

## DEPARTMENT OF THE INTERIOR

## Fish and Wildlife Service

## 50 CFR Part 17

RIN 1018-AB66

## Endangered and Threatened Wildlife and Plants; Determination of Threatened Status for the Delta Smelt

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Final rule.

**SUMMARY:** The Fish and Wildlife Service (Service) determines threatened status for the delta smelt (*Hypomesus transpacificus*), pursuant to the Endangered Species Act of 1973, as amended (Act). This osmerid fish species occurs only in Suisun Bay and the Sacramento-San Joaquin estuary (known as the Delta) near San Francisco Bay, California. The delta smelt has declined nearly 90 percent over the last 20 years, and is primarily threatened by large freshwater exports from the Sacramento River and San Joaquin River diversions for agriculture and urban use. The prolonged drought, introduced nonindigenous aquatic species, reduction in abundance of key food organisms, and agricultural and industrial chemicals also threaten this species. The final decision on the determination of critical habitat included in the proposed rule is postponed in accordance with section 4(b)(6)(C)(ii) of the Act. This rule implements the protection and recovery provisions afforded by the Act for the delta smelt.

EFFECTIVE DATE: April 5, 1993.

**ADDRESSES:** The complete file for this rule is available for public inspection, by appointment, during normal business hours at the U.S. Fish and Wildlife Service, Sacramento Field Office, 2800 Cottage Way, E-1803, Sacramento, California 95825-1846.

**FOR FURTHER INFORMATION CONTACT:** Nadine R. Kanim (see ADDRESSES section) at 916/978-4866.

**SUPPLEMENTARY INFORMATION:****Background**

The delta smelt originally was classified as the same species as the pond smelt (*Hypomesus olidus*), but Hamada (1961) and Moyle (1976, 1980) recognized the delta smelt as a distinct species. Hamada retained the name *H. olidus* for the delta smelt and renamed the pond smelt *H. sakhalinus*. In 1963, McAllister renamed the delta smelt from *H. olidus* to *H. transpacificus*, with a Japanese subspecies (*H. t. nipponensis*)

and a California subspecies (*H. t. transpacificus*). More recent taxonomic work has shown that these subspecies should be recognized as species, the delta smelt being *H. transpacificus* and the Japanese smelt being *H. nipponensis* (Moyle 1980).

The delta smelt was described as follows by Moyle *et al.* (1989): A slender-bodied fish typically 60-70 mm (2.36-2.76 in) in standard length (SL), although a few may attain 120 mm (4.73 in) SL. Live fish are nearly translucent and have a steely-blue sheen to their sides. Occasionally there may be one chromatophore between the mandibles, but usually none is present. Its mouth is small, with a maxilla that does not extend past the mid-point of the eye. The eyes are relatively large; the orbit width is contained about 3.5-4 times in the head length. Small, pointed teeth are present in the upper and lower jaws. The first gill arch has 27-33 gill rakers and there are 7 branchiostegal rays. There are 9-10 dorsal fin rays, 8 pelvic fin rays, 10-12 pectoral fin rays, and 15-17 anal fin rays. The lateral line is incomplete and has 53-60 scales along it. There are 4-5 pyloric caeca.

From the analysis of length-frequency data, scientists have determined that the delta smelt is primarily a species with a 1-year (annual) life span (Moyle *et al.* 1992). Juvenile delta smelt are 40-50 mm (1.58-1.97 in) fork length (FL) by early August. They become sexually mature adults when 55-70 mm (2.17-2.76 in) FL. Although the largest delta smelt on record is 126 mm (4.96 in) FL, this species rarely grows larger than 60 mm (3.15 in) FL (Stevens *et al.* 1990). By June, delta smelt longer than 50 mm (1.97 in) FL are rare throughout their range, indicating that adult delta smelt die after spawning.

Historically, the delta smelt occurred from Suisun Bay upstream to the city of Sacramento on the Sacramento River and Mossdale on the San Joaquin River (Moyle *et al.* 1992). It is the only smelt endemic to California and the only true native estuarine species found in the Delta (Moyle *et al.* 1989, Stevens *et al.* 1990, and Wang 1986). The delta smelt is a euryhaline species (species adapted to living in fresh and brackish water) that occupies estuarine areas with salinities below 2 grams per liter (parts per thousand, ppt), rarely occurring in estuarine waters with more than 10-12 ppt salinity, about one-third sea water (Ganssle 1966, in Moyle 1996).

Delta smelt historically congregated in upper Suisun Bay and Montezuma Slough (mainly during March to mid-June) when the Sacramento and San Joaquin river flows were high. During very high river outflows some smelt

may be washed into San Pablo Bay, but the rapidly restored higher salinities do not allow permanent populations of delta smelt to become established. Because of substantial human-caused changes in the relative ratios of seasonal freshwater outflows, the center of delta smelt abundance has shifted to the Sacramento River channel in the Delta in the years since 1981 (Moyle *et al.* 1992). Delta smelt are now rare in Suisun Bay, and virtually absent from Suisun Marsh where they once were seasonally common. Even though suitable spawning and nursery habitat conditions occur less frequently in Suisun Bay than previously, when these conditions are present, they provide for increased levels of delta smelt recruitment that augment overall population levels. These suitable conditions occur when the mixing zone between salt water and freshwater is located in Suisun Bay.

Delta smelt have a low fecundity, producing 1,247-2,590 eggs per female (Moyle *et al.* 1992), when compared to two other species of Osmeridae occurring in California that exhibit fecundities from 5,000-25,000 eggs per female (Moyle 1976). Delta smelt spawn in freshwater at temperatures from about 7-15 degrees Celsius (°C) between February and June. Most spawning occurs in the dead-end sloughs and shallow edge-waters of channels in the western Delta; spawning also has been recorded in Montezuma Slough near Suisun Bay and far upstream in the Sacramento River near Rio Vista (Radtko 1966, Wang 1986). The adhesive demersal eggs attach to hard substrates such as rocks, gravel, tree roots, and submerged branches. Based on data for a closely related species, delta smelt eggs probably hatch in 12-14 days. The planktonic larvae are transported downstream to the mixing zone. Within the mixing zone, the pelagic larvae are zooplanktivores and feed on copepods, cladocerans, and amphipods. The primary food for all life stages of the delta smelt are the nauplius, copepodite, copepodid, and adult stages of the euryhaline copepod *Eurytemora affinis*. Adult smelt consume *E. affinis* during all times of the year. The opossum shrimp (*Neomysis mercedis*) is secondarily important as food for adult smelt, and cladocerans (*Daphnia* sp., *Bosmina* sp.) are consumed seasonally by adult smelt.

The decline in the delta smelt population was concurrent with increased human changes to seasonal Delta hydrology, freshwater exports, and the accompanying changes in the temporal, spatial, and relative ratios of water diversions. These deleterious

hydrological effects, coupled with severe drought years, introduced nonindigenous aquatic species, and reduction in abundance of key food organisms, appear to have reduced the species' capacity to recover from natural seasonal fluctuations in hydrology.

Many introduced species adversely affect all life stages of the delta smelt. These introduced species compete for the zooplankton for food, or alter the species composition of the zooplankton community, thereby further decreasing the ability of the delta smelt population to recover.

