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Department of the Interior

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50 CFR Part 17

Endangered and Threatened Wildlife and Plants; Notice of Remanded Determination of Status for the Sacramento splittail (*Pogonichthys macrolepidotus*); Final Rule

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Fish and Wildlife Service

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[RIN 1018–AH73]

Endangered and Threatened Wildlife and Plants; Notice of Remanded Determination of Status for the Sacramento splittail (*Pogonichthys macrolepidotus*)

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Final rule; revised determination.

SUMMARY: On January 6, 1994, we, the U.S. Fish and Wildlife Service (Service) proposed to list the Sacramento splittail (*Pogonichthys macrolepidotus*), a fish species native to central California, as a threatened species under the Endangered Species Act of 1973, as amended (Act). We published a final rule to list the species as threatened on February 8, 1999. Our final decision to list the Sacramento splittail was subsequently challenged in the cases *San Luis & Delta-Mendota Water Authority* v. *Anne Badgley, et al.* and *State Water Contractors, et al.* v. *Michael Spear, et al.* On June 23, 2000, the Federal Eastern District Court of California found our final rule to be unlawful and on September 22, 2000, remanded the determination back to us for a re-evaluation of our final decision. However, because the District Court did not vacate our previous final decision, the decision remained in place until we issued a new determination. After a thorough review and consideration of all the best scientific and commercial information available, we are removing the Sacramento splittail from the list of threatened species. In accordance with the Administrative Procedure Act, the Service has determined that this rule relieves an existing restriction, and good cause exists to make the effective date of this rule immediate.

EFFECTIVE DATE: In compliance with the Federal Eastern District Court of California order, this rule is effective September 22, 2003.

ADDRESSES: Comments and materials received, as well as supporting documentation used in the preparation of this final decision, are available for public inspection, by appointment, during normal business hours at the Sacramento Fish and Wildlife Office, U.S. Fish and Wildlife Service, 2800 Cottage Way, Suite W–2605, Sacramento, CA 95825.

FOR FURTHER INFORMATION CONTACT: Wayne White (*see* **ADDRESSES**), (telephone: 916/414–6600; facsimile: 916/414–6713). Information is available in alternate formats upon request.

SUPPLEMENTARY INFORMATION:

Background

The Sacramento splittail (hereafter referred to as splittail) is a fish species native to central California and represents the only extant species in its genus in North America. We have previously discussed the taxonomic history of the splittail along with the physical description of the taxon in our final listing rule (64 FR 5963). Please refer to that document for a detailed discussion of these subjects. It is our intent, in this document, to reiterate and discuss only those topics directly relevant to this decision.

To assist the reader in understanding terminology used in this determination, we have provided below several terms with their corresponding definitions as they are used in this document. As used in this determination, the term ''Delta'' refers to all tidal waters contained within the legal definition of the San Francisco Bay-Sacramento-San Joaquin River Delta, as delineated by section 12220 of the State of California's Water Code. Generally, the Delta is contained within a triangular area that extends south from the City of Sacramento to the confluence of the Stanislaus and San Joaquin Rivers at the southeast corner and Chipps Island in Suisun Bay at the southwest corner. The term ''Estuary,'' as used in this determination, refers to tidal waters contained in the Sacramento and San Joaquin Rivers, the Delta, and San Pablo and San Francisco bays. ''Export facilities,'' as used in this determination, refers to the Bureau of Reclamation (USBR) Central Valley Project (CVP) and the California Department of Water Resources (CDWR) State Water Project (SWP) water export facilities in the South Delta.

Splittail are native to California's Central Valley. Historically, splittail were found as far north as Redding on the Sacramento River (Rutter 1908). Splittail were also found in the tributaries of the Sacramento River as far as the current Oroville Dam site on the Feather River and Folsom Dam site on the American River (Rutter 1908). Along the San Joaquin River, historic distribution is unclear. Girard (1854) reported two *Pogonichthys* species in the San Joaquin River. These reports do not make a distinction between which of the two species was found at particular locations on the San Joaquin River. In the southern Central Valley, Tulare Lake was likely to have supported many native fish species, including splittail (Moyle 1976) but has since been drained and reclaimed. Splittail were present within Buena Vista and Kern Lakes (Moyle 2002), both of which are reclaimed.

Some researchers (Sommer *et al.* (1997)) indicate that splittail still occur, at least during optimal conditions, through as much as 78 percent of their former range in terms of river reaches. However, others (Moyle and Yoshiyama 1992) believe the species appears to be restricted to a small portion of its former range, with dams and diversions preventing access to upstream habitat in large rivers and streams beyond the valley floor (Moyle and Yoshiyama 1992). The State of California indicates that splittail still occur in a large portion of its range (80% in the Sacramento, and 70% in the San Joaquin). There appears to be consensus that at least 20% and possibly more of the species range has been reduced. Baxter (2001b) found that the range of the splittail extends away from the Delta, though detections on the periphery of its range appear to be part of a single, mobile, Sacramento and San Joaquin River/Bay-Delta population that includes fish from the Napa and Petaluma River systems. Their distribution in the Estuary suggests that brackish water may characterize optimal rearing habitat for fish greater than 75 millimeters (mm) (3.0 inches (in)) standard length (SL) (Moyle *et al.* 2001). Suisun Marsh includes the largest areal extent of shallow water habitat available to the splittail and likely has the greatest concentrations of the species.

Splittail are relatively long-lived and larger fish may be 8 to 10 years old (Moyle 2002). Splittail reach about 110 mm (4.3 in) SL in their first year, 170 mm (6.6 in) SL in their second year, and 215 mm (8.4 in) SL in their third year (Moyle 2002). Male and female splittail may mature by the end of their second year (Daniels and Moyle 1983), but some males mature in their first year and some females do not mature until their third year (Caywood 1974).

The largest females can produce over 250,000 eggs per year (Daniels and Moyle 1983). Other and more current estimates of splittail fecundity have shown high variability and occasionally, lower numbers. Caywood (1974) found a mean of 165 eggs per mm (6.5 in) of SL of fish sampled and reported a maximum of 100,800 eggs in one female. Daniels and Moyle (1983) observed approximately 17,500 to 266,000 eggs per female splittail. Feyrer and Baxter (1998) found a mean of 261 eggs per mm (10.2 in) of SL and estimated maximum fecundity at 150,000 eggs. Bailey *et al.* (1999) examined fish held for a considerable time in captivity and found that fecundity ranged from 24,753 to 72,314 eggs per female, which agrees with Caywood's (1974) observations.

Although primarily a freshwater species, splittail can tolerate salinities as high as 10 to 18 parts per thousand (ppt) (Moyle 1976; Moyle and Yoshiyama 1992). Salinity tolerance in splittail increases in proportion to length; adults can tolerate salinities as high as 29 ppt for short periods (Young and Cech 1996). Splittail populations fluctuate annually, depending on spawning success, which is well correlated with freshwater outflow and the availability of shallow water habitat with submerged vegetation (Daniels and Moyle 1983; Sommer *et al.* 1997). Fish typically reach sexual maturity by the end of their second year. The onset of spawning is associated with rising water levels, increasing water temperatures, and increasing day length. Peak spawning occurs from February through May, although records of spawning exist for late January to early July (Wang 1986). In some years, most spawning may take place within a limited period of time. For instance, in 1995, a year of high spawning activity, most splittail spawned over a short period in April, even though larval splittail were captured from February through early July (Moyle *et al.* 2001). Within each spawning season older fish reproduce first, followed by younger individuals (Caywood 1974).

Splittail spawning occurs over flooded vegetation in tidal freshwater and brackish water habitats of estuarine marshes and sloughs and slow-moving, shallow reaches of large rivers. Observations of splittail spawning have indicated spawning at depths of less than 1.5 meters (m) (4.9 feet (ft)) in the Cosumnes River floodplain (Moyle *et al.* 2001), and at depths of less than 2 m (6.6 ft) in Sutter Bypass (Moyle *et al.* 2001). Sommer and Harrell (1999) postulated that individual splittail may not spawn in the year following a successful effort.

