genetic variability than mainland populations. This observation is consistent with other mainland-island genetic studies reported in the literature. Allan (1999) states that several factors may account for the lower genetic variation observed in *Lotus dendroideus* var. *traskiae*, including small population size, genetic bottlenecks associated with the founding of new island populations, stochastic events, or isolation.

In terms of genetic diversity, Allan (1999) also found that *Lotus dendroideus* var. *traskiae* tends to have the majority (two-thirds) of its variability contained among populations. He postulated that the low genetic variability within a given population may be due to endemism, partial inbreeding, and stochastic events (e.g., local extinctions) in small populations, in accord with Wright's (1932) island model.

Allan's (1999) genetic studies revealed that populations of *Lotus dendroideus* var. *traskiae* were predominantly inbreeding and the taxon was exhibiting an autogamous (self-fertilization) breeding system. Allan (1999) wrote that halictid bees, bumblebees, and small beetles were the primary pollinators for this species and he postulated that differences in pollinator abundance and visitation might account for the high percentage of *Lotus dendroideus* var. *traskiae* populations that are exhibiting inbreeding. He states that differences in pollinator behavior have been postulated to account for differences in levels of inbreeding observed in Japanese mainland and island populations of *Campanula punctata*.

As stated previously, *Lotus dendroideus* var. *traskiae* has been known to hybridize with *Lotus argophyllus* var. *adsurgens* in disturbed areas in Wilson Cove (Allan 1999; Liston *et al.*, 1990). Plants of intermediate morphology were first observed by R. M. Beauchamp in 1986 (Liston *et al.* 1990). In April 1989, Liston and his fellow researchers returned to Wilson Cove and noted a small number of suspected hybrids sympatric with the largest known population of *Lotus dendroideus* var. *traskiae*. A smaller population of morphologically typical *Lotus argophyllus* var. *adsurgens* was found approximately 80 feet upwind, and the two taxa were separated by a road. Liston *et al.* (1990) employed the techniques of enzyme electrophoresis and restriction fragment analysis of nuclear ribosomal DNA to document the occurrence and extent of hybridization in these two adjacent *Lotus* populations. A total of 38 plants were sampled at Wilson Cove, representing most available individuals. Six plants were from a population of *Lotus argophyllus* var. *adsurgens*, and 32 plants were from an adjacent population of *Lotus dendroideus* var. *traskiae*. Visually, five of the plants were found to be morphologically intermediate between the two subspecies. Of these five plants, one had the restriction fragment profile of *Lotus argophyllus* var.

adsurgens; while the remaining four individuals combined the profiles of the two subspecies. This result confirms that some individuals of intermediate morphology are of hybrid origin. Liston *et al.* (1990) also sampled plants of both subspecies at Waynuk Canyon, approximately 15 miles south of Wilson Cove; however, no hybrids were discovered there.

No documented evidence of hybridization has been recorded in disturbed or undisturbed areas on the remainder of the island. All hybrid plants in the general vicinity of Wilson Cove appear to be of F₁ morphology (first generation). It is unknown, however, whether backcrosses between the hybrids and their parents have occurred (Allan 1999). Therefore, Allan (1999) confirmed that hybridization between *Lotus dendroideus* var. *traskiae* and the more common *Lotus argophyllus* var. *adsurgens* had occurred. However, hybridization between the two subspecies appears to be a somewhat rare event.

Taxonomy

We listed San Clemente Island lotus as *Lotus scoparius* (Nutt.) Ottley subsp. *traskiae* (Abrams) Raven. Since listing, Isely (1978) considered all of the San Clemente Island taxa to be separable from mainland *Lotus scoparius*. Isely (1978) elevated the insular taxa to species rank using the oldest name available (*Lotus dendroideus*) among the three subspecies. The currently recognized name, *Lotus dendroideus* var. *traskiae*, was published by Isely in 1978. This has been recognized in recent floristic (Isely 1993) and systematic treatments (Isely 1998).

