Cirsium hydrophilum var. *hydrophilum*
(Suisun Thistle)

5-Year Review:
Summary and Evaluation

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U.S. Fish and Wildlife Service
Sacramento Fish and Wildlife Office
Sacramento, California
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5-YEAR REVIEW
Cirsium hydrophilum var. *hydrophilum* / Suisun Thistle

I. GENERAL INFORMATION

Purpose of 5-Year Reviews:

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. The purpose of a 5-year review is to evaluate whether or not the species' status has changed since it was listed (or since the most recent 5-year review). Based on the 5-year review, we recommend whether the species should be removed from the list of endangered and threatened species, be changed in status from endangered to threatened, or be changed in status from threatened to endangered. Our original listing of a species as endangered or threatened is based on the existence of threats attributable to 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 consideration of reclassification or delisting of a species. In the 5-year review, we consider the best available scientific and commercial data on the species, and focus on new information available since the species was listed or last reviewed. 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:

Cirsium hydrophilum var. *hydrophilum* is a perennial herb in the Asteraceae (aster) family. It has slender, erect stems that are 3.0 to 4.5 feet tall and well branched. The upper leaves are deeply lobed and reduced to narrow strips with strongly spine-toothed margins. Pale lavender-rose flower heads appear between July and September. *Cirsium hydrophilum* var. *hydrophilum* grows in the upper reaches of tidal marshes, where it is associated with *Typha angustifolia* (narrowleaf cattail), *Scirpus americanus* (three-square or American bulrush), *Juncus balticus* (Baltic rush) and *Distichlis spicata* (saltgrass). Once fairly common in appropriate habitat throughout Suisun Marsh (Solano County), the subspecies' current distribution is restricted within Suisun Marsh to scattered colonies within relict undiked high tidal marshes (fully tidal, emergent estuarine marshes) at Peytonia Slough Ecological Reserve, Rush Ranch, upper Hill Slough, and the Joice Island portion of Grizzly Island Wildlife Area. Much of its historic tidal wetland habitat has been converted to diked, managed, or muted (damped tide) tidal marshes. Extant populations are threatened by (1) changes to natural tidal regimes, (2) feral pigs, (3) mosquito abatement activities, (4) invasion by *Lepidium latifolium* (perennial pepperweed), (5) plant-eating insects, and (6) extirpation of small populations due to random events.

Methodology Used to Complete This Review:

This review was prepared by the Sacramento Fish and Wildlife Office (SFWO), following the Region 8 guidance issued in March 2008. We used species survey and monitoring reports from experts who have been monitoring various localities of this species, peer-reviewed journal articles and the California Natural Diversity Database (CNDDB) maintained by the California

Department of Fish and Game. Personal communications with experts were our primary sources of information used to update the species' status and threats. We received one comment letter in response to our Federal Notice initiating this 5-year review. 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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Federal Register (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 February 14, 2007 (72 FR 7064). We received comments from one group, California Native Plant Society, in response to this notice. They support retaining endangered status for this species.

Listing History:

Original Listing
FR Notice: 62 FR 61916
Date of Final Listing Rule: November 20, 1997
Entity Listed: Subspecies: *Cirsium hydrophilum* var. *hydrophilum*
Classification: Endangered

Associated Rulemakings: In the final listing rule for *Cirsium hydrophilum* var. *hydrophilum* (Suisun thistle) and *Cordylanthus mollis* ssp. *mollis* (soft bird's beak), we determined that the designation of critical habitat was not prudent because the designation would not be beneficial to the conservation of the two subspecies (U.S. Fish and Wildlife Service 1997). On November 17, 2003, the Center for Biological Diversity and others filed a lawsuit in the Northern District of California against the Secretary of the Interior, challenging the not prudent determination of critical habitat for the two subspecies (Center for Biological Diversity, *et al*. v. Gale Norton, Secretary of the Department of the Interior, *et al*., CV 03-5126-CW). As part of the stipulated settlement, the Service agreed to finalize the designation on or before April 1, 2007. A proposed rule to designate critical habitat for the two plant subspecies was published in the Federal Register on April 11, 2006 (71 FR 18456). On April 12, 2007, the Service published a final rule in the Federal Register to designate critical habitat for *Cirsium hydrophilum* var. *hydrophilum* (Suisun thistle) and *Cordylanthus mollis* ssp. *mollis* (72 FR 18517; U.S. Fish and Wildlife Service 2007). Sites designated for as critical habitat for *C. hydrophilum* var. *hydrophilum* were Hill Slough Marsh; Peytonia Slough Marsh; Rush Ranch/Grizzly Island Wildlife Area (U.S. Fish and Wildlife Service 2007).