Splittail larvae remain in shallow, weedy areas close to spawning sites for 10 to 14 days and move into deeper water as they mature and swimming ability increases (Wang 1986; Sommer *et al.* 1997). Bailey (1994) has documented that splittail eggs hatch in 3 to 5 days at 18.5 degrees centigrade (°C), (65.3 degrees Fahrenheit (°F)). Bailey (1994) also found that at 5 to 7 days after hatching, the yolk sac is absorbed and the diet begins to include small rotifers. Moyle *et al.* (2001) states that splittail of 20 to 25 mm (0.8 to 1.0 in) total length (TL) "* * * are essentially small juveniles, capable of fairly active swimming" and that 4 to 5 weeks post-hatch are required to reach this size class.

It is speculated that Suisun Marsh is the likely late stage rearing area for juvenile splittail hatched and reared in the extensive spawning habitat found within the Yolo Bypass, as a hydrologic connection apparently exists between these waters (N. Monsen, unpubl. data referenced in Moyle *et al.* 2001). Splittail use of Suisun Marsh varies with outflow (Baxter 1999a).

Splittail are benthic foragers. In Suisun Marsh, adults feed primarily on opossum shrimp (*Neomysis mercedis,* and presumably, non-native shrimp species of the genus *Acanthomysis* as well), benthic amphipods (*Corophium* spp.), and other small crustaceans, although detrital material makes up a large percentage of their stomach contents (Daniels and Moyle 1983). In the Delta, clams, crustaceans, insect larvae, and other invertebrates also are found in the adult diet. More recently, research has indicated a shift in adult splittail diet towards the non-native Asiatic clam (*Potamocorbula amurensis*) in Suisun Marsh.

Historically, *Eurytemora affinis,* the native euryhaline copepod, has been the most important food for larval fishes in the Estuary. 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 native *E. affinis* populations have declined since 1980. It is not known if the non-native species have displaced *E. affinis* or whether changes in the estuarine ecosystem now favor *S. doerrii* and the two *Pseudodiaptomus* species. Meng and Orsi (1991) reported that *S. doerrii* is more difficult for larval striped bass to catch than native copepods because it is fast swimming and has an effective escape response. It is not known if this difference in copepod swimming and escape behavior has affected the feeding success of young splittail. Zeug *et al.* (2002) and Hieb (2002) reported a high abundance of an introduced, predatory Palaemonid shrimp (*Exopalaemon modestus*) in the Yolo Bypass and Delta. It is not known what effect(s) this invasive species will have on the trophic (food) pyramid of the estuary, though Moyle (2002b) speculates it is likely to prey on mysid shrimp and thus, may compete with splittail for food. Juvenile feed mainly on plankton composed of small animals (zooplankton), and then small crustaceans and insect larvae as body size increases.

Predators of splittail include striped bass (*Morone saxatilis*), largemouth bass (*Micropterus salmoides*) and other centrarchids, and other native and non-native piscivores (Moyle 1976, Moyle 2002a). Introduced, non-native benthic foragers such as shokihaze goby (*Tridentiger barbatus*), chameleon goby (*T. trigonocephalus*), and yellowfin goby (*Acanthogobius flavimanus*), may feed on splittail eggs. Introduced planktivorous, threadfin shad (*Dorosoma petenense*) and inland silverside (*Menidia beryllina*), compete directly with larval and juvenile splittail for food. Other non-native cyprinids, such as golden shiner (*Notemigonus crysoleucas*), red shiner (*Notropis lutrensis*), and fathead minnow (*Pimephales promelas*) are also likely to compete with splittail. In recent years, splittail have been found most often in slow moving sections of rivers, sloughs, and in dead end sloughs (Moyle 1976, Daniels and Moyle 1983). Reports from the 1950's, however, mention Sacramento River spawning migrations and catches of splittail during fast tides in Suisun Bay (Caywood 1974). Current accounts place splittail as far upstream as the Red Bluff Diversion Dam on the Sacramento River (Baxter 1999a). Splittail have been recorded in recent times from within Salt Slough and at the Merced River confluence on the San Joaquin River, and within the Napa and Petaluma Rivers (Baxter 1999a, 1999b; USACE 2002a, 2002b).

Splittail are frequently found in areas subject to flooding because they require flooded vegetation for spawning and rearing. Historically, the major flood basins (*e.g.*, Colusa, Sutter, American, and Yolo basins; Tulare, Buena Vista, and Kern lakes) distributed throughout the Sacramento and San Joaquin valleys provided spawning and rearing habitat. These flood basins have all been reclaimed or modified for flood control purposes (*i.e.* as bypasses), and much of the floodplain area adjacent to the rivers is now inaccessible behind levees. The Yolo Bypass may approximate some of the Yolo Basin's former role, and the Butte Creek, Butte Sink, Sutter Bypass system remains somewhat intact. Meng and Moyle (1995) reported that the core distribution of splittail extends from Suisun Bay and Marsh through the western Delta.

The Yolo and Sutter bypasses and the Cosumnes River floodplain serve as important splittail spawning and early rearing habitat (Sommer *et al.* 1997), as they approximate the large, open, shallow water areas which have been extensively reduced. The Yolo and Sutter bypasses provide good habitat for fish, particularly splittail, when flooded for several weeks in March and April. To provide the best spawning conditions for splittail, water must remain on the bypasses until fish have completed spawning, and larvae are able to swim out on their own, during the draining process. The Cosumnes River also possesses natural and restored floodplain features. This river is unique in that it is not dammed and the hydrograph is relatively natural. The contributions made by this habitat are somewhat limited by the fact that the Cosumnes River watershed is lower in elevation than most adjacent rivers. It is therefore somewhat less dominated by the extended spring peak flow characteristic of a higher altitude watershed with greater snowmelt potential.

In summary, the current distribution of splittail habitat is certainly reduced at least 20% and may be much more reduced in extent from that which may have historically been present. Clearly, perhaps the largest portion of the splittail's habitat is contained in the natural and newly restored floodplains of the Cosumnes River, managed floodplains such as the Yolo and Sutter bypasses, disjunct segments adjacent to the Sacramento and San Joaquin rivers and in lower reaches of their respective tributaries.

In years where the Yolo and Sutter bypasses are not sufficiently inundated, splittail spawning is confined primarily to the natural and newly restored floodplains of the Cosumnes River and the margins of rivers and other floodplain features that are inundated at lower river stages. These areas likely represent only a fraction of the area which was historically subject to inundation; levees preclude access to reclaimed floodplains and basins. There are indications, based on presence of larvae and juveniles, that spawning in the Sacramento River occurs relatively far upstream at Colusa (Baxter 1999a; 1999b). Splittail appear to utilize the San Joaquin River in wet years when appreciable runoff exceeds the capacity for storage and diversion of runoff. The Tuolumne, Cosumnes, Feather, American, Napa, and Petaluma rivers, and numerous other smaller waters support splittail spawning activity. Early indications are that the Napa River may contain a robust subpopulation of splittail (USACE 2002a, 2002b).

Abundance

Seven sampling programs capture splittail frequently enough to allow the calculation of useful abundance indices. These programs are: (1) CDFG's Fall Midwater Trawl (Fall MWT); (2) CDFG's San Francisco Bay Midwater Trawl (Bay Study MW); (3) CDFG's San Francisco Bay Otter Trawl (Bay Study OT); (4) University of California (UC) Davis's Suisun Marsh Otter Trawl (Suisun Marsh OT); (5) Service's Chipps Island Trawl survey (Chipps Is. Trawl); (6) fish salvage operations (which repatriate fish taken from water intake screens) at the CVP Tracy Fish Collection Facility (CVP); and (7) fish salvage at the SWP Skinner Delta Fish Protective Facility in the south Delta (SWP).

Four other sampling programs provide additional splittail information but the data are insufficient to support useful indices. These are: (1) Service's Delta Beach Seine Survey; (2) CDFG's Summer Townet Survey; (3) U.S. Army Corps of Engineers' (USACE) Napa River Survey; and (4) CDFG's Creel Census.

Surveys Employed in Abundance Analyses

The data available even today on splittail abundance are not optimal. There are a number of survey programs which generate data, each of which have more or less limiting factors. This has made analysis of the status of the species based on this survey data problematic. Descriptions of all fisheries sampling programs that routinely detect splittail follow, and are differentiated into two categories: those that were used in the calculation of abundance indices and those that were not.

