

Limnanthes floccosa ssp. *californica*
(Butte County Meadowfoam)

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



Photo by Rick Kuyper, USFWS

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

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5-YEAR REVIEW

Species reviewed: *Limnanthes floccosa* ssp. *californica* (Butte County meadowfoam)

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5-YEAR REVIEW
***Limnanthes floccosa* ssp. *californica* (Butte County meadowfoam)**

I. GENERAL INFORMATION

I.A. Methodology used to complete the review:

This review was prepared by Sacramento Fish and Wildlife Office (SFWO) staff using information from the 2005 *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* (Recovery Plan) (Service 2005), the California Natural Diversity Database (CNDDDB 2007), and personal communications with biologists and others with first-hand experience with *Limnanthes floccosa* ssp. *californica*. We interviewed knowledgeable individuals for their suggestions regarding *L. floccosa* ssp. *californica* for recommendations to assist in the recovery of the species. We used the U.S. Fish and Wildlife Service's (Service) March 27, 2006, 5-Year Review template to complete this review.

I.B. Contacts

Lead Regional or Headquarters Office – Diane Elam, Deputy Division Chief for Recovery, Listing, and Habitat Conservation Planning, and Jenness McBride, Fish and Wildlife Biologist, Region 8 (California and Nevada Operations),
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Lead Field Office – Kirsten Tarp, Recovery Branch, Sacramento Fish and Wildlife Office,
916-414-6600

I.C. Background

I.C.1. FR Notice citation announcing initiation of this review: 71 FR 14538, March 22, 2006

I.C.2. Listing history

Original Listing

FR notice: 57 FR 24192

Date listed: June 8, 1992

Entity listed: *Limnanthes floccosa* ssp. *californica*, a plant subspecies

Classification: Endangered

I.C.3. Associated rulemakings:

Critical habitat for this species was proposed on September 24, 2002 (67 FR 60033). The final rule to designate critical habitat for *Limnanthes floccosa* ssp. *californica* was published on August 6, 2003 (68 FR 46684). A re-evaluation of non-economic exclusions from the August 2003 final designation was published on March 8, 2005 (70 FR 11140). An evaluation of

economic exclusions from the August 2003 final designation was published on August 11, 2005 (70 FR 46924). Administrative revisions were published on February 10, 2006 (71 FR 7117).

I.C.4. Review History:

We have not conducted any previous 5-year reviews.

I.C.5. Species' Recovery Priority Number at start of review:

2C (full species, high degree of threat, high recovery potential), based on a priority ranking system where 1 is the highest-ranking recovery priority and 18 is the lowest. The "C" after the number indicates the conflict of the species with development projects or other construction or economic activity.

I.C.6. Recovery Plan or Outline

Name of plan: Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon

Date issued: December 15, 2005

II. REVIEW ANALYSIS

Species Overview

Limnanthes floccosa ssp. *californica* is a narrowly distributed annual plant in the meadowfoam or false mermaid family (Limnanthaceae). The range of the subspecies lies entirely within Butte County, California. *Limnanthes floccosa* ssp. *californica* is found primarily on the margins of vernal swales and to a lesser extent on the margins of vernal pools located on alluvial terraces in annual grasslands with mima mound topography. Mima mounds are soil mounds of unknown origin that are a few feet in height. The species is restricted to a narrow 28-mile strip along the eastern flank of the Sacramento Valley from northwestern to central Butte County (CNDDDB 2007). The species was first collected in 1914 near the intersection of State Highway 99 and Shippee Road, south of the City of Chico. However, it was not differentiated from the more widespread *L. floccosa* ssp. *floccosa* (woolly meadowfoam) until 1973, when it was determined to be a distinct taxon and given the name *L. floccosa* ssp. *californica* (Arroyo 1973). The 2005 Recovery Plan reported 21 natural *L. floccosa* ssp. *californica* occurrences (20 extant and one extirpated prior to the listing) and one introduced occurrence (C. Sellers, Community Service Department, City of Chico, *in litt.* 2006, CNDDDB 2007). Seven of those occurrences have been discovered since the time of listing in 1992 (North Table Mountain, Upper Rock Creek, and five localities on Dove Ridge Conservation Bank), but the range of the species remains largely unchanged. The occurrences are found at 165 to 1,167 feet in elevation (McNeill and Brown 1979, CNDDDB 2007). The experimental locality at Tuscan Preserve, also known as the Wurlitzer Ranch, in northern Butte County, was established from seed from the Doe Mill occurrence (C. Sellers, *in litt.* 2006).

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

II.A.1. Is the species under review listed as a DPS?

Yes
 No

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

II.B. Recovery Criteria

II.B.1. Does the species have a final, approved recovery plan containing objective, measurable criteria?

Yes
 No

II.B.2. Adequacy of recovery criteria.

II.B.2.a. Do the recovery criteria reflect the best available and most up-to-date information on the biology of the species and its habitat?

Yes
 No

II.B.2.b. Are all of the 5 listing factors that are relevant to the species addressed in the recovery criteria (and is there no new information to consider regarding existing or new threats)?

Yes
 No

II.B.3. List the recovery criteria as they appear in the recovery plan, and discuss how each criterion has or has not been met, citing information. For threats-related recovery criteria, please note which of the 5 listing factors are addressed by that criterion. If any of the 5 listing factors are not relevant to this species, please note that here.

General recovery criteria for *Limnanthes floccosa* ssp. *californica* and 19 other listed plants and animals are described in the 2005 Recovery Plan. This Recovery Plan uses an ecosystem-level approach because many of the listed species and species of concern addressed in the plan co-occur in the same natural ecosystem and share the same threats. The over-arching recovery strategy for *L. floccosa* ssp. *californica* is habitat protection and management. The five key elements that comprise this ecosystem-level recovery and conservation strategy are: (1) habitat protection; (2) adaptive management, restoration, and monitoring; (3) status surveys; (4)

research; and (5) participation and outreach. The four listing factors noted in the rule to list the species include habitat loss (factor A), predation or disease (factor C), inadequacy of existing regulatory mechanisms (factor D), and other man-made or natural factors affecting its continued existence (factor E). The Recovery Plan's recovery criteria address each of these factors. Factor B, overutilization for commercial recreational, scientific, or education purposes, was not included as a threat to this subspecies in the listing and is not addressed in the Recovery Plan.