In 1987, the Service funded an analysis of survey data (Moyle and Herbold 1989). These survey data were collected from Suisun Marsh and the Delta by the University of California, Davis, and the California Department of Fish and Game. The report concluded that: (1) Freshwater flows set an upper limit to delta smelt stock recruitment within the year, (2) other environmental factors (physical and/or biological) may further depress the smelt population; however, the proportion of time when water flows are reversed (upstream flow) in the lower San Joaquin River during the egg and larval stages probably is the major source of density-independent mortality to the delta smelt, and (3) a larger adult smelt population was associated with higher freshwater outflows because these flows produced higher plant and animal biomasses at all aquatic trophic levels.

#### Previous Service Action

The Service included the delta smelt as a category 1 candidate species in the January 6, 1989, Animal Notice of Review (50 FR 554). Category 1 lists species for which data in the Service's possession are sufficient to support proposals for listing.

On June 29, 1990, the Service received a petition dated June 26, 1990, from Dr. Don C. Erman, President-Elect of the California-Nevada Chapter of the American Fisheries Society, to list the delta smelt as an endangered species with critical habitat. The Service made a 90-day finding that substantial information had been presented indicating that the petitioned action may be warranted, and announced this decision in the *Federal Register* on December 24, 1990 (55 FR 52852). The Service initiated a status review at that time. During the status review, the Service examined the available data on the early life history and ecology of this species. Available data on physiological tolerances and estuarine factors were also examined in relation to actual or potential threats to the delta smelt. Primary sources of information

describing the many human factors and projects that may affect the delta smelt are the voluminous expert testimonies presented to the California State Water Resources Control Board's 1987 Water Quality/Water Rights Proceeding on the San Francisco Bay and Sacramento-San Joaquin River Delta. This proceeding is also known as the Bay-Delta Proceeding, Evidentiary Hearing Record, July 7-December 29, 1987. The exhibits and transcripts spanned 54 days of hearings. Comments received by the Service on the petitioned action and the recommendations of an expert review panel were also considered during the status review.

On October 3, 1991, the Service published a proposal to list the delta smelt as a threatened species and requested public comment (56 FR 50075). This proposed rule constituted the 12-month finding that the petitioned action was warranted, in accordance with section 4(b)(3)(B) of the Act. Having considered all the information presented during the comment period, testimony given at the California State Water Resources Control Board's 1992 Water Right Phase of the Bay-Delta Estuary Proceedings, and other relevant information (CDWR 1992, Sweetnam 1992a) the Service now determines the delta smelt to be a threatened species.

#### Summary of Comments and Recommendations

In the October 3, 1991, proposed rule (56 FR 50075) and associated notifications, all interested parties were requested to submit factual reports or information that might contribute to the development of a final rule. Appropriate State agencies, county governments, Federal agencies, scientific organizations, and other interested parties were contacted and requested to comment. On November 6, 1991, the Service received a written request for a public hearing from Mr. George R. Baumli of the State Water Contractors, Sacramento, California. Sixteen additional requests for public hearings were received within the allowed 45-day time period following publication of the proposed rule (Section 4(b)(5)(E) of the Act (16 U.S.C. 1531 *et seq.*)). As a result, the Service published a notice of public hearing on December 19, 1991 (56 FR 65877). Newspaper notices of the public hearings were published in the *Sacramento Bee*, *Visalia Times Delta*, and *Fresno Bee* on December 16, 1991, and in the *Los Angeles Times* on December 17, 1992, all of which invited general public comment. Public hearings were conducted in California on January 9, 1991, in Sacramento; on January 14, 1992, in Santa Monica; and

on January 16, 1992, in Visalia. At each meeting, testimony was taken from 1 p.m. to 4 p.m. and from 6 p.m. to 9 p.m. A total of 69 individuals testified at the hearings.

During the four-month comment period, the Service received 360 comments (i.e., letters and oral testimony) from 348 individuals. Of the 342 comments that stated a position on listing, 37 (11 percent) supported listing and 305 (89 percent) did not.

Support for the proposed listing was expressed by 1 Federal agency, 2 ichthyologists with expertise in California native fishes, 14 conservation organizations (or branches thereof), 3 sport and commercial fishing organizations and 15 other interested parties.

The California Department of Fish and Game was among 18 commenters that stated no opinion on the proposed listing. The California Department of Fish and Game submitted additional scientific information and expressed continuing concern that the delta smelt population has suffered a 90 percent decline in the past 20 years.

Opposition to the proposed listing was expressed by one elected official, one Federal agency, one State agency, and a number of local government entities. Many local government agencies, water districts, business and trade associations, other private interests, and one Federal agency submitted comments regarding the possible effects that listing, and particularly, designation of critical habitat, might have on planned activities and development.

Because of the complexity of the economic analysis that must accompany the final rule designating critical habitat, the Service has decided to make final only the listing portion of the proposed rule at this time so that immediate protection of the delta smelt will be possible and the likelihood that this species may become endangered or extinct will be reduced. Section 4(b)(6)(C)(ii) of the Act allows the Service to extend the deadline for designating critical habitat for up to 1 year (October 3, 1993, in this case), if critical habitat is not yet determinable and/or immediate protection is needed for the species through a final listing action. As discussed in the Critical Habitat section of this rule, both of these reasons apply in this instance; therefore, the Service is now going forward with this final listing rule. Hence, the comments pertaining to designation of critical habitat or the potential economic impacts of such designation will not be discussed here, but will be addressed when a final decision on

critical habitat is made. Comments addressing the issue of listing this species are responded to here.

Written comments and oral statements obtained during the public hearings and comment periods are combined into general issues and discussed below.

**Comment 1:** Many commenters requested that the Service delay or not list the delta smelt because the scientific data currently available are insufficient to support such a decision. For example, one population index (fall midwater trawl abundance index) indicated that the number of delta smelt have increased during the past 5 years and are more abundant today than they were 10 years ago. Many of these respondents suggested that the Service follow the recommendation of the California Fish and Game Commission and decline to list the species until additional studies on distribution and abundance have been completed. Conversely, many commenters claimed that the available scientific data (including six other population indices) clearly demonstrate a marked decrease in the abundance of the species over historic levels.

**Service Response:** Section 4(b)(1)(A) of the Act, requires that a listing determination be based on the best scientific and commercial data available. As discussed in the section of this rule entitled Summary of Factors Affecting the Species, the Service has reviewed the results of several monitoring studies conducted by the California Department of Fish and Game and the University of California, Davis (Moyle and Herbold 1989, Stevens *et al.* 1990, Moyle *et al.* 1992), which demonstrate that after 1981 the delta smelt population has remained at consistently low levels. Seven abundance indices used to record trends in the status of the delta smelt show that this species has not previously suffered as consistently low population levels as those experienced in the last 10 years (Stevens *et al.* 1990). These same indices also show a pronounced decline from historical levels of abundance. The summer tow net abundance index is thought to be one of the more representative indices since data has been collected over a wide geographic area (from San Pablo Bay upstream through most of the Delta) for the longest period of time (since 1959). The summer tow net abundance index measures the abundance and distribution of larval delta smelt and provides data on the recruitment potential of the species. This index declined after 1981 and, except for one year (1986) has remained at extremely low levels since 1982 (Moyle *et al.*

1992). New data for the summer tow net index indicates the 1992 population has not increased from the consistently low levels recorded since 1987 (Sweetnam 1992a).