Review History: We have not conducted any prior five-year review or other status reviews for this species.

Species' Recovery Priority Number at Start of Review: The recovery priority number for *Cirsium hydrophilum* var. *hydrophilum* is 3C, according to the Service's 2007 Recovery Data Call for the SFWO, 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 variety that faces both a high degree of threat and a high potential for recovery. The "C" indicates conflict with construction or other development projects or other forms of economic activity.

Recovery Plan or Outline: The Sacramento Fish and Wildlife Office is currently preparing a draft recovery plan for this species.

II. REVIEW ANALYSIS

Application of the 1996 Distinct Population Segment (DPS) policy

The Endangered Species Act (the Act, 32 USC 1531 et seq.) defines "species" to include any subspecies of fish, wildlife or plants, and any distinct population segment of any species of vertebrate fish or wildlife. This definition limits the listing of distinct population segments (DPSs) to vertebrate species. 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.

Information on the Species and its Status

Abundance

At the time of listing, only two sites were known to have been occupied by *Cirsium hydrophilum* var. *hydrophilum*: Peytonia Slough Ecological Reserve and Rush Ranch, both in Suisun Marsh. Collectively, the occurrences of the subspecies totaled a few thousand individuals, occupying a total area of less than one acre (U.S. Fish and Wildlife Service 1997). At the time of listing, no active management was occurring at either location.

Since the time of listing and in the absence of recent surveys, the species is thought to be present at the above two sites, plus upper Hill Slough and the Joice Island portion of Grizzly Island Wildlife Area, both in Suisun Marsh (CNDDB 2006). The Joice Island location is near the eastern end of the Rush Ranch colonies and may be part of that same population. Potential habitat exists on private land directly adjacent to the four known locations on public land. The status of the species on private land is unknown.

Peytonia Slough Ecological Reserve

Peytonia Slough Ecological Reserve is owned and managed by California Department of Fish and Game (CDFG). The population there is associated with tidal marsh habitats that are hydrologically connected to Peytonia Slough. Because hydrological alterations within the Peytonia Ecological Reserve have been extensive and made it difficult to access potential habitat areas, there has never been a complete rare plant survey of this property. There is extensive potential habitat present, including a dense network of surrogate habitat in the form of the mosquito ditches typically dug to drain problem areas (Grewell 2006). Though these mosquito ditches may support the species in the short-term, they are artificial and cannot sustain the species in the long-term.

A fire started by vandals at Peytonia Slough Ecological Reserve in 2001 may have affected or eliminated this population of *Cirsium hydrophilum* var. *hydrophilum* (Grewell, pers. comm. 2007). There have not been any surveys for the species at either the burned or unburned portions of the Reserve since this fire.

Rush Ranch

Rush Ranch is owned and managed by Solano Land Trust. The colonies at Rush Ranch are associated with tidal marsh habitats that are hydrologically connected to the First and Second Mallard Branches, Cutoff Slough and Suisun Slough. This location represents the largest population of *Cirsium hydrophilum* var. *hydrophilum.*

The most recent comprehensive survey of *Cirsium hydrophilum* var. *hydrophilum* within its range was conducted at Rush Ranch by L.C. Lee and Associates (LCLA) for the Solano County Water Agency in June and July 2003. This study documented 209 patches grouped into 47 subpopulations across approximately 8.55 acres. All were considered to belong to a large, single population of approximately 137,500 (range of 22,300 to 873,200) individuals (LCLA 2003). This survey demonstrates a population size of *C. hydrophilum* var. *hydrophilum* which far exceeds previous estimates made at the time of listing. In addition, preliminary transect data

from that study suggest a vigorous size/age class distribution of the species, with recruitment of young individuals exceeding the total number of flowering reproductive adults (LCLA 2003).