Fall Midwater Trawl Survey

The Fall MWT was initiated by CDFG in 1967 to sample striped bass, a non-native sport fish. In addition to striped bass, CDFG has maintained records of other fish species captured in the samples in most years. This monitoring program currently samples 100 sites from San Pablo Bay in the west to Rio Vista on the lower Sacramento River and to Stockton on the San Joaquin River. Data are collected from September through December using a midwater trawl with a 3.7 square m (39.8 square ft) wide mouth. Unlike the summer townet survey, the Fall MWT survey catches all splittail size classes, although larger fish are more likely to evade capture. Catches of splittail are generally low in number because splittail generally reside and feed on the channel bottom. Furthermore, splittail apparently use shallow (less than 6 m (19.7 ft)) and near-shore waters to a higher degree than open channels. The Fall MWT does not sample edge waters, and the proportion of samples in shallow water stations varies by region: 20 of 35 stations in San Pablo Bay; 1 of 18 in Carquinez Strait; 8 of 25 in Suisun Bay/Marsh; and 1 of 38 in the Delta. A monthly abundance index for splittail captured by the Fall MWT is calculated by grouping the samples by area (17 areas) and then calculating an area weighted average catch from each area; the index is the sum of these area weighted mean catches. The annual Fall MWT Index is the sum of the four monthly indices. Splittail lengths were not recorded until 1975, so for data collected prior to 1975, Young Of Year (YOY) (age 1) fish could not be differentiated from other age classes. Fall MWT data from 1967 through 2002 was used in our abundance analysis.

San Francisco Bay Studies

The San Francisco Bay Studies sample waters west of the Delta seaward to south San Francisco Bay using both a midwater trawl (Bay Study MWT) and an otter trawl (Bay Study OT) (Baxter 1999a). These programs capture relatively few splittail, but are still considered important because they involve two types of sampling equipment and frequent sampling (Baxter 1999a). Much of the sampling takes place in San Francisco Bay in deep water channels that are not characteristic splittail habitat. Monthly indices are calculated as the sum of regional volume-weighted average catch per 10,000 cubic meters (m^3) (353,147 cubic feet (cf)) for the Bay Study MWT and the sum of regional area-weighted average catch per 10,000 m^3 (353,147 cf) for the Bay Study OT (Sommer *et al.* 1997). During the 1997 index period, the Bay Study MWT collected only one YOY, and the Bay Study OT collected none at index stations. The tremendous variability in this survey's catch is likely due to the rare or limited occurrence of individuals splittails at the periphery of its range, which would result in limited detectability during sampling. Splittail can be expected to be captured in San Francisco and San Pablo bays only during time of infrequent, high outflow, when captures appear to increase for all net-based gear types. San Francisco Bay Studies data from 1980 through 2002 was used in our abundance analysis.

Suisun Marsh Otter Trawl

The Suisun Marsh OT surveys began in 1979 and are conducted by the University of California (UC) Davis as part of a long-term study of the ecology of the entire fish community of the marsh. Data from the 1979 survey have been excluded from our abundance analysis as greater sampling effort was employed in 1979 than in all subsequent years (Dr. Peter Moyle, pers. comm.). The survey is funded by California Department of Water Resources (CDWR) in part to determine if management actions in Suisun Marsh are affecting fish communities. The program samples 21 sites monthly in nine sloughs with an otter trawl that drags along the bottom and samples much of the water column in the shallow sloughs. In small sloughs, the trawl samples much of the cross sectional area; in large sloughs, the sampling fraction is smaller. A monthly abundance index is calculated as mean catch per trawl. The annual abundance index is calculated as the mean of the monthly index values (Sommer *et al.* 1997). While the splittail catches are dominated by YOY, the sampling also consistently catches larger fish. In this regard, the Suisun Marsh OT sampling of splittail is perhaps the most thorough of the various sampling programs. Splittail collection in the Marsh is enhanced by reduced gear avoidance in narrow, relatively shallow sloughs sampled as part of the monthly survey. In such conditions, the net samples a larger proportion of the channel cross sectional area than in any other survey. Larger sizes of splittail, however, apparently become progressively less vulnerable to the trawls, a limitation shared by all trawl-based surveys. Spawning occurs only sporadically in the marsh, and in most years YOY recruit from upstream in the Sacramento River, including the bypasses (Sommer *et al.* 1997). Recent modeling studies indicate that the Yolo Bypass, a major spawning and nursery area, may be hydrologically connected to Suisun Marsh (N. Monsen, Stanford University, unpubl. data) so juvenile trends in the marsh are likely to be heavily influenced by upstream production in the Yolo Bypass during those years when inundated for a sufficient period of time. Suisun Marsh Otter Trawl data from 1980 through 2001 was used in our abundance analysis.

Chipps Island Survey

The U.S. Fish and Wildlife Service conducts a sampling program for juvenile salmon in the deep water channel near Chipps Island at the western terminus of the Delta. A midwater trawl is pulled at the surface in ten 20 minute hauls per day during May and June (Sommer *et al.* 1997). Data are compiled to produce an index based on the catch per hour of trawling for the months of May and June combined (Sommer *et al.* 1997). The program was initiated in 1975, but data before 1979 must be viewed with some caution as many splittail were not measured (Baxter 1999a); as only data related to the number of splittail caught were recorded. Length data from 1987 through 1993 was recorded such that determinations of age from the data cannot be done, and is therefore inadequate to calculate age-specific abundance indices. The Age 0 index reached minor peaks in 1982 and 1986, declined to low levels during the 1987–1992 drought (based on total splittail catch), then increased sharply to a record level in 1995; minor peaks occurred in 1998 and 2000, and remaining data tracked water year variability. For Age 1 splittail, the Chipps Island index for the period 1976 to 2001 shows high variability.

The Chipps Island trawl seems to sample splittail best in high outflow years when all age groups are more vulnerable to trawls due to increased turbidity, as is likely true for all gear types and surveys. It is, however, difficult to discern actual abundance from year biases, and turbidity can be high at Chipps Island regardless of outflow. Regardless, because the trawl captures fish only in the top couple of meters (or yards) of water in open channels, relatively low numbers of the benthic-foraging splittail are caught. The indices are probably less precise at low population levels due to the infrequent captures of splittail, a characteristic shared by all surveys. The Chipps Island Survey data from 1976 through 2002 was used in our abundance analysis.

Central Valley and State Water Project (CVP and SWP) Fish Salvage

The CVP and SWP operate fish screening facilities to divert fish away from the pump intakes into holding facilities where they are counted, measured, and released. Data collection takes place at two hour intervals when the pumps are operating. Consequently, the fish salvage operations provide the highest number of splittail caught per survey, but the number of data points (annual indices) is comparable to the other surveys. All splittail age groups are collected, the surveys do not suffer from gear avoidance by fish, and sampling locations do not vary over time. Reliable CVP data and SWP data both start in 1979. The salvage abundance index is calculated based on the total number of fish salvaged divided by the volume of water pumped (Sommer *et al.* 1997). However, the pumps are not operated as sampling programs *per se* so the amount of ''sampling'' is related to the amount of water exported, which in turn is related to the amount of water available, water demand, and, in recent years, changes in pump operations to protect migratory salmon, splittail, and delta smelt (*Hypomesus transpacificus*) and to maintain appropriate salinities in Suisun Bay and Marsh. Also, the Salvage index does not address catch per volume per unit time. Lacking a time factor, the Salvage index may not adequately describe the differential variability in catch that may occur as approach velocities at Clifton Court Forebay (SWP) or Old River (CVP) change.

Unlike the CVP and SWP salvage, several surveys do not account for the volume per unit time sampled. Trawl data, presented as fish captured per volume of water sampled, do not describe the trawl speed, or the perceived trawl approach speed when pulled against a current. Seine indices are expressed as catch of fish per haul and do not include factors for catch per unit volume and/or per unit time. Seines are employed at sites with low water velocities, but variation in velocity within and between sampling locations likely exists. Trawls and seines may be more effective when employed through higher velocity waters; splittail may be more vulnerable to capture when already navigating swifter currents. Trawls, seines, and pumps therefore share a common difficulty in expressing catch per unit volume per unit time. Each of these techniques may also differentially detect splittail under turbid conditions. The pumps differ from trawling and seining, however, in that the pumps may differentially entrain (collect) weak swimming juvenile and fatigued post-spawn adult splittail as velocities towards the facilities vary. Regardless of boat or current speed, or turbidity, trawls and seines do not draw fish towards them, whereas the pumps may. The SWP catch also does not account for the predation that occurs in the Clifton Court Forebay, nor the latent mortality that may occur when salvaged fish are released.