II.C.2. Five-Factor Analysis (threats, conservation measures, and regulatory mechanisms)

III.C.2.a. Present or threatened destruction, modification or curtailment of its habitat or range: As stated above, non-native herbivores were cited in the final rule (42 FR 40863) for the listing of *Lotus dendroideus* var. *traskiae* as the main cause of the decline of this species. The final rule highlighted three principle threats associated with domestic and feral herbivores on the island: habitat alteration and destruction, facilitation of invasion by non-native plant species, and direct predation on plants by grazing animals. With the final removal of these herbivores in 1992, the vegetation on San Clemente Island has rebounded, and the status of many rare plant populations, including *Lotus dendroideus* var. *traskiae*, has improved (S. Junak pers. comm. 2006). Although the principle threat to the recovery of *Lotus dendroideus* var. *traskiae* appears to have been eliminated, erosion as a result of overgrazing and competition with non-native invasive plant species remain ongoing threats. Other threats that were not addressed in the final rule include alteration of San Clemente Island habitats by military training activities and increased fire frequencies from military training activities.

Erosion

Defoliation from overgrazing on San Clemente Island caused increased erosion over much of the island, especially on steep slopes where denuded soils can be quickly washed away during storm events. Erosion has been identified in the INRMP (U. S. Department of the Navy, Southwest Division 2002) as a threat to the canyon woodland habitat where *Lotus dendroideus* var. *traskiae* occurs. Although more vegetative cover is now present, erosion is still a threat to the recovery of *Lotus dendroideus* var. *traskiae*, especially in areas where it grows in proximity to roads. Except for the main artery, which is paved for 6 of its 20 miles, the island's roads are either unpaved or only partially paved. Because *Lotus dendroideus* var. *traskiae* often grows in proximity to roads, during storm events, run-off can cause scour of root systems and even complete uprooting of the plant. According to the INRMP, condition of the island's roads are "poor and non-maintainable" because of poor drainage during the rainy season. Currently, an evaluation of road erosion priorities is underway, and the results will be incorporated into subsequent INRMP updates.

Invasive Non-native Species

Another threat to the recovery of *Lotus dendroideus* var. *traskiae* is the spread of invasive non-native plants into its habitat. A large number of plant taxa have colonized San Clemente Island, and several annual grasses including *Avena barbata*, *Bromus* spp. and *Vulpia myuros*, cover large portions of San Clemente Island (U. S. Department of the Navy, Southwest Division 2002). These non-native grasses may compete with *Lotus dendroideus* var. *traskiae* for space or other resources such as light, water, and nutrients. Non-native plant species can also alter ecological processes such as nutrient cycling or the prevalence of fire (Brooks 1999) that otherwise could affect the persistence of this species. As stated above, non-native annual grasses were found associated with *Lotus dendroideus* var. *traskiae* in 69 percent of its locations in 1996 and 1997, and percent cover of these species was over 40 percent in *Lotus dendroideus* var. *traskiae* habitats.

Another non-native species, *Carpobrotus edulis* (ice-plant), also appears to be hindering the recovery of *Lotus dendroideus* var. *traskiae* (Allan 1999). This invasive species occupies large areas of Wilson Cove where it may be out-competing native species such as *Lotus dendroideus* var. *traskiae* for space, nutrients, and water (Allan 1999). Allan (1999) states that this encroachment contributes to habitat destruction, which may lead to the long-term establishment of hybrid swarms between *Lotus dendroideus* var. *traskiae* and the more common *Lotus adsurgens* var. *argenteus*.

Fire

An associated threat from the invasion of non-native annual grasses is the increased fuel load they provide for fire. Because annual grasses vary in density with rainfall, they have the potential to significantly alter the fuel load in wet years. They also provide a fuel that is easily ignitable due to the short time needed for fuel moisture to drop to low levels. For example, in the Mojave desert, an increase in fire frequency and intensity in this once sparsely vegetated biome has been attributed to the invasion and proliferation of non-native annual grasses (Brooks 1999; Brooks and Esque 2004). Non-native annual grasses can also extend the fire season by more than a month because they dry out sooner than the native herbaceous flora.