Results of the second longest running study (since 1967), the fall midwater trawl abundance index, have shown upward movement in the three of the last four years. This index measures the abundance and distribution of adult delta smelt in a large geographic area (San Pablo Bay upstream to Rio Vista on the Sacramento River and Stockton on the San Joaquin River) and provides an indication of their survivorship to the later months of their 1-year life span. The cause of this seemingly anomalous increase in survival of adult delta smelt cannot be determined with any certainty. Because the total number of delta smelt captured in each trawl tow is low compared to previous years, Dr. Moyle (University of California at Davis, *in litt.*, 1992) attributes the recent higher index values to the fact that the entire delta smelt population has been confined to a restricted area in the Sacramento River, from Sherman Island to Rio Vista. The higher index values may be an artifact of the increased probability of capturing schools of fish that are concentrated in a relatively restricted area.

Because this listing determination is based on the results of up to 33 years of long-term monitoring studies, the Service does not agree that additional studies will greatly alter the present findings. Preliminary indices for the months of September and October 1992 indicate that this year's survival of adult delta smelt is consistent with the low levels of abundance recorded since 1987 (Sweetnam 1992a). The September index represents a total of 61 adult delta smelt caught during the month. Most of these fish were collected in the lower Sacramento River. The October index represents a total of two adult delta smelt caught in 80 trawl tows during the entire month (D. Sweetnam, CDFG, pers. comm.). Other than those cited above, the Service has received no new data on the abundance or distribution of the delta smelt. However, if additional data gathered as a result of the California Department of Fish and Game's ongoing studies show that the species should not be listed, the Service is afforded the ability to delist the species (50 CFR 424.11(d)(3)).

**Comment 2:** One respondent maintained that the best scientific data available indicate that the delta smelt population has been severely underestimated. In an experimental test, the California Department of Fish and Game demonstrated that more smelt

could be caught when a midwater trawl with a finer mesh size was used.

**Service Response:** The findings of this rule are based primarily on the relative abundance of the delta smelt population today as it compares to its abundance throughout the period of record. The manner in which the long-term delta smelt abundance indices are calculated does not allow precise population estimates to be determined. These indices are used for population trend analysis. Any correction factor (as a result of a change in mesh size) applied to current population estimates would have to be applied to historical values as well. When the correction factor is applied to all years of data, the results still show a 90 percent population decline during the past 20 years.

**Comment 3:** Numerous commenters suggested that the current threats facing the species and the alarming decline in its abundance merit the designation of the delta smelt as an endangered species rather than a threatened species.

**Service Response:** The Service has carefully assessed the best scientific and commercial information available regarding the past, present, and future threats faced by the delta smelt in determining to list this species. The available data indicate a significant population decline over the last 20 years. The current population has remained relatively stable over the last 5 years, although it has done so at low levels. No apparent recovery is occurring. Based on the evaluation of all available information on population dynamics and threats to this species, the preferred action is to list the delta smelt as a threatened species.

**Comment 4:** Several individuals claimed that the designs of the population monitoring studies were inadequate, and by their nature, bias the interpretation of the data collected with regard to distribution and overall abundance of the species.

**Service Response:** In the proposed rule, and the discussion in this final rule, under Summary of Factors Affecting the Species, the Service recognizes that " \* \* \* much of the available data on the population dynamics of the delta smelt were obtained from studies focused on other fish species, such as striped bass (*Morone saxatilis*) and chinook salmon (*Oncorhynchus tshawytscha*). Consequently, the collection methods used in these studies were not designed to estimate the delta smelt population." Nevertheless, the Service and other scientists contend that the sampling techniques provide a repeatable, consistent measure of delta smelt population trends and distribution over

the last 33 years. Furthermore, the Service is obliged to consider the best scientific and commercial data available in making its listing determination. The best available scientific data on the present and historical distribution and abundance of the delta smelt indicate that the species has experienced a significant decline in number and restriction in distribution in the past 20 years.

*Comment 5:* A few commenters asserted that no listing determination could be made for the delta smelt because the Service has not demonstrated any statistically significant correlation between the factors suggested in the proposed rule as having contributed to the species' decline and its distribution and abundance. For example, commenters remarked that there is no statistically significant correlation between the location where delta smelt are caught at any one time and areas of 2 ppt salinity. In addition, they contended that there is no statistically significant relationship between delta smelt abundance and the mixing zone location or with the number of days the San Joaquin River's flow is reversed. Because of this perceived lack of statistically significant data, one respondent claimed he was unclear about the source of the data that the Service relied upon to reach its conclusion that the species should be listed. Another commenter argued that the proposed rule was biased because the Service neglected to state that one of the conclusions reached by Stevens *et al.* (1990) was that no evidence exists to link directly the effects of delta water exports with the abundance of the delta smelt. The State Water Contractors suggested that for the reasons listed above, the analysis of factors affecting the species, upon which the Service bases its listing determination, is flawed. Conversely, Dr. Moyle (*in lit.* 1992) expressed his concern that the proposed rule understated the importance of the relationship of the effect of Delta water exports, agricultural diversion, and pumping to the decline in abundance of the species.

*Service Response:* The Endangered Species Act requires the Service to base listing determinations upon the best available scientific and commercial data. The Service is not required to show statistical significance between each of the causes of decline listed in this and the proposed rule, and the location or abundance of delta smelt collected; and a lack of such statistical significance does not invalidate the analysis of the five factors upon which this listing determination is based. The complexity of the Delta ecosystem and

the numerous stated factors contributing in time and space to the species' decline make it highly unlikely that any one factor would show a direct correlation with its distribution or abundance. To show a direct causal link between any of these factors and a measurable or determinable effect on the species, a study would have to be designed such that all other factors besides the one being tested were ruled out. This type of study would have to be conducted under very controlled circumstances such as those found in the laboratory. Another difficulty with determining single factor cause and effect relationships is that the delta smelt is an annual species. Therefore, the effects of a single type of environmental perturbation on one life stage in a given year may not have a direct, measurable effect on other life stages in a subsequent year. The Service acknowledges that each of the conclusions reached by Stevens *et al.* (1990) was not listed in the proposed rule. The context of the subject conclusion was that the California Department of Fish and Game could not directly link Delta water exports to the decline of the delta smelt because the monitoring study has not been specifically designed to test this hypothesis and that sampling and environmental variables are likely to mask any such direct relationships. However, the precipitous decline in delta smelt abundance after 1961 coincides with a proportional increase in fresh water diversion by State and Federal water projects during the months when delta smelt are spawning (Moyle *et al.* 1992). Furthermore, the Service lists species because of threats to their continued existence, even though we may not precisely understand the exact causal relationships leading to the decline.

*Comment 6:* One respondent maintained that in its discussion of the existing regulatory mechanisms that are now in place to protect the delta smelt, the Service neglected to consider that the California Fish and Game Commission directed the California Department of Fish and Game to initiate a 3-year study designed to determine the status of the delta smelt and reasons for its decline. Furthermore, the California Fish and Game Commission requested that if the California Department of Fish and Game found that the status of the species continued to suffer, that this fact should be brought to the California Fish and Game Commission's attention. Because the California Fish and Game Commission has authority to emergency list a species, this commenter suggested

that current regulatory mechanisms are adequate.

*Service Response:* As stated above, the Service may list a species even though the exact causes of decline are not known. Continuing studies may shed light on the causes of decline, and may lead to recovery or management actions that may be of benefit to the species. However such studies do not result in direct protection of the species. Furthermore, the delta smelt is not listed by the State at this time, and State listing would not provide protection from Federal actions. No legal mechanism exists that affords protection to the delta smelt, *per se*, or that provides protective measures to ensure the continued existence of the species.

*Comment 7:* According to one commenter, the proposed rule violates the Regulatory Flexibility Act (5 U.S.C. Section 603) as well as the obligations imposed by Executive Order 12291, and Executive Order 12630.