The Recovery Plan describes the geographic distribution of vernal pool taxa according to the vernal pool regions defined by the California Department of Fish and Game (CDFG) (Keeler-Wolf *et al.* 1998). Vernal pool regions are discrete geographic regions identified largely on the basis of endemic species, with soils and geomorphology as secondary elements. Within the vernal pool regions, the Recovery Plan identifies core areas that support high concentrations of federally listed vernal pool species, are representative of a given species' range, and are generally where recovery actions are focused. Core areas are distinct areas that provide the features, populations, and distinct geographic and/or genetic diversity necessary to the recovery of a species. More than one federally listed vernal pool species may be found within a single core area, and the core areas encompass areas larger than just the location of any single species. Within each core area, the Recovery Plan identifies specific percentages of suitable habitat that should be protected to achieve recovery for listed species. Core areas are ranked as Zone 1, 2, or 3 in order of their overall priority for recovery, with Zone 1 reflecting the highest priority areas. Protection of the majority of suitable habitat within Zone 1 core areas, and Zone 2 and 3 core areas where appropriate, is recommended to provide corridors and dispersal habitat, support metapopulation dynamics, provide for reintroduction or introduction sites, and to protect currently undiscovered populations. Many of the species covered by the Recovery Plan can be recovered primarily through the protection of Zone 1 core areas.

In this review, most *Limnanthes floccosa* ssp. *californica* occurrences are those reported in the California Natural Diversity Database (CNDDDB). The CNDDDB defines occurrence as a location separated from other locations of the species by at least one-fourth mile that may contain populations, individuals, or colonies. For the purposes of this review, "element occurrence" or "occurrence" refers to a report contained in the CNDDDB. Places where the subspecies is found but that are unreported to CNDDDB are noted as "sites", "localities", etc., in order to differentiate them from occurrences as reported and defined in the CNDDDB.

Downlisting /delisting criteria for *Limnanthes floccosa* ssp. *californica* include:

1. Habitat protection: Accomplish habitat protection that promotes vernal pool ecosystem function sufficient to contribute to population viability of the covered species.

The Recovery Plan is designed to be implemented in a logical, progressive manner. *Limnanthes floccosa* ssp. *californica* occurs in the Northeast Sacramento Valley Vernal Pool Region. Core areas are ranked as Zone 1, 2, or 3 in order of their overall priority for recovery. All but three of the 20 extant natural occurrences of *L. floccosa* ssp. *californica* are found in four Zone 1 core areas. The three occurrences found outside of the core areas are (a) the type locality, north of Shippee, which may be extirpated; (b) an occurrence along Highway 99, north of Thermalito Afterbay; and (c) the recently discovered occurrence on North Table Mountain Ecological

Reserve. Further implementation of recovery actions in vernal pool habitat outside of the Zone 1 core areas described in the Recovery Plan may be recommended for *L. floccosa* ssp. *californica* occurrences found outside the Zone 1 core areas. Recovery criteria 1A-E address listing factor A (habitat loss).

1A. Suitable vernal pool habitat within each prioritized core area for the species is protected.

Four Zone 1 core areas are identified in the Recovery Plan as supporting occurrences of *Limnanthes floccosa* ssp. *californica* and being important for recovery of the subspecies: (1) Chico, (2) Doe Mill, (3) Oroville, and (4) Vina Plains. The amount of suitable habitat that exists rangewide has not yet been estimated; therefore, the percentage of suitable habitat that has been protected rangewide is still unknown. The Service has only recently approved the Recovery Plan and does not yet have sufficient information to quantify either the acreage of suitable habitat within each core area or the acreage of protected habitat that is suitable for *L. floccosa* ssp. *californica*.

One of the three known occurrences located outside of core areas is found within the North Table Mountain Ecological Reserve, owned and managed by CDFG (CNDDDB 2007). This reserve is managed for multiple use including hiking and hunting (CDFG website 2007b). The other two occurrences that are found outside of the Oroville core area are not protected. These occurrences are the type locality, northwest of Highway 99 and Gage-Shippee Road, which may be extirpated; and the occurrence found along Highway 99 north of Thermalito Afterbay.

Table 1: *Limnanthes floccosa* ssp. *californica* core recovery areas and occurrences (This table does not include the three occurrences found outside of core recovery areas).

| Core Area Name (# of Occurrences) | Occurrence Name | Natural/Created | Status | Ownership Type | Protection Type |
|-----------------------------------|-----------------------------|-----------------|------------|-----------------------|---|
| Chico (5) | | | | | |
| | Cohasset Road | Natural | Extant | CDFG | Conservation Easement |
| | Rancho Arroyo | Natural | Extant | Private | Conservation Easement on Foothill Park Preserve and Bidwell Ranch |
| | Chico airport | Natural | Extant | City of Chico | None |
| | Chico airport | Natural | Extant | City of Chico | None |
| | Diesel | Natural | Extirpated | Unknown | None |
| Doe Mill (4) | | | | | |
| | EO 34 – Doe Mill/ Bruce Rd. | Natural | Extant | Private/City of Chico | Partly protected under public agency fee ownership |

| | | | | | |
|--------------------|--|---------|--------------------|---|---|
| | | | | | |
| | EO 7 – Assembly of God/N. Enloe/ Bruce Rd./ Stilson Canyon. | Natural | Extant | Private | None |
| | EO 20 – North of Skyway/ Bruce Rd. | Natural | Extant | Private | None |
| | EO 43 – Humbug Rd/Skyway | Natural | Extant | Unknown | None |
| Oroville (7) | | | | | |
| | State Highway 149 | Natural | Extant | Butte County Association of Governments/Private | Conservation easement in progress |
| | Shippee Road | Natural | Presumed extant | Private | None |
| | Dove Ridge 5 localities | Natural | Extant | Private conservation bank | Conservation Easement |
| Vina Plains (3) | | | | | |
| | Rock Creek | Natural | Extant | Private | None |
| | Unnamed drainage | Natural | Extant | Private | None |
| | Tuscan Preserve | Created | Extant | Private | Conservation Easement |

Discussion of occurrences within each core area:

1. Chico core area: Four extant occurrences and one extirpated occurrence of *Limnanthes floccosa* ssp. *californica* are found in this core area. The Cohasset Road occurrence, which is one of the largest *L. floccosa* ssp. *californica* occurrences, was permanently protected in 2006 when the 754-acre parcel on which it is located was acquired by the California Department of Fish and Game in conjunction with five Federal and local partners (CDFG website 2007a). A portion of the Rancho Arroyo occurrence was protected in the 292-acre Foothill Park East Preserve in the late 1990s; the remainder of the occurrence is located on Bidwell Ranch, a 750-acre property owned by the City of Chico (C. Sellers, *in litt.*, 2006). The 120-acre area within Bidwell Ranch that supports the *L. floccosa* ssp. *californica*, its watershed, and 200-foot buffers will likely be set aside for *L. floccosa* ssp. *californica* conservation (C. Sellers, *in litt.*, 2006). The two occurrences surrounding the Chico Airport are currently

unprotected. The Diesel occurrence was last seen in 1980 and is considered extirpated due to development activities.