The relationship between fire and the ecology of *Lotus dendroideus* var. *traskiae* has not been studied. Although fire may aid the dispersal of *Lotus dendroideus* var. *traskiae* individuals (U. S. Department of the Navy, Southwest Division 2002), the most beneficial fire intervals and intensities are unknown. According to the species account provided in the INRMP, members of the genus *Lotus* “seed prolifically following fire” and “some regeneration after fire has been observed in this species” (U. S. Department of the Navy, Southwest Division 2002). Because this species is short-lived and relies on its seed bank for recruitment, fire may create openings in the vegetation where *Lotus dendroideus* var. *traskiae* seedlings can become established. However, in areas that burn on a more frequent basis the seed bank may become depleted if individuals burn before they produce seeds. Although an individual plant has the ability to produce vast amounts of seed (Junak and Wilken 1998), the seed bank must be replenished on a regular basis to ensure the continued survival of this species.

Land Use

San Clemente Island is owned by the U. S. Department of the Navy and with its associated offshore range complex is the primary maritime training area for the Navy Pacific Fleet and Navy Sea, Air and Land (SEALS). The island also supports training by the U. S. Marine Corps, the U. S. Air Force, and other military organizations. As the last range in the eastern Pacific Basin where many training operations are performed prior to troop deployments, portions of the island receive intensive use, especially the area known as the Shore Bombardment Area (SHOBA) (U. S. Department of the Navy, Southwest Division 2002).

SHOBA covers approximately the southern one-third of San Clemente Island and supports a variety of training operations involving both live and non-live munitions fire. These operations include: Naval Surface Fire Support (NSFS), which involves live fire from ships to the Impact Areas; Combined Arms exercises, which involve practicing coordination of all supporting arms of the Navy, Marine Corps, and Air Force such as NSFS, Artillery, Mortars, Fixed Wing

Aircraft and Helicopters; amphibious training of Marine Corps Artillery Units using live fire; close air support/strike using both live and inert munitions from fixed wing aircraft and helicopters; targeting precision guided munitions with lasers; explosive ordinance disposal; and naval Special Warfare operations. Certain munitions exercises involve the use of incendiary devices such as illumination rounds, white phosphorous and tracer rounds, which pose a high risk of fire ignition (U.S. Fish and Wildlife Service 2002).

Because of the elevated risk of fire associated with these training activities, live and non-live munitions fire is targeted towards two delineated Impact Areas within SHOBA where training disturbances and repeated fires are concentrated. Strip burning and fire retardant are used to maintain fuel breaks around these impact areas and to limit the spread of fires. Because of the dangers associated with unexploded ordinance, however, it is not safe to implement certain measures to combat fire in and around the Impact Areas, including the use of helicopters from any altitude to make water drops. Instead, fires are controlled by back-burning and holding the fire along a road, fuel break, or other fuel treated area (U.S. Department of the Navy, Southwest Division 2002). Much of the remainder of SHOBA serves a buffer function where there is less intensive use and fire suppression can be used to protect sensitive resources, such as *Lotus dendroideus* var. *traskiae*. As of 2004, 20 occurrences and approximately 300 *Lotus dendroideus* var. *traskiae* individuals were documented in this buffer zone (Junak 2006).

The Navy has adopted a set of fire management policies and practices to minimize the risk of fires spreading from the impact areas to adjoining habitat, including maintenance of fire breaks around impact areas; restrictions on the times and conditions when certain munitions can be used during the fire season; and the presence of a fire-fighting helicopter on-island during periods of military training within SHOBA (U.S. Fish and Wildlife Service 1997; U.S. Fish and Wildlife Service 2002). These factors help to minimize, but do not eliminate, the threat of fire and fire suppression activities on *Lotus dendroideus* var. *traskiae* individuals located in SHOBA.

The Navy proposes to change fire management policies and practices in the near future through adoption of a Fire Management Plan (FMP) that is in preparation. It is hoped that the FMP will provide greater flexibility regarding when various munitions can be used during the fire season (K. O'Connor pers. comm. 2006). The FMP will also likely modify the conditions when certain fire protection resources must be available and ready for use on the island (e.g., a dedicated fire helicopter) (U. S. Department of the Navy 2001; K. O'Connor pers. comm. 2006). These modifications to the fire management policies could alter the effectiveness of fire suppression measures to protect *Lotus dendroideus* var. *traskiae*.

