Malacothamnus clementinus
(San Clemente Island Bush Mallow)

5-Year Review:
Summary and Evaluation

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

August 2007

5-YEAR REVIEW

Species reviewed: San Clemente Island Bush Mallow (*Malacothamnus clementinus*)

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I. GENERAL INFORMATION

I.A. Methodology used to complete the review: This review was compiled by William B. Miller of the Carlsbad Fish and Wildlife Office 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 Jenness McBride, California-Nevada Operations Office, 916-414-6464.

Lead Field Office: Karen Goebel and William B. Miller, Carlsbad Fish and Wildlife Office, 760-431-9440 ext. 206.

Cooperating Field Office(s): Not applicable.

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 (Service) announced initiation of the 5-year review and asked for information from the public regarding the species' status (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. 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: Species. *Malacothamnus clementinus* (Munz and I. M. Johnston) Kearney
Classification: Endangered

I.C.3. Associated rulemakings: None.

I.C.4. Review History: No status reviews have been completed since the time of listing.

I.C.5. Species' Recovery Priority Number at start of review: In the 2005 Recovery Data Call for the Carlsbad Fish and Wildlife Office, *Malacothamnus clementinus* was assigned a recovery priority of "8," indicating that the species faces a moderate degree of threat but also has a high potential for recovery.

I.C.6. 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 (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 a 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 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, specific delisting criteria are not included. 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

Species Overview

Malacothamnus clementinus is a rounded subshrub (with stems woody only at the base) in the Malvaceae (mallow family). It is up to 1-2 meters tall with numerous branched stems arising from its base (Munz and Johnston 1924; Munz and Keck 1959; Bates 1993; S. Junak pers. comm. 2006). Its leaves are angularly 3-5 lobed or nearly circular or ovate, less than 5 centimeters in length and conspicuously bicolored, with green, sparsely pubescent (covered with short, fine hairs) upper surfaces and veiny, white hairy under surfaces that are densely matted with branching hairs (Munz and Johnston 1924). The flowers are many, with a reduced petiole and are densely compacted in clusters in the uppermost axils, forming interrupted spikes 10-20 centimeters long. Flowers are bisexual and variously described as having pink or white and fading lavender petals, with well developed calyx lobes that have branched, densely matted pubescence (Munz and Johnston 1924; Bates 1993). Plants bloom from March to August (California Native Plant Society 2001). *Malocothamnus clementinus* is the only species within its genus that occurs on San Clemente Island (Tierra Data Inc. 2005).

Malacothamnus clementinus is restricted to San Clemente Island, where it occurs in a range of conditions, including rock crevices along canyon walls, at the base of rocky walls, at the base of escarpments between coastal terraces, along canyon rims and ridgelines, and in vegetated flats (S. Junak pers. comm. 2006; Junak and Wilken 1998; U. S. Department of the Navy, Southwest Division 2001). It is often associated with maritime cactus scrub vegetation on coastal flats at the southwestern end of the island (Junak and Wilken 1998). The collection of moisture in rock crevices and at the base of canyon walls and escarpments may provide favorable conditions for this species (S. Junak pers. comm. 2006).

Based on the occurrence of *Malacothamnus clementinus* in clustered groupings of stems, it generally is believed that stem groupings represent individual plants that have propagated via underground runners or rhizomes (U. S. Fish and Wildlife Service 1984; Helenurm 1999; S. Junak pers. comm. 2006). That it propagates via rhizomes is also suggested by the observation that the species is seldom observed to set seed (S. Junak pers. comm. 2006). The ease of resprouting from rhizomes and the adaptation of other species in the genus to fire (*e.g.*, *M. fasciculatus*) suggest that *M. clementinus* may similarly be adapted to fire through its ability to send up shoots from underground stems (U. S. Fish and Wildlife Service 1984; S. Junak pers. comm. 2006).

Malacothamnus clementinus was among the first plants 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 (Ripley 1975). 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 1976 Smithsonian report (41 FR 24523) and the 1977 final rule to list *M. clementinus* (42 FR 40682) did not include specific information regarding the size, number, or trends of populations for this species. However, for many decades prior to its listing, *M. clementinus* was only known from the Lemon Tank type locality (Kearney 1951; U. S. Fish and Wildlife Service 1984). At the time of its listing in 1977, a person commenting on the listing proposal noted that a second colony of two to three small plants had been discovered on the edge of an inaccessible ledge in China Canyon (U. S. Fish and Wildlife Service 1984; 42 FR 40682). China Canyon is a southwesterly facing canyon near the southern end of San Clemente Island, around 13-14 kilometers from Lemon Tank Canyon.

Abundance and Distribution

San Clemente Island has a history of overgrazing by domestic and feral herbivores that has led to severe erosion and dramatic alteration of the island's vegetation communities. These changes are likely associated with the restriction of the range of *Malacothamnus clementinus* to one known population at the time of its listing in 1977. Since then, around 30 new occurrences of *M. clementinus* have been discovered among the generally southwesterly facing coastal terraces and their associated escarpments along the southern portion of San Clemente Island (Junak and Wilken 1998; Junak 2006). These occurrences are distributed across the southern third of the island, and their appearance is likely associated with the removal of feral goats and pigs from the island in the early 1990s. Based on his observations of plant growth form and development, Steve Junak, the botanist who has documented most of the new occurrences, believes that many of the new occurrences result from plants that have re-emerged from persistent underground stems that survived despite complete, or near complete, removal of above ground plant parts by feral herbivores (S. Junak pers. comm. 2006). Approximately 19 of the new occurrences were documented during sensitive plant surveys conducted during 1996 and 1997. An additional 11 occurrences were documented during 2003 and 2004 surveys. In this portion of *M. clementinus*' range, these newly discovered occurrences are scattered below canyon rims, at the base of terrace escarpments and in flat areas from around Box Canyon in the north to around Horse Beach Canyon in the south. Several occurrences are found within Horse Beach Canyon. Collectively, these occurrences span a distance of about 8 kilometers that overlaps the boundary of the U. S. Navy's shore bombardment area (SHOBA) at the southern end of the island; 17 of the occurrences are within SHOBA and 12 occurrences are to the north and outside of SHOBA.