2. Doe Mill core area: This core area contains four occurrences of *Limnanthes floccosa* ssp. *californica*. A portion of the largest occurrence in this core area (CNDDDB Element Occurrence No. 34) is protected within the 15-acre Doe Mill Preserve, which is owned by the City of Chico and protected under public agency fee ownership (C. Sellers, C.R. Sellers Associates, *in litt.*, 2008). The remainder of Element Occurrence No. 34 and the other three occurrences in this core area are fragmented by roads and urban development. The remaining occurrences in this core area are unprotected and threatened by proposed development. We understand that projects are proposed in the Doe Mill core area which could affect *L. floccosa* ssp. *californica*, including the Stonegate, Eastgate, Meriam Park, Mission Vista Hills, and Canyon View High School projects (Service 1993, 2002, 2007, 2004a, and 2003, respectively), and expansion of State Route 32 by the City of Chico (Gallaway Consulting, Inc. 2006, J. Marr, CDFG, *in litt.*, 2007). Competition with nonnative plants also threatens this species at Doe Mill Preserve and other locations (D. Kelley, *in litt.*, 2007, Center for Natural Lands Management 1996).

3. Oroville core area: This core area contains seven occurrences of *Limnanthes floccosa* ssp. *californica* (one occurrence north of State Highway 149, one occurrence on Shippee Road, and five occurrences on Dove Ridge Conservation Bank). A portion of the occurrence along the north side of State Highway 149 is proposed to be protected by a conservation easement within the Butte County Area Governments' vernal pool creation site (Restoration Resources 2006, A. Newsum, Butte County Association of Governments (BCAG), pers. comm., 2008, A. Newsum, *in litt.*, 2008). The five occurrences found on the Dove Ridge Conservation Bank and the occurrence north of State Highway 149 are recorded in the CNDDDB as a single occurrence (CNDDDB 2007). The Conservation Bank is protected under a conservation easement that requires the site to be managed to benefit *L. floccosa* ssp. *californica* in addition to other federally listed species. In 2004, enlargement of natural vernal pools and swales by excavation, construction of seasonal wetlands, and planting of riparian woodlands was proposed within the Conservation Bank, in some cases within close proximity to swales occupied by *L. floccosa* ssp. *californica* (Loafer Creek LLC 2004). Expansion of the *L. floccosa* ssp. *californica* habitat within the Conservation Bank is still proposed (D. Nelson, Clark and Nelson, pers. comm., 2008). The Dove Ridge Conservation Bank Agreement was amended to include expansion of natural vernal pools and swales as a method to increase the number of credits available in the Bank (Loafer Creek LLC undated). The effects of this construction on the hydrology of the *L. floccosa* ssp. *californica* habitat at the Conservation Bank have not yet been analyzed.

4. Vina Plains core area: Two natural occurrences and one introduced occurrence of *Limnanthes floccosa* ssp. *californica* are found in this core area. The two natural occurrences, one located on an unnamed tributary to Rock Creek and another approximately one mile to the north on another drainage, are on privately-owned land and are unprotected. Little survey information is available on these occurrences. The introduced occurrence at Tuscan Preserve is protected under a conservation easement (C. Sellers, *in litt.* 2006). This occurrence, which has been surveyed for the last 15 years, varies annually in numbers of plants from 1,500 to 200,000

(D. Kelley, Kelley and Associates Environmental Sciences, Inc., *in litt.*, 2007, D. Kelley, pers. comm., 2007).

1B. Species occurrences distributed across the species geographic range and genetic range are protected. Protection of extreme edges of populations protects the genetic differences that occur there.

Limnanthes floccosa ssp. *californica* has been known historically and currently to occur only in Butte County within the Northeast Sacramento Valley Vernal Pool Region. The recovery criteria in the Recovery Plan are to protect 100 percent of all occurrences of the species and to protect 95 percent of suitable habitat rangewide within the four core areas. All or portions of nine of the 20 extant natural occurrences receive some level of protection. The protected *L. floccosa* ssp. *californica* locations are Stone Ridge Ranch, recently acquired in fee title by CDFG; Doe Mill Preserve, Foothill Park East Preserve, and Bidwell Ranch (these protect the Rancho Arroyo occurrence and are contiguous); the five locations at Dove Ridge Conservation Bank; and North Table Mountain Ecological Reserve, which is owned and managed by CDFG. This criterion has not been met because the occurrences at the most northern and southern edges of the subspecies' range have not yet been protected. The introduced locality at Tuscan Preserve is also protected under a conservation easement.

1C. Reintroductions must be carried out and meet success criteria established in the recovery plan.

The Recovery Plan recommends reintroduction to two locations (1) Shippee and (2) Diesel. The Diesel occurrence is considered extirpated by CNDDDB. The Shippee occurrence which was once considered extirpated has been considered extant since the subspecies was rediscovered there in 1988 and 1991 (CNDDDB 2008); however, a survey conducted in 2008 did not find the subspecies there (C. Sloop, Research Director, Laguna de Santa Rosa Foundation, pers. comm., 2008). Reintroduction to the Shippee location will likely not be recommended if additional surveys indicate the species is present. *Limnanthes floccosa* ssp. *californica* was introduced at the Tuscan Preserve, also known as Lower Wurlitzer Ranch, in 1992 and 1993, as compensation for loss of *L. floccosa* ssp. *californica* habitat north of the Doe Mill Preserve (C. Sellers, *in litt.*, 2003). Monitoring of the Tuscan Preserve over the past 15 years has shown the presence of between 1,500 and 200,000 plants (D. Kelley, pers. comm., 2007). No reintroductions to previously occupied habitat have occurred. This criterion has not been met.

1D. Additional occurrences identified through future site assessments, GIS and other analyses, and status surveys that are determined essential to recovery are protected. Any newly found occurrences may count towards recovery goals if the occurrences are permanently protected as described in the recovery plan.

Additional occurrences of *Limnanthes floccosa* ssp. *californica* may be found in potential habitat in Butte County, particularly on private lands which support suitable habitat and soil types but have not yet been surveyed. At this time, the Service is not aware of surveys of additional areas. A soil survey of Butte County has been completed (Natural Resources Conservation Service 2006); however, the soil types which support *L. floccosa* ssp. *californica* may occur in inclusions

that are too small to be captured at the scale of the soil series maps (J. Marr, CDFG, *in litt.*, January 18, 2007). No GIS or other analyses to identify areas of potential occurrence are known. This recovery criterion has not been met.