II.C.2.b. Overutilization for commercial, recreational, scientific, or educational purposes: This factor was determined not to be applicable in the

final rule (42 FR 40682), although voucher herbarium specimens of *Lotus dendroideus* var. *traskiae* individuals and seeds have been collected for ecological research, genetic research, and conservation banking purposes. Because San Clemente Island is a military installation, public access to it is restricted by the Navy, thus limiting the potential for overutilization to threaten *Lotus dendroideus* var. *traskiae*.

II.C.2.c. Disease or predation: The grazing of feral goats and the rooting of feral pigs was considered a serious threat to *Lotus dendroideus* var. *traskiae* in the final rule (42 FR 40682). As stated above, however, these non-native mammalian predators/browsers were removed from San Clemente Island in 1992. Although fruit and seed predation by weevils was reported for the closely related *Lotus argophyllus* var. *adsurgens*, Junak and Wilken (1998) found no evidence of predation on *Lotus dendroideus* var. *traskiae* seeds, either by weevils or beetles. Currently, no other predators or diseases on San Clemente Island are known to pose a significant threat to *Lotus dendroideus* var. *traskiae*.

II.C.2.d. Inadequacy of existing regulatory mechanisms:

Federal Laws

This factor was determined not to be applicable in the final rule (42 FR 40682). At that time, the regulatory mechanisms with potential to protect *Lotus dendroideus* var. *traskiae* were the National Environmental Policy Act (NEPA) and the Endangered Species Act (ESA). NEPA requires Federal agencies to integrate environmental values into their decision making processes by considering the environmental impacts of their proposed actions and reasonable alternatives to those actions. The ESA requires all Federal agencies to insure that any action authorized, funded or carried out by such agency is not likely to jeopardize the continued existence of any endangered or threatened species. Additionally, section 9(a)(2)(B) of ESA prohibits the destruction, damage, or moving of an endangered plant that occurs on Federal property.

In 1977, concurrent with the listing of *Lotus dendroideus* var. *traskiae*, six species found on San Clemente Island were federally listed including San Clemente loggerhead shrike (*Lanius ludovicianus mearnsi*), San Clemente Island sage sparrow (*Amphispiza belli clementine*), island night lizard (*Klauberina riversiana*), San Clemente Island Indian paintbrush (*Castilleja grisea*), San Clemente Island larkspur (*Delphinium variegatum* ssp. *kinkiense*), and San Clemente Island bush mallow (*Malacothamnus clementinus*) (42 FR 40682). In 1997, two additional species found on San Clemente Island, San Clemente Island woodland star (*Lithophragma maximum*) and Santa Cruz Island rockcress (*Sibara filifolia*), were listed as endangered (62 FR 42692). If *Lotus dendroideus* var. *traskiae* were not listed, it could receive regulatory protection through the obligation of the Navy to consult with the U.S. Fish and Wildlife Service under section 7 of the ESA in those cases where it occurs in habitat occupied by these other listed species. Through the consultation process, the Service will work with

the Navy to identify measures that will avoid, minimize, and promote the conservation of listed species potentially impacted by any proposed project.

State Laws

In 1982, *Lotus dendroideus* var. *traskiae* was listed as endangered under the California Endangered Species Act (CESA); however, the State has regulatory authority on military installations in only rare circumstances. This would also apply to the California Environmental Quality Act (CEQA). CEQA review of a proposed project is only required of California public agencies, including local and regional agencies (Remy *et al.* 1996). Therefore, CEQA review is not required for Federal projects or projects on military lands unless the lead agency is a non-Federal agency (*e.g.*, a privately run ski resort built on Forest Service lands). Because *Lotus dendroideus* var. *traskiae* occurs only on San Clemente Island, which is entirely owned by the Federal Government, CEQA and CESA afford it little additional protection.

San Clemente Island INRMP

In 2002, pursuant to the Sikes Act Improvement Act of 1997, the Navy adopted an Integrated Natural Resources Management Plan (INRMP) for San Clemente Island (U. S. Department of the Navy, Southwest Division 2002). An INRMP is a plan that is intended "...to guide installation commanders in managing their natural resources in a manner that is consistent with the sustainability of those resources while ensuring continued support of the military mission."