Comparisons between CVP and SWP salvage and other sampling operations have to be made with caution. Nevertheless, the general patterns are similar to other studies, with diminished catches of both adults and juveniles during periods of drought and large catches of juveniles following wet winters. The CVP and SWP fish salvage data from 1979 through 2002 was used in our abundance analysis.

Surveys Not Employed in Abundance Analyses

US Fish and Wildlife Service Beach Seine Survey

The survey provides the broadest geographical coverage of all of the sampling programs but is focused on outmigrating juvenile salmonids. The beach seine primarily captures YOY splittail but any fish less than 25 mm (1 in) long are not identified. The limited data show low catches of splittail during dry years and higher catches during wet years, reinforcing the concept of a strong outflow-production relationship. This general relationship may, however, be due to other factors. For example, turbidity may be higher in high outflow years, thus rendering fish more vulnerable to capture.

Summer Townet Survey

The CDFG summer townet survey began in 1959 to provide an index of striped bass abundance. It samples YOY fish twice monthly at 30 sites using oblique tows in mid-channel. Starting and ending dates vary from year to year. Sample sites are located throughout the Delta, Suisun Bay, and San Pablo Bay. Data for species other than striped bass were not regularly recorded until after 1962, but were also not recorded in 1966, 1967, and 1968 (Sommer *et al.* 1997). The survey catches only low numbers of YOY splittail, presumably because it focuses on pelagic (open water) habitats while splittail are benthic in orientation. Not surprisingly, splittail catch varies widely and the index reflects only gross changes in YOY splittail abundance. The index peaked in 1982, was low during the 1987 to 1992 drought years, and abruptly rebounded in 1995 and 1998 (Baxter 1999a, 1999b).

Napa River Survey

This survey exists in association with a flood control and ecosystem restoration project in the Napa River. It is performed by consultants under contract to USACE, and involves a range of sampling techniques including beach seine, purse seine, otter trawl, fyke nets, and a 20 mm (0.8 in) size class surveys. The Napa River Survey began sampling in March 2001 and has detected splittail (USACE 2002a, 2002b) but the data are too recent and of too short a term (two years, including 2002 unpublished data) to be useful for an abundance index. The survey is scheduled to be completed in 2007 or 2008, after 7 years of data collection. Additionally, the Napa River is less well understood in terms of relationships between outflow, splittail habitat, and splittail production, than are the Central Valley rivers and the Delta. As such, the variables employed in our current analysis of abundance and trend (*see* Abundance section, below) cannot be applied to this distinct river system at this time.

California Department of Fish and Game Creel Census

CDFG collects creel census data in association with the Sacramento River System Angler Survey. This survey was initially conducted from August, 1989, to December, 1994, and was resumed in 1999 and 2000. Adult splittail catch data were only recorded during 1991 through 1994, and in 1999 and 2000. This survey collected angler count, fishing effort and fish catch information on the Sacramento River from Redding to Carquinez Bridge year round with the same effort, 4 week days and 4 weekend days per month per section, so changes in catch can reflect fish presence related to angler effort.

To reflect only the presence of migrating fish, Baxter (2001b) analyzed only catch data from Garcia Bend (RKM 80 (RM 50)) and upstream. Creel census data from 1991 through 1994 indicated a total annual catch of 114, 266, 498, and 110 splittail, respectively. The 1999 and 2000 censuses yielded an annual catch of 103 and 232 splittail, respectively. These catches represent 96 days of survey effort each year and are useful primarily to help establish the periods in which adult splittail migrate upstream. No abundance indices were calculated by any agency, organization, or individual from these data, as they fail to meet the criteria established by Meng and Moyle (1995) and are generally considered inadequate to the task of quantifying splittail abundance.

Survey Summary

All fish sampling methods may inherently suffer from a selection bias. This bias results from the particular method and must be considered when interpreting results. Because none of the surveys were designed specifically to monitor splittail populations, the survey equipment, survey locations, and sampling frequency must all be taken into consideration when interpreting the data. All the survey methodologies appear to sample young of the year (YOY) most effectively. As a result conclusions regarding YOY abundance appear to be the most accurate and reliable. Combined information from all survey efforts suggest that some successful reproduction occurs every year, but large numbers of young are produced only during years of relatively high outflow (wet years). This suggests that the majority of adult fish in the population result from spawning in wet years and lowest numbers are produced during drought years. The distribution and timing of YOY in the surveys also indicates that most spawning takes place in the bypasses, rivers or upper Delta, although some sporadic spawning also takes place in Suisun Marsh. It must be recognized, however, that YOY abundance may not be an entirely accurate indicator of adult abundance because there exists no observed stock-recruitment relationship (relationship between the number of adult fish and the number of offspring typically expected to join the adult population) in splittail (Sommer *et al.* 1997; Moyle 2002). Consequently, YOY abundance may not describe the current of future population sizes or trends.

Abundance Trend Analyses

We initially evaluated and analyzed the aforementioned data series using a method published by Meng and Moyle (1995) in the Transactions of the American Fisheries Society. This method was used during the initial status review for the splittail and was again employed during the development of the proposed rule to list the splittail (59 FR 862). This same method was replicated during the development of the final listing rule published on February 8, 1999, (64 FR 5963) using abundance data provided and updated by CDFG, CDWR, and UC Davis. The Meng and Moyle (1995) methodology (*see* 66 FR 2828 for complete description of methods) has been superceded by more current models employed by CDFG, and was not used to help us make this final determination. Further, this removal does not discuss the more recently available analytical methods such as permutation-based exact calculations of p-values for stratified (as opposed to unstratified) Mann-Whitney U-tests, as appeared in the August 17, 2001, notice (66 FR 43145) where we presented an updated statistical analysis of abundance data for the Sacramento splittail and requested comments on it. While these stratified Mann-Whitney U-tests represented an improvement on what essentially remained a Meng and Moyle (1995) statistical approach, and presented a major alternative to the categorical (*i.e.*, ''before'' and ''after'') approaches of both Meng and Moyle (1995) and Sommer *et al.* (1997), substantive scientific and statistical issues raised during the August 17, 2001, (66 FR 43145) public comment period resulted in our using an alternative statistical analysis to help us make this final determination. The following details the history and findings of the current analysis.

In an August 17, 2001, notice (66 FR 43145) we presented an updated statistical analysis of abundance data for the Sacramento splittail and invited public comments on the analysis and data, in specific technical review of the information. We concurrently sought peer review on the statistical analysis from five subject-area experts affiliated with a total of five agencies and organizations. Requests for peer review were sent to: (1) Dr. Peter B. Moyle of UC Davis, Davis, California; (2) Dr. Charles H. Hanson of Hanson Environmental, Inc., Walnut Creek, California; (3) Randall D. Baxter of CDFG, Central Valley/Bay-Delta Branch, Stockton, California; (4) Michael Chotkowski of the USBR, Mid-Pacific Region, Sacramento, California; and (5) Ted R. Sommer of CDWR, Environmental Services Office, Sacramento, California.

Following careful consideration of comments received from numerous respondents to the August 17, 2001, notice, including those provided through the peer review process, we concluded that the abundance indices and Multiple Linear Regression (MLR) model jointly developed and submitted by CDFG (2001) and USBR (2001), hereafter referred to as the CDFG/USBR MLR Model, provided the best scientific data (method) available, for statistically evaluating temporal trends of splittail abundance information. The CDFG/USGS MLR Model thus superceded the permutation-based exact calculations of p-values for stratified (as opposed to unstratified) Mann-Whitney U-tests.

On March 21, 2002, (67 FR 13095), we reopened the public comment period (67 FR 13095;67 FR 15337) to solicit comments on the CDFG/USBR MLR Model. We again sought peer review on the statistical analysis from the five individuals identified above. We have retained the CDFG/USBR MLR Model, albeit in a slightly modified form, after consideration of all public comments received, inclusive of this and preceding comment periods.