Hill Slough

In June 2007, a new location was identified for *Cirsium hydrophilum* var. *hydrophilum* in a fully tidal area in the upper reaches of Hill Slough (CDFG pers. comm. 2007*a*). The population size was estimated at 10 plants. The occurrence was documented by a California Department of Fish and Game botanist and is a valid report.

Grizzly Island Wildlife Area

Grizzly Island Wildlife Area is owned and managed by CDFG. The colonies here are associated with tidal marsh habitats that are hydrologically connected to Second Mallard Branch, Cutoff Slough and Montezuma Slough. There have been no surveys of *Cirsium hydrophilum* var. *hydrophilum* at Grizzly Island Wildlife Area since 2003.

Reproduction

Specific flower pollinators of *Cirsium hydrophilum* var. *hydrophilum* have not been directly studied; however field observations indicate that several bee species may be important in pollinating the species (LCLA 2003). The most common insect species observed gathering pollen at Rush Ranch was the yellow-faced bumble bee (*Bombus vosnesenskii*) (LCLA 2003).

Flowering plants may produce hundreds of seed heads. Seed heads observed in July 2000 had three to five ripe seeds per head, but many of them contained aborted seeds or were found with insect larvae in active seed predation (Baye 2000).

Information on short and long distance seed dispersal in *Cirsium hydrophilum* var. *hydrophilum* is lacking. All new colonies detected in the last decade have been clustered around known populations in Suisun Marsh (B. Grewell pers. comm. 2000). The presence of numerous small, discrete colonies of *C. hydrophilum* var. *hydrophilum* as seen by LCLA (2003) at Rush Ranch suggests that the subspecies may have relatively local breeding microhabitats resulting in limited seed dispersal. However, the height of the point of seed release has a large effect on dispersal distances of plumed seeds (Harper 1977). The relatively tall stature of this subspecies, as compared to other associated tidal marsh plants, and flat topography of the surrounding marsh could potentially allow for long distance seed dispersal.

<u>Spatial distribution</u>

Cirsium hydrophilum var. *hydrophilum* is only known from locations in Suisun Marsh. Its distribution has been reduced to only four locations therein. In addition, the fire at Peytonia Slough, mentioned above, may have destroyed the entire population at that location. If a fire indeed eliminated that population and the individuals at Grizzly Island Wildlife Area are, in fact, part of the larger Rush Ranch population, then it is possible that the Rush Ranch and Hill Slough populations are the only remaining extant populations of *C. hydrophilum* var. *hydrophilum*.

<u>Habitat or ecosystem</u>

Most known *Cirsium hydrophilum* var. *hydrophilum* occurrences are found in regularly flooded and permanently saturated habitats, along the banks of canals or ditches, within 50 to 100 feet of

the high water mark of natural tidal channels; and on tidal floodplains within tidal marshes (U.S. Fish and Wildlife Service 2007). Habitat for the species does not occur within diked seasonal wetlands with drainage ditches that are dry part of the year. However, permanent ponds and perennially-flooded tidal ditches that supply such ponds within managed marsh may potentially harbor *C. hydrophilum* var. *hydrophilum* (U.S. Fish and Wildlife Service 2007).

During the survey by LCLA in 2003, most *Cirsium hydrophilum* var. *hydrophilum* individuals were found along the banks of Suisun and Cutoff Sloughs; First and Second Mallard Branches and their tributaries; and the mosquito ditches that bisect the marsh (LCLA 2003). Seventy percent of subpopulations were found along mosquito ditches. Infrequently, LCLA documented patches occurring in high marsh habitat distant from flowing water.

Anthropogenic muting of tidal regimes in the lower Hill Slough area, as described below under section II.C.2.a, may explain why *Cirsium hydrophilum* var. *hydrophilum* is not widespread here, but this is speculative (Grewell 2006). In fact, the population at upper Hill Slough, in tidal habitat, was only recently identified. California Department of Fish and Game intends to restore the area north of Hill Slough to fully tidal marsh in the future, however, restoration planning is still in the preliminary stages (CDFG 2007*b*).

Habitat exists at Hill Slough, an area on the opposite side (east side) of Suisun Slough from the Peytonia Slough population, despite muted tidal flows and lack of historic records of the species' occurrence.

Though none of the locations supporting *Cirsium hydrophilum* var. *hydrophilum* have undergone detailed assessments of habitat or ecosystem conditions, it appears that most locations do not support full ecosystem function due to muted tidal action or invasive species issues.