Of relevance to the protection of *Lotus dendroideus* var. *traskiae*, the San Clemente Island INRMP includes an objective to: "Protect, monitor, and restore plants and cryptograms in order to manage for their long-term sustainability on the island" (p. 4-37, U. S. Department of the Navy, Southwest Division, 2002). Associated with this objective are a number of proposed management strategies that include: consideration of *Lotus dendroideus* var. *traskiae* as a "management focus plant" such that it is considered independently from its associated plant community for management; conducting status surveys for this species; ensuring that management focus plants have a network of suitable sites; performing pollination studies on *Lotus dendroideus* var. *traskiae*; and continuing to apply genetic research and management approaches to its management. Other INRMP strategies targeted towards the terrace complex of maritime desert scrub, in which *Lotus dendroideus* var. *traskiae* occurs, include: accelerating the recovery of shrubs on terrace faces and flats; reducing the percent cover of invasive plants from the 1992-93 baseline of 41 percent on terrace faces and 53 percent on terrace flats; controlling erosion, particularly in association with active and abandoned roads; and establishing a preliminary fire return interval of 5 years in grassy areas and 10 years or longer in shrublands.

To date, concerted efforts have been made to control escape of fire from the Impact Areas and to reduce the cover of non-native species (K. O'Connor pers. comm. 2006). The Navy has also funded rare plant surveys that have documented

new occurrences of *Lotus dendroideus* var. *traskiae* and field studies that have determined some aspects of its reproductive potential.

For purposes of the INRMP, San Clemente Island has been divided into 18 Management Units (U. S. Department of the Navy, Southwest Division 2002). These Management Units were ranked for both military and natural resource value. *Lotus dendroideus* var. *traskiae* occurs in 10 of these management units, including 4 units that have a high military value ranking (Table 1). These 4 units contain only 12 (11 percent) of the 105 *Lotus dendroideus* var. *traskiae* locations on the island but contain 2,170 (27 percent) of the individuals. The Pyramid Cove Management Unit contains SHOBA and is therefore, subjected to heavy military use. NOTS Pier, where underwater ordnance is tested, and 23 percent of *Lotus dendroideus* var. *traskiae* individuals occur, is completely contained within a Special Warfare Training. Approximately 42 (40 percent) of the *Lotus dendroideus* var. *traskiae* locations occur in areas that have low military value. These occurrences account for 56 percent (4,424 of 7,900) of the *Lotus dendroideus* var. *traskiae* individuals on the island.

In conclusion, although the INRMP (U. S. Department of the Navy, Southwest Division 2002) is technically not a regulatory mechanism, it is an important guiding document that helps to integrate the military’s mission with natural resource protection on San Clemente Island. The INRMP targets a number of objectives towards protection and restoration of *Lotus dendroideus* var. *traskiae* habitats.

Table 1. The military value for each of the 12 Management Units containing *Lotus dendroideus* var. *traskiae* individuals on San Clemente Island. Management Units in bold contain the greatest number of *Lotus dendroideus* var. *traskiae* individuals.

Management Unit	Military Value	Number of <i>Lotus dendroideus</i> var. <i>traskiae</i> locations	Number of <i>Lotus dendroideus</i> var. <i>traskiae</i> individuals
Pyramid Cove	Highest	1	3
Wilson Cove	High	1	200
NOTS Pier	High	6	1,830
Seal Cove	High	4	137
Cave Canyon	Medium	1	3
Mt. Thirst	Medium	17	566
Lemon Tank	Low	25	3,946
Mosquito Cove	Lowest	8	430
Lost Point	Lowest	9	77
Eagle Canyon	Lowest	12	274

II.C.2.e. Other natural or manmade factors affecting its continued existence:

Other natural or manmade factors affecting the continued existence of *Lotus dendroideus* var. *traskiae* include constrained access to its habitat for performing active management and hybridization with *Lotus argophyllus adsurgens* (Allan 1999).

Access to SHOBA

Because SHOBA is used for ship-to-shore bombardment, access to this area is often restricted for non-military personnel. In the past, individuals conducting surveys or working on invasive species control projects have been granted access to SHOBA when military activities are not occurring. Because of the frequency of training, access to SHOBA can be restricted for long periods of time, and there may only be brief intervals when biological work can be done (K. O'Connor pers. comm. 2006). This can undermine the effectiveness of invasive species control programs that often rely on treatments during a particular time in an organism's life cycle (*e.g.*, spraying herbicide prior to seed set by invasive non-native grasses).