The CDFG/USBR MLR Model includes HYDROLOGY and TIME (year) as independent variables and ABUNDANCE INDICES as the dependent variable. We consider this statistical approach superior to the previous practice of using Mann-Whitney U tests (Meng and Moyle 1995; Sommer *et al.* 1997) because it does not require arbitrarily dividing an inherently continuous data set into ''before'' and ''after'' categories (*see* previous discussion of this issue in the August 17, 2001, notice; 66 FR 43145). We consider the CDFG/USBR MLR Model superior to the polynomial regression model presented in the August 17, 2001, notice (66 FR 43145) because existing abundance index monitoring programs have not been conducted for a sufficient duration to provide for reasonably conclusive application of the polynomial model (as concluded in the August 17, 2001, notice (66 FR 43145)). We also support use of the CDFG/USBR MLR Model because of the facility with which it can be applied to all sets of splittail age class data from all seven applicable abundance monitoring data sets (Fall MWT, Bay Study OT, Bay Study MWT, Chipps Island, Suisun Marsh, CVP salvage, and SWP salvage). The seven surveys include a total of 20 discrete sets of age-specific abundance monitoring data. These 20 datasets consist of the 2 age classes (0 and 1 or more) for the Suisun OT, in addition to the 3 age classes (0, 1, and 2 or more) for each of the other 6 surveys.

The CDFG/USBR MLR Model explicitly controls for potential confounding effects of hydrological year type, the factor that is nearly unanimously viewed as the single strongest predictor of splittail year class strengths (*e.g.*, Moyle *et al.* 2001), by utilizing the number of days total delta inflow (DAYFLOW, California Department of Water Resources' mathematical hydrology model) exceeds 1,557 cubic meters per second (cms) (55,000 cubic feet per second (cfs)) during the February through May spawning/rearing period as a predictor (independent variable). The 1,557 cms (55,000 cfs) variable was selected because it approximates the critical inflow value above which Delta floodplains, especially the key splittail spawning area in the Yolo Bypass, become inundated. The 1,557 cms (55,000 cfs) variable thus captures the existence of appreciable bypass and spawning habitat inundation. This is conceptually comparable, yet superior, to the stratified Mann-Whitney U tests presented in the August 17, 2001, notice (66 FR 43145), which also controlled for hydrological year type. There is, however, one potentially important assumption associated with the CDFG/USBR MLR Model that remains untested, and that concerns the assumption of a lack of interaction between the HYDROLOGY and TIME variables. In essence, the CDFG/USBR MLR Model assumes that the long term probabilities of high and low flow water years are random.

Discussion of CDFG/USBR MLR Model results

The results addressed in this discussion differ somewhat from those published previously (67 FR 13095) due to the inclusion of new data for 2001 and 2002 in some of the indices as it has become available (see discussion of each survey, above). We also removed from the analysis data taken for the Suisun OT in 1979, based on comments received from the USBR (2002) indicating that differing survey protocols were used in 1979 as compared to other years.

The question of how to analyze the less-than-optimal data we have on splittail was vexing. In large part we have accepted the statistical model provided to us by CDFG and USBR. However, while our approach was generally consistent with theirs, there are two major differences. First, we used all 20 data sets weighted equally; whereas the BOR and CDFG recommended that the data sets be weighted by their relative importance. Second, we accepted a 20 percent risk that we would wrongly conclude there is a downward trend in the population for each of the 20 data sets in order to reduce the risk that we would fail to detect a trend if, in fact, one exist. We used this approach in order to ensure our assumptions were conservative. The effect was to establish a ''worse-case'' scenario with respect to the status of the populations when we conducted our threats analysis. As a result, our interpretation of the model results differs from theirs.

Our model results indicate that fifteen of twenty data sets have a downward trend, more downward trending data sets than we would expect based on chance. Typically, statisticians decide whether such trends are ''statistically significant'' or not. Interpreting the model results using the classic statistical standard (p # 0.05) for determining significance, we find that five of the fifteen downward trends are statistically significant. CDFG and USBR believe that this result is insufficient to make a determination that the splittail is declining in abundance. By adopting the more relaxed standard (p # 0.20), we increase the likelihood that a significant result will be identified, a conservative approach. Taking this approach (p # 0.20), we find nine significant downward trending data sets and two significant upward trending data sets. We believe that the existing data sets constitute the best available scientific information and that our more conservative approach indicates a number of significant declining splittail population trends exist. Coupled with the CDFG and USBR results, we have bracketed the range of possibility regarding the population status of the species as a whole. We believe this range is the best context for us to use when we conduct our threats analysis.

We fully concur with the statements of various respondents that abundance monitoring data for splittail have methodological weaknesses of one sort or another; none of the surveys were designed specifically to rigorously measure splittail population numbers (see Moyle *et al.* 2001; Meng and Moyle 1995; and Sommer *et al.* 1997 for descriptions of surveys). However, existing data sets do constitute the best available scientific information for the species.

While our conservative approach to analyzing that information is more likely to produce results indicating that significant declining splittail population trends exist, we believe that using this ''worst case'' scenario in analyzing the impacts reported in the section entitled Summary of Factors Affecting the Species is most likely to result in a listing finding that is robust.

Because we have chosen to adopt the CDFG/USBR MLR Model jointly submitted by CDFG and USBR (as our primary basis for abundance analyses), and are no longer using our analysis in our August 17, 2001 notice (66 FR 43145), specific comments on our analysis in our August 17, 2001 notice (66 FR 43145) will not be addressed in the section entitled Summary of Comments and Recommendations.

Previous Federal Action

On February 8, 1999, we published a final rule listing the splittail as threatened under the Act (64 FR 5963). Please refer to the final rule for a discussion of Federal actions prior to the publication of the final rule. At the time of our final determination of threatened status for the splittail, the splittail population had declined in both numbers and range and was primarily threatened by changes in water flow and water quality resulting from the export of water from the Sacramento and San Joaquin Rivers, periodic prolonged drought, loss of shallow water habitat, introduced aquatic species, and agricultural and industrial pollutants.

Subsequent to the publication of the final rule, plaintiffs in the cases San Luis & *Delta-Mendota Water Authority* v. *Anne Badgley,*° *et al.* and State Water Contractors, *et al.* v. *Michael Spear, et al.* commenced action in the Federal Eastern District Court of California, challenging the listing of the splittail as threatened, alleging various violations of the Act and of the Administrative Procedure Act (5 U.S.C 551 *et seq.*), specifically that we: (1) Failed to use the best scientific and commercial data available; (2) ignored all pre-1980 and post-1992 data available and that we used only selected data from the 1980 to 1992 period; (3) did not publish a summary of the available data, which data we considered, and the relationship between the data and our decision on the final rule; and (4) promulgated the final rule in a manner that was arbitrary, capricious, and not in accordance with law, in that the splittail did not meet the definition of a threatened species as set forth in the Act.

On June 23, 2000, the Court rendered summary judgment in the two cases in favor of the plaintiffs, finding that our promulgation of the final rule listing the splittail as threatened was unlawful. On September 22, 2000, the court remanded the determination of whether or not the splittail is a threatened or endangered species to us. The court ordered us to re-evaluate our final determination and publish a new finding within 6 months of the date of the remand order, and kept the rule in effect during that period. The court used its equitable powers to retain the protections of the Act for the species during the remand of the rule to the Service.

On January 12, 2001, we reopened the comment period for 30 days to seek information regarding the splittail's status, abundance and distribution, as well as information regarding issues identified by the District Court in its June 23, 2000, judgment (66 FR 2828). At that time, we were subject to a court-ordered deadline of March 22, 2001. On March 16, 2001, we received an extension from the District Court until June 22, 2001, so that we could reopen the comment period. Subsequent to that extension, we reopened the comment period for the second time since the remand, from May 8, 2001 to June 7, 2001 (66 FR 23181). On June 28, 2001, we received an additional extension from the court so that the comment period could be reopened and we could have additional time to obtain reviews of the revised statistical analyses which we employed in response to prior comments. The comment period was then opened on August 17, 2001 (66 FR 43145); while the court ordered decision date was established as January 31, 2002. We later received an additional extension from the court until October 15, 2002, so that we could seek comments on the MLR Model submitted by CDFG and USBR during the August 17, 2001, comment period. On March 21, 2002, we reopened the comment period for the fourth time since the remand (67 FR 13095) and on April 1, 2002, we corrected the duration of the comment period to reflect 60 days (67 FR 15337). On October 31, 2002, we received an additional extension from the court so that the comment period could be reopened for a fifth time since the remand (67 FR 66344) to solicit comments on the revised statistical analysis we had done, as described in our March 21, 2002 document (67 FR 13095). Finally, on February 28, 2003, the court approved a joint stipulation requiring us to submit our final determination to the **Federal Register** for publication on or before September 15, 2003. This final determination is in compliance with that joint stipulation agreement.

