actions, in accordance with section 4(b)(3)(B)(iii) of the Act; notification of this finding was published on January 20, 1984 (49 FR 2485). The finding was reviewed annually in October of 1983 through 1994, pursuant to section 4(b)(3)(C)(i) of the Act. Publication of this proposal constitutes the final finding for the petitioned action.

Summary of Factors Affecting the Species

Section 4 of the Endangered Species Act (Act) and regulations (50 CFR part 424) promulgated to implement the listing provisions of the Act set forth the procedures for adding species to the Federal lists of endangered and threatened species. A species may be determined to be endangered or threatened due to one or more of the five factors described in section 4(a)(1). These factors and their application to *Cirsium hydrophilum* (Greene) Jepson var. *hydrophilum* (Suisun thistle) and *Cordylanthus mollis* Gray ssp. *mollis* (soft bird's-beak) are as follows:

A. The Present or Threatened Destruction, Modification, or Curtailment of Their Habitat or Range

Habitat for Cirsium hydrophilum var. hydrophilum and Cordylanthus mollis ssp. mollis has been severely curtailed by past human activities. Hydraulic mining, diking and filling involved in agricultural land conversion and urbanization, waste disposal, port and industrial development, railroad construction, dredging, salt production, and sedimentation have drastically reduced the amount of tidal marsh in California (Atwater 1979, MacDonald 1990, Association of Bay Area Governments (ABAG) 1991). Changes in freshwater inflow, pollution, habitat conversion, habitat fragmentation, and alteration of the natural tidal regime continue to threaten the habitat of both species.

In San Pablo Bay, historical tidal wetlands have been diked and converted to agricultural lands that were farmed for oat hay. In addition, approximately 4,050 ha (10,000 acres) also were converted to salt ponds. In Suisun Bay, most of the 28,780 ha (71,100 acres) of tidal marshes that existed in 1850 were converted originally to agricultural land, and then to diked seasonal wetlands used for waterfowl management. Only 3,780 ha (9,340 acres) within Suisun Marsh remain as tidal marsh (Dedrick 1989). Most of the remaining tidal marshes are backed by steep levees, allowing for little or no transitional wetland habitat-the habitat required by Cirsium

hydrophilum var. *hydrophilum* and *Cordylanthus mollis* ssp. *mollis*.

The change of freshwater inflow has modified the habitat for these two taxa. Agricultural and municipal uses have diverted over 50 percent of the historical annual inflow of freshwater from the Suisun Marsh and Delta (ABAG 1991). During the past 40 years, significant portions of the tidallyinfluenced brackish marsh within Suisun Bay have become more saline due to decreased freshwater flows (Pavlik 1992). Increased salt levels within the Suisun Marsh may threaten Cordylanthus mollis ssp. mollis and Cirsium hydrophilum var. hydrophilum. Salt stress causes decreased plant growth and lower reproduction. When salinity levels remain high during extended drought conditions, population viability may be greatly impaired to the extent they lose their ability to maintain themselves as components of a healthy wetlands ecosystem (Pavlik 1992). When salinity increases in the root zone, salt stress reduces plant abundance and causes shifts in plant distribution. This has occurred even in common salt-tolerant plants (Pavlik 1992). Cordylanthus mollis ssp. mollis and C. hydrophilum var. hydrophilum may be especially vulnerable to increased salt levels due to the limited number of individuals and their restricted distribution.

The two plant species also face threats from habitat fragmentation associated with commercial and residential development, road construction, and effects of historical fragmentation by activities associated with clearing for agriculture, railroad construction, dredging, and conversion to salt ponds. These activities have split habitat into smaller, more isolated units. Habitat fragmentation may alter the physical environment, changing the amount of incoming solar radiation, water, wind, or nutrients for the remnant vegetation (Saunders et al. 1991). In addition, a higher proportion of the area of these fragmented natural areas is subject to the influences from external factors (e.g., additional development, off-road vehicular use, competition with nonnative vegetation, human intrusion, and numerous other human influences) that disrupt natural ecosystem processes. Further effects of habitat fragmentation on the two plant species are discussed in Factor E.

Projects that convert habitat from tidal marsh to diked seasonal wetlands potentially threaten both *Cirsium hydrophilum* var. *hydrophilum* and *Cordylanthus mollis* ssp. *mollis.* Within Suisun Marsh, the conversion of tidal marsh to diked seasonal wetlands, a practice common in the development of waterfowl managements areas, is a potential threat for both species (Randall Brown, *in litt.* 1993). The planned conversion of 40 ha (100 acres) of salt grass (*Distichlis spicata*), an associated species for both *C. hydrophilum* var. *hydrophilum* and *C. mollis* ssp. *mollis*, in Hill Slough as enhancement of habitat for wildlife (California Department of Water Resources (CDWR) 1984) will further diminish the amount of suitable habitat for these two plant species.

Habitat conversion for planned future urbanization threatens both species. In ABAG's analysis of the San Francisco Bay Estuary, over 4,856 ha (12,000 acres) of wetlands in the Bay will be subject to moderate to high development uses over the next 12 years (ABAG 1991). Highway expansion projects within the San Francisco Bay Estuary during the next 20 years are expected to fill 146 wetland ha (362 acres) (ABAG 1991). Some of the expansion projects will threaten Cordylanthus mollis ssp. mollis by eliminating additional habitat. Widening of California Highway 37 will threaten wetlands that occur along the Napa River (ABAG 1991) and may adversely affect habitat for C. mollis ssp. mollis. Proposed widening of Highway 12 near the Suisun Marsh would threaten the habitat of both plants (Brenda Grewell, pers. comm. 1993), either due to habitat fragmentation as discussed above or by runoff.

Projects that alter the natural tidal regime also threaten both taxa. The Western Suisun Marsh Salinity Control Project (CDWR and U.S. Bureau of Reclamation (USBR) 1991, CDWR and USBR 1993) is proposed to lower channel salinity in the western portion of Suisun Marsh to comply with water quality standards specified by the State Water Resources Control Board's Water Right Decision 1485. Project alternatives initially proposed for this project include the Cutoff Slough Water Delivery System, Cordelia-Goodyear Ditch, and the Boynton-Cordelia Ditch. The proposed Cutoff Slough Water Delivery System includes tide gates that would threaten tidal marsh by subjecting it to higher water elevations and converting the area to a natural water storage reservoir (Randall Brown, CDWR, in litt. 1993). Although this proposed alternative initially has been eliminated, this project is still in the proposed stage and has not been finalized.

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