The southern distribution of *Malacothamnus clementinus* is disjunct from the historical, and only other known location for the species, that is located mid-island within northeasterly facing Lemon Tank Canyon. Lemon Tank falls about 6.5 kilometers to the north of the nearest of these populations. Thus, the known range of *M. clementinus* has expanded greatly to the south on San Clemente Island since its listing, with the distance between the northernmost and southernmost populations spanning a distance of about 15 kilometers. However, the current distribution is disjunct, with almost all of the occurrences found on the southwestern-facing coastal terraces at the southern end of San Clemente Island.

Malacothamnus clementinus occurs in groupings of stems that are assumed to represent the same genetic individual. Because of this assumption, the size of occurrences has been recorded using several methods, including counting the number of stem groupings or “clumps;” counting the total number of stems within a clump; and/or measuring the approximate area covered by plant groupings. However, uneven application of these enumeration methods causes some ambiguity when comparing occurrence sizes, suggesting more refined methods are needed to document trend beyond the appearance of new occurrences. Occurrences documented in 1996-1997 ranged in size from 1 to 50 clumps, with about half of these made up of 10 or fewer clumps (average 15 clumps per occurrence) (Junak and Wilken 1998). One of these occurrences is described as supporting 45 clumps within 600 square meters, and another is described as supporting 20 clumps within 20,000 square meters (Junak and Wilken 1998). Occurrences documented in 2003-2004 had between 1 and 7 clumps (average 2.27 clumps per occurrence), with the largest occurrence supporting 7 clumps with a cumulative total of 720 stems in around 68 square meters (Junak 2006).

Vegetation trend monitoring conducted on San Clemente Island between the years of 1992-2003 documented *Malacothamnus clementinus* at three monitoring plots (Tierra Data Inc. 2005). Monitoring data for one of those plots is of little value because that plot’s boundaries were inconsistently delineated over time, and only one plant was detected (outside the plot boundary) during one year (Tierra Data Inc. 2005; L. Kellogg pers. comm. 2006). Monitoring data for the remaining two plots is provided in Table 1.

Table 1
1992 – 2003 Vegetation Trend Monitoring Plot Data for *Malacothamnus clementinus*

Monitoring Plot Location	**Number of Plants Observed**					
	1992	**1993**	**1994**	**2000**	**2002**	**2003**
Horse Beach Canyon	108	N.S.[1]	0	62 mature plants 30 seedlings[2]	N.S.	87 mature plants 3 seedlings[2]
Horse Canyon	N.S.	0	N.S.	N.S.	4	79

[1]N.S. = plot not sampled; [2] Sprouts recorded as seedlings may be true seedlings or sprouts that have emerged from underground rhizomes (E. Kellogg pers. comm.. 2006)

Each of these two monitoring plots burned in 1994. These data, therefore, appear to show the recovery following fire of a *Malacothamnus clementinus* population that was previously documented in Horse Beach Canyon before the 1994 fire. When last observed this occurrence was “…becoming overwhelmed by *Encelia californica* [the native California brittlebush or bush sunflower] and *Rhus integrifolia* [the native lemonadeberry or sumac], although younger offshoots appear to be expanding along the margins and up the canyon slope from the original location" (p. iii, Tierra Data Inc. 2005). The monitoring trend data also reveal the recent emergence and expansion of an occurrence that was not previously known in Horse Canyon.

In sum, monitoring plot trend data and the appearance of around 30 new occurrences of *Malacothamnus clementinus* since the early 1990s suggest this species is responding favorably to the removal of feral herbivores from San Clemente Island. This species also appears to exhibit some tolerance to fire, as monitoring data has tracked the recovery of a population following fire and new occurrences have been discovered in recently burned areas (Junak and Wilken 1998; S. Junak pers. comm. 2006) and (Tierra Data Inc. 2005).

Genetics

Two studies have examined genetic variation in *Malacothamnus clementinus* using complementary techniques (Helenurm 1997, 1999). The first study used starch gel electrophoresis to examine the frequency of expression of specific cellular enzymes (primary gene products known as "allozymes") to obtain a measure of variation in the genes coding for those enzymes (Helenurm 1997). That study examined allozyme variability of 199 individuals from 9 of the 11 occurrences known at the time. Although a goal of the study was to sample a minimum of 30 individuals per occurrence, actual sample sizes varied based on the number of individuals per occurrence (estimated to range from 1 to 75 individuals).

Of 11 gene loci surveyed (each locus representing the position of alleles, which are different forms of a gene, on the chromosome), only two loci were found to be polymorphic (having different forms of the allele at that particular locus) within the "population" of plants examined. All of the detected genetic variation (*i.e.*, polymorphism) was restricted to a single occurrence in Box Canyon (Helenurm 1997). Thus, very little differentiation among occurrences or among individuals within an occurrence was detectable. The investigator concluded that *Malacothamnus clementinus* has very low genetic variation at both the species and population level (Helenurm 1997). Helenurm (1997) also suggested that the lack of within-population variability, the small size of populations, and the observation of low seed production could indicate that populations are comprised of clonal plants (clumps of genetically identical stems) or are otherwise inbred with impaired reproductive capability due to self incompatibility mechanisms among closely related individuals.

The second study used the relatively more sensitive technique of random amplification of polymorphic DNA (RAPD analysis) to study genetic variability of 95 plants from19 discrete locations (additional locations of *Malacothamnus clementinus* were discovered subsequent to sampling for the first study) (Helenurm 1999). Because the species is distributed within canyons that may contain a number of discrete patches of stems, the sampling regime involved collection of samples from five individuals per patch to determine if patches consist of a few genotypes or a single clonal individual.