1E. Habitat protection results in protection of hydrology essential to vernal pool ecosystem function, and monitoring indicates that hydrology that contributes to population viability has been maintained through at least one multi-year period that includes above average, average, and below average local rainfall as defined above, a multi-year drought, and a minimum of 5 years of post-drought monitoring.

Monitoring of hydrology has not occurred at any of the known extant occurrences; therefore, this recovery criterion has not been met.

2. Adaptive Habitat Management and Monitoring

Recovery criteria 2A-D address listing factor A (habitat loss), C (disease and predation), and E (other natural or human-caused factors).

2A. Habitat management and monitoring plans that facilitate maintenance of vernal pool ecosystem function and population viability have been developed and implemented for all habitat protected, as previously discussed in sections 1A-E.

Habitat management and monitoring plans have been developed for four locations: the Dove Ridge Conservation Bank, Foothill Park East Preserve, Doe Mill Preserve, and Tuscan Preserve. However, it is unclear whether the Doe Mill Preserve Plan has been finalized or implemented. This criterion has not been met.

2B. Mechanisms are in place to provide for management in perpetuity and long-term monitoring of 1A-E, as previously discussed (funding, personnel, etc).

Of the protected locations of *Limnanthes floccosa* ssp. *californica*, only Dove Ridge Conservation Bank, Foothill Park East Preserve, and the Tuscan Preserve are known to have long-term funding for management and monitoring in perpetuity (J. Marr, pers. comm., 2007, D. Kelley, pers. comm., 2007, K. Whitney, Foothill Associates, *in litt.*, 2007). Therefore, this criterion has not been met. The locality north of State Highway 149 has been fenced and is being monitored; efforts are currently being made by Butte County Association of Governments to complete a conservation easement on the site (A. Newsum, pers. comm., 2008, A. Newsum, *in litt.*, 2008).

2C. Monitoring indicates that ecosystem function has been maintained in the areas protected under 1A-D for at least one multi-year period that includes above average, average, and below average local rainfall, a multi-year drought, and a minimum of 5 years of post-drought monitoring.

Many of the naturally-occurring locations have received varying levels and frequency of surveys; however, continuous monitoring of ecosystem function has not occurred during a time period

that meets the requirements specified in the 2005 Recovery Plan (one multi-year period that includes above average, average, and below average local rainfall, a multi-year drought, and a minimum of 5 years of post-drought monitoring). The introduced occurrence at Tuscan Preserve has been surveyed over the last 15 years (D. Kelley, pers. comm., 2007). This criterion has not been met.

2D. Seed banking actions have been completed for species that would require it as insurance against risk of stochastic extirpations or that will require reintroductions or introductions to contribute to meeting recovery criteria.

The Recovery Plan recommends collection of seeds from all extant occurrences. Seed was collected from some occurrences and accessioned at Rancho Santa Ana Botanic Garden in 1990, 1992, and 1999. Therefore, this criterion has been partially met.

3. Status Surveys:

This recovery criterion addresses listing factor A because surveys help to prioritize which occurrences should be protected first. Listing factor E is addressed because surveys help alert land managers to threats to *Limnanthes floccosa* ssp. *californica* from invasive, nonnative plant species and other natural or manmade factors.

3A. Status surveys, 5-year status reviews, and population monitoring show populations within each vernal pool region where the species occur are viable (e.g., evidence of reproduction and recruitment) and have been maintained (stable or increasing) for at least one multi-year period that includes above average, average, and below average local rainfall, a multi-year drought, and a minimum of 5 years of post-drought monitoring.

See 2C above. This criterion has not been met.

3B. Status surveys, status reviews, and habitat monitoring show that threats identified during and since the listing process have been ameliorated or eliminated. Site-specific threats identified through standardized site assessments and habitat management planning also must be ameliorated or eliminated.

The primary threat identified during the listing was loss of habitat due to urban development, particularly in the Chico area. Although some occurrences have been protected, proposed urban development or related projects such as road widening continues to threaten several occurrences, including all the occurrences in the Doe Mill core area. Surveys conducted for *Limnanthes floccosa* ssp. *californica* since the listing have been designed for the purpose of determining presence or absence of the subspecies within proposed development or road projects and have generally been limited in scope, focusing on a single parcel or occurrence rather than on threats to the occurrences. Threats to the subspecies also continue from nonnative plants and off-road vehicles. No new information since the time of listing is available on the level of threat from garbage dumping. This criterion has not been met.

4. Research:

Research addresses the four listing factors discussed in the listing.

4A. Research actions necessary for recovery and conservation of the covered species have been identified (these are research actions that have not been specifically identified in the recovery actions but for which a process to develop them has been identified). Research actions (both specifically identified in the recovery actions and determined through the process) on species biology and ecology, habitat management and restoration, and methods to eliminate or ameliorate threats have been completed and incorporated into habitat protection, habitat management and monitoring, and species monitoring plans, and refinement of recovery criteria and actions.

The Recovery Plan discusses a variety of research that would be beneficial to help refine recovery actions and criteria, and guide overall recovery and long-term conservation efforts (pages IV-53 to IV-63). The Recovery Plan recommends research on genetics, taxonomy, biology of vernal pool species, the effects of habitat management practices on vernal pool species and their habitat, and threats to vernal pool species and ecosystems. The Tuscan Preserve is the site of several research projects by University of California, Davis, graduate students (D. Kelley, pers. comm., 2007). The results of this research may provide valuable information for monitoring and management plans.

The majority of information needs discussed in the 2005 Recovery Plan are still outstanding. This criterion has not been met.

4B. Research on genetic structure has been completed (for species where necessary – for reintroduction and introduction, seed banking) and results incorporated into habitat protection plans to ensure that within and among population genetic variation is fully representative by populations protected in the Habitat Protection section of this document, described previously in sections 1A-E.

This criterion has not been met.

4C. Research necessary to determine appropriate parameters to measure population viability for each species have been completed.

See 4B, above. This criterion has not been met.

5. Participation and outreach:

Participation and outreach addresses the four listing factors described in the threats analysis in the original listing.

5A. Recovery Implementation Team is established and functioning to oversee rangewide recovery efforts.

The Recovery Plan discusses a variety of participation programs to achieve the goal of recovery of the listed species in the plan. An essential component of this collaborative approach is the formation of a single recovery implementation team overseeing the formation and function of multiple working groups formed at the vernal pool region level. The Service is currently in the preliminary stages of organizing both a recovery implementation team and multiple working groups. Service employees have met with various stakeholders to determine interest of stakeholders to be involved in working groups and/or the recovery implementation team. This criterion has not been met.