Five-Factor Analysis

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

In the final listing rule, threats under this factor all related to alteration of the natural tidal regime (*i.e.*, diking and filling involved in agricultural land conversion and urbanization, ditching for mosquito abatement, changes to freshwater inflow, and habitat fragmentation). There has generally been little to no change in the magnitude and imminence of these threats since the time of listing. Since the time of listing, new habitat conversion for purposes of urbanization or conversion to seasonal wetlands has not occurred in habitat for *Cirsium hydrophilum* var. *hydrophilum* on public land. However, private lands continue to experience development (Grewell, pers. comm. 2007). Derelict and actively maintained levees from historic diking practices continue to result in muted (damped) tidal flows, which in turn, reduce available habitat for *C. hydrophilum* var. *hydrophilum*. Diversion of tidal flows into the Lawler Ranch ditch (mitigation for the Suisun City subdivision north of the tidal wetland) may be a limitation to *C. hydrophilum* var. *hydrophilum* full establishment at the Hill Slough site. These diversions, initiated in the early 1990s likely affected tidal hydroperiod at Hill Slough that is also correlated

with a reduction in fecundity of the formerly robust population there of *Cordylanthus mollis* ssp. *mollis* (soft bird's beak), a generally associated federally endangered plant (Grewell 2006).

Alteration of natural tidal cycles still exists in much of the potential habitat and represents both the most significant historic and current threat to *Cirsium hydrophilum* var. *hydrophilum* and its habitat. With respect to effects to *C. hydrophilum* var. *hydrophilum*, alteration of tidal cycles includes muting of tidal flows, increases in freshwater runoff and diversion of freshwater for agricultural and municipal uses. A large portion of historic tidal marshes in Suisun Bay were diked and managed for waterfowl. These historic reductions of habitat have affected the extent and composition of tidal marsh communities. As a result, many native halophytic (salt-tolerant) plants are exceedingly rare in tidal marshes within the estuary (Goals Project 1999). One area where tidal restoration may result in opportunities for proliferation of the species is at Hill Slough (L. Thompson pers. comm. 2007). Also, an 80 acre ponded area at Rush Ranch is being considered for restoration to tidal habitat (B. Wallace pers. comm. 2007). If tides are returned to this area, it may well support populations of *C. hydrophilum* var. *hydrophilum* in the future. Both projects are in the preliminary planning stages.

The brackish tidal wetlands in Rush Ranch have been ditched extensively to drain standing water, in an effort to reduce mosquito breeding habitat. Ditching has greatly altered the hydrology of the marsh, primarily because the ditches cut across natural drainage patterns. As a result, mosquito ditches have led to the reduction of tidal inundation and the consequent infilling of first order channels, creating new mosquito breeding habitat (Collins *et al*. 1986, WRA *et al*. 1989). Originally, ditching may have reduced *Cirsium hydrophilum* var. *hydrophilum* habitat by reducing tidal influence in first order channels. However, the mosquito ditching currently provides new, artificial habitat for *C. hydrophilum* var. *hydrophilum* similar enough to first order channels to promote colonization of these ditches. In the 2003 LCLA study, seventy percent of *C. hydrophilum* var. *hydrophilum* subpopulations were associated with mosquito ditch banks. Even though *C. hydrophilum* var. *hydrophilum* appears to have responded favorably to mosquito ditching, large scale ditching is extremely disruptive to the tidal marsh system (LCLA 2003).

Existing threats under this factor not discussed in the listing rule include impacts to habitat from the rooting and trampling of feral hogs, the curtailment of habitat due to anticipated sea level rise, and fire.

The threat from feral hogs (*Sus scrofa*) to *Cirsium hydrophilum* var. *hydrophilum* was not described in the listing rule, however, it is a present threat at both known locations of the species. Thirty-four percent of the *C. hydrophilum* var. *hydrophilum* subpopulations at Rush Ranch showed signs of damage due to rooting and trampling of feral pigs when surveyed in 2003 (LCLA 2003). Further, disturbances on the landscape created by feral pigs may enhance colonization opportunities for a non-native plant *Lepidium latifolium* (perennial pepperweed), to threaten the tidal marsh ecosystem, discussed further under Factor E (LCLA 2003). No formal study has been conducted to conclude the degree of threat from feral hogs. No management is currently occurring at known locations to ameliorate these threats.