*Service Response:* The Department of the Interior has determined that the analyses required by the Regulatory Flexibility Act (5 U.S.C. 603) and Executive Order 12291 are not applicable to listing determinations. The Department has also determined that any analysis performed under Executive Order 12630 may not delay a listing determination. The Act requires that listing decisions be made solely on the basis of biological information. The legislative history to the 1982 amendments of the Act states:

"The Committee of Conference \* \* \* adopted the House language which requires the Secretary to base determinations regarding the listing or delisting of species "solely" on the basis of the best scientific and commercial data available to him. As noted in the House Report, economic considerations have no relevance to determinations regarding the status of species and the economic analysis requirements of Executive Order 12291, and such statutes as the Regulatory Flexibility Act and the Paperwork Reduction Act, will not apply to any phase of the listing process." H.R. Conf. Rep. No. 835, 97th Cong., 2d Sess. 20 (1982); accord H.R. Rep. No. 567, 97th Cong., 2d Sess. 12, 19-20 (1982); S. Rep. No. 418, 97th Cong., 2d Sess. 4 (1982).

*Comment 8:* One respondent alleged that the review panel convened by the Service during the status review stage of the listing process was biased by the composition of members and the documents provided by the Service for review.

*Service Response:* All four biologists that were asked by the Service to review the status of the delta smelt have a long history of working with western endangered or threatened fishes, expertise in fish ecology, and are

knowledgeable about the Federal listing process. For these reasons, the Service determined that these experts were uniquely qualified to review the available information and make an informed finding regarding the current status of the delta smelt. All information maintained in the Service's files on this subject is available for public review.

**Comment 9:** A few commenters claimed that listing the delta smelt would have negative environmental effects. Specifically, if Central Valley farmers must depend to a greater extent on groundwater for agricultural production, further overdraft of the groundwater table is likely.

**Service Response:** Section 4(a)(1) of the Act requires that a decision to list a species as endangered or threatened be based on the five factors described in the section of this final rule entitled Summary of Factors Affecting the Species. These five factors pertain only to the biology and habitat requirements of the species in question. Nevertheless, the Service is aware that replenishment of groundwater overdraft is one of the many uses of water diverted from the Delta. The effects of Delta water diversions and exports on delta smelt habitat is discussed in Factor A of the Summary of Factors section.

**Comment 10:** Many commenters suggested that the delta smelt should not be listed because of the effect such an action would have on California's economy. Several commenters stated that the proposed rule did not fully address the economic impact incurred in California as a result of the proposed listing.

**Service Response:** Under section 4(b)(1)(A) of the Act, a listing determination must be based solely on the best scientific and commercial data available. The legislative history of this provision clearly states the intent of Congress to "ensure" that listing decisions are "based solely on biological criteria and to prevent nonbiological considerations from affecting such decisions" H.R. Rep. No. 97-835, 97th Cong., 2d Sess. 19 (1982). As further stated in the legislative history, "economic considerations have no relevance to determinations regarding the status of species" *Id.* at 20. As stated previously, the Service is required to address economic considerations within the context of designating critical habitat. The Service may exclude areas from critical habitat due to economic or other relevant impacts, provided that such exclusion would not lead to the extinction of the species.

**Comment 11:** One commenter requested a six-month extension of the

Federal Register publication of this final rule because of substantial disagreement among scientists regarding the sufficiency or accuracy of the scientific data.

**Service Response:** The Act requires the Secretary of the Interior, within 1 year of publishing a proposed listing, to issue a final rule, withdraw the proposed listing, or publish a notice that the 1-year period is being extended for up to 6 months (16 U.S.C. 1533(b)(6)(A)). The 1-year period may be extended if the Secretary finds "substantial disagreement regarding the sufficiency or accuracy of the available data relevant to the determination or revision concerned." (16 U.S.C. 1533(b)(6)(B)(i)). This disagreement must be "among scientists knowledgeable about the species" (50 CFR 424.17(a)(1)(iv)). The Service did not find substantial disagreement among knowledgeable scientists during the review of materials pertaining to the status of the delta smelt. The Service received no information indicating that the delta smelt is more widespread or under lesser threats than was previously thought. Therefore, the Service has determined that the date of publication of this final rule cannot be extended.

**Comment 12:** The Service received a reply that maintained that since there were questions among the scientific community about the validity of the taxonomic classification of the delta smelt (*H. transpacificus*) as a distinct species from the Japanese smelt (*H. nipponensis*), federally listing would be a violation of the Act.

**Service Response:** There is no uncertainty among the scientific community regarding the validity of the taxonomic classification of the delta smelt. In the Background section of this final rule is a description of the taxonomic revisions that have led to the currently accepted scientific nomenclature for this species.

**Comment 13:** One respondent attested that recent California Department of Fish and Game fall midwater trawl surveys found the delta smelt to be the most abundant species of fish collected.

**Service Response:** Northern anchovy (*Engraulis mordax*) represent by far the greatest proportion of the fish species caught in midwater trawl tows in all but 3 years during the period of this monitoring program (Sweetnam 1992b). For those 3 years, longfin smelt (*Spirinchus thaleichthys*) and threadfin shad (*Dorosoma petenense*) were caught in the greatest numbers.

### Summary of Factors Affecting the Species

After a thorough review and consideration of all information available, the Service has determined that the delta smelt should be classified as a threatened species. Procedures set forth at section 4 of the Endangered Species Act (16 U.S.C. 1533) and regulations (50 CFR part 424) promulgated to implement the listing provisions of the Act were followed. A species may be determined to be endangered or threatened because of one or more of the five factors described in section 4(a)(1). These factors and their application to the delta smelt (*Hypomesus transpacificus*) are as follows:

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

The delta smelt was one of the most common and abundant pelagic fish caught by California Department of Fish and Game trawl surveys in the Delta during the early 1970's (Stevens and Miller 1983, Moyle *et al.* 1989, Stevens *et al.* 1990). Its distribution once ranged from western Suisun Bay upstream to Sacramento on the Sacramento River and to Mossdale on the San Joaquin River (Radtke 1966, Moyle 1976, Moyle *et al.* 1992). Smelt populations fluctuated a great deal in the past, but after 1981 began a precipitous decline. Over the last 20 years, the population has experienced a ten-fold decline in numbers, and since 1982, has remained at extremely low levels. Recent population abundance indices confirm that the species has not shown any significant signs of recovery (Moyle and Herbold 1989, Moyle *et al.* 1989, Stevens *et al.* 1990, Moyle *et al.* 1992, Sweetnam 1992a). This species' pelagic life history, dependence on pelagic microzooplankton, 1-year life span, and low fecundity are characteristics of a fish species that is affected greatly by perturbations to its reproductive habitat or larval nursery areas. Under existing levels of water development, the delta smelt is especially vulnerable during protracted drought periods. Deleterious effects of the present drought period would be exacerbated if additional alterations in hydrology caused by reductions of freshwater inflows to the Delta alter the timing and/or duration of water exports. A weak stock-recruitment relationship (i.e., little evidence of the effect of parent population size on subsequent recruitment) strongly suggests that environmental or habitat factors are severely limiting delta smelt abundance, even during those years

when adults may be abundant (Moyle *et al.* 1992).