5B. Vernal pool regional working groups are established and functioning to oversee regional recovery efforts.

See 5A, above. This criterion has not been met.

5C. Participation plans for each vernal pool region have been completed and implemented.

See 5A, above. This criterion has not been met.

5D. Vernal pool region working groups have developed and implemented outreach and incentive programs that develop partnerships contributing to achieving recovery criteria 1-4.

See 5A, above. This criterion has not been met.

II.C. Updated Information and Current Species Status

II. C.1. Biology and Habitat

Limnanthes floccosa ssp. *californica* seeds germinate in the late fall after the rainy season begins. The earliest reported observation of seedlings is from November (M. Wacker, Center for Natural Lands Management, *in litt.* 2005). Seed that does not germinate in the first year following its production may still be viable. Seed dormancy is likely the cause of population fluctuations of up to two orders of magnitude between years in *L. floccosa* ssp. *californica*. Seedlings can apparently tolerate short periods of submergence (Jokerst 1989, Dole and Sun 1992).

Limnanthes floccosa ssp. *californica* typically begins flowering in February, reaches peak flowering in March, and may continue into April if conditions are suitable. Nutlets are produced in March and April, and the plants die back by early May (Jokerst 1989, Dole and Sun 1992).

Limnanthes floccosa ssp. *californica* has floral adaptations that allow for cross-pollination by insects, but self-pollination mechanisms take over to ensure seed set if insect pollination is unsuccessful. The particular pollinators of *L. floccosa* ssp. *californica* have not been identified; however, other meadowfoam species are pollinated by the native burrowing bees *Andrena limnanthis* and *Panurginus occidentalis* (Thorp and Leong 1998) and by honeybees (Kesseli and Jain 1984), beetles, flies, true bugs (order Hemiptera), butterflies, and moths (Mason 1952,

Thorp and Leong 1998). Hybridization between *Limnanthes* taxa is limited in natural settings, due to differences in flower structure, phenology, and microhabitat (Arroyo 1973, Jain 1976b, Ritland and Jain 1984, Dole and Sun 1992). Nutlets of *L. floccosa* ssp. *californica* are apparently dispersed by water and can remain afloat for up to 3 days (Hauptli *et al.* 1978). Most meadowfoam nutlets are dispersed only short distances. In an experiment where nine meadowfoam taxa were seeded into artificial vernal pools (Jain 1978), only four taxa colonized other parts of the pools where they had been introduced, and only two appeared in pools where they had not been seeded, even after 2 years. *Limnanthes floccosa* ssp. *californica* was not included in the study; however, *L. floccosa* ssp. *floccosa* was not found outside of the areas where it had been seeded. Thus, *L. floccosa* ssp. *californica* nutlets would not be expected to disperse beyond their pool or swale of origin. Birds and livestock are potential sources of long-distance seed dispersal, but specific instances of such dispersal have not been documented (Jain 1978).

II.C.1.a. Abundance and population trends:

When listed, there were 18 known extant occurrences of this subspecies (57 FR 24192). Quantitative information on the numbers of plants and area occupied by *Limnanthes floccosa* ssp. *californica* has not been collected in a consistent and systematic manner at all occurrences since the time of listing; therefore, definitive range-wide abundance and population trend information is not yet available. Some surveys have been conducted on individual locations with varying results. Surveys conducted in 2004 for *L. floccosa* ssp. *californica* indicate that some of the locations may be decreasing in numbers of plants (J. Dole *in litt.*, 2007, Center for Natural Lands Management 2004). However, at least one occurrence, Rancho Arroyo (also known as Foothill Park East Preserve), was reported to have increased in area and in number of plants beginning in approximately 2005 (K. Whitney, Foothill Associates, *in litt.*, January 30, 2007, C. Sellers, *in litt.*, 2007). Surveys conducted at Tuscan Preserve and Doe Mill Preserve over 15 years showed that numbers of plants fluctuated annually, reflecting the weather conditions (D. Kelley, *in litt.*, 2007).

II.C.1.b. Spatial distribution, trends in spatial distribution (e.g., increasingly fragmented, increased numbers of corridors, etc.), or historic range (e.g., corrections to the historical range, change in distribution of the species' within its historic range, etc.):

Habitat continues to be highly fragmented throughout the subspecies' range due to conversion of natural habitat for urban and agricultural uses. This fragmentation has resulted in smaller isolated occurrences of the subspecies. For example, the six *L. floccosa* ssp. *californica* colonies located around the intersection of Bruce Road, Humboldt Road, Stilson Canyon Road and State Highway 32 in Chico (CNDDDB 2008), were likely one large population prior to the construction of these roads. Current aerial photography indicates that vernal pools and swales in this area were apparently continuous across the landscape; however, the colonies are now hydrologically isolated from each other. Such populations may be highly susceptible to extirpation due to chance events or additional environmental disturbance (Gilpin and Soule 1988; Goodman 1987). If an extirpation event occurs in a occurrence that has been fragmented, the opportunities for recolonization will be greatly reduced due to physical isolation from other source occurrences.

Due to the fragmented nature of the occupied habitat, many occurrences are patchy rather than contiguous and thus have been counted as multiple occurrences by different individuals. Therefore, although the number of occurrences noted in the Recovery Plan (21) differs from that in the California Natural Diversity Data Base (16), the locations of occurrences and area occupied are largely in agreement.

The location of the two most recently recorded occurrences, at North Table Mountain and at Upper Rock Creek, expand the known range of the species by approximately 5 miles to the east and 0.8 mile to the north (CNDDDB 2007). The North Table Mountain occurrence is located in a single vernal pool and consisted of approximately 50 plants in 2005 (CNDDDB 2007). The Upper Rock Creek occurrence contained 500 plants, when last surveyed in 1999, in a drainage of a sloping terrace (CNDDDB 2007). Therefore, these additional occurrences do not affect the status of the species because they do not substantially increase the amount of known occupied habitat or its range.

Limnanthes floccosa ssp. *californica* occurs in different soils on Tuscan-Igo-Anita Complex Fan terraces of 0-3 percent slope, 0-50 percent rock cobble with an underlying clay durapan. According to the 2006 Butte Area Soil Survey, *L. floccosa* ssp. *californica* is found on 32 different "Musym" classes of soil, but always with an underlying durapan, rock cobble and common hydrological factors (J. Marr, CDFG, *in litt.* January 2007, Natural Resource Conservation Service 2006).