Using 6 primers for DNA amplification, a total of 33 gene loci were detected, of which 29 were polymorphic (Helenurm 1999). Genetic variation was detected at RAPD loci within all occurrences sampled. Box Canyon and Horse Beach Canyon exhibited the greatest genetic variability, and Lemon Tank had the least genetic variation (Helenurm 1999). Overall, a substantial proportion of the genetic variation found in *Malacothamnus clementinus* was found among different occurrences rather than within single occurrences, indicating that all occurrences may contain genetic variation not found elsewhere (Helenurm 1999).

The extent of genetic differentiation among occurrences was variable, with genetic identities ranging from 0.741 to 0.962 (the maximum possible genetic identity is 1.000, indicating a pair of occurrences that share all alleles at the same frequencies) (Helenurm 1999). Interestingly, the genetic relationship among occurrences did not correspond with physical distance. Cluster analysis revealed that patches in the same canyon often did not group together nor did adjacent canyons generally group together genetically (Helenurm 1999). Combined with the relatively high level of genetic differentiation found among occurrences, this finding reveals that gene flow is highly limited in *Malacothamnus clementinus*, even among patches within the same canyon (Helenurm 1999).

At the patch level, nearly all patches exhibited as many different genotypes as individuals sampled (6 of 19 occurrences had one fewer genotype than individuals sampled) (Helenurm 1999). This indicates that "…clonal growth is not extensive in the species and that patches of closely adjacent individuals are not likely to represent the same genetic individual" (p. 39, Helenurm 1999). Further study is needed to determine the relationship among adjoining individuals, the pattern of mating in the species (*e.g.*, the relative proportion of inbred to outcrossed seeds), and whether a self-incompatibility system exists that prevents or inhibits reproduction among closely related individuals.

Habitat

As discussed in the final listing rule for three other Channel Island plants (62 FR 42692), the decline of *Malacothamnus clementinus* and the decline of all of San Clemente's endemic flora is primarily attributed to the introduction of nonnative animal and plant species by Euro-Americans during the last 200 years. Goats (*Capra hircus*) were present on San Clemente Island as early as 1827 (Dunkle 1950) and sheep (*Ovis aries*) were introduced around 1868 (Kellogg and Kellogg 1994). Other large herbivores historically introduced to San Clemente Island include cattle (*Bos taurus*), pigs (*Sus scrofa*), and mule deer (*Odocoileus hemionus*) (62 FR 42692).

In particular, ranching of sheep and, following their removal, proliferation of goats, led to severe overgrazing, trampling of vegetation, and denudation of the island. Sheep likely numbered in the thousands at the turn of the 20th century, and records suggest that a herd of 11,000 to 12,000 sheep was maintained for about 20 years prior to their removal in 1934 (O'Malley 1994). Following sheep removal, goats proliferated without control from sheep ranchers, who had been keeping the goat population in check (Kellogg and Kellogg 1994). In the early 1970s, the goat population was estimated to be around 10,000 (Kellogg and Kellogg 1994).

With intensive grazing pressure leading to near complete consumption of grasses, sheep and goats fed on less palatable shrubs and trees, causing a tremendous loss of shrub and tree cover (Kellogg and Kellogg 1994; O'Malley 1994). Overgrazing also led to 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). Grazing animals also facilitated the spread of nonnative plants. A 1992 flora for San Clemente Island listed 380 species, 99 of which were nonnative, 4 were listed as endangered, and 2 were believed to be extinct (Kellogg and Kellogg 1994).

In an effort to preserve the endemic flora and fauna, all feral goats and pigs were removed from the island by the Navy in 1992 (Kellogg and Kellogg 1994). The Navy also initiated a long-term vegetation monitoring program in 1992-1993 to track the status of sensitive plant species and to document vegetation changes on the island following animal removals (Tierra Data Inc. 2005).

Determination of broad patterns of vegetation recovery from that monitoring are complicated because baseline data was collected during a series of wet years that were followed by a series of dry years.

Furthermore, additional impacts on vegetation have been brought about by military activities and there has been a variable response of individual plant species since animal removals (Tierra Data Inc. 2005). Rainfall patterns have had a large influence on trend data due to the importance of precipitation in promoting plant germination and growth, particularly for annual species (Tierra Data Inc. 2005). Ongoing military training activities have altered the island's fire regime by increasing fire frequency in some areas. This interrupts and modifies plant successional processes, promotes the invasion and proliferation of nonnative annual grasses (D'Antonio and Vitousek 1992), and has caused a reduction in cover of some native species in areas that have burned (*e.g.*, the coastal cholla cactus *Opuntia prolifera* and *Encelia californica*) (Tierra Data Inc. 2005).

In general, both nonnative and native flora have benefitted from the removal of feral herbivores, and there is an increasing trend of native shrub cover on the island (L. Kellogg pers. comm. 2006). Native bulbous perennials have increased dramatically since monitoring began in 1992-1993, while percent cover of native perennial grasses has remained fairly steady (Tierra Data Inc. 2005). Spatially localized long-term trends are evident for some native shrub species. Cover of shrubs such as California sagebrush (*Artemisia californica*), island snapdragon (*Galvezia speciosa*), and bush sunflower (*Encelia californica*) has increased on the southern end of the island in a number of areas (Tierra Data Inc. 2005). Boxthorn (*Lycium californicum*) has decreased on some plots towards the northern portion of the island but increased elsewhere. Coyote brush (*Baccharis pilularis*) has dramatically increased in clay grasslands and could lead to the conversion of these areas into native shrublands (Tierra Data Inc. 2005).

