Trifolium trichocalyx
(Monterey Clover)

5-Year Review:
Summary and Evaluation

Photo by Dr. Ronald Branson

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

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5-YEAR REVIEW

Trifolium trichocalyx (Monterey Clover)

I. GENERAL INFORMATION

Purpose of 5-Year Review:

The U.S. Fish and Wildlife Service (Service) is required by section 4(c)(2) of the Endangered Species Act (Act) to conduct a status review of each listed species at least once every 5 years to ensure that its classification as threatened or endangered provides the appropriate level of protection. We consider the best available scientific and commercial data on the species, and focus on new information since the species was listed. The purpose of our review is to evaluate whether or not the species' status has changed since listing, and whether reclassification or delisting should be considered. Our original listing of a species as endangered or threatened is based on the existence of one or more of the five threat factors described in section 4(a)(1) of the Act, and we must consider these same five factors in any subsequent reclassification or delisting of a species. A 5-year review contains an analysis of updated information on the species' biology and threats, and we interpret progress towards recovery in the context of eliminating or reducing the five threat factors. If we recommend a change in listing status based on the results of the 5-year review, we must propose to do so through a separate rule-making process defined in the Act that includes public review and comment.

Species Overview:

As summarized in the recovery plan for this species, Recovery Plan for Five Plants from Monterey County, California (Service 2004), *Trifolium trichocalyx* is a small annual plant in the pea family (Fabaceae). The species is only known to occur in a 206-acre (83-hectare (ha)) area in the central portion of the Monterey Peninsula, Monterey County, California. This area is bordered by golf courses and residential development to the west, and residential and commercial development to the north, east, and south. *Trifolium trichocalyx* is a classic fire follower, taking advantage of reduced forest cover that allows a significantly higher proportion of light to reach the herbaceous ground cover for the first few years after a fire. The species becomes scarce when the forest canopy closes, persisting primarily as a seed bank in the soil while shade and competition increase during succession of the forest community. The area known to support the species has not undergone a significant fire since 1987 when approximately 160 acres (65 ha) burned. Because of this fact, this 5-year review contains little additional information that is not contained in the 2004 recovery plan. The species has not been observed since 1995 when 22 individuals were located.

Methodology Used to Complete the Review:

This review was prepared by the Ventura Fish and Wildlife Office (VFWO), following the Region 8 guidance issued in March 2008. We used information from the recovery plan, survey information from experts who have been monitoring various localities of this species, and the California Natural Diversity Database (CNDDB) maintained by the California Department of

Fish and Game (CDFG). The recovery plan and personal communications with experts were our primary sources of information used to update the species' status and threats. This 5-year review contains updated information on the species' biology and threats, and an assessment of that information compared to that known at the time of listing or since the last 5-year review. We focus on current threats to the species that are attributable to the Act's five listing factors. The review synthesizes all this information to evaluate the listing status of the species and provide an indication of its progress towards recovery. Finally, based on this synthesis and the threats identified in the five-factor analysis, we recommend a prioritized list of conservation actions to be completed or initiated within the next 5 years.

Contact Information:

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Lead Regional Office: Diane Elam, Deputy Division Chief for Listing, Recovery, and Habitat Conservation Planning, and Jenness McBride, Fish and Wildlife Biologist, Region 8, Pacific Southwest; (916) 414-6464.

FR Notice Citation Announcing Initiation of This Review: A notice announcing initiation of the 5-year review of this taxon and the opening of a 60-day period to receive information from the public was published in the Federal Register on March 25, 2009 (74 FR 12878). No information was received in relation to this species.

Listing History:

Original Listing
FR Notice: 63 FR 43100
Date of Final Listing Rule: August 12, 1998
Entity Listed: *Trifolium trichocalyx* (species)
Classification: Endangered

State Listing
Trifolium trichocalyx was listed as endangered by the State of California in 1979.