Sea level rise, such as that potentially associated with global climate change, and anticipated associated flood control responses, though not discussed in the listing rule, may impose

significant long-term threats to conservation of *Cirsium hydrophilum* var. *hydrophilum*. Conservation of high marsh zones in the face of sea level rise requires landward transgression (displacement) of the marsh profile on broad, sloping plains (Field *et al*. 1999, Baye 2006). Many alluvial terraces and valleys adjacent to the estuary are bordered by steep levees or are already converted to intensive agriculture, residential, or commercial development. In Suisun Bay, however, some undeveloped grazing land remains. If the sea level rises, conflicting needs for flood protection, agriculture, and marsh transgression could effectively compress tidal marsh zones to a point at which they could not support C. *hydrophilum* var. *hydrophilum* habitat (Grewell 2006). Land use planning and economic pressures that favor conversion of "underdeveloped" grazing lands contribute to the loss of potential transgressive high marsh habitat for long-term viability of the species (Baye 2006).

Planning Efforts

Two regional planning efforts provide (or will provide upon completion) some degree of conservation. The Suisun Marsh Protection Plan of 1976 (SMPP) establishes a "primary management area" in Suisun Marsh that encompasses the entire range of *Cirsium hydrophilum* var. *hydrophilum* (San Francisco Bay Conservation and Development Commission (BCDC) 1976). The plan recommends that areas within the primary management area "should be protected and managed to enhance the quality and diversity of the habitats". It further recommends that "the tidal marshes in the primary management area should be preserved" and that "where feasible, historic marshes should be returned to wetland status" (BCDC 1976). This plan has been generally successful in limiting and defining development in the area.

The Suisun Marsh Habitat Management, Preservation, and Restoration Plan (SMHMP) is being developed by the Suisun Marsh Charter Group (Charter Group), a collaborative effort among Federal, State, and local agencies with primary responsibility for actions in the Suisun Marsh. The Charter Group was formed in 2001 to resolve issues of amending the Suisun Marsh Preservation Agreement (SMPA), obtain a Regional General Permit from the U.S. Army Corps of Engineers, implement the Suisun Marsh Levee Program, and recover local populations of threatened and endangered species. The Charter Group has been charged with developing a regional plan that would outline the actions needed in Suisun Marsh to preserve and enhance managed seasonal wetlands, restore tidal marsh habitat, implement a comprehensive levee protection and improvement program, and protect ecosystem and drinking water quality. The proposed SMHMP also would provide for simultaneous protection and enhancement of: (1) the Pacific Flyway and existing wildlife values in managed wetlands; (2) threatened and endangered species; (3) tidal marshes and other ecosystems; and (4) water quality, including, but not limited to, the maintenance and improvement of levees. The SMHMP is expected to be completed (via Notice of Determination and Record of Decision) by October 2009 (J. Engle pers. comm. 2007).

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

As stated in the final rule, overutilization currently is not known to be a factor for this species. Increased collecting for scientific or horticultural purposes or excessive visits by individuals interested in seeing rare plants was expected to potentially result from increased publicity

resulting from publication of the final listing rule (U.S. Fish and Wildlife Service 1997). We have no new information regarding this potential threat.

FACTOR C: Disease or Predation

In the final listing rule, the presence of a thistle weevil (*Rhinocyllus conicus*) in a portion of the *Cirsium hydrophilum* var. *hydrophilum* population was stated to be a possible threat to the species. This threat was discovered by California Department of Water Resources in June 1996 when the weevil was collected inside *C. hydrophilum* var. *hydrophilum* flower heads, many of which had no seeds (U.S. Fish and Wildlife Service 1997). The larval stage of this weevil is known to feed on seeds. Plant-eating insects can significantly limit seed production and plant demography as seen in several other *Cirsium* species (Louda and Potvin 1995; Palmisano and Fox 1997; Rose et al. 2005).

Since the time of listing, there has been more documentation of the presence of the thistle weevil on *Cirsium hydrophilum* var. *hydrophilum* at Rush Ranch, though the degree of its threat is still unknown. In 2003, Louda and her colleagues (2003) found that two introduced weevil species (*Rhinocyllus conicus* and *Larinus planus* [Canada thistle bud weevil]) caused population decline in native thistle species in the central prairie states. The same year, LCLA found *R. conicus* present on *C. hydrophilum* var. *hydrophilum* at Rush Ranch.