Research on Reproductive Ecology

Seed production in natural populations of *Malacothamnus clementinus* is observed to be very low (Helenurm 1997, 1999; S. Junak pers. comm. 2006), which leads to a number of questions regarding the reproductive ecology of this species. It is still unknown whether there is an intact pollinator community; whether newly arisen occurrences derive from seeds or are sprouts from dormant roots; and whether the reproduction of natural populations is impaired by a self-incompatibility mechanism, inbreeding depression, or another factor.

Studies of a single clone at Santa Ana Botanic Garden suggest that *Malacothamnus clementinus* is probably self-compatible and probably requires pollinators to set seed (Junak and Wilken 1998). Potential pollinators that have been incidentally observed in the wild include two species of wasp and a single butterfly (Junak and Wilken 1998).

A flower and fruit study of plants in China, Horse Beach, and Norton canyons revealed that plants produce 89-90 flowers per shoot, have 3.9 to 4.2 seeds per fruit, and there is from 4 to 12 percent germination success of seeds (Junak and Wilken 1998). The relatively low number of seeds found in natural occurrences is attributed to low insect visitation rates or an unknown factor (Junak and Wilken 1998). Combined with apparent low germination success, it is reasonable to speculate that newly arisen or spreading occurrences result at least partially from vegetative propagation (S. Junak pers. comm. 2006).

The ability to reproduce vegetatively (clonally) by rhizomes is known for other species in the genus *Malacothamnus* (Kearney 1951; Munz 1963). Based on observations of new occurrences, and having seen shoots arising from partially exposed root systems at some of them, the surveyor responsible for documenting most of the new occurrences has postulated that many of them derive from dormant roots that have persisted persecution by drought and feral herbivores (S. Junak pers. comm. 2006). The source of new shoots cannot be positively determined without excavating plants directly (S. Junak pers. comm. 2006; L. Kellogg pers comm. 2006).

However, a recent genetic study suggests that aggregations of stems (clumps) are not necessarily individual plants and quite frequently they are not (Helenurm 1999). Although this finding indicates that individuals in a patch do not represent the same genetic individual, it does not clarify whether such individuals are newly derived from sexual reproduction or if they are from historic occurrences that have re-emerged from dormant roots. Whatever the mechanism, it remains possible that adjoining plants are closely related and share alleles controlling potential matings (Helenurm 1999). Low seed production may indicate the existence of a self-incompatibility mechanism that prevents seed production among a small number of individuals that share self-incompatibility alleles (Helenurm 1999).

Taxonomy

No taxonomic classifications or changes in nomenclature have been published since the listing in 1977.

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

The 1977 final listing rule (42 FR 40682) highlighted three principle threats to the species associated with domestic and feral herbivores on San Clemente Island: habitat alteration and destruction, facilitation of invasion by nonnative plant species, and direct predation on plants by grazing animals. By 1992, the Navy removed the last of the feral goats and pigs in an effort to preserve the island's endemic vegetation (Kellogg and Kellogg 1994). Since that time, many of the island's sensitive plant species have been recovering, including a dramatic expansion in the distribution of *Malacothamnus clementinus.* This suggests that feral goats and pigs were a chief threat to the distribution of the species. However, competition with nonnative invasive plant species and erosion likely remain ongoing threats. Other threats that were not addressed in the final rule include alteration of San Clemente Island habitats by military activities, unnaturally high fire frequencies in the southern portion of the species' range, and constrained access to its habitat for conducting active management.

II.C.2.a. Present or threatened destruction, modification or curtailment of its habitat or range:

<u>Land Use</u>

San Clemente Island is owned by the U. S. Department of the Navy. With its associated offshore range complex, it is the primary maritime training area for the Navy Pacific Fleet and Navy Sea, Air and Land (SEALS), and it supports training by the U. S. Marine Corps, the U. S. Air Force, and others. 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. To help integrate its mission with resource protection, the Navy has adopted an Integrated Natural Resource Management Plan (INRMP) to help govern land uses on the island (U. S. Department of the Navy, Southwest Division, 2001).

The distribution of *Malacothamnus clementinus* includes a single occurrence mid-island at Lemon Tank, and a scattering of occurrences that span a distance of about 8 kilometers along the southwesterly-facing coastal terraces at the southern end of the island. The northern Lemon Tank occurrence falls within an area identified by the INRMP as potentially needing environmental clean-up pursuant to the Resource Conservation and Recovery Act (RCRA) and Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). However, this site is still in the study phase and has not been listed or proposed for listing on the National Priorities List. Thus, although there are no immediate plans for clean-up at this site (U. S. Department of the Navy Southwest Division 2001), this occurrence could be impacted by future environmental clean-up.

The Lemon Tank occurrence also falls within the bounds of a Special Warfare Training Area (SWAT). SWATS are specific areas set aside for SEAL training activities. SEAL training includes practicing onshore and nearshore activities such as clandestine landings, minimum disturbance patrolling, and clandestine extraction of troops. Once at the objective, troops may use intensive firepower that can include the use of demolitions, flares, tracers, pistols, rifles and shotguns. Included within SWAT-5, and in proximity to the Lemon Tank occurrence, are an ordnance land use area and a Missile Impact Range. The missile impact range has an overlapping designation as a Training Area and Range (TAR). TARs are specific areas identified for continuation training of SEAL teams from Naval Special Warfare Group ONE. Although the precipitous canyon walls at Lemon Tank where this occurrence is located likely provide some degree of protection from troop movements, training activities and any associated fire have the potential to modify and possibly curtail *Malacothamnus clementinus* habitat in this location.