Associated Rulemakings: N/A

Review History: N/A

Species' Recovery Priority Number at Start of 5-Year Review: The recovery priority number for *Trifolium trichocalyx* is 5C according to the Service's 2008 Recovery Data Call for the Ventura Fish and Wildlife Office, based on a 1-18 ranking system where 1 is the highest-ranked recovery priority and 18 is the lowest (Endangered and Threatened Species Listing and Recovery Priority Guidelines, 48 FR 43098, September 21, 1983). This number indicates that the taxon is a species that faces a high degree of threat and has a low potential for recovery. The "C"

indicates conflict with construction or other development projects or other forms of economic activity.

Recovery Plan or Outline

Name of Plan or Outline: Recovery Plan for Five Plants from Monterey County, California

Date Issued: 2004

II. REVIEW ANALYSIS

Application of the 1996 Distinct Population Segment (DPS) Policy:

The Endangered Species Act defines species as including any subspecies of fish or wildlife or plants, and any distinct population segment (DPS) of any species of vertebrate wildlife. This definition limits listing as distinct population segments to 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.

Updated Information on Current Species Status, Biology, and Habitat:

Description

Trifolium trichocalyx is a much-branched prostrate annual herb of the pea family (Fabaceae). It can be quite inconspicuous, as the prostrate branches may be only 1.2 to 1.6 inches (3 to 4 centimeters (cm)) long. However, branches may reach a length of 8 to 12 inches (20 to 30 cm) with favorable conditions (Abrams 1944). Numerous flowers are clustered into heads subtended by laciniate-toothed involucres (whorl of specialized leaves). Purple corollas scarcely equal the length of the calyx and deciduous seed pods enclose up to seven seeds.

Species Biology and Life History

Trifolium trichocalyx is a classic fire follower, taking advantage of reduced forest cover that allows a significantly higher proportion of light to reach the herbaceous ground cover for the first few years after a fire. The species appeared after both a 1901 and 1987 fire in this area; thus possibly harboring a seed bank capable of surviving more than 85 years. Studies undertaken by Doak et al. (2000) investigated germination cues needed by the species. Their research suggests that light is the only germination requirement. However, seeds potentially buried within the historical occurrence area may require different germination cues than the seeds used in the germination experiment because the experimental seeds were never buried (Doak et al. 2000).

Morgan (pers. comm. 2009) stated that many clover species are very responsive to disturbance and would expect scarification of the seed (e.g., from disking or scraping) to result in re-generation of *Trifolium trichocalyx*.

Jones and Stokes Associates (1996) suggested that small bees are likely pollinators as they are with other *Trifolium* clover species; however, pollinators were not observed during their studies.

In 1 year of growing approximately six *Trifolium trichocalyx* plants, Morgan (pers. comm. 2009) stated that pollinators were never observed visiting the plants. Native bees, however, were observed visiting other *Trifolium* clover species that were grown concurrently and in the immediate vicinity of the *Trifolium trichocalyx* plants. Morgan suggested that pollinators are more likely to visit other *Trifolium* clover species that typically contain larger flowers and thus avoiding the smaller *Trifolium trichocalyx* flowers.

Distribution

Since the recovery plan was published for the species in 2004, no new information concerning species distribution has been gathered. The entire distribution of *Trifolium trichocalyx* is not well known due to: 1) information not having been collected at current known sites following most of the historical fires prior to the plant being identified, and 2) few biologists having expertise in identification of clover species (Service 2004). Additionally, while conducting research of the species, Doak et al. (2000) stated that much of the species life history consists of difficult-to-see seeds in the soil, which presents challenges that leave us with little knowledge on the distribution or ecology of *Trifolium trichocalyx*. In particular, censuses of the species' range have relied solely on surveying for adult plants, which are usually non-existent.