II.C.1.c. Habitat or ecosystem conditions (e.g., amount, distribution, and suitability of the habitat or ecosystem):

Limnanthes floccosa ssp. *californica* is found primarily in the deepest areas of vernal swales and to a lesser extent on the margins of vernal pools (Arroyo 1973, Dole 1988, Jokerst 1989, BioSystems Analysis, Inc. 1993, California Natural Diversity Data Base 2003). Both the swales and vernal pools where it grows are on alluvial terraces in annual grasslands with a mima mound topography (Kelley and Associates Environmental Sciences 1992b, BioSystems Analysis, Inc. 1993). Swales vary in width from narrow channels to broad, pool-like areas (LSA Associates, Inc. 1994). Occupied swales are inundated periodically by water from the surrounding uplands, causing the soil to become saturated. However, *L. floccosa* ssp. *californica* does not persist in pools or swales that are inundated for prolonged periods or remain wet during the summer months, nor does it occur in drainages where water flows swiftly (Jokerst 1989, Kelley and Associates Environmental Sciences 1993a). The swales that support *Limnanthes floccosa* ssp. *californica* are generally less than 3.9 inches deep (LSA Associates, Inc. 1994) and pools are typically less than 100 feet long (Jokerst 1989). *Limnanthes floccosa* ssp. *californica* has also been found occasionally in disturbed areas, such as drainage ditches, firebreaks, and graded sites (McNeill and Brown 1979, Jokerst 1989, Kelley and Associates Environmental Sciences 1992b, BioSystems Analysis, Inc. 1993, Kelley and Associates Environmental Sciences 1993a).

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

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

At the time of listing, the primary threat to *Limnanthes floccosa* ssp. *californica* was loss of habitat by urban development and proposed highway widening or realignment of Highway 149 (57 FR 24192). Currently, portions of nine natural occurrences and the created locality of *L. floccosa* ssp. *californica* are protected; the remaining 11 occurrences are located on privately owned land and are unprotected. Since listing, the widening of Highway 149 was the subject of an Endangered Species Act section 7 formal consultation between the Service and the U.S. Army Corps of Engineers, for which a biological opinion was developed (Service 2002a, Service 2004b). Avoidance measures, minimization measures, and compensation for impacts from the Highway 149 project to *L. floccosa* ssp. *californica* were described in the Service's biological opinion. Habitat loss or degradation from urbanization continues to be the greatest threat to all occurrences of the subspecies, even to those that are protected from development. Habitat degradation results from changes in the amount of surface and subsurface water hydrology, introduction of invasive plants, and in areas adjacent to agricultural or residential uses, introduction of pesticides and herbicides.

All occurrences in the Doe Mill core area are threatened variously by proposed residential, school, or road development projects. Occurrence number 7, for example, is threatened by three proposed subdivisions (Meriam Park (Service 2007), Stonegate (Service 1993), and Eastgate (Service 2002b)) and a high school (Canyon View High School (Service 2003)). The two occurrences in the Vina Plains core area are located on unprotected private land for which we have no information on possible development plans. Of the five occurrences in the Chico core area, two are protected (Stone Ridge Ranch, Foothill Park East Preserve/Bidwell Park), one has been considered extirpated since before the listing (east of Diesel Road), and two are threatened by potential indirect effects, such as changes in hydrology and introduction of invasive plants, from airport expansion (CNDDDB 2008). Of the seven localities in the Oroville core area, the occurrence north of Highway 149 is proposed to be partially protected in a vernal pool preserve, the occurrence on Shippee Road is located on unprotected private land. Five localities in the Oroville core area are found in the Dove Ridge Conservation Bank, which as noted earlier, may be subject to effects from vernal pool and swale expansion (Loafer Creek LLC undated); however, the beneficial or adverse effects of this expansion on the hydrology of *Limnanthes floccosa* ssp. *californica* habitat have not yet been analyzed.

In addition to the threats from development projects that have already been proposed, rapid population growth is predicted for all of Butte County and its urban areas. The City of Chico predicts the construction of approximately 20,000 new housing units and a 61 percent increase in population by 2030 (Butte County Association of Governments 2006). The population of Butte County is expected to increase by 48 percent by 2030 (Butte County Association of Governments 2006). The need for additional housing and associated development will likely threaten the remaining unprotected occurrences of *Limnanthes floccosa* ssp. *californica* which are mostly located in or near existing urban areas or roads.

In summary, portions of nine of the 20 extant natural occurrences of *Limnanthes floccosa* ssp. *californica* are protected from development; the remaining 11 natural occurrences are located on privately owned land and are unprotected. The single introduced locality is protected under a conservation easement. However, all occurrences, even those that are protected from development, are vulnerable to habitat loss or degradation resulting from changes in the amount of surface and subsurface water hydrology, introduction of invasive plants, and in areas adjacent to agricultural or residential uses, introduction of pesticides and herbicides.

II.C.2.b. Overutilization for commercial, recreational, scientific, or educational purposes:

Overutilization for commercial purposes was not known to be a factor in the 1992 final listing rule and does not appear to be a threat at this time.

II.C.2.c. Disease or predation:

We are not aware of any new information regarding disease or predation since the listing of *Limnanthes floccosa* ssp. *californica* in 1992. The 1992 listing rule does not mention disease as a factor; however, inappropriate grazing was noted as apparently causing adverse effects to the species at the Cohasset occurrence (57 FR 24192). Jokerst (1989) also mentions that numbers of plants increased when grazing was reduced at the North Enloe and Bruce-Stilson occurrences although the species persisted in areas receiving light to periodic heavy grazing. Development of appropriate grazing regimes is addressed in the 2005 Recovery Plan criteria.

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

Federal Laws

Endangered Species Act: The Endangered Species Act of 1973, as amended (Act), is the primary Federal law that provides protection for *Limnanthes floccosa* ssp. *Californica* since its listing in 1992. Section 7(a)(2) requires Federal agencies to consult with the Service to ensure any project they fund, authorize, or carry out does not jeopardize a listed species. Section 9 of the Act and Federal regulations pursuant to section 4(d) of the Act prohibit the “take” of federally endangered wildlife, however, the take prohibition does not apply to plants. Instead, plants are protected in two particular circumstances. Section 9 prohibits (1) the removal and reduction to possession (i.e. collection) of endangered plants from lands under Federal jurisdiction, and (2) the removal, cutting digging, damage, or destruction of endangered plants on any other area in knowing violation of a state law or regulation, or in the course of any violation of a state criminal trespass law. Section 9 also makes illegal the international and interstate transport, import export and sale or offer for sale of endangered plants and animals. The protection of Section 9 afforded to endangered species is extended to threatened wildlife and plants by regulation. Federally listed plants may be incidentally protected in areas where they co-occur with federally listed wildlife species. In some cases, federally listed plants are included as covered species in habitat conservation plans prepared by non-Federal applicants as part of the terms and conditions for issuance of an incidental take permit for federally listed wildlife under section 10(a)(1)(B).