The southern portion of *Malacothamnus clementinus*' distribution spans the boundary of an intensively used area known as the Shore Bombardment Area (SHOBA), where military training exercises have led to high fire frequencies. Around 17 of 30 known occurrences fall within SHOBA, which encompasses 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 the following activities: live fire from ships to the two delineated Impact Areas; Combined Arms exercises, which involve practicing coordination of all supporting arms of the Navy, Marine Corps and Airforce 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 training activities, live and non-live munitions fire is targeted towards two delineated impact areas in the southern portion of 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. Two of the 17 *Malacothamnus clementinus* occurrences within SHOBA lie within the fuel breaks, and 10 lie within proximity to the fuel breaks (U. S. Fish and Wildlife Service 2002).

Also within SHOBA, but outside of the impact areas, about six occurrences of *M. clementinus* are concentrated in or near lower Horse Beach Canyon, above Horse Beach (U. S. Fish and Wildlife Service 1997, 2002). Horse Beach is used for special warfare training activities that include the use of live-fire, illumination rounds and tracers. Several other occurrences lie further up Horse Beach Canyon. Training activities within SHOBA pose a direct threat to individual plants and occurrences due to the ground disturbance associated with them and the potential for recurrent fire.

Fire

The Navy has adopted a set of fire management policies and practices to minimize the risk of fires spreading from the impact areas, including 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, 2002). However, because of the risk of explosion from unexploded ordinance, it is not safe to implement certain measures to combat fires that escape the impact areas, including using conventional ground attack or the use of helicopters from any altitude to make water drops. This results in occasional escape of fires from the impact areas and their spread into adjoining areas (Map 3-1, U. S. Department of the Navy 2001). Due to the risks associated with fighting fires in SHOBA, unless a fire threatens human life or facilities, fires that escape the impact areas and their fuel breaks are typically allowed to burn themselves out and sometimes can burn for days, covering large acreages (U. S. Department of the Navy, Southwest Division 2001; L. Kellogg pers. comm. 2006).

This contrasts with the northern portion of the island where wildfires are typically suppressed and ground attack is more likely to involve lighting back-fires along a road, fuelbreak, or other fuel treated area to contain the fire and prevent further losses (L. Kellogg pers. comm. 2006). A map of fire boundaries since 1979 reveals a mosaic pattern of fire frequency for the southern portion of the island, where some areas have burned multiple times and others have only burned once or a few times (U. S. Department of the Navy, Southwest Division 2001). Most of the southern portion of the island within and adjoining SHOBA has burned at least once since 1979, while no fire record exists since that time for large expanses on the northern portion of the island (U. S. Department of the Navy, Southwest Division 2001).

Occurrences of *Malacothamnus clementinus* have been discovered within and outside of the impact areas in SHOBA (Junak and Wilken 1998; U. S. Department of the Navy 2001), indicating that the species is tolerant of at least occasional fire. However, these occurrences appear to fall within areas that fire mapping suggests have only burned once or twice since 1979 (U. S. Department of the Navy, Southwest Division 2001). High fire frequency may be a potential threat that could limit the distribution of *M. clementinus* by overwhelming its tolerance threshold (Keeley 2004; Jacobson *et al.* 2004). Further study is needed to determine a safe fire return interval for this species. Factors implemented by the Navy to limit the spread of fire from the impact areas help to minimize, but do not eliminate, the threat of recurrent fire.

Two of the southern *Malacothamnus clementinus* occurrences coincide with long-term vegetation monitoring plots that have each burned once since monitoring began. In a plot that burned in 1994, *M. clementinus* was first discovered in 2002, and its numbers dramatically increased over the following year of monitoring (Tierra Data Inc. 2005). In another plot, plants were initially detected in 1992 prior to a 1993 fire. Two years following the fire, the species was not apparent, but recent monitoring indicates that this occurrence has become re-established and is approaching pre-fire levels (Tierra Data Inc. 2005). This occurrence is now becoming overwhelmed by the native shrubs bush sunflower and lemonadeberry but appears to have responded by sending shoots outwards (Tierra Data Inc. 2005).

Based on its growth characteristics, monitoring data, and the fire-adaptedness of other plants in the genus, it is likely that *Malacothamnus clementinus* is resilient to, and could benefit from, occasional fire. Occurrences in Horse Beach Canyon demonstrated lush growth and appeared to respond favorably to a single fire in this location (S. Junak pers. comm. 2006). However, fires that are spaced at close intervals, as is the pattern in much of SHOBA, could exceed plant re-growth capabilities and may limit the recovery of *M. clementinus* in this portion of its range (U. S. Department of the Navy, Southwest Division 2001; U. S. Fish and Wildlife Service Biological Opinion 1-6-97-F-21R).

<u>Nonnative Species</u>

One of the potential threats to *Malacothamnus clementinus* identified in the final listing rule (42 FR 40682) is the spread of invasive nonnative plants into its habitat. Nonnative species have potential to compete with *M. clementinus* for space or other resources such as light, water, and nutrients. Nonnative invasives can also alter habitat structure, ecological processes such as nutrient cycling (Zink *et al.* 1995), and the prevalence of fire (Brooks 1999).

By 1992, 99 nonnative species were documented as occurring on San Clemente Island (Kellogg and Kellogg 1994), with many of them having become naturalized to become a significant component of island habitats. Since then, additional nonnative plants continue to be discovered, which may represent new introductions from military personnel, vehicles and/or equipment (*e.g.*, *Schismus* sp. [Mediterranean grass], *Brassicae tournefortii* [Asian mustard]) (J. Dunn pers. comm. 2006; L. Kellogg pers comm. 2006; S. Junak pers. comm. 2006).

Presently, known occurrences of *Malacothamnus clementinus* are often associated with native maritime desert scrub vegetation types, where nonnative grasses (*e.g.*, *Avena* spp. [wild oats], *Bromus* spp [annual brome grasses]) are present but not a dominant component of the plant community (Tierra Data Inc. 2005). Vegetation trend monitoring plots where *M. clementinus* occurs present an equivocal picture of the importance of nonnative species as competitors. Cover of nonnative plants increased (from 38 to 47 percent) in one monitoring plot between 1993 and 2002, and decreased (from 70 to 20 percent) in another plot between 1992 and 2000. However, as discussed above, large interannual variability in the prevalence of annual grasses associated with seasonal rainfall may overwhelm the ability to discern long term trends in plant succession through the comparison of just two or a few years of data.