Summary of Comments and Recommendations

During the five comment periods following the remand, we contacted all appropriate State and Federal agencies, Tribes, county governments, elected officials, and other interested parties and invited them to comment. We have requested that all interested parties submit factual reports or information that might contribute to the development of a final determination. In addition, we have invited public comment through the publication of notices in various newspapers. We published notice of the January 12, 2001, reopening of the comment period in the *Sacramento Bee, Fresno Bee* and *Contra Costa Times* newspapers. For the May 8, 2001, notice, we invited public comment through publication of notices in the *Antioch Ledger-Dispatch, the Marysville Appeal-Democrat,* the *Fresno Bee,* and the *Sacramento Bee.* For the August 17, 2001, reopening notice we invited public comment through publication of notices in the *Marysville Appeal-Democrat,* the *Fresno Bee,* and the *Sacramento Bee.* An electronic mail address for submission of comments was provided in the May 8, 2001, and August 17, 2001, notices and was posted on the Sacramento Fish and Wildlife Office's official web site. For the March 21, 2002 reopening notice, we invited public comment through publication of notices on March 27, 2002, in the *Marysville Appeal-Democrat,* the *Sacramento Bee,* and the *Fresno Bee.* An electronic mail address was not provided for the March 21, 2002, reopening due to uncertainties regarding our internet access. An electronic mail address was, however, provided with our April 1, 2002, correction, and with our October 31, 2002, reopening. We also sent out notices of each reopening of the comment period to all parties on a mailing list for Sacramento splittail information.

During the five comment periods opened since the remand, we received a total of 33 written comment letters representing 1 Federal agency, 2 State agencies, 2 local governments, and 13 private individuals or organizations. We reviewed all comments received for substantive issues and new information regarding the status of the Sacramento splittail. Of the comments we received, only 3 supported listing. Information contained in these comments was reviewed to determine if it raised any new substantive issues that had not been raised in comments previously submitted, and subsequently addressed in this final determination.

The following is a summary of comments we received during the 197 days associated with the five comment periods opened since the remand of the final listing rule. For additional information on comments received during three previous comment periods before the current litigation, please see the previous final listing rule (64 FR 5963). Substantive comments and information raised or provided during the public comments periods have either been incorporated directly into this notice or addressed below.

Peer Review

As previously discussed in the above abundance section, we requested 5 biologists to provide scientific review of the proposed listing of the splittail as threatened. Technical data provided by the peer reviewers have been incorporated into or addressed in this document, while other issues raised by the peer reviewers are addressed below.

Peer Reviewer Comment 1: A peer reviewer cited the ''White Paper'' (Moyle *et al.* 2001) for splittail as raising the possibility that abundance may not be a reliable measure of population status for the splittail.

Our Response: We acknowledge that abundance may not be the most reliable measure of population status, but assert that it is the best scientific measure available. The utility of abundance as a measure of splittail population status is reflected in its continued use by the scientific community including researchers (Meng and Moyle 1995, Sommer *et al.* 1997) and agencies (CDFG, CDWR, USBR).

Peer Reviewer Comment 2: A peer reviewer cited the ''White Paper'' (Moyle *et al.* 2001) for splittail as reporting a tentative population model result that stated, ''* * * a long series of dry years is unlikely to drive the splittail to extinction, even if the population is greatly reduced.'' Another peer reviewer asserted that if the splittail were truly going extinct, all surveys would show a decline.

Our Response: A species warrants listing as threatened under the Act if is in danger of becoming endangered in the foreseeable future throughout all or a significant portion of its range (16 U.S.C. 1532(20)). It is possible for the splittail to be undergoing threats or declines in a significant portion of its range without declines showing in all surveys. Alternatively, threats to the splittail may support listing even in the absence of our ability to document current population declines. However, even considering our conservative analysis of the apparent splittail population declines and the threats analysis, we believe the conservation elements of the California State and Federal cooperative program (CALFED) and the Central Valley Project Improvement Act (CVPIA) programs adequately mitigate for these threats (please refer to Summary of Factors Affecting the Species section for a detailed discussion of CALFED and the CVPIA).

Peer Reviewer Comment 3: A peer reviewer submitted comments that included an analysis using a modified version of Meng and Moyle's (1995) pre-decline and post-decline method. The peer reviewer also divided the data by year class and used data available from all years and requested we consider these analyses.

Our Response: As discussed earlier in this notice, we acknowledge that there are other methods by which to analyze the available data, but that we have now employed an analysis using the CDFG/USBR MLR Model data series to describe population trends of the splittail. We refer the peer reviewer to our Abundance section for a discussion of our most recent statistical analysis of the species population trends.

Peer Reviewer Comment 4: A peer reviewer criticized us for evaluating the results of the CDFG/USBR MLR Model for all 20 data series of splittail abundance index data, instead of limiting the evaluation to the nine data series that the respondents view as most representative of overall splittail populations. Another peer reviewer stated that Bay Study OT and Fall MWT data were more indicative of splittail abundance trends, rather than the trends made evident by data collected at the SWP Salvage facilities, Chipps Island, and in Suisun Marsh, which the respondent felt were narrow in geographic scope.

Our Response: We note that these and other respondents have previously criticized us, while employing different analysis, for not treating all 20 data series equally and for not including all available data series in statistical evaluations of abundance trends. We refer the commentor to the section entitled Abundance for a discussion of our treatment of the data series.

Peer Reviewer Comment 5: A peer reviewer reiterated his assessment that the statistical evidence for a declining trend in splittail abundance is weak, and cited an analysis that asserted that evidence for a time trend in 7 of 20 data series is not a compelling factor in determining that declines exist. The peer reviewer specifically cited Manly (2002) which states ''The Service claims that lack of power to detect a trend gives a reason for using a 20 [percent] level of significance in assessing whether or not there is evidence of a trend with individual series. This then allows [the Service] to claim evidence for a trend for 7 of the 20 series. Although this sounds impressive, it is less so when it is realized that by chance alone 4 of the 20 series (*i.e.,* 20 [percent] of them) are expected to give a significant result if this level of significance is used.'' The peer reviewer also asserted that the weak nature of the MLR Model regression coefficients will be demonstrated with the calculation of splittail abundance indices for 2000, 2001, and 2002 and their inclusion into the models.

Our Response: Using the most recent data, our analysis now indicates that 9 of 20 indices show significant negative trends at the 20 percent level of significance, while 2 of 20 show significant positive trends at that significance level. As we noted earlier in the analysis, we achieved these results by a conscious choice of a variable that accepted a higher risk of incorrectly identifying downward trends in population in order to take a conservative position in our threats analysis.

Peer Reviewer Comment 6: A peer reviewer criticized our acceptance of the ''sign'' (*i.e.,* positive or negative) results of the CDFG/USBR MLR Model coefficients at face value because in most cases (16 of 20) the true signs (*i.e.,* positive or negative) were just as likely to be positive as negative.

Our Response: We cannot apply the respondent's reasoning to the available data. The p-value for a coefficient is what statistical analysis has indicated it should be; simply because a given p-value does not rise to the level of 95 percent significance criterion, does not indicate that the p-value automatically reverts to 50 percent.

Peer Reviewer Comment 7: It was noted by a peer reviewer that in half the CDFG/USBR MLR Model runs the dependent variable was significantly non-normal and that as a consequence probability statements will be ''slightly'' in error.

Our Response: We believe that the peer reviewer's comment is correct. This type of error alone, however, would not necessarily invalidate our evaluations of the signs and magnitudes of the regression coefficients. The error would have to be of a nature that creates bias. The peer reviewer did not provide any statistical or other argument to explain why such error would necessarily result in bias. The unknown statistical effects of non-normality in half the model runs constitutes just the sort of uncertainty that leads us to be cautious about giving undue weight to any conclusions regarding the abundance index data for splittail.

Peer Reviewer Comment 9: A peer reviewer believes that the extended drought of 1984 to 1992 created only a perception of decline and that it was the ''* * * accidental juxtaposition of a series of wet, strong splittail years with a series of dry, weak years that prompted [our] interest in the first place.''