In addition, *Phyciods mylitta* caterpillars were collected on a population of *C. hydrophilum* var. *hydrophilum* in September 1996. These caterpillars have caused significant damage to the rosettes of plants that will flower the following year (U.S. Fish and Wildlife Service 1997).Though documented in the listing rule to have occurred previously at Rush Ranch, *Phyciods mylitta* caterpillars were not located there during LCLA's 2003 study.

L.C. Lee and Associates did not collect sufficient data to assess whether *R. conicus* or *P. mylitta* pose a significant threat to *C. hydrophilum* var. *hydrophilum.* Additional research is necessary to better our understanding of these threats to the species. No management is currently occurring at known locations to ameliorate these threats (Grewell, pers. comm. 2007).

Disease was not stated in the listing rule as a threat to the species, nor is it currently known to threaten the species.

FACTOR D: Inadequacy of Existing Regulatory Mechanisms

<u>Federal laws</u>
Although the final rule listing *Cirsium hydrophilum* var. *hydrophilum* as an endangered species stated that Section 404 of the Clean Water Act represents the primary Federal law that affords some protection to the species since it occurs in wetlands, it also stated that the Clean Water Act, by itself, does not provide adequate protection to the species. The Service, as part of the Section 404 review process, provides comments to the U.S. Corps of Engineers on nationwide permits and individual permits, however, the Service's comments are only advisory. In practice, a rare plant species would likely not receive any special consideration with regard to conservation or protection unless it was listed under the Act (62 FR 61916).

The National Environmental Policy Act (NEPA) (42 U.S.C. 4321 et seq.) may afford some protection to populations affected by Federal activities. The NEPA requires all Federal agencies to formally document, consider, and publicly disclose the environmental impacts of Federal actions and management decisions affecting the human environment, but NEPA does not require or guide mitigation for impacts.

State Laws

Cirsium hydrophilum var. *hydrophilum* is not state-listed under the California Endangered Species Act, so no protection is afforded to the plant therein. Also, the Native Plant Protection Act (Division 2, Chapter 10, section 1900 *et seq*.) does not provide any special protection to this species.

The California Environmental Quality Act (CEQA) requires disclosure of potential environmental impacts of proposed projects and identification of opportunities for conservation efforts, it does not guarantee that such conservation efforts would occur. Protection of species through CEQA is, therefore, dependent upon the discretion of the lead agency involved.

Absent the listing of the species as endangered under the Act, no changes in the adequacy of protections of section 404 of the Clean Water Act, the California Endangered Species Act or CEQA are known to have occurred since the time of listing. Existing regulatory mechanisms are not adequate to provide for this species.

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

Several threats were identified under this factor in the listing rule: invasion of *Lepidium latifolium* (perennial pepperweed), possible hybridization with *Cirsium vulgare* (bull thistle), chronic oil spills and associated clean-up efforts, and risk of extirpation of small populations due to random events. There has generally been no change in the magnitude and imminence of these threats since the time of listing, though management efforts are expected to be underway soon to help ameliorate several of these threats.

All known populations of *Cirsium hydrophilum* var. *hydrophilum* are negatively affected by non-native plants. The most problematic and widespread invasive plant in Suisun Marsh is the perennial herb, *Lepidium latifolium* (Grewell 2005). It occurs along the high marsh edge of San Francisco Bay, especially in disturbed areas, deposits of sand or tidal litter, or levee slopes. In brackish marshes with lower salinity, it invades the middle marsh plain and channel edges. *Lepidium latifolium* forms large monotypic patches that displace native marsh vegetation (Renz 2000). As much as 40 percent of *L. latifolium* biomass is below-ground, with most of it concentrated in the upper 24 inches (Renz 2000). This concentration of biomass in surface roots enhances the weed's competitiveness for water and nutrients. Further, as well as being a prolific seed producer, its roots fragment easily and can sprout even after exposure on the soil over the winter. Root fragments also can be carried by water and establish new populations where they are deposited (Renz 2000). L.C. Lee and Associates (2003) observed that one of the five most dominant associates of *C. hydrophilum* var. *hydrophilum* at Rush Ranch, based on canopy coverage, was *L. latifolium*. A *L. latifolium* control plan is currently being developed by Solano

Land Trust for implementation at Rush Ranch. No control plan exists for *L. latifolium* at Peytonia Slough Ecological Reserve or Grizzly Island Wildlife Area (Grewell pers. comm. 2007).