Possibly the greatest structural change to alter habitats on San Clemente Island has been the naturalization and proliferation of nonnative annual grasses that accompanied the loss of shrub and tree cover from overgrazing (U. S. Fish and Wildlife Service 1984). Invasion and proliferation of nonnative annual grasses in the genera *Bromus* and *Schismus* in the Mojave desert has been implicated as a major factor responsible for reduced fire intervals and increased fire intensity in this formerly sparsely vegetated biome (Brooks 1999; U. S. Geological Survey 2003). Grasses exploit many different microhabitats and create a continuous and persistent fuel bed by filling in what was once plant free space with living plants and thatch (dead, dried plant material) (Brooks 1999). Because annual grasses vary in density with rainfall they have potential to significantly alter the fuel condition in wet years. Grasses also provide a “flashy” fuel that is easily ignitable due to the short time needed for fuel moisture to drop to low levels, even during a diurnal cycle.

Recurrent fire and/or natural successional processes when alien propagules are present can lead to vegetation type conversion of native shrub-dominated to alien-dominated landscapes (D’Antonio and Vitousek 1992; Haidinger and Keeley 1993; Keeley *et al.* 2005). Type conversion of native shrublands to alien-dominated grasslands following fire has been commonly observed in California shrublands (Keeley *et al.* 2005). Alien grasses and forbs are often capable of rapidly expanding into areas that have been disturbed by fire (D’Antonio and Vitousek 1992). Given sufficient time to recover between fires, shrublands may become re-established. However, repeated disturbance associated with high fire frequency has been observed to overwhelm the tolerance threshold of many shrub species (Keeley 2004; Jacobson *et al.* 2004).

Invasion of maritime desert scrub by nonnative grasses when accompanied by recurrent ignition sources in SHOBA could similarly result in the type conversion of this plant community to alien-dominated grasslands. Although it is likely that following an individual fire *Malacothamnus clementinus* will be able to persist by resprouting from roots, the ability of this species to withstand frequent recurrent fires facilitated by the invasion of nonnative species is unknown.

Erosion

Malacothamnus clementinus occurs in a range of conditions including rock crevices at the base and along canyon walls, along canyon rims and ridgelines, at the base of coastal terrace escarpments, and in flat areas adjoining creekbeds. In the southwestern portion of its distribution, it is found along coastal terraces that are largely derived from rocky, stable volcanic substrates that do not appear to be particularly prone to erosion (S. Junak pers. comm. 2006). However, erosion was listed as a potential threat to five occurrences that were documented adjoining creekbeds in 1996-1997 (Junak and Wilken 1998).

More generally, severe erosion historically accompanied overgrazing by domestic and feral herbivores on the island (U. S. Department of the Navy, Southwest Division 2001). Even following their removal, the legacy of these animals remains in the form of persistent and severe erosion on parts of the island. Although the rocky volcanic substrates where many occurrences have been documented do not appear vulnerable to erosion at this time, the association of this species with canyon rims and at the base of rocky walls and escarpments suggests erosion could be a factor within suitable habitat elsewhere. Because periods of erosion often follow fire (Wells 1987), this threat is likely exacerbated by recurrent fire.

II.C.2.b. Overutilization for commercial, recreational, scientific, or educational purposes: This factor was determined to be not applicable in the final listing rule (42 FR 40682). As a military installation, public access to San Clemente Island is restricted by the Navy. Known collections of this species since its listing have been performed to promote the recovery of the species through seed banking and research on its germination characteristics (M. Wall pers. comm. 2006).

II.C.2.c. Disease or predation: At the time of listing, grazing of feral goats and rooting of feral pigs were viewed as serious threats to the continued existence of *Malacothamnus clementinus* (42 FR 40682). In 1992, feral goats and pigs were entirely removed from the island, thus removing these threats. This appears to have significantly improved the prospects of survival for this species. Presently, there are no predators or diseases on San Clemente Island that are known to pose a significant threat to *M. clementinus*.

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

Federal Protections

This factor was determined not to be applicable in the final rule (42 FR 40682). At that time, the only regulatory mechanism with potential to protect *Malacothamnus clementinus* was the National Environmental Policy Act (NEPA), due to the occurrence of the species on federally owned land. This law continues to apply and requires the disclosure of environmental effects of projects under Federal jurisdiction. Although impacts to *M. clementinus* would likely be considered significant due to its rarity even if it were not listed, NEPA does not require that project proponents avoid, minimize, or mitigate such impacts. However, NEPA does require that proponents consider and disclose to the public the need for mitigation associated with proposed actions, and to include mitigation options among the alternatives considered.

The Act requires all Federal action 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 species (section 7(a)(2)). If *Malacothamnus clementinus* were not itself listed under the Act, some regulatory protection would still be incidentally afforded to it in those cases where *M. clementinus* occurs in habitat occupied by eight other listed species. In such locations, the Navy is obligated to consult with the U. S. Fish and Wildlife Service regarding any anticipated adverse impacts to listed species. Through the consultation process, the Service often works with the Navy to identify measures that will avoid, minimize, and promote the conservation of listed species.

One of the more significant section 7 consultations that has been completed was on the effects of the Navy's fire management activities. As part of that consultation, the Navy established fire management practices to minimize the risk of spread of fire from training activities into areas supporting sensitive species. The Navy also established a 3,908-hectare Island Night Lizard Management Area (INLMA) that overlaps the distribution of *Malacothamnus clementinus*. Based on our analyis of mapped occurrences, around 15 occurrences of *M. clementinus* fall within the INLMA. Some of the conservation measures adopted for this area include minimizing disturbances to the extent practicable by directing construction projects and training exercises elsewhere, performing exotic plant removals and management efforts to hasten the recovery of disturbed areas, and seeking concurrence from the Service for new activities proposed within the INLMA. Even if it were not protected by the Act, *M.*

clementinus would likely benefit from the minimization of disturbance and habitat management efforts in the INLMA.