Moyle *et al.* (1989) reported multiple and synergistic causes of the delta smelt decline in the following order of importance: (1) Reduced river outflows, primarily in the Sacramento and San Joaquin Rivers, and their tributaries, (2) extremely high river outflows in years with unusually high rainfall, (3) entrainment mortality caused by water diversion, (4) human and natural perturbations to the smelt's food web, (5) presence of toxic substances in the aquatic habitat (e.g., agricultural and industrial chemicals, heavy metals, etc.), and (6) loss of genetic integrity because of a sharply curtailed delta smelt population. This small delta smelt population may become displaced by the wagasaki, or Japanese smelt (*Hypomesus nipponensis*), which was inadvertently introduced into reservoirs of the Sacramento River drainage by the California Department of Fish and Game (Moyle 1976).

Delta water diversions and exports presently total up to about nine million acre-feet per year. State and Federal projects presently export about six million acre-feet per year when there is sufficient water available, and in-Delta agricultural uses result in diversion of about three million additional acre-feet per year. Plans currently being prepared propose to greatly increase exports and diversions in the future. The Service is aware of 21 major Central Valley Project, State Water Project, or private organization proposals that will result in increased water exports from the Delta, reduce water inflow to the Delta, change the timing and volume of Delta inflow, or increase heavy metal contamination into the Delta. These proposed projects or actions include but are not limited to: Los Banos Grandes Reservoir, South Delta Water Management Program, South Delta Water Barriers Project, North Delta Water Management Project, West Delta Water Management Project, Coastal Aqueduct proposal, Delta Wetlands Corporation Water Storage Project, Central Valley Project contract renewals, Los Vaqueros Reservoir, the Central Valley Project and State Water Project wheeling purchase agreement, reactivation of the San Luis Drain, Stanislaus-Calaveras River Basin Water Use Program, Kern Water Bank, Arvin Edison water storage and exchange proposal, and State Water Project Pump additions.

A significant change in in-Delta diversions is unlikely; if anything, a slight decrease in in-Delta agricultural use is probable. The Federal pumping plant has been operated at capacity for

many years except for a very few drought years, so increased exports at this plant appear unlikely. The State Water Project pumping plant and the capacity of the State Aqueduct have considerable unused capacity, however. A table of past and projected State Water Project deliveries from Delta sources during the years of 1962 to 2035 are listed in California Department of Water Resources (1992). In the 1980's, deliveries ranged from 1.5 million acre-feet to 2.8 million acre-feet. By 1993, if enough water is available, deliveries could increase to as much as 3.8 million acre-feet. By 2010, deliveries of up to 4.2 million acre-feet are possible.

Since 1963, the proportion of water exported from the Delta during October through March has been higher than in earlier years (Moyle *et al.* 1992). The timing of these proportionally higher exports have coincided with the delta smelt's spawning season. Federal and State water diversion projects in the southern Delta export, by absolute volume, mostly Sacramento River water with some San Joaquin River water. During periods of high export pumping and low to moderate river outflows, however, reaches of the San Joaquin River reverse direction and flow to the pumping plants located in the southern Delta. The State-operated pumping plant presently exports water at rates up to 6,400 cfs. The State is considering proposals to export an additional 3,900 cfs. The Federal pumping plant can export water at rates up to 4,600 cfs. In addition, local private diverters export up to 5,000 cfs from about 1,800 diversions scattered throughout the Delta.

When total diversion rates are high relative to Delta outflow and the lower San Joaquin River and other channels have a net upstream (i.e., reverse or negative) flow, out-migrating larval and juvenile fish of many species become disoriented. Large mortalities occur as a result of entrainment and predation by striped bass at the various pumping plants and other water diversion sites. Net positive riverine flows and estuarine outflows of sufficient magnitude are required for delta smelt larvae to be carried downstream into the upper end of the mixing zone of the estuary rather than upstream to the pumping plants.

In recent years, the number of days of reversed San Joaquin River flow have increased, particularly during the February-June spawning months for delta smelt (Moyle *et al.* 1992). All size classes of delta smelt suffer near total loss when they are entrained by the pumping plants and diversions in the south Delta. Very few are effectively

salvaged at the State and Federal pumping plant screens. The few delta smelt that are transported into water project reservoirs or canals fail to reproduce. This species' embryonic, larval, and postlarval mortality rates also will become higher as reduced western Delta flows allow increases in the salinity level and relocation of the mixing zone.

The delta smelt is adapted for life in the mixing zone (brackish water/freshwater interface) of the Sacramento-San Joaquin estuary. The estuary is an ecosystem where the mixing zone and salinity levels are determined by the interaction of river outflow and tidal action. Moyle *et al.* (1992) reported that delta smelt were most abundant in shallow, low salinity water associated with the mixing zone, except when they spawned. Their analysis showed that smelt were collected from water with a mean salinity of 2 ppt with a mean temperature of 15 °C, but were found in salinities ranging from 0-14 ppt at temperatures ranging from 6-23 °C. The larvae require the high microzooplankton densities produced by the mixing zone environment. The best survival and growth of smelt larvae occurs when the mixing zone occupies a large geographic area, including extensive shoal regions that provide suitable spawning substrates within the euphotic zone (depths less than 4 m). Sixty-two percent of delta smelt collected in Suisun Bay occurred at 3 sampling stations with depths less than 4 m; the remaining 38 percent were caught at 6 deeper stations.

During periods of drought and increased water diversions, the mixing zone and associated smelt populations are shifted farther upstream in the Delta. During years prior to 1984, the mixing zone was located in Suisun Bay during October through March (except in months with exceptionally high outflows or during years of extreme drought). From April through September, the mixing zone usually was found upstream in the channels of the rivers. Since 1984, with the exception of the record flood outflows of 1986, the mixing zone has been located primarily in the river channels during the entire year because of increased water exports and diversions. When located upstream, the mixing zone becomes confined to the deep river channels, becomes smaller in total surface area, contains very few shoal areas of suitable spawning substrates, may have swifter, more turbulent water currents, and lacks high zooplankton productivity. Delta smelt reproduction very likely is adversely affected now that the mixing zone is located in the main channels of

the Delta, east of Suisun Bay (Moyle *et al.* 1992). In 1982, the decline of the delta smelt population in response to the shifted location of the mixing zone was significant. In all respects, the upstream river channels are much less favorable for the spawning and survival of the smelt. The decline of the delta smelt population since 1981 has been concurrent with an increasing amount and proportion of freshwater diversions that confine the mixing zone to the narrow, deep, and less productive channels in the lower rivers.

#### *B. Overutilization for Commercial, Recreational, Scientific, or Educational Purposes*

Not known to be applicable; however, the delta smelt may be harvested as a non-target by-catch in commercial bait fisheries for other baitfish species. Some scientific collecting is conducted for the delta smelt; however, these activities do not appear to be adversely affecting this species. Native Americans historically harvested delta smelt for food, but modern Native Americans are not known to be harvesting this fish. No recreational or educational uses of this animal are expected to affect the delta smelt population.

#### *C. Disease or Predation*

Not known to be applicable. However, the introduced striped bass may have caused an increase in predation on all size classes of the delta smelt. An effort by the California Department of Fish and Game is underway to compensate for striped bass population mortalities caused by water export projects. The 1991 striped bass stock was very low relative to the population in the 1960's. The striped bass compensation program annually releases 1-2 million juvenile hatchery-reared striped bass in the estuary in an effort to rebuild the population. This year the Director of the California Department of Fish and Game decided not to release striped bass because of the potential harm they would cause to the federally threatened Sacramento River winter-run chinook salmon.