According to records available through the CNDDB (2009), the Consortium of California Herbaria (Consortium 2009), and various survey reports (Jones and Stokes Associates 1996, Ferreira 1995) all collections and unvouchered observations of *Trifolium trichocalyx* occur in an approximate 206 acre (83 ha) area in the central portion of the Monterey Peninsula which is referred to in this document as the Huckleberry Hill area. The habitat where the species is known to occur has been set aside as natural areas by Pebble Beach Company and consists of the Huckleberry Hill Natural Reserve and the S.F.B. Morse Botanical Reserve (Morse Reserve). It is likely that *Trifolium trichocalyx* may exist as a seed bank throughout the Huckleberry Hill area; however, until the next significant fire or appropriate fire management occurs in the vicinity, it is unlikely that additional sites will be discovered. Until better means are established to determine distributions and numbers of *Trifolium trichocalyx*, it is crucial to not rely solely on past distribution maps, as these surveys are likely to be as much the product of recent fire history as of the actual distribution of the species (Doak et al. 2000).

Abundance, Population Trends

Since the recovery plan was published for the species in 2004, no new information concerning species abundance has been gathered. Before the 1987 fire at Huckleberry Hill, the species was known only from occurrences at the area known now as the Morse Reserve, and near State Route 68. A small number of plants were observed near State Route 68 following a fire in 1990 (Yadon pers. comm. in Jones and Stokes Associates 1996), approximately 0.5-mile north of the nearest occurrence. The fire in May 1987 burned stands of Monterey pine and pygmy forests at the Morse Reserve and Huckleberry Hill Natural Reserve. The following spring approximately 1,000 plants were identified in recovering Monterey pine forest and in smaller numbers at scattered locations in recovering pygmy forest and on intervening slopes in recovering Monterey pine forest (Jones and Stokes Associates 1996). In spring 1989, only a few plants could be found at the sites of the 1988 occurrences, with much of the previous year's habitat dominated by foothill deer vetch (*Lotus humistratus*). All sites known to support the species during the 1980s

and 1990s were surveyed in 1995 and only two occurrences totaling 22 plants were found in small grassy clearings (Jones and Stokes Associates 1996).

Habitat or Ecosystem Conditions (e.g., amount and suitability)
Since the recovery plan was published for the species in 2004, no new information concerning the species habitat has been gathered. The majority of occurrences documented during 1988 and 1995 were on slopes ranging from 15 to 30 percent grade. The species occurs in openings within Monterey pine forest on poorly-drained Narlon loamy fine sand, and on well-drained Sheridan coarse loamy sand. These soils support a thin or loamy sand upper surface underlain by highly compacted sandy clay. Jones and Stokes Associates (1996) estimated that suitable habitat for the species has declined from 1,754 acres (710 ha) to the current extent of 539 acres (218 ha) due to residential and golf course development. This acreage figure was estimated using data from Jones and Stokes Associates (1994), which examined vegetation and soils on different geomorphic surfaces of the Monterey Peninsula.

Following the 1987 fire, all healthy populations were under standing dead Monterey pines in well-drained, deep soils. Jones and Stokes Associates (1996) reported that herbaceous species associated with *Trifolium trichocalyx* include Australian fireweed (*Erechtites argula*), and thimble clover (*Trifolium microdon*). Typical woody species commonly associated with the species are Monterey pine, Hooker's manzanita (*Arctostaphylos hookeri*), shaggy-barked manzanita (*Arctostaphylos tomentosa*), and huckleberry (*Vaccinium ovatum*). In areas where *Trifolium trichocalyx* occurs within pygmy forest, associated plants include Bishop pine (*Pinus muricata*) and the federally threatened Gowen cypress (*Cupressus goveniana* ssp. *goveniana*).

Changes in Taxonomic Classification or Nomenclature
No changes in taxonomy or nomenclature have been made since the time of listing.

Genetics
No new studies concerning the genetics of this taxon have been done since the time of listing.