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. 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" (p. 1-1, U. S. Department of the Navy, Southwest Division 2001). To achieve this, the San Clemente Island INRMP proposes an array of management strategies to address identified goals and objectives for specified management units and their natural resources.

Of relevance to the protection of *Malacothamnus clementinus*, 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. 4-39, U. S. Department of the Navy, Southwest Division 2001). Associated with this objective are a number of proposed management strategies that include the following: consideration of *M. clementinus* 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 *M. clementinus*; 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 *M. clementinus* 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.

Possibly in conflict with protection and/or recovery of *Malaocthamnus clementinus* is the competing objective included in the INRMP to protect military access to the SHOBA firing ranges due to SHOBA's high military value for ship-to-shore bombardment training (U. S. Department of the Navy, Southwest Division 2001). To minimize this conflict, the INRMP includes a set of Fire Management Guiding Principles. These principles reference a Fire Management Plan that has yet to be proposed or adopted (L. Kellogg, pers. comm. 2006). Presently, the guiding principles emphasize the allocation of fire protection resources for human life and firefighter safety first, with high value, vulnerable facilities; structures;

habitats; and natural and cultural resources ranked second. The guiding principles also call for the use of pre-suppression management to reduce the risk of ignitions and adverse ecological effects of wildland fire. When pre-suppression management strategies are needed to protect natural resource assets, highest priority is given to those assets that fall under regulatory compliance (*e.g.*, listed species).

To date, a number of the INRMP management strategies, or aspects of them, have been implemented. The Navy has implemented rare plant surveys that have documented new occurrences of *Malacothamnus clementinus*. Genetic research and pollination studies have also been performed. Concerted efforts have been made to control escape of fire from the SHOBA Impact Areas. However, other objectives have not been implemented, such as reducing the percent cover of invasive plants from 1992-93 baseline conditions (K. O'Connor pers. comm. 2006.).

Although the INRMP is technically not a regulatory mechanism because its implementation is subject to funding availability, it is an important guiding document that helps to integrate the military's mission with natural resource protection on San Clemente Island. An important objective of the INRMP is to protect military access to SHOBA firing ranges. However, the INRMP also targets a number of objectives towards protection of *Malacothamnus clementinus* and its habitat, and includes a set of fire management guiding principles and practices that help to reduce the threat of fire ignitions escaping into *M. clementinus* habitat.

II.C.2.e. Other natural or manmade factors affecting its continued existence: There are several other factors with potential to affect the continued existence of *Malacothamnus clementinus* that derive from both the natural attributes of extant populations, as well as proposed changes to the San Clemente Island fire management regime and civilian access to training areas.

<u>Natural Factors</u>

Although the number of known occurrences of *Malacothamnus clementinus* has increased dramatically since its listing, there appears to be little gene flow among occurrences and each is comprised of a relatively small number of individuals (Helenurm 1999; Junak and Wilken 1998; Junak 2006). The conservation biology literature commonly notes the vulnerability of species known from one or very few locations and/or from small populations (*e.g.*, Shaffer 1981, 1987; Primack 1998; Dunning *et al.* 2006). In particular, small population size and low levels of genetic interchange among them make *M. clementinus* populations particularly vulnerable to inbreeding depression and loss of genetic variability due to random fixation (*e.g.*, genetic drift). Genetic analysis further suggests that

M. clementinus has very low genetic variation at both the species and population levels (Helenurm 1997, 1999). Low genetic variation may influence the ability of populations to adjust to novel or fluctuating environments, survive stochastic events, or to maintain high levels of reproductive performance (Huenneke 1991).

Malacothamnus clementinus occurrences are already observed to have low seed production (Junak and Wilken 1998; Helenurm 1997, 1999). This may suggest low pollinator visitation or the existence of a self-incompatibility mechanism that may combine with low genetic diversity to constrain recruitment in populations (Junak and Wilken 1998; Helenurm 1999; Huenneke 1991). Although RAPD data show that patches of plants are not made up of a single clonal individual (*i.e.*, clump of genetically identical stems resulting from vegetative reproduction), it is still possible that patches are comprised of closely related individuals that share alleles controlling potential matings (Helenurm 1999). If this species has a predominantly outcrossing mating system but occurrences/patches consist of highly related individuals, then introduction of unrelated individuals among populations may be needed to improve the likelihood of successful matings and recruitment via sexual reproduction in the species.

<u>Fire Management</u>

The Navy has proposed for some time to change fire management policies and practices on San Clemente Island through adoption of a Fire Management Plan (FMP) that is in preparation. The Navy hopes that the FMP will provide greater flexibility when various munitions can be used during the fire season (K. O’Connor pers. comm. 2006). To be more cost-effective, 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, Southwest Division 2001; K. O’Connor pers. comm. 2006.). By using real-time weather and fire forecasting to determine when certain munitions can be used and when helicopters must be present, these modifications to the fire management policies could alter the effectiveness of fire suppression measures to protect *Malacothamnus clementinus* by increasing the logistical complexity of fire hazard reduction and strategic response. As suggested above, we believe that any change to the fire management regime which leads to shorter fire return intervals could reduce the suitability of habitat for and curtail the range of *M. clementinus* by overwhelming its tolerance threshold to fire.

Access to SHOBA

Because SHOBA is used for ship-to-shore bombardment as well as other munitions training exercises, access to this area is often restricted for non-military personnel (U. S. Department of the Navy, Southwest Division 2001). These restrictions can influence both the timing and locations where access is granted.