As stated in the listing rule, hybridization with *Cirsium vulgare*, a non-native, also is a potential threat to *Cirsium hydrophilum* var. *hydrophilum.* Hybridization with *C. vulgare* was suggested as a possible explanation for the previously presumed extinction of *C. hydrophilum* var. *hydrophilum* (Smith and Berg 1988). Though recent studies have indicated that the two species coexist at Rush Ranch, no genetic studies have been conducted since the time of listing to determine if hybridization has indeed occurred. L.C. Lee and Associates (2003) found that 45 percent of *C. hydrophilum* var. *hydrophilum* subpopulations at Rush Ranch contained *C. vulgare*. It is known that *C. vulgare* hybridizes readily with other *Cirsium* species. No research is currently planned to determine if hybridization is occurring and no management plan is in place or development to ameliorate this threat at any of the three known locations.

Oil spills and chronic pollution from point and non-point sources (heavy metal contamination from point and non-point sources) continue to occur in or near habitat for *Cirsium hydrophilum* var. *hydrophilum* (U.S. Fish and Wildlife Service 2007). On April 27, 2004, Kinder Morgan Energy Partners, L.P. spilled 123,774 gallons of diesel fuel through a ruptured pipeline in western Suisun Marsh near Roos Cut. The spill occurred within known habitat for *C. hydrophilum* var. *hydrophilum* and contaminated 225 acres of the marsh to varying degrees (Solano County 2005). It is not known whether populations of *C. hydrophilum* var. *hydrophilum* were directly affected.

It is not known how fire affects the viability of *Cirsium hydrophilum* var. *hydrophilum* or its seed, but it is considered a minor threat nonetheless. Human-caused fires present a continual threat of at least temporary habitat loss in Suisun Marsh. Three fires have occurred recently within existing and potential *C. hydrophilum* var. *hydrophilum* habitat in Suisun Marsh (Grewell pers comm. 2007). Arsonists set fire in 2001 to a large portion of Peytonia Slough Ecological Reserve, burning all vegetation from Suisun Slough to the Southern Pacific Railroad tracks, including the only remaining previously known population at Peytonia Slough Ecological Reserve. There has been no follow-up survey to document the distribution and abundance of *C. hydrophilum* var. *hydrophilum* on the reserve since the fire.

Peytonia Slough Ecological Reserve endured a second fire in February 2007 which burned 50 to 60 acres of potential tidal marsh habitat.

Since the time of listing, the distribution of the species within its range has not increased and the habitat of the species remains restricted due to fragmentation and historic conversion to other uses. The resulting small populations are still highly susceptible to extinction due to random natural and human-made events, such as pest outbreaks, extended drought, oil spills, genetic or demographic problems or a combination of these events.

III. RECOVERY CRITERIA

Does the species have a final, approved recovery plan containing objective, measurable criteria? No.

IV. SYNTHESIS

The overall population status of *Cirsium hydrophilum* var. *hydrophilum* appears to be declining at this time. The number of individuals appears generally increasing at Rush Ranch, the largest of the populations. However, there is reason to believe that fire may have destroyed the Peytonia Slough Ecological Reserve population and the Grizzly Island Wildlife Area colonies may not be a separate population from that at Rush Ranch. This would leave just two extant populations. In addition, muting of tidal cycles and invasion of non-native *Lepidium latifolium* in *C. hydrophilum* var. *hydrophilum* habitat are immediate, ongoing, widespread and significant threats which show no sign of being ameliorated in the near future. The significant ramifications of sea level rise due to global climate change could result in loss of populations and habitat in the future. To a lesser degree, rooting and trampling from feral hogs, mosquito abatement activities, possible hybridization with *Cirsium vulgare*, oil spills and other pollution, and extirpation of small populations due to random events also threaten the survival of *C. hydrophilum* var. *hydrophilum*.