Safety concerns relative to the presence of unexploded ordinance within SHOBA have recently prompted the Navy to review access policies (K. O'Connor pers. comm. 2006). During the winter/spring of 2005 and 2006, all access for civilian personnel was withheld for one to two months. Currently, the Navy is considering adopting a new set of policies to address access to SHOBA. It is anticipated that access to the Impact Areas will be granted only when an explosive ordinance device escort can be present (K. O'Connor pers. comm. 2006). Restricted access to certain portions of SHOBA could impair the ability of biologists to implement erosion control measures or to detect and combat new invasive species prior to their becoming established and posing a threat to native species.

Hybridization with *Lotus adsurgens* var. *argenteus*

It is unknown if more hybrid individuals have been produced since the Liston *et al.* (1990) study was published. At that time, four hybrids from a total of 38 individuals were not considered a large threat to the persistence of the two parent species. Liston *et al.* (1990) offered the following three hypotheses for the paucity of hybrid individuals. First, hybrids may be selected against and/or have reduced fitness, or be sterile. If this were the case, then hybridization would not be a threat to the genetic integrity of *Lotus dendroideus* var. *traskiae*. Conversely, if the hybrids are recent in origin (within the last 20 years), and because the species are woody perennials, few hybrid individuals would be expected. If this is the correct scenario, then the genetic integrity of the largest-known (at the time of publication) population of *Lotus dendroideus* var. *traskiae* might be at risk by introgressive hybridization. Lastly, the presence of only four hybrids might be an artifact of the genetic testing method that was used. Liston *et al.* (1990) stated that there should be further investigation of these hypotheses before management recommendations are made.

Allan (1999) states that *Lotus dendroideus* var. *traskiae* should be "closely monitored" because "although 64 occurrences containing 3,000 individuals had

been identified and the species appears to be reasonably stable, it continues to face a threat due to hybridization with the more widespread *Lotus adsurgens* var. *argenteus*.” Although hybridization has only been documented at Wilson Cove, Allan (1999) states that it is “particularly disconcerting in that it may lead to a loss of genetic diversity through genetic assimilation of the smaller population (*Lotus dendroideus* var. *traskiae*) by the larger one (*Lotus adsurgens* var. *argenteus*).” Alternately, genetic diversity of *Lotus dendroideus* var. *traskiae* could be reduced due to outbreeding depression in that the hybrids may have reduced fitness.

II.D. Synthesis

The status of *Lotus dendroideus* var. *traskiae* has improved since its listing as endangered in 1977. Although exact population numbers were unknown at that time, surveys in 1980 found only 9 occurrences totaling about 1,340 individuals. Surveys conducted since the complete removal of non-native mammalian herbivores from San Clemente Island in 1992 indicate that the species is increasing in both the number of known locations and the number of individuals. *Lotus dendroideus* var. *traskiae* is currently known from over 100 locations which contribute to an overall total estimated abundance of about 7,900 individuals. This suggests that a principle threat to the species was eliminated with the removal of non-native grazing animals from the island. Another measure that may help the recovery of *Lotus dendroideus* var. *traskiae* is the 2002 adoption of the San Clemente Island INRMP by the Department of the Navy. The INRMP helps promote the conservation of *Lotus dendroideus* var. *traskiae* by identifying a number of goals and objectives that are directed towards the protection and restoration of its habitat.

The documented increase in the number of *Lotus dendroideus* var. *traskiae* occurrences and individuals and the complete removal of non-native mammalian herbivores from San Clemente Island have improved the status of the species, and we no longer consider it in danger of extinction (i.e., meeting the definition of endangered). However, *Lotus dendroideus* var. *traskiae* occurs in the buffer zone of the SHOBA, putting it at risk from fire. In addition, erosion resulting from past grazing activities continues as do threats from non-native invasives and potential hybridization with *Lotus dendroideus* var. *argenteus*. Because of these remaining threats, we find that the species meets the definition of threatened (likely to become endangered in the foreseeable future throughout all or a significant portion of its range), and therefore, recommend that it be reclassified. As the U.S. Navy continues to implement its INRMP, we expect that threats to the species will continue to decline.