Clean Water Act: Section 404 of the Clean Water Act may afford some protection to *Limnanthus floccosa* ssp. *californica*. The U.S. Army Corps of Engineers (USACE or Corps) issues permits for the discharge of dredged or fill material into navigable waters of the United States. The Corps interprets “the waters of the United States” expansively to include not only traditional navigable waters, but also other defined waters that are adjacent or hydrologically connected to traditional navigable waters. Before issuing a 404 permit to a project applicant that may affect federally listed species, the Corps is required under section 7 of the Endangered Species Act to consult with the Service.

However, recent Supreme Court rulings have called into question the Corps’ definition of Waters of the U.S. On June 19, 2006, the U.S. Supreme Court vacated two district court judgments that upheld this interpretation as it applied to two cases involving “isolated” wetlands. Currently, the Corps regulatory oversight of vernal pools is in doubt because of their “isolated” nature. In response to the Supreme Court decision, the Corps and the U.S. Environmental Protection Agency (USEPA) have recently released a memorandum providing guidelines for determining jurisdiction under the Clean Water Act. The guidelines provide for a case-by-case determination of a “significant nexus” standard that may protect some, but not all, vernal pool habitat (USEPA and USACE 2007). The overall effect of the new permit guidelines on loss of vernal pool habitat is not known at this time. If the Corps loses its regulatory authority over vernal pools, unmitigated destruction of potential habitat for *L. floccosa* ssp. *californica* may increase over the range of the species.

California State Laws

The State’s authority to conserve plants is comprised of four pieces of legislation: the California Endangered Species Act (CESA), the Native Plant Protection Act (NPPA), the California Environmental Quality Act (CEQA), and the Natural Community Conservation Planning Act (NCCPA) (California Native Plant Society 2001).

Limnanthus floccosa ssp. *californica* was State-listed as endangered in 1982. CESA (California Fish and Game Code, section 2080 *et seq.*) and NPPA (Division 2, Chapter 10, section 1908) prohibit the unauthorized take of State-listed threatened or endangered plant species. Unlike the take prohibition in the Federal Endangered Species Act, the State prohibition includes plants; however, landowners are exempt from this prohibition for plants taken via habitat modification. As noted in the 1992 Federal rule to list *L. floccosa* ssp. *californica*, the landowner is required to notify the CDFG 10 days in advance of changing land use in order to allow salvage of listed plants (NPPA Division 2, Chapter 10, section 1913).

The California Environmental Quality Act (CEQA) (chapter 2, section 21050 *et seq.* of the California Public Resources Code) requires government agencies to consider and disclose environmental impacts of projects and to avoid or mitigate them where possible. Under CEQA, public agencies must prepare environmental documents to disclose environmental impacts of a project and to identify conservation measures and project alternatives. Through this process, the public can review proposed project plans and influence the process through public comment. However, CEQA does not guarantee that such conservation measures will be implemented.

Butte County Association of Governments has begun preparation of the Butte Regional Habitat Conservation Plan/Natural Community Conservation Plan (Plan) (Butte County Association of Governments website 2007). The Plan is proposed to cover the western two thirds of Butte County and is being coordinated on behalf of the cities of Biggs, Chico, Gridley, Oroville, and Butte County. The Plan is proposed to cover 36 species including *Limnanthes floccosa* ssp. *californica* and is expected to be completed in 2010.

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

Other natural or manmade threats cited in the 1992 final rule include competition from nonnative plants in concert with the effects of grazing and stochastic extinction resulting from the effects of natural fluctuations in rainfall on small isolated populations (57 FR 24192). Additionally, due to proximity of the species to roads and urban development, garbage dumping, off-road vehicle use, and widening or realignment of Highway 149 were considered threats to portions of some occurrences. In addition to the threats discussed in the 1992 listing which continue to threaten the species, a new threat identified since the listing is the ecosystem effects of climate change.

Competition from Nonnative Plants: The Draft Land Management Plan for the Doe Mill Preserve (Center for Natural Lands Management 1996) noted that the occurrence of *Limnanthes floccosa* ssp. *californica* was “healthy” in 1991 but was reduced in numbers in 1996 and stressed from competition with the nonnative grass, *Taeniatherum caput-medusae* (medusa-head). The Draft Land Management Plan recommended mowing, burning, or grazing as the most feasible methods for controlling the grass (Center for Natural Lands Management 1996). The Doe Mill Preserve was burned within the last two years (B. Vlamis, pers. comm. 2007). However, the effects to invasive grasses from the fire were minimal and the preserve may require grazing in addition to controlled fall burns to control invasive grasses (D. Kelley, pers. comm., 2007). This occurrence, as well as other small, isolated occurrences, is threatened by insufficient grazing or other management practices to control invasive plants (D. Kelley, pers. comm., 2007). No specific information on threats to other occurrences of *L. floccosa* ssp. *californica* from competition with aggressive, nonnative plants is available.

Glyceria declinata (waxy manna grass) is a nonnative, perennial grass which may become a threat to *Limnanthes floccosa* ssp. *californica*. *Glyceria declinata* was not included as a threat in the rule to list the subspecies in 1992 but it is now known to occur in Butte County. *Glyceria declinata* is found in northern Butte County, 0.25 mile south of Singer Creek, just south of the Butte County line, adjacent to or within the Vina Plains core area (Joe Silveira, USFWS pers. comm., 2007). The Tuscan Preserve is located approximately two miles south of the observed occurrence of *G. declinata*, and there is concern that this invasive grass may invade the preserve.

Glyceria declinata forms dense stands and is able to invade vernal pool habitat and displace native plants (The Nature Conservancy 2006). Because of the rapidity with which *G. declinata* has become established in vernal pool habitat in other areas of California, including other listed species habitat, *G. declinata* could quickly become a threat to the species. Dense stands of *G. declinata* plants up to 3 feet in height can shade-out endemic vernal pool species and appear capable of eliminating or significantly reducing occurrences of native annual plant species (The Nature Conservancy 2006). For example, in 2001, the cover of *G. declinata* in a large vernal

pool in San Joaquin County was estimated as 2 percent; however, by 2006 the cover was greater than 90 percent (The Nature Conservancy 2006). The California Invasive Plant Council describes *G. declinata* as a moderately invasive plant about which little is known but that may be a serious pest in vernal pool habitats (California Invasive Plant Council 2006).