Our Response: We disagree with the peer reviewer's claims that the period of extended drought has been ignored, as well as with the contention that the splittail's drought-driven declines are the sole factor under consideration in our determination. We first note that the period of continuous drought is considered by most authoritative sources to have begun in 1987 (Moyle *et al.* 2001; Baxter 1999a; Sommer *et al.* 1997), not 1984 as reported by the respondent. We note, however, that 1985 and 1986 were dry years (Cannon 2001 in prep.).

The declines noted during the 1987 to 1992 drought were the likely result of a paucity of spawning habitat being available. The drought decreased the amount of floodplain (*i.e.* Yolo Bypass and mainstem river margins) available for spawning and thus, spawning output was lower. Low splittail population densities were aggravated by the CVP and SWP's diversion of a greater proportion of water from the Delta than in prior years; fish were entrained at the facilities and the entrapment zone (location where fish become vulnerable to the export facilities' effect on currents in the Delta), was located well upstream of Suisun Marsh in increasingly suboptimal habitat. These events are described in detail in our February 8, 1999, final listing rule (64 FR 5963).

The basis for the peer reviewer's claim that we are disproportionately concerned with splittail declines noted during the 1984 (or 1987) to 1992 drought is unclear. True, the ''accidental juxtaposition'' of wet and dry years resulted in abundance data that appeared to illustrate a precipitous drop in the splittail population. There are, however, up to 10 years of pre-drought as well as up to 8 to 10 years of post-drought data. The data collected during six years of continuous drought are but a subset of the nearly 20 years of extant splittail data. The splittail's relatively long life span and resilience following unfavorable conditions renders the declines exhibited during a discrete drought unlikely to influence the analytical findings from an ever-lengthening period of record. Most importantly, we now employ the CDFG/USBR MLR Model, which explicitly controls for potential confounding effects of hydrological year type. The respondent's concern would be more applicable to abandoned analytical techniques. The arbitrary pre- and post-decline cut point approach of Meng and Moyle (1985) was driven by trends noticed during the 1987 to 1992 drought, as was a formerly touted alternative analysis that involved the use of 1987 (the beginning of the drought) as a cut point (Sommer *et al.* 1997) for determining percent declines.

We also disagree with the contention that the 1987 to 1992 drought serves as the only factor which triggered our investigations of the splittail's status. Our interest in the splittail was prompted initially by the statement in Daniels and Moyle (1983) that the splittail's and delta smelt's ''* * * abundance could decline rapidly if environmental conditions become unfavorable for them, possibly making them candidates for listing as threatened species.'' We subsequently included the Sacramento splittail as a category 2 candidate species for possible future listing as endangered or threatened in the January 6, 1989, Animal Notice of Review (54 FR 554). The candidate category system was abandoned on February 28, 1996 (61 FR 7457), and species meeting the definition of the former category 2 (such as splittail) were no longer considered candidates. Our administrative proceedings on splittail resumed on November 5, 1992, when we received a petition from the Natural Heritage Institute to add the Sacramento splittail to the List of Endangered and Threatened Wildlife and to designate critical habitat for this species in the Sacramento and San Joaquin Rivers and associated estuary.

Peer Reviewer Comment 10: A peer reviewer, in response to our March 21, 2002 (67 FR 13095) notice, believed that we should not have adopted the CDFG/USBR MLR Model which was jointly submitted in CDFG's and USBR's respective peer review and comment letters. The CDFG/USBR MLR Model was advocated by its submitting agencies as an approach superior to our Meng and Moyle (1985) method utilized in our 1994 proposed listing (59 FR 862) and 1999 final listing (64 FR 5963) rules, the polynomial regression technique discussed in our August 17, 2001 (66 FR 43145) notice, or the Sommer *et al.* (1997) technique formerly forwarded by CDFG and CDWR.

Our Response: We agree that USBR's submission was labeled *A Sample Alternative Model of Sacramento Splittail Abundance.* However, USBR (2001) included no language in their agency comment letter and peer review submission to suggest their intent was to have us retain the polynomial regression analysis (66 FR 43145), revert to the Meng and Moyle (1985) analysis, adopt the Sommer *et al.* (1997) analysis, or employ any other analytical technique until the CDFG/USBR MLR Model and results reached a greater state of refinement.

To the contrary, USBR's peer review and comment letter states, ''Results presented in Table 1, include actual p-values for the Service's inspection.'' (USBR 2001). To advocate we abandon the model is to advocate we abandon analysis of p-values. Furthermore, USBR scientifically derived and submitted multiple conclusions in their peer review and comment letter, such as, ''In summary, the results [of the CDFG/USBR MLR Model] presented here clearly indicate that hydrologic variability strongly affects YOY splittail indices, and also affects some adult indices in succeeding years as cohorts propagate through the population.'' (USBR 2001). These conclusions were not accompanied by any disclaimers that the conclusions should be disregarded because the model was not yet sufficiently developed or that the conclusions should not be applied to the review of the splittail's population trends.

The CDFG/USBR MLR Model was also submitted to us by CDFG. Consistent with the USBR peer review and comment letter, CDFG also derived and submitted multiple conclusions based on the specific runs of the CDFG/USBR MLR Model that the USBR is now criticizing us for accepting. CDFG advocated the use of the CDFG/USBR MLR Model (as submitted) in their peer review and comment letter (CDFG 2001) with the statement, ''Our response is composed of two parts: a discussion of individual analyses presented in our August 17, 2001, notice (66 FR 43145), and a summary of the results of a multiple regression analysis [the CDFG/USBR MLR Model] that we believe is more useful in evaluating trends in survey indices.'' Again, consistent with the USBR's peer review and comment letter, CDFG's peer review and comment letter did not qualify any of the conclusions they derived from the CDFG/USBR MLR Model with disclaimers about the inappropriateness of employing the model.

We independantly evaluated the structure and findings of the CDFG/

USBR MLR Model and determined that it represented the best available scientific and commercial information. We retain our conclusions regarding our analysis and meta-analysis of the model's results, regardless of its developers' current desire to secondarily qualify its application.

Peer Reviewer Comment 11: A peer reviewer commented that it was unclear whether we had independently re-derived the CDFG/USBR MLR Model results submitted jointly by CDFG and USBR.

Our Response: We did not independently re-derive those results. We accepted the results presented in CDFG (2001) and USBR (2001) at face value, as they were developed by subject area experts within CDFG and USBR during a peer review and public comment process.

Peer Reviewer Comment 12: A peer reviewer believed that our that our statement, ''* * * [the] traditional [alpha-value] criteria assume a much higher standard of statistical power than the splittail data are able to meet * * *'' in our March 21, 2002, notice (67 FR 13095) is erroneous.

Our Response: We agree with the peer reviewer that in a strictly literal sense, the choice of an alpha-value criterion can be made without any regard for statistical power. However, in practice, researchers are concerned with both type I error (determined by the choice of an alpha value) and type II error (directly related to the statistical power of a study). When conducting our analysis, we made a conscious choice to use the more conservative nontraditional approach of using an alpha value of 0.20.

Peer Reviewer Comment 13: A peer reviewer asserted that the purpose of statistical hypothesis testing in the case of the MLR Model is to decide whether trends do or do not exist, not to evaluate gradients of reliability in evaluating trends.

Our Response: The CDFG/USBR MLR Model is a probabilistic approach to examining time trends, it is not a categorical ''either/or'' approach (as the respondent appears to assert). We chose to evaluate the probabilities associated with competing hypotheses concerning the abundance status of splittail. It is for this reason that we stated that all trends, not just trends meeting an arbitrary traditional confidence criterion (95 percent confidence, or alpha-value of 0.05) were evaluated.

Peer Reviewer Comment 14: A peer reviewer believes that a trawl's declining catch efficiency for adult splittail as compared to juvenile and YOY rendered trawl surveys less likely to reflect trends and stated that adult and juvenile indices should not be combined. The peer reviewer also suggested that Bay Study OT and Fall MWT were more representative measures of abundance.

Our Response: While we concur that declining catch efficiency may be a characteristic of trawls, we do not agree that it should be used to exclude a trawl survey's data. Declining catch efficiency within a given trawl survey is expected to be uniform from year to year, thus rendering inter-annual analysis valid. Although an age bias will make data series for older age-class fish less sensitive for detecting change, it will not produce a long-term directional bias (*i.e.,* we have no reason to believe that the capture efficiency for older age class splittail is becoming progressively worse over time). Thus, any trends in the older age class data series with a substantive p-value can be viewed to be roughly as accurate and reliable as for the Age-0 class of splittail showing trends at comparable p-values.