Historically, biologists doing surveys and other individuals doing invasive species control have been granted access to SHOBA during times that do not conflict with military exercises. Because sensitive resources are known to occur within the Impact Areas, biologists have also generally been granted access to the Impact Areas. However, because of the frequency of training, access can be restricted for several weeks at a time or more, and there may only be brief intervals when biological work can be done (K. O'Connor pers. comm. 2006.). This and the lead time needed to do range-scheduling can undermine the effectiveness of surveys and invasive species control efforts by limiting the ability to time these activities during optimal times in an organism's life cycle (*e.g.*, spraying herbicide prior to an invasive plant setting seed).

Safety concerns relative to the presence of unexploded ordinance within SHOBA have recently prompted the Navy to re-appraise access policies (K. O'Connor pers. comm. 2006). During the winter and spring of 2006, all access for non-military personnel was withheld for a one- to two-month period, and the Navy is presently considering adopting a new set of policies to address access (K. O'Connor pers. comm. 2006). These policies are anticipated to restrict access to the Impact Areas during times when an explosive-ordinance-device escort can be present, but the policies could eliminate all access to the Impact Areas by biologists and restoration personnel (K. O'Connor pers. comm. 2006). Restricted access to certain portions of the range could impair the ability of biologists to detect and combat new invasive plant colonists prior to their becoming established and presenting a significant threat to *Malacothamnus clementinus*. As discussed above, invasive species are one of the threats to *M. clementinus* due to their potential to directly compete with individual plants for light and space and/or their ability to indirectly increase the frequency and intensity of fire within *M. clementinus* habitat.

II.D. Synthesis

Historically restricted to a single known occurrence on San Clemente Island, the status of *Malacothamnus clementinus* has dramatically improved with the discovery of around 30 additional occurrences towards the southern end of the island since its listing in 1977. Expansion of its distribution and the overall recovery of San Clemente Island vegetation since complete removal of feral goats and pigs in 1992 suggest that these animals were a principle threat limiting the distribution of this species. Despite feral animal removals, a number of threats remain for *M. clementinus*, including competition with invasive plant species, erosion, alteration of San Clemente Island habitats by military activities, unnaturally high fire frequencies in the southern portion of its range, and constrained access to its habitat for conducting active management. Small sizes of *M. clementinus* occurrences, low genetic diversity (Helenurm 1997, 1999) and little gene flow among occurrences (Helenurm 1999) could also continue to threaten *M. clementinus* due to the vulnerability of small populations to a range of environmental, demographic, and genetic stochastic factors. Countering some of these threats is the adoption by the Navy of an INRMP for San Clemente Island that contains goals to minimize impacts and actively manage for the species.

Despite on-going threats, the trend for *Malacothamnus clementinus* appears to be the emergence of an increasing number of occurrences along the southwestern coastal terraces of San Clemente Island. Although it is conceivable that a catastrophe such as a drought or fire could still affect the entire distribution of the species, it now occurs across a broad enough area and in a diverse enough range of conditions that some occurrences would likely survive such an event. Monitoring information further indicates that the species is capable of withstanding occasional fire. This suggests that the species is no longer in danger of extinction throughout all or a significant portion of its range and warrants reclassification to threatened status.

III. RESULTS

III.A. Recommended Classification: Downlist to threatened status**.**

III.B. New Recovery Priority Number: <u>14, indicating a species with high recovery potential and low degree of threat.</u> The number of *Malacothamnus clementinus* occurrences have increased and threats have diminished for the species from a moderate to a lower level. The recovery potential for this species remains high.

III.C. If a reclassification is recommended, indicate the Listing and Reclassification Priority Number (FWS only): Based on the Final Listing Priority Guidance for Fiscal Year 2000 (64 FR 57114), this species should be given a delisting Priority Number 4 (signifying 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 reclassifying or delisting *Malacothamnus clementinus*, 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) Develop and implement a species reintroduction program in coordination with San Clemente Island restoration actions to accelerate the recovery of this species. Such

a plan should use genetic data to select source plants from populations with the highest levels of genetic variability (Helenurm 1999).

(2) Based on the recommendations of Helenurm (1999), perform additional genetic studies to determine the relatedness of individuals in patches and to determine the pattern of mating (*i.e.*, proportion of inbred and outcrossed seeds). If results from this study indicate that patches of plants consist of highly related individuals and seed production is impaired by a self-incompatibility mechanism or inbreeding, develop and implement a transplantation program to improve seed production in the species.

(3) To reduce the loss of any remaining genetic variation, incorporate as objectives in the INRMP to conserve as many populations of *M. clementinus* as possible and to manage those populations so that they support as many individuals as possible. In particular, work with the Navy to develop an environmental clean-up plan for the Lemon Tank dump site that provides for the conservation of *M. clementinus* in that location.

(4) Study the range of fire conditions, especially fire frequency, that *M. clementinus* can withstand.

(5) Perform additional studies on the pollination of naturally occurring populations to determine if low seed production is due to poor pollinator visitation.

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<u>Personal Communications</u>: The following people were contacted for information relevant to the status of *Malacothamnus clementinus*. 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. Telephone conversations with William Miller of the Carlsbad Fish and Wildlife Office on April 11, 2006, June 19, 2006, and June 30, 2006.

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U. S. FISH AND WILDLIFE SERVICE
5-YEAR REVIEW of *Malacothamnus clementinus*

Current Classification Endangered
Recommendation resulting from the 5-Year Review

__X__ **Downlist to Threatened**
____ **Uplist to Endangered**
____ **Delist**
____ **No change is needed**

Appropriate Listing/Reclassification Priority Number, if applicable __4__

Review Conducted By: William B. Miller

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

Approve ________________ Date 9-24-07

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

Approve ________________ Date 9/28/07