#### *D. The Inadequacy of Existing Regulatory Mechanisms*

Regulatory mechanisms currently in effect do not provide adequate protection for the delta smelt or its habitat. This species is not listed by the State of California. The California Fish and Game Commission ruled on August 30, 1990, that a petition to the State to list the species was unwarranted, rejecting the California Department of Fish and Game's recommendation to list the delta smelt as a threatened species

under State authority (Stevens *et al.* 1990). State listing would have provided some measure of protection to the species because State agencies would have been required to consult with the California Department of Fish and Game if any project they funded or carried out would adversely affect the delta smelt. However, even if the State of California had listed the delta smelt, the species would not have been protected from the adverse effects of Federal actions.

Suisun Bay is the best known nursery habitat for this species' reproduction and larval survival, but the habitat has been deleteriously altered because of higher salinities in spring. These higher salinities are caused by the large number of freshwater diversions that allow brackish seawater to intrude farther upstream. At present, there are relatively few periods when freshwater outflow volumes through the Delta and Suisun Bay of any significance are mandated for wildlife or fisheries. Federal and State agencies had planned to increase 1991 and probably 1992 water supplies for out-of-stream uses at the expense of environmental protection of estuarine fish and wildlife resources in the fifth and potentially sixth years of drought (Morat 1991). Because of significantly higher than normal precipitation and subsequent higher instream flows during March, 1991, a State agency request for relaxation of Delta water quality standards was withdrawn. It is likely, should the severe California drought continue, that this water quality relaxation action will be requested again in the near future to favor out-of-stream water use over the need to protect aquatic habitats for fish and wildlife.

Present regulatory processes do not ensure that water inflows to Suisun Bay and the western Sacramento-San Joaquin estuary will be adequate to maintain the mixing zone near or in Suisun Bay to benefit delta smelt and other fish and wildlife. The California State Water Resources Control Board (Board) has the authority to condition or require changes in the amount of water inflow and the amount of water exported or diverted from the Delta. At the Board's Water Quality/Water Rights Hearings in 1987, a Service biologist testified that the delta smelt had been recommended for addition to the Federal Animal Notice of Review as a category 1 candidate species (Lorentzen 1987). The Board has not taken regulatory or legal action to protect this animal or its habitat during the 4 years since the Service expressed its concern for several species native to Sacramento-San Joaquin estuary. On December 9, 1992, the Board released a copy of

Water Rights Decision 1630 (D-1630), San Francisco Bay/Sacramento-San Joaquin Estuary (California State Water Resources Control Board 1992). A meeting to consider adoption of D-1630 is scheduled for January 25, 1993. In whatever form it is finally adopted by the Board, D-1630 will establish minimum levels of public trust uses of the delta for up to 5 years. Subsequently, long-term standards will be prepared and adopted.

Implementation of the draft decision as prepared would result in improved habitat conditions for the delta smelt. The Service is presently in the process of analyzing the draft terms and conditions to determine to what extent delta smelt will be benefited, if the decision is adopted and implemented. However, even assuming immediate adoption and implementation of these interim terms and conditions, their adequacy as a regulatory mechanism to protect the delta smelt remains in question. The Service is aware that the salinity standards currently in effect (D-1485) are inconsistently implemented and frequently violated due to operational constraints. Institutional guarantees of compliance have been lacking in the past and are needed in the future.

Similarly, the Service is currently analyzing the potential effects on the delta smelt and other fish and wildlife resources in California as a result of the recent enactment of the Central Valley Project Improvement Act (Pub. L. 102-575). Two of the stated purposes of this act are to: "protect, restore, and enhance fish, wildlife, and associated habitats in the Central Valley and Trinity River basins of California" and "to contribute to the State of California's interim and long-term efforts to protect the San Francisco Bay/Sacramento-San Joaquin Delta Estuary". Section 3406(b)(2) dedicates annually 800,000 acre-feet of Central Valley Project water for various purposes including the benefit of federally listed species. While the Service is reasonably certain that the delta smelt will realize some benefit from implementation of this Act, the magnitude and timeliness of these protections may be inadequate to prevent the endangerment of the delta smelt. For example, many analysts predict that provisions within the Act will take many years for the courts to resolve. Finally, neither adoption of the State Water Resources Control Board's Decision 1630 or the Central Valley Project Improvement Act protect the delta smelt *per se*, or provide mechanisms to ensure the continued existence of the species.

For the reasons stated above, the Service considers the existing regulatory mechanisms inadequate to assure the long-term existence of delta smelt in Suisun Bay and the Delta.

#### *E. Other Natural or Manmade Factors Affecting its Continued Existence*

The delta smelt is highly vulnerable to extinction because of its short life span, present small population size, and restricted distribution. The limited gene pool may result in depressed reproductive vigor and loss of genetic variation.

Poor water quality also may be a threat. All major rivers in this species' historic range are exposed to large volumes of agricultural and industrial chemicals that are applied in the California Central Valley watersheds (Nichols *et al.* 1986). Agricultural chemicals and their residues, and chemicals originating in urban runoff, find their way into the rivers and estuary. Toxicology studies of rice field irrigation drain water of the Colusa Basin Drainage Canal documented significant toxicity of drain water to striped bass embryos and larvae, medaka larvae, and the major food organism of the striped bass larvae and juveniles, the opossum shrimp (*Neomysis mercedis*). This drainage canal flows into the Sacramento River just north of the City of Sacramento. The majority of drain water samples collected during April and May 1990 were acutely toxic to striped bass larvae (96-hour exposures), the third consecutive year that the Colusa Basin rice irrigation drain water has been acutely toxic (Bailey *et al.* 1991). Delta smelt may be similarly affected by agricultural and industrial chemical run-off.

Some heavy metal contaminants have been released into the Delta from industrial and mining enterprises. Although the effects of these contaminating compounds on delta smelt larvae and their microzooplankton food resources are not well known, the compounds could potentially adversely affect delta smelt survival. In addition, increases in urban development in the Sacramento Valley will continue to result in concurrent increases in urban runoff. Finally, a proposal to reactivate the San Luis Drain would result in discharge of high levels of selenium from the San Joaquin Valley into the Delta. Selenium has been shown to cause developmental defects in and mortality of wildlife species.

In recent years, untreated discharges of ship ballast water introduced nonindigenous aquatic species to the Sacramento-San Joaquin estuary

ecosystem (Carlton *et al.* 1990). Several introduced species adversely affect the delta smelt directly. An asian clam (*Potamocorbula amurensis*), introduced as veliger larvae at the beginning of the present drought, was first discovered in Suisun Bay during October 1986. By June 1987, the asian clam was nearly everywhere in Suisun, San Pablo, and San Francisco Bays irrespective of salinity, water depth, and sediment type at densities greater than 10,000 individuals per square meter. Asian clam densities declined to 4,000 individuals per square meter as the population aged during the year (Carlton *et al.* 1990). Persistently low river outflow and concomitant elevated salinity levels may have contributed to this species population explosion (Carlton *et al.* 1990). The asian clam could potentially play an important role in affecting the phytoplankton dynamics in the estuary. It may have an effect on higher trophic levels by decreasing phytoplankton biomass and by directly consuming *Eurytemora affinis* copepod nauplii, the primary food of delta smelt.