Drought and Climate Change: *Limnanthes floccosa* ssp. *californica* is an obligate wetland species found primarily in vernal swales and vernal pools (Arroyo 1973, Jokerst 1989); therefore, maintenance of the natural hydrology of these wetlands is necessary for the survival and recovery of this subspecies. Drought or flood conditions will place additional strains on the vernal pool ecosystems supporting *L. floccosa* ssp. *californica* occurrences, all of which are already fragmented or reduced by development and road construction. Where occurrences persist on only marginal habitat, the addition of drought conditions is likely to result in higher rates of mortality in the short term with the effects of low reproductive output and survivorship persisting after the drought has ceased. It is unknown how quickly *L. floccosa* ssp. *californica* occurrences may rebound after severe climatic conditions.

Climate is predicted to change in California during the 21st century (Lenihan *et al.* 2006, Cayan *et al.* 2005, Field *et al.* 1999). Even modest changes in warming could result in a reduction of the spring snowpack, earlier snowmelt, and more runoff in winter with less runoff in spring and summer, more winter flooding, and drier summer soils (Cayan *et al.* 2005, Field *et al.* 1999). Although the specific effects of climate change on *L. floccosa* ssp. *californica* are not yet known, the predicted shift in precipitation of increased winter runoff and reduced spring and summer rainfall have the potential to adversely affect this subspecies.

Off-road Vehicles: Impacts from off-road vehicles continue to threaten to the subspecies. In 2006, a vehicle driving off-road in Bidwell Ranch became stuck in the mud near an area supporting *L. floccosa* ssp. *californica* (B. Vlamis, pers. comm., 2007). Vehicles can crush the plants and seeds, and compact the soil, thus making germination more difficult, and alter the hydrology of the habitat. Portions of many *L. floccosa* ssp. *californica* occurrences are located adjacent to roads and are unfenced thereby exposing them to potential damage from off-road driving.

II.D. Synthesis

When listed in 1992, the major threats to known occurrences of *Limnanthes floccosa* ssp. *californica* were habitat loss and fragmentation from urbanization and conversion of natural lands to agriculture. Nine of the 20 total extant natural occurrences are now partially or completely protected; however, the remaining occurrences continue to be threatened by land conversion to urban development, habitat loss and fragmentation, impacts from surrounding land use, adjacent road widening, competition with nonnative plant species, potential changes to hydrology, introduction of pesticides and herbicides, off-road vehicles, stochastic extinction, and other human activities. In particular, all four occurrences in the Doe Mill core area are threatened by proposed development projects. Secondarily, lack of management of invasive plants, including inappropriate levels of grazing, is also a major threat. The overall trend of the subspecies is unclear due to lack of systematic surveys; occurrences which have been monitored

appear variously to be declining, increasing, or stable. Many occurrences occupy a small area and have small numbers of plants, indicating that extirpation is still a threat even on protected sites. As potential *L. floccosa* ssp. *californica* habitat is converted to other land uses throughout the four core areas without prior surveys for the species, opportunities for discovery of additional occurrences are lost.

The Recovery Plan noted that there are a total of 20 known extant occurrences of this species, an increase from 18 reported in the 1992 listing (Service 1992). The number of occurrences recorded in CNDDDB and by the Service has changed over time as new occurrences were discovered or when multiple occurrences were combined into single occurrences. Currently, 20 natural extant and one introduced occurrence are known to exist, and one occurrence has been extirpated. Since the listing in 1992, the discovery of two new occurrences has expanded the known range of the subspecies by only 5 miles to the east and less than a mile to the north.

The recovery criteria in the Recovery Plan are to protect 100 percent of all occurrences of the subspecies and to protect 95 percent of suitable habitat rangewide within the four core areas. Currently, portions of nine of the 20 natural occurrences are protected. Therefore, this recovery criterion has not been met. In addition to habitat preservation, other criteria discussed within the Recovery Plan have not been met, and in some instances, not initiated. These include research, monitoring, management, and participation and outreach. Based on the continued threats of habitat loss and degradation, nonnative invasive plants, and small population size, we conclude that *Limnanthes floccosa* ssp. *californica* still meets the Act's definition of endangered, and no status change is recommended at this time.

III. RESULTS

III.A. 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*
- No change is needed**

III.B. New Recovery Priority Number: 3C

We recommend that the recovery priority number be changed to 3C because the taxonomic unit is "subspecies" and has a high degree of threat and a high potential for recovery. The "C" indicates that some degree of conflict exists with urban development. Previously, the recovery priority number was 2C which is for the taxon of "species".

IV. RECOMMENDATIONS FOR FUTURE ACTIONS

1. Permanently protect remaining occurrences through conservation easements, fee title, or other protective methods. Implement existing approved management plans for *Limnanthes floccosa* ssp. *californica*. Develop and implement management plans for all occurrences for which management plans have not yet been developed.
2. Conduct a status survey of all recorded locations of *Limnanthes floccosa* ssp. *californica* to verify the identity of the plants and determine the status, area occupied, micro-site and hydrology analysis, pollinators, and threats of plants present. Many of the occurrences in CNDDDB have not been thoroughly surveyed for over 15 years. The one presumed extirpated site should also be revisited and surveyed.
3. Conduct surveys on potential *Limnanthes floccosa* ssp. *californica* habitat in Butte County for additional occurrences, including the area northeast of Highway 99 between the City of Chico and the intersection of Highways 70 and 149.
4. Conduct studies to determine the effects of grazing and burning on *Limnanthes floccosa* ssp. *californica* and appropriate management at each *L. floccosa* ssp. *californica* occurrence based on individual conditions of each location such as soil type and grass species present.
5. Conduct a study to determine the effects of nonnative, invasive plants on *Limnanthes floccosa* ssp. *californica* and appropriate management at *L. floccosa* ssp. *californica* occurrences.

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U.S. FISH AND WILDLIFE SERVICE
5-YEAR REVIEW OF *Limnanthes floccosa* ssp. *californica*


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

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

Review Conducted By Sacramento Fish and Wildlife Office staff

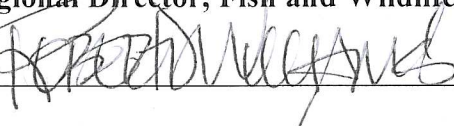
FIELD OFFICE APPROVAL:

Lead Field Supervisor, Fish and Wildlife Service

Approve  Date 7 July 2008

REGIONAL OFFICE APPROVAL:

Lead Regional Director, Fish and Wildlife Service

Approve  Date 7/10/08

Active