Species-specific Research and/or Grant-supported Activities
In 1997, Federal funds were awarded to the University of California at Santa Cruz (UCSC) through the Service's Endangered Species Act section 6 grant program to identify the ecological factors affecting the recovery of *Trifolium trichocalyx* as well as four other plant taxa endemic to the Monterey Peninsula area (Doak et al. 2000). Specific to this species, research focused on determining how soil samples may be used to determine the presence of *Trifolium trichocalyx* seeds banks, and also to understand the germination cues needed by this species. Results of these studies have been incorporated into this report.

Five-Factor Analysis

FACTOR A: Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range

The Recovery Plan (Service 2004) identifies the most significant threat to the species has been the loss of potential habitat from urban and recreational (e.g., golf courses) development. At the

time of listing, less than 20 percent of the historical Monterey pine forest on the Monterey Peninsula was estimated to remain, much of it in fragmented and increasingly isolated stands (Jones and Stokes Associates 1994 in Service 1998). Jones and Stokes Associates (1996) estimated that habitat for the species has declined approximately 69 percent, from 1,754 acres (710 ha) to 539 acres (218 ha) as of 1996. Of locations mapped for the species, the majority of occurrences appear to be within the Huckleberry Hill Natural Reserve and Morse Reserve; however, individuals have been identified adjacent to the south of the Huckleberry Hill Natural Reserve. A number of plants are presumed to have been extirpated when the Poppy Hills Golf Course was developed in 1980 (Service 2004). The Service is unaware of any potential habitat losses since the species was listed in 1998.

The Huckleberry Hill Natural Reserve and Morse Reserve comprise over 400 acres (162 ha) of permanently dedicated open space. Land development plans by Pebble Beach Company, which were recently denied by the California Coastal Commission (CCC), would have resulted in the loss of 150 acres (61 ha) of Monterey pine forest, including the loss of 42 acres (17 ha) of Environmentally Sensitive Habitat Area (ESHA) (known as Sawmill Gulch), which is located within the Huckleberry Hill Natural Reserve. The scenic easement designation placed over the Huckleberry Hill Natural Reserve (including Sawmill Gulch) was required by the CCC as mitigation for the Spanish Bay Resort development approved in 1985 (CCC 2007). *Trifolium trichocalyx* is not known to occur within this area; however, the Spanish Bay Resort coastal development permit also requires that this area be restored. Therefore, Sawmill Gulch could potentially be used as habitat expansion areas for *Trifolium trichocalyx*. The land development plans would have preserved additional habitat in the vicinity of Huckleberry Hill; however, Ferreira (1995) states that any further development in the Huckleberry Hill area of Pebble Beach would be directly reducing remaining habitat for the species.

In summary, although some measures have been undertaken to protect the species remaining habitat, threats to the habitat persists, as evidenced by Pebble Beach Company's recent efforts to develop a large portion of the remaining Monterey pine forest on the Monterey Peninsula. Little opportunity for population expansion is available adjacent to the species occurrence locations because habitat has already been converted to other uses, including roads, residential development, and golf courses.

FACTOR B: Overutilization for Commercial, Recreational, Scientific, or Educational Purposes

Overutilization for commercial, recreational, scientific, or educational purposes was not known to be a factor in the 1998 final listing rule (63 FR 43100). Overutilization for any purpose does not appear to be a threat at this time.

FACTOR C: Disease or Predation

Disease or predation were not discussed as threats at the time of listing or in the recovery plan and are currently not considered threats to its existence.

FACTOR D: Inadequacy of Existing Regulatory Mechanisms

At the time of listing, regulatory mechanisms thought to have some potential to protect *Trifolium trichocalyx* included: (1) listing under the California Endangered Species Act (CESA); (2) the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA); (3) the California Coastal Act; and (4) local land use laws, regulations, and policies. The listing rule (63 FR 43100) provides an analysis of the level of protection that was anticipated from those regulatory mechanisms. This analysis appears to remain currently valid. *Trifolium trichocalyx* was listed as endangered by the State of California in 1979. As such, projects that would affect *Trifolium trichocalyx* are subject to CESA and CEQA requirements. The lead CEQA agency with primary authority or jurisdiction over a project is responsible for conducting a review of the project and to consult with other agencies concerned about resources affected by the project. However, required biological surveys are not always adequate to identify the presence of *Trifolium trichocalyx*, as the species is not visible above ground while it exists as seed banks.