Three non-native species of euryhaline copepods (*Sinocalanus doerrii*, *Pseudodiaptomus forbesi*, and *Pseudodiaptomus marinus*) became established in the Delta between 1978 and 1987 (Carlton *et al.* 1990) while *Eurytemora affinis* populations, the native euryhaline copepod, have declined since 1980. It is not known if the introduced species have displaced *E. affinis* or whether changes in the estuarine ecosystem now favor *S. doerrii* and the two *Pseudodiaptomus* species (Moyle *et al.* 1989). These introduced copepod species are more efficient at avoiding the predation of larval delta smelt. The introduced copepods also exhibit a different swimming behavior that makes them less attractive to feeding delta smelt larvae. Because of reduced food availability or feeding efficiency causing decreased food ingestion rates, weakened delta smelt larvae are more vulnerable to starvation or predation.

The significantly altered microzooplankton food web now present in the Suisun Bay-Delta estuary may have decreased the gross growth efficiency of delta smelt larvae. Gross growth efficiency is the proportion of weight-specific food ingestion rate that goes to larval fish body growth. When food ingestion rates are low, gross growth efficiency is low. At low gross growth efficiencies, larval fish take much longer to metamorphose to juveniles. Long larval stage durations increase the likelihood that density-dependent mechanisms (e.g., predators, overgrazing of food resources, etc.) and

density-dependent mechanisms (e.g., adverse salinities, temperature, absence of zooplankton, water diversion entrainment and impingement mortality, etc.) would develop to adversely affect survival and recruitment. In temperate latitudes, where spawning is temporally and spatially confined, as it is for the delta smelt, both mortality and growth rates tend to be low. Ingestion in temperate species is relatively low compared to tropical species, and larval stage duration is long and potentially highly variable. Under these circumstances, small changes in either mortality rates or growth rates can have significant adverse effects on recruitment potential (Shepherd and Cushing 1980, Houde 1989). Therefore, the timing of spawning and the availability of favorable spawning sites for adults are added critical elements in the recruitment success of the spawned cohort.

The Service has carefully assessed the best scientific and commercial information available regarding the past, present, and future threats faced by this species in this listing determination. The Service acknowledges that available data on the population dynamics of the delta smelt were collected incidental to other investigations and were not intended to provide a population estimate. The Service believes, however, that these data represent the best available information and support the listing of this species. The available data indicate a significant population decline over the last 20 years. Though the current population has remained relatively stable over the last 5 years, it has done so at very low levels. No apparent recovery is occurring. The delta smelt faces threats from a more frequent upstream shift of its aquatic estuarine habitat, and a reduction of available habitat due to drought, replenishment for groundwater overdraft, and water exports and diversions. The shift in location of the mixing zone, as well as the reduced area available to the smelt, is expected to continue in the future. These factors will continue to adversely affect all life stages of the delta smelt. Because the smelt population is at such low levels, this species' 1-year lifespan is also a factor that threatens the species. The failure of a single reproductive season could significantly affect the ability of this species to survive and recover. Based on the evaluation of all available information on population dynamics and threats to this species, the Service has determined that listing as threatened is appropriate at this time.



### Critical Habitat

Section 4(a)(3) of the Act requires that, to the maximum extent prudent and determinable, the Secretary designate critical habitat at the time a species is determined to be endangered or threatened. Section 4(b)(6)(C) further indicates that a concurrent critical habitat determination is not required if the Service finds that determination of endangered or threatened status is essential to the conservation of the involved species, or that critical habitat is not then determinable. The Service finds that determination of threatened status for the delta smelt is essential. Without a listing determination, the protections conferred the species pursuant to section 7, through a limitation on the commitment of resources on the part of concerned Federal agencies or applicants for Federal permits, could not be applied. Therefore, to ensure that the full benefits of section 7 and other conservation measures under the Act will apply to the delta smelt, prompt determination of threatened status is essential.

Section 4(b)(2) of the Act requires the Service to consider economic and other impacts of designating a particular area as critical habitat. The Service has contracted for an economic impacts analysis of designating critical habitat for the delta smelt. In addition, the Service is in the process of evaluating the information that was submitted during the comment period on the potential economic impacts of critical habitat designation. However, because of the complexities and extent of the activities being assessed, this evaluation will not be completed until later in 1993. Upon completion of this economic impact analysis, the Service will render a final determination. The decision on designation of critical habitat must be made by October 3, 1993, pursuant to section 4(b)(6)(C)(ii) of the Act.

### Available Conservation Measures

Conservation measures provided to species listed as endangered or threatened under the Endangered Species Act include recognition, recovery actions, requirements for Federal protection, and prohibitions against certain activities. Recognition through listing encourages and results in conservation actions by Federal, State, and private agencies, groups, and individuals. The Endangered Species Act provides for possible land acquisition and cooperation with the States and requires that recovery actions be carried out for all listed species. Such

actions are initiated by the Service following listing. The protection required of Federal agencies and the prohibitions against taking and harm are discussed, in part, below.

Section 7(a) of the Act, as amended, requires Federal agencies to evaluate their actions with respect to any species that is proposed or listed as endangered or threatened and with respect to its critical habitat, if any is being designated. Regulations implementing this interagency cooperation provision of the Act are codified at 50 CFR part 402. Section 7(a)(4) of the Act requires Federal agencies to confer informally with the Service on any action that is likely to jeopardize the continued existence of a proposed species or result in destruction or adverse modification of proposed critical habitat. If a species is subsequently listed, section 7(a)(2) requires Federal agencies to insure that activities they authorize, fund, or carry out are not likely to jeopardize the continued existence of such a species or to destroy or adversely modify its critical habitat, if any is designated. If a Federal action may affect a listed species or its critical habitat, the responsible Federal agency must enter into consultation with the Service. Federal actions that may affect the delta smelt include U.S. Army Corps of Engineers funding or issuance of permits for water pumping facilities or structures, levee construction or repairs, and channel dredging and dredge spoil disposal projects. Other examples include U.S. Bureau of Reclamation or California Department of Water Resources water export or water management operations or projects, and U.S. Environmental Protection Agency actions pertaining to the water quality standards of Suisun Bay, Suisun Marsh, and the Delta. Measures to protect the listed winter-run chinook salmon, for which the National Marine Fisheries Service has jurisdiction under the Act, also may affect the delta smelt and may require consultation with the Service.

Under section 4 of the Act, listing the delta smelt would provide for the development of a recovery plan, which would bring together Federal, State, and private efforts to develop conservation strategies for the species. The recovery plan would develop a framework of recovery activities, priorities, and funding requirements to accomplish conservation objectives and ensure the survival and recovery of the delta smelt. The Act and its implementing regulations found at 50 CFR part 17.31 set forth a series of general prohibitions and exceptions that apply to all threatened wildlife not covered by a special rule. These prohibitions, in part,

would make it illegal for any person subject to the jurisdiction of the United States to take (including harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt any such conduct), import or export, transport in interstate or foreign commerce in the course of commercial activity, or sell or offer for sale in interstate or foreign commerce any such species. It also is illegal to possess, sell, deliver, carry, transport, or ship any such wildlife that has been taken illegally. Certain exceptions apply to agents of the Service and State conservation agencies.

Permits may be issued to carry out otherwise prohibited activities involving endangered or threatened wildlife species under certain circumstances. Regulations governing permits are at 50 CFR part 17. Permits for threatened species are available for scientific purposes, to enhance the propagation or survival of the species, and/or for incidental take in connection with otherwise lawful activities. In some instances, permits may be issued during a specified period of time to relieve undue economic hardship that would be suffered if such relief were not available. For threatened species, permits are lawful for zoological exhibition, educational purposes, or special functions consistent with the purposes of the Act. Further information regarding regulations and requirements for permits may be obtained from the U.S. Fish and Wildlife Service, Office of Management Authority, Permits Branch, 4401 N. Fairfax Drive, room 432, Arlington, Virginia 22203-3507 (703/358-2104).