These threats face the species regardless of whether ownership is public or private. Even on public land, functional habitat management/ restoration plans are not yet in place for any of the three locations supporting *C. hydrophilum* var. *hydrophilum*. Similarly, CDFG's tidal restoration plan for the Hill Slough area is still in the very early planning phases. Even after plans are implemented, a population response by *C. hydrophilum* var. *hydrophilum* will not be immediate. Moreover, the cost of tidal restoration efforts are often expensive, requiring substantial economic and community support. Therefore, these efforts represent potential, but not current amelioration of the significant threats facing *C. hydrophilum* var. *hydrophilum*. The ultimate status of the species depends heavily on full implementation of management plans. Maintaining stable populations will depend upon future diligent and long-term management by CDFG, Solano Land Trust, and other involved landowners, particularly in regards to control of non-native plants.

After reviewing the best available scientific data, the Service has concluded that *Cirsium hydrophilum* var. *hydrophilum* should remain classified as endangered. The threats posed by muting of tidal cycles and invasive species such as *Lepidium latifolium* remain an immediate, widespread, significant and ongoing problem for *C. hydrophilum* var. *hydrophilum* populations.

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 is needed

New Recovery Priority Number ___3C__ (No change)

It is recommended that the recovery priority number remain 3c. The species continues to have a high degree of threat, a high potential for recovery, and some degree of potential conflict with construction or other development projects or economic activity.

VI. RECOMMENDATIONS FOR ACTIONS OVER THE NEXT FIVE YEARS

1) A recovery plan for *Cirsium hydrophilum* var. *hydrophilum* should be developed which describes recovery strategies and specific tasks necessary for recovery of the species. A draft recovery plan for this species and five other listed tidal marsh species is currently in development by the Service.

2) Natural tidal cycles should be maintained (and restored at Hill Slough and the ponded area of Rush Ranch) because the middle to high marsh area, with periodic tidal flooding, is vital to *Cirsium hydrophilum* var. *hydrophilum*.

3) Control of *Lepidium latifolium* should be conducted at Peytonia Slough Ecological Reserve, Rush Ranch, Hill Slough, Grizzly Island Wildlife Area, as appropriate, to reduce competition with *Cirsium hydrophilum* var. *hydrophilum*.

4) Research should be conducted to determine whether hybridization is occurring between *Cirsium hydrophilum* var. *hydrophilum* and *Cirsium vulgare* at Rush Ranch.

5) Research should be conducted to determine the extent to which seed predation by *Rhinocyllus conicus* is negatively affecting populations of *Cirsium hydrophilum* var. *hydrophilum*. If a substantial threat exists, research into effective means of *Rhinocyllus conicus* control should be researched and implemented at appropriate sites.

6) Surveys should be conducted within potential *Cirsium hydrophilum* var. *hydrophilum* habitat as well as at known population centers to identify potential new occurrences as well as to provide an updated species status with which to make management decisions. Specifically, Peytonia Slough Ecological Reserve should be surveyed to determine if that

population is extant and the Hill Slough area should be more extensively surveyed to determine the abundance of *C. hydrophilum* var. *hydrophilum* there.

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U.S. FISH AND WILDLIFE SERVICE
5-YEAR REVIEW of *Cordylanthus mollis* ssp. *mollis* (Soft Bird's Beak)

Current Classification __Endangered_____
Recommendation resulting from the 5-Year Review

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

Review Conducted By ___Sacramento Fish and Wildlife Office staff_____

FIELD OFFICE APPROVAL:

Lead Field Supervisor, Fish and Wildlife Service

Approve Susan C. Moore Date 1/16/09

REGIONAL OFFICE APPROVAL:

Lead Assistant Regional Director, Fish and Wildlife Service

Approve Mill Fri 2/11/09

U.S. FISH AND WILDLIFE SERVICE
5-YEAR REVIEW of *Cirsium hydrophilum* var. *hydrophilum* (Suisun thistle)

Current Classification __Endangered_____
Recommendation resulting from the 5-Year Review

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

Review Conducted By ___Sacramento Fish and Wildlife Office staff_____

FIELD OFFICE APPROVAL:

ACTING

Lead Field Supervisor, Fish and Wildlife Service

Approve _____ Date 1/23/09

REGIONAL OFFICE APPROVAL:

Lead Assistant Regional Director, Fish and Wildlife Service

Approve _____ Date 2/11/09