In addition to the laws and regulations discussed above, local county regulations may also benefit *Trifolium trichocalyx.* This species occurs within a portion of the Monterey Peninsula included in the California Coastal Zone. The Del Monte Forest Land Use Plan of 1984 was developed to comply with the Coastal Act's requirement that all counties prepare a plan for those portions of the Coastal Zone within their jurisdiction. Once the Del Monte Forest Land Use Plan was certified by the CCC, development permits within the Del Monte Forest coastal zone became the responsibility of the County of Monterey. The County of Monterey also has designated certain areas, including a portion of where *Trifolium trichocalyx* is known to occur, as ESHAs. Although the County of Monterey recognizes the importance of these areas, protection of listed species through the California Coastal Act and local land use designations is dependent upon the review of the lead agency involved. Additionally, while no development projects have been implemented in the area where *Trifolium trichocalyx* occurs since the time of listing, State and local regulations may not protect the species from indirect impacts that occur from such threats as changes in hydrology in adjacent areas and the spread of nonnative species.

FACTOR E: Other Natural or Manmade Factors Affecting Its Continued Existence

<u>Alteration of fire frequency</u>

At the time of listing, the alteration of natural fire cycles was identified as a significant threat to the species' survival. The species is only known to occur within an area bordered by residential development and Pebble Beach Company facilities (e.g., golf courses, structures). This fact combined with the limited remaining habitat makes this species extremely susceptible to stochastic events. *Trifolium trichocalyx* seed banks within the Huckleberry Hill area are apparently viable after an extended period of time; however, due to fire suppression, the normal fire cycle in Monterey pines has been lengthened. Due to the lack of knowledge on the species, it is unknown what effect the lack of a natural fire regime will have on seed viability. In the absence of fire, or a reasonable habitat disturbance alternative, this species could become extirpated at certain locations or potentially be rendered extinct (CDFG 2005).

Small numbers of individuals and populations

Conservation biology literature discusses that small populations are threatened by inbreeding depression (Ellstrand and Elam 1993). Small populations can have significantly lower germination rates than larger populations of the same species due to high levels of homozygosity (Menges 1991). Based on historical records, we believe that urban and recreational development on the Monterey Peninsula has already reduced the distribution of this species in the area where it occurs. Indirect effects from urbanization in the Huckleberry Hill area could include changes in hydrology, vegetation, and an increase in nonnative species. While any one of these factors may not be enough to threaten the survival of *Trifolium trichocalyx* independently, its limited range and the cumulative and synergistic effects of all of these factors combined could be a threat to the survival and recovery of the species.

Climate Change

Current climate change predictions for terrestrial areas in the Northern Hemisphere indicate warmer air temperatures, more intense precipitation events, and increased summer continental drying (Field et al. 1999, Cayan et al. 2005, IPCC 2007). Recently, the potential impacts of climate change on the flora of California were discussed by Loarie et al. (2008). Based on modeling, they predicted that species' distributions will shift in response to climate change, specifically that the species will "move" or disperse to higher elevations and northward, depending on the ability of each species to do so. Species diversity will also shift in response to these changes with a general trend of diversity increases shifting towards the coast and northwards with these areas becoming de facto future refugia. However, predictions of climatic conditions for smaller sub-regions such as California remain uncertain. It is unknown at this time if climate change in California will result in a warmer trend with localized drying, higher precipitation events, or other effects. While we recognize that climate change is an important issue with potential effects to listed species and their habitats, we lack adequate information to make accurate predictions regarding its effects to *Trifolium trichocalyx* at this time.