### National Environmental Policy Act

The Service has determined that an Environmental Assessment, as defined under the authority of the National Environmental Policy Act of 1969, need not be prepared in connection with regulations adopted pursuant to section 4(a) of the Endangered Species Act of 1973, as amended. A notice outlining the Service's reasons for this determination was published in the Federal Register on October 25, 1983 (48 FR 49244).

### References Cited

- Bailey, H.C., D.J. Ostrach, and D.E. Hinton, 1991. Effect of rice irrigation water in Colusa Basin Drain on fertilization success and embryonic development in striped bass. Contract No. 9-169-250-0 Draft Report to California State Water Resources Control Board. 31 pp.
- California Department of Water Resources, 1992. Data and computations used to determine 1993 water charges. Bulletin 132-92, Appendix B. California

Department of Water Resources, Sacramento, California. 136 pp.

California State Water Resources Control Board. 1992. Draft Water Right Decision 1630, San Francisco Bay/Sacramento-San Joaquin Delta Estuary, December 1992. State Water Resources Control Board, Sacramento, California. 121 pp. + Appendices.

Carlton, J.T., J.K. Thompson, L.E. Schemel, and F.H. Nichols. 1990. Remarkable invasion of San Francisco Bay (California, USA) by the asian clam *Potamocorbula amurensis*. I. Introduction and dispersal. Mar. Ecol. Prog. Ser. 66:81-94.

Ganssle, D. 1966. Fishes and decapods of San Pablo and Suisun bays. Pp. 64-94 in D.W. Kelley, ed.: Ecological studies of the Sacramento-San Joaquin estuary, Part 1. Calif. Dept. Fish and Game, Fish Bulletin No. 133.

Hamada, K. 1961. Taxonomic and ecological studies of the genus *Hypomesus* of Japan. Mem. Fac. Fish Hokkaido Univ. 9(1):1-56 (as cited by Moyle 1976, 1980).

Houde, E.D. 1989. Comparative growth, mortality, and energetics of marine fish larvae: Temperature and implied latitudinal effects. Fishery Bulletin, U.S. 87:471-495.

Lorentzen, E.M. 1987. U.S. Fish and Wildlife Service testimony in the matter of State Water Resources Control Board water quality/water rights proceeding on the San Francisco Bay and Sacramento-San Joaquin River Delta, September 8-10, 1987. U.S. Fish Wildl. Serv. Exhibits 17-24. 11 pp.

McAllister, D.E. 1963. A revision of the smelt family, Osmeridae. Bull. Natl. Mus. Canada 191. 53 pp. As cited by Moyle 1976, 1980.

Morat, R.J. 1991. U.S. Fish and Wildlife Service testimony in the matter of State Water Resources Control Board Public Hearing and Board Meeting on consideration of drought-related emergency water rights order and related actions in response to a request for a hearing from the Department of Water Resources, March 15, 1991. U.S. Fish Wildl. Serv. Exhibit 1. 3 pp.

Moyle, P.B. 1976. Inland Fishes of California. University of California Press, Berkeley, California. 405 pp.

Moyle, P.B. 1980. *Hypomesus transpacificus* (McAllister), Delta smelt, P. 123 in D.S. Lee et al., eds.: Atlas of North American freshwater fishes. North Carolina State Mus. Nat. Hist., Raleigh, North Carolina. 854 pp.

Moyle, P.B. and B. Herbold. 1989. Status of the delta smelt, *Hypomesus transpacificus*. Unpublished final report prepared for U.S. Fish and Wildlife Service, Sacramento Field Office, Habitat Conservation Division, Sacramento, California. 42 pp.

Moyle, P.B., B. Herbold, D.E. Stevens, and L.W. Miller. 1992. Life history and status of delta smelt in the Sacramento-San Joaquin Estuary, California. Trans. Amer. Fish. Soc. 121:67-77

Moyle, P.B., J.E. Williams, and E.D. Wikramanayake. 1989. Fish species of special concern of California. Final report prepared for State of California, Department of Fish and Game, Inland Fisheries Division, Rancho Cordova, California. 222 pp.

Nichols, F.H., J.E. Cloern, S.N. Luoma, and D.H. Peterson. 1986. The modification of an estuary. Science 231:567-573.

Radtke, L.D. 1966. Distribution of smelt, juvenile sturgeon, and starry flounder in the Sacramento-San Joaquin Delta. Pp. 115-119 in J.L. Turner and D.W. Kelley, eds.: Ecological studies of the Sacramento-San Joaquin estuary, Part 2. California Department of Fish and Game Fish Bulletin No. 136.

Shepherd, J.G. and D.H. Cushing. 1980. A mechanism for density-dependent survival of larval fish as the basis of a stock recruitment relationship. J. Cons. Int. Explor. Mer 39:160-167.

Stevens, D.E. and L.W. Miller. 1983. Effects of river flow on abundance of young chinook salmon, American shad, longfin smelt, and delta smelt in the Sacramento-San Joaquin river system. North American Journal of Fisheries Management 3:425-437.

Stevens, D.E., L.W. Miller, and B.C. Bolster. 1990. Report to the Fish and Game Commission: A status review of the delta smelt (*Hypomesus transpacificus*) in California. California Department of Fish and Game Candidate Species Status Report 90-2. 149 pp.

Sweetnam, D. 1992a. Delta Smelt Project Update, October 1992. Unpublished report

prepared by California Department of Fish and Game, Bay-Delta and Special Water Projects Division, Stockton, California. 7 pp.

Sweetnam, D. 1992b. Facsimile transmission to Nadine Kanim, December 9, 1992. California Department of Fish and Game, Bay-Delta and Special Water Projects Division, Stockton, California. 6 pp.

Wang, J.C.S. 1986. Fishes of the Sacramento-San Joaquin estuary and adjacent waters, California: A guide to the early life histories. Interagency Ecological Study Program for the Sacramento-San Joaquin Estuary, Tech. Rept. 9.

**Author**

The authors of this rule are Nadine R. Kanim and A. Keith Taniguchi, Sacramento Field Office (see ADDRESSES section).

**List of Subjects in 50 CFR Part 17**

Endangered and threatened species, Exports, Imports, Reporting and recordkeeping requirements, and Transportation.

**Regulation Promulgation**

Accordingly, part 17, subchapter B of chapter I, title 50 of the Code of Federal Regulations, is amended as set forth below:

**PART 17—[AMENDED]**

1. The authority citation for part 17 continues to read as follows:

**Authority:** 16 U.S.C. 1361-1407; 16 U.S.C. 1531-1544; 16 U.S.C. 4201-4245; Pub. L. 99-625, 100 Stat. 3500, unless otherwise noted.

2. Amend § 17.11(h) by adding the following, in alphabetical order under FISHES, to the List of Endangered and Threatened Wildlife:

**§ 17.11 Endangered and threatened wildlife.**

\* \* \* \* \*

(h) \* \* \*

Species		Historic range	Vertebrate population where endangered or threatened	Status	When listed	Critical habitat	Special rules
Common name	Scientific name						
FISHES							
Smelt, delta	<i>Hypomesus transpacificus</i>	U.S.A. (CA)	Entire	T	492	NA	NA

Dated: January 19, 1993.

Richard N. Smith,  
Acting Director, U.S. Fish and Wildlife  
Service.

[FR Doc. 93-5085 Filed 3-4-93; 8:45 am]

BILLING CODE 4310-65-M

---