III. RESULTS

III.A. Recommended Classification: Downlist to Threatened

III.B. New Recovery Priority Number 15

The trend for *Lotus dendroideus* var. *traskiae* appears to be the documentation of

an increasing number of occurrences suggesting that threats have diminished for the species from a moderate to a lower level (Junak and Wilken 1998; Junak 2006). This also suggests that the recovery potential for this species remains high. Therefore, the recovery priority is recommended to be revised from 9 to 15.

III.C. If a reclassification is recommended, indicate the Listing and Reclassification Priority Number (FWS only):

This species should be given a reclassification priority of “4,” which indicates an unpetitioned action with a moderate management impact.

IV. RECOMMENDATIONS FOR FUTURE ACTIONS – Because the California Channel Islands Species Recovery Plan (U.S. Fish and Wildlife Service 1984) does not include criteria for the reclassification and/or delisting of *Lotus dendroideus* var. *traskiae*, a primary recommendation is to update the recovery plan to include such criteria. However, a number of actions can proceed in the interim that will promote recovery. These actions include the following:

1. Study the range (frequency and intensity) of fire conditions that *Lotus dendroideus* var. *traskiae* individuals and its seed bank can withstand. Determine the fire interval at which *Lotus dendroideus* var. *traskiae* best survives and reproduces.
2. Conduct genetic research island-wide on individuals to determine if this species has high genetic variability among populations.
3. Follow up on research conducted by Liston *et al.* (1990) to determine if hybridization is a serious threat to the recovery of *Lotus dendroideus* var. *traskiae*.
4. Identify areas where erosion may be threatening *Lotus dendroideus* var. *traskiae* individuals and implement erosion control measures.
5. Establish a non-native annual grass removal program in *Lotus dendroideus* var. *traskiae* habitats such that percent cover of these species decreases by at least 10 percent (a goal identified in the INRMP).

V. REFERENCES

- Allan, G. J. 1999. Molecular Systematic and Biogeographic Studies of the Temperate Herbaceous Papilioniod Tribes Loteae and Coronilleae (Fabeae). Ph. D. Dissertation. The Claremont Graduate School. 105 pp.
- Brooks, M. L. 1999. Alien annual grasses and fire in the Mojave Desert. *Madrono* 46:13.
- Brooks M. L. and T. C. Esque. “Nonnative Grass Invasions and Fire in the Mojave Desert.” September 15, 2004. U. S. Geological Survey Western Ecological Research

- Center. July 19, 2006.
<http://www.werc.usgs.gov/invasivespecies/mojavegrassfire.html>.
- Isely, D. 1978. New varieties and combinations in *Lotus*, *Baptisia*, *Thermopsis* and *Sophora* (Leguminosae). *Brittonia* 30(4): 466-472.
- Isely, D. 1993. *Lotus*. In Ed. J.C. Hickman. The Jepson manual. University of California Press. Berkeley, California. p. 616.
- Isely, D. 1998. Native and naturalized Leguminosae (Fabaceae) of the United States (exclusive of Alaska and Hawaii). ML Bean Science Museum Press, Brigham Young University, Provo, Utah.
- Johnson, D. L. 1980. Episodic vegetation stripping, soil erosion, and landscape modification in prehistoric and recent historic time, San Miguel Island, California. In: The California Islands: Proceedings from a Multidisciplinary Symposium, D. M. Power, ed., Santa Barbara Museum of Natural History, Santa Barbara, California.
- Junak, S. A. 2006. Sensitive Plant Survey Data for San Clemente Island, California. Collected for the Department of the Navy, Southwest Region under cooperative agreement with Naval Facilities Engineering Command South Division. On file, Carlsbad Fish and Wildlife Office, Carlsbad, CA.
- Junak, S. A. and D. H. Wilken. 1998. Sensitive Plant Status Survey, Naval Auxiliary Landing Field San Clemente Island, California, Final Report. Santa Barbara Botanic Garden Technical Report No. 1 prepared for the Department of the Navy, Southwest Division. San Diego, CA.
- Kellogg, E. M. and J. L. Kellogg. 1994. San Clemente Island vegetation condition and trend and the elements of ecological restoration. Reedley, California: Tierra Data Systems.
- Liston, A., L. H. Rieseberg, and O. Mistretta. 1990. Ribosomal DNA evidence for hybridization between island endemic species of *Lotus*. *Biochemical Systematics and Ecology* 18:239-244.
- Munz, P. A. 1974. A Flora of Southern California. University of California Press, Berkeley and Los Angeles, California.
- Remy, M. H., T. A. Thomas, J. G. Moose, and W. F. Manley. 1996. *Guide to the California Environmental Quality Act (CEQA)*. Point Arena, California: Solano Press Books, 1996.
- U. S. Department of the Navy, Southwest Division. 2002. San Clemente Island Integrated Natural Resources Management Plan. San Diego, CA. Prepared by Tierra Data Systems, Escondido, CA.