III. RECOVERY CRITERIA

Recovery plans provide guidance to the Service, States, and other partners on ways to minimize threats to listed species and on criteria that may be used to determine when recovery is achieved. There are many paths to accomplishing recovery of a species and recovery may be achieved without fully meeting all recovery plan criteria. For example, one or more criteria may have been exceeded while other criteria may not have been accomplished. In that instance, we may determine that, over all, the threats have been minimized sufficiently, and the species is robust enough, to reclassify the species from endangered to threatened or perhaps to delist it. In other cases, new recovery opportunities unknown at the time the recovery plan was finalized may be more appropriate. Likewise, new information may change the extent that criteria need to be met for recognizing recovery of the species. Overall, recovery is a dynamic process requiring adaptive management, and assessing a species' degree of recovery is likewise an adaptive process that may, or may not, fully follow the guidance provided in a recovery plan. We focus our evaluation of species status in this 5-year review on how progress toward achieving recovery criteria has contributed to eliminating or reducing the listing threats discussed in the five-factor analysis.

The recovery plan indicates that downlisting for *Trifolium trichocalyx* can be considered when all of the following criteria have been achieved:

1. At least five viable populations (i.e., populations that are stable or increasing based on a minimum of 12 years of monitoring) occur in suitable habitat. One of these populations is the Huckleberry Hill population.

No other populations have been discovered or re-introduced within the known historic range of the species; therefore, this criterion has not been met. Ensuring that five viable populations occur in suitable habitat may be relevant; however, the complexities associated with identifying discrete populations of this ephemeral plant make it difficult for us to measure this criterion. This criterion may need to be revised in future recovery plans and could be based on preserving all or portions of the species remaining potential habitat.

2. All five of the sites are on land that is protected from human-induced disturbance (i.e., development, recreation) that would negatively affect growth or reproduction of the plants. Funds must be available for appropriate long-term management. As determined by research, protected habitat must be of adequate size (large enough to support a functioning ecosystem [e.g., species present to support seed dispersal and pollination, areas that support fluctuating distributions, areas that harbor suitable unoccupied habitat for population expansion]) and configuration to ensure that ecosystem and community processes and associated species (e.g., hydrologic regime, fire, food webs, pollinator fauna, Monterey pine forest communities) are maintained, and that an adequate diversity of sites exist for population expansion and for colonization of new areas as microhabitat conditions change.

As discussed above, we currently have no appropriate method for measuring five viable populations of the species; therefore, this criterion may need to be revised in future recovery plans. The majority of *Trifolium trichocalyx* occurrences are within areas that have been permanently protected by easements (i.e., Huckleberry Hill Natural Reserve and Morse Reserve). However, we believe that any further development in the Huckleberry Hill area of the Monterey Peninsula would directly reduce the species remaining habitat. Undeveloped areas within the vicinity of Huckleberry Hill that are not protected by easements are important for potential expansion of the species, and we believe they require protection. Additionally, funds dedicated for long-term management of the species in protected areas have not been committed. This criterion has not been met.

3. The Huckleberry Hill population and four additional viable populations (as described in 1 above) have been managed so as to allow regeneration of plants and replenishment of the seed bank found in the soil within protected habitat.

As stated in criteria (1) and (2) above, we have no suitable method to determine five distinct populations of this ephemeral species. Currently, the areas where *Trifolium trichocalyx* is known to occur is not being managed to allow regeneration of plants and replenishment of the seed bank. This criterion has not been met.

4. A seed bank has been established at a recognized institution certified by the Center for Plant Conservation.

Currently *Trifolium trichocalyx* seed is being stored at the Plant Genetic Resources Conservation Unit located on the Griffin Campus of the University of Georgia. Additionally, *Trifolium trichocalyx* seed is being stored at the U.S. Department of Agriculture's National Center for Genetic Resource Preservation in Fort Collins, Colorado. This criterion is relevant and up-to-date. This criterion has been met.

Criteria to delist the species were not included in the recovery plan. We stated that they would be developed after management was underway and specific data became available relating to presence of seed banks, germination, recruitment, and prescribed burn strategies.