U. S. Fish and Wildlife Service. 1984. Recovery Plan for the endangered and threatened species of the California Channel Islands. U. S. Fish and Wildlife Service, Portland, Oregon. 165 pp.

U. S. Fish and Wildlife Services. 1997. Biological/Conference Opinion (1-6-97-F-21) on Training Activities on San Clemente Island. On file at Carlsbad Fish and Wildlife Office, Carlsbad, CA.

U. S. Fish and Wildlife Service. 2002. Re-Initiation of Consultation (1-6-97-F-21/ FWS-LA-2808) on Naval Training Activities that Cause Fires on San Clemente Island. On file at Carlsbad Fish and Wildlife Office, Carlsbad, CA.

Wright, S. 1932. The roles of mutation, inbreeding, crossbreeding and selection in evolution. Proceedings of the Sixth International Congress of Genetics, 356-366.

Personal Communications:

The following people were contacted for information relevant to the status of *Lotus dendroideus* var. *traskiae*. These people provided a range of expertise based on their involvement with specific survey efforts, scientific studies and/or management of San Clemente Island biological resources.

Dunn, Jonathan. Botanical Conservation Manager at the San Diego Zoological Society Conservation and Research for Endangered Species, Applied Conservation Division, Escondido, California. April 11, 2006 Telephone conversation with William Miller of the Carlsbad Fish and Wildlife Office.

Junak, Steve. Santa Barbara Botanic Garden, Santa Barbara, California. April 11, 2006, telephone conversation with William Miller of the Carlsbad Fish and Wildlife Service Office.

Kellogg, Elizabeth. Tierra Data Systems, Escondido, California. July 21, 2006, telephone conversation with William Miller of the Carlsbad Fish and Wildlife Service Office; July 5, 2006, telephone conversation with Christine Beck of the Carlsbad Fish and Wildlife Service Office.

O'Connor, Kim, Botanist, U. S. Department of the Navy, Southwest Division, San Diego, California. Multiple communications with William Miller of the Carlsbad Fish and Wildlife Service Office as follows: March 27, 2006, telephone conversation; April 10, 2006, telephone conversation; May 8, 2006, telephone conversation; July 7, 2006, telephone conversation with Christine Beck of the Carlsbad Fish and Wildlife Service Office.

Wall, Michael, Curator of the Seed Program at Rancho Santa Ana Botanic Garden,
Claremont, California. July 21, 2006, email correspondence with Christine Beck of
the Carlsbad Fish and Wildlife Service Office.

U.S. FISH AND WILDLIFE SERVICE
5-YEAR REVIEW of *Lotus dendroideus* var. *traskiae*

Current Classification is Endangered
Recommendation resulting from the 5-Year Review

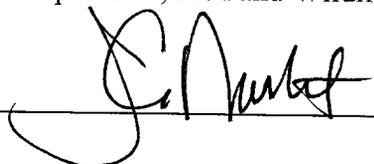
- Downlist to Threatened**
- Uplist to Endangered**
- Delist**
- No change is needed**

Appropriate Listing/Reclassification Priority Number, if applicable: 4

Review Conducted By: Christine Beck

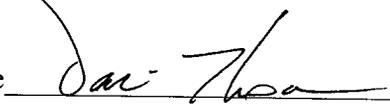
FIELD OFFICE APPROVAL:

Lead Field Supervisor, Fish and Wildlife Service

Approve  Date July 31, 2007

REGIONAL OFFICE APPROVAL:

Acting
Lead Regional Director, Fish and Wildlife Service

Approve  Date 9/24/07