IV. SYNTHESIS

The status of *Trifolium trichocalyx* has not changed substantially since the time of listing in 1998. At that time, the species was only known from the Huckleberry Hill area on the Monterey Peninsula, Monterey County, California. Jones and Stokes Associates (1996) estimated that habitat for the species has declined from 1,754 acres (710 ha) to the then current extent of 539 acres (218 ha) due to residential and recreational development. Since 1988, annual population numbers have fluctuated between approximately 1,000 plants in 1988, which were identified in an approximately 160 acre (65 ha) burned area at Huckleberry Hill, to 22 plants in 1995. The majority of known occurrences are within the Huckleberry Hill Natural Reserve and the Morse Reserve, with additional occurrence locations adjacent to and south of these areas. Recently, the CCC denied the approval of plans by Pebble Beach Company which would have eliminated over 150 acres (61 ha) of Monterey pine forest, including the development of a portion of the Huckleberry Hill Natural Reserve. This fact suggests that current land use protections may be enough to ensure that a portion of the species habitat remains undeveloped. However, this also suggests that the remaining Monterey pine forest habitat (which may harbor *Trifolium trichocalyx* seed banks) on the Monterey Peninsula is still threatened with development.

The species continues to be threatened by the alteration of natural fire cycles within the Monterey pine forest. Additionally, for this fire-follower to survive between fire cycles, the plant's habitat and seed bank must remain relatively intact and undisturbed. Extinction of *Trifolium trichocalyx* is very possible due to the small amount of remaining habitat and the ephemeral nature of the plant's reappearance after fires (Service 2004). In addition, there is little suitable habitat for the taxon to expand its current distribution because of residential and recreational development that has already occurred. The persistence of this plant species is wholly dependent on maintaining the remaining existing habitat and the recurrence of fire, whether intentional or unintentional. The little remaining existing habitat along with the ecological requirements (fire management) needed by this plant to reproduce leave *Trifolium trichocalyx* at extreme risk of extinction from stochastic events. We conclude that this taxon continues to be in danger of extinction throughout its currently known range and therefore meets the definition of endangered under the Federal Endangered Species Act; no status change is recommended at this time.

V. RESULTS

Recommended Classification:

____ Downlist to Threatened
____ Uplist to Endangered
____ Delist (indicate reasons for delisting per 50 CFR 424.11):
____ *Extinction*
____ *Recovery*
____ *Original data for classification in error*
__X__ No Change

New Recovery Priority Number and Brief Rationale: No change

VI. RECOMMENDATIONS FOR FUTURE ACTIONS

1. Work with Pebble Beach Company, Del Monte Forest Foundation, Pebble Beach Community Services District, and Pebble Beach residents to develop and implement a fire management plan that would mimic natural fire regimes within the Huckleberry Hill area. If a burn management plan is not implemented, burn box experiments should be conducted to determine where the species occurs within the Huckleberry Hill area.

2. Surveys for *Trifolium trichocalyx* should be conducted following fires and/or following substantial scarification of potential habitat on the Monterey Peninsula.

3. Experiment with establishment of new populations in similar habitat on the Monterey Peninsula or at Point Lobos State Reserve. If these efforts are successful, attempts to establish other populations could be undertaken on the Monterey Peninsula.

4. Germination trials should be conducted that mimic natural soil conditions and germination cues to establish more clearly the conditions needed to facilitate germination.

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Personal Communications

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U.S. FISH AND WILDLIFE SERVICE
5-YEAR REVIEW of *Trifolium trichocalyx* (Monterey clover)

Current Classification: Endangered

Recommendation Resulting from the 5-Year Review:

____ Downlist to Threatened
____ Uplist to Endangered
____ Delist
__X_ No change needed

Review Conducted By: Chad Mitcham

FIELD OFFICE APPROVAL:

Field Supervisor, U.S. Fish and Wildlife Service

Approve Diane K Noda Date 9/16/09