We also concur that trawls' declining catch efficiency does preclude the combination of age class data. We report each index separately herein and do not combine adult and juvenile indices other than for meta-analytical purposes. We also acknowledge that, in certain situations, adult abundance for different age classes (of adults) is combined and reported because the data are collected in that manner, *i.e.,* salvage data are reported as Age-1 and as Age-2 and greater with no differentiation made for individuals greater-than Age-2 classes. Situations such as this represent a relict of the sampling methodology but remain the best available information. We continue to believe that as long as the degree of age-based capture bias is constant over a survey period, all age classes should show approximately the same trends, and that combining age classes for meta-level statistical analyses is not problematic.

We reiterate that the Suisun Marsh OT, which combines an efficient, bottom trawling technique with focused surveys in a small habitat at the core of the splittail's range, is the most likely to detect a trend and likely suffers from less sampling inefficiency than the Bay Study OT (low detection of splittail at periphery of range) and Fall MWT (unlikely to detect benthic fish and does not sample shallow water or near-shore areas).

Peer Reviewer Comment 15: A peer reviewer asserted that the peer review process for scientific publications doesn't necessarily ensure that published papers are unbiased, scientifically sound, and without errors. The *Transactions of the American Fisheries Society* does not use the double-blind method for peer review. This issue was raised in regards to our past use of the Meng and Moyle (1995) methodology to determine splittail abundance.

Our Response: We agree with this assertion. Each piece of scientific work, whether a peer reviewed published paper or an unpublished, unreviewed, draft report, must be objectively evaluated for the scientific merit of its content alone. Peer reviewed publication provides no guarantee of scientific merit. The test of time, following publication, provides the ultimate measure of scientific merit. Indeed, subsequent iterative examination of the splittail's status has resulted in our abandonment of Meng and Moyle (1995), Sommer *et al.,* (1997) and our permutation-based exact calculations of p-values for stratified (as opposed to unstratified) Mann-Whitney U-tests (66 FR 43145).

Peer Reviewer Comment 16: A peer reviewer claimed we ignored the draft ''White Paper'' published by Moyle *et al.* (2001, in prep.)

Our Response: We use the various findings and hypotheses found in the draft and revised White Paper (Moyle *et al.* 2001 in prep.) extensively throughout this document.

Peer Reviewer Comment 17: A peer reviewer stated that the range of the splittail is wider than was previously thought.

Our Response: The greater range of the splittail was acknowledged in the January 12, 2001, notice (66 FR 2828). The above Background section of this final document contains a discussion of the range of the splittail.

Peer Reviewer Comment 18: Several peer reviewers felt that we should not classify the Yolo and Sutter bypasses as a threat to the splittail, as we did in the January 12, 2001, reopening of comment period (66 FR 2828), based primarily upon the data found in Sommer *et al.* (1997) and Sommer (2001a). The bypasses have demonstrated the capability of producing large numbers of splittail when inundated. One peer reviewer also felt that the bypasses cannot be considered a threat simply because the conditions could be better. Another peer reviewer claimed that current operations in the bypasses do not harm splittail or their habitat. Another peer reviewer felt that the bypasses are not to be considered a threat because even though their splittail habitat conditions are not optimal, they are still sufficient to provide substantial benefits to the species. Finally, another peer reviewer stated that the Yolo and Sutter bypasses are a ''net benefit'' to the splittail in that without their existence, the species might not have persisted to the present day.

Our Response: We have determined, based on consideration of scientific data and information provided by respondents, that the Yolo and Sutter bypasses are not, in and of themselves, a threat to the splittail. Our reevaluation of this issue is discussed in Factor E of the section entitled Summary of Factors Affecting the Species.

Peer Reviewer Comment 19: A peer reviewer felt that our determination that the Sutter and Yolo bypasses would require inundation for at least 30 continuous days between March and April in order for them to be considered a beneficial splittail spawning habitat was inaccurate and could affect water supply and flood management.

Our Response: We have not proposed inundation of the bypasses for any specific interval, duration, or frequency. Rather, we have speculated that the bypasses would have their greatest benefits to splittail if they became inundated at a frequency and duration that as closely as possible mimics the natural, precipitation-driven hydrograph. The reference to 30 days is a statement regarding how the inundation patterns of the bypasses at times do not meet the life history requirements of the splittail. Inundation of bypasses in dry years would reduce the effects of drought on the splittail. We also speculate that if the bypasses were inundated at a frequency and duration that as closely as possible mimics the natural, precipitation-driven hydrograph, then the numbers of non-native fish would be reduced, as non-native fishes favor ponded and continuously inundated habitats.

Peer Reviewer Comment 20: A peer reviewer believed that full implementation of the CALFED Program would preclude the need to list the splittail and indicated that over $10 million had been spent on actions that could improve conditions for splittail.

Our Response: We refer the peer reviewer to the section entitled Summary of Factors Affecting the Species.

Peer Reviewer Comment 21: A peer reviewer asserted that the age-based capture bias argues against combining data from different age groups.

Our Response: We assume this comment refers to the pooling of data series from all age classes for meta-level statistical evaluation. We believe that as long as the degree of age-based capture bias is constant over a survey period, all age classes should show about the same trends, and that combining age classes for meta-level statistical analysis will not be a problem.

State Agencies

We received comments from the following California State agencies: Department of Fish and Game (CDFG) and Department of Water Resources (CDWR). Technical data provided by the CDFG and CDWR have been incorporated into or addressed in this document, while other issues raised by State agencies are addressed below:

State Agency Comment 1: CDFG submitted comments that included an analysis using a modified version of Meng and Moyle's (1995) pre-decline and post-decline method. CDFG also divided the data by year class and used data available from all years and requested we consider these analyses.

Our Response: As discussed earlier in this notice, we acknowledge that there are other methods by which to analyze the available data, but that we have now employed an analysis using the CDFG/USBR MLR Model data series to describe population trends of the splittail. We refer CDFG to our Abundance section for a discussion of our most recent statistical analysis of the species population trends.

State Agency Comment 2: CDFG reiterated their assessment that the statistical evidence for a declining trend in splittail abundance is weak. CDFG cited an analysis that asserted that evidence for a time trend in 7 of 20 data series is not a compelling factor in determining that declines exist. CDFG specifically cited Manly (2002) which states ''The Service claims that lack of power to detect a trend gives a reason for using a 20 [percent] level of significance in assessing whether or not there is evidence of a trend with individual series. This then allows [the Service] to claim evidence for a trend for 7 of the 20 series. Although this sounds impressive, it is less so when it is realized that by chance alone 4 of the 20 series (*i.e.,* 20 [percent] of them) are expected to give a significant result if this level of significance is used.'' CDFG also asserted that the weak nature of the MLR Model regression coefficients will be demonstrated with the calculation of splittail abundance indices for 2000, 2001, and 2002 and their inclusion into the models.

Our Response: As we note in our earlier analysis we made a conscious decision to use the more conservative, nontraditional 0.20 alpha for analysis purposes.

State Agency Comment 3: CDWR claimed we ignored the ''White Paper'' published by Moyle *et al.* (2001).

Our Response: We agree with and use many of the various findings and hypotheses found in the draft and revised White Paper (Moyle *et al.* 2001) extensively throughout this document. We believe that the White Paper is a useful resource and contributes to the knowledge on splittail biology. The paper has been referenced throughout this document.

State Agency Comment 4: CDWR stated that the hypothetical analytical model presented at the January 29, 2001, CALFED Bay-Delta Program (CALFED Program) Splittail Science Conference and described in the White Paper (Moyle *et al.,* 2001) indicates that the splittail, even during severe and lengthy drought, is unlikely to be driven to extinction.

Our Response: We ultimately arrive at the same conclusion as Dr. Moyle, that the splittail is unlikely to be driven to extinction. However, at this point we are unwilling to accept that premise solely on the basis of the White Paper. To date, there remains no proven scientific method for determining the current splittail population size primarily because no extant survey was designed specifically to monitor splittail populations or to determine their absolute numbers. Further, the splittail exhibits relatively wide variation in annual abundance in response to prevailing hydrologic conditions; it is likely that the population size exhibits appreciable year to year variability which would confound size estimates.

Calculating the current population's risk of and/or time to extinction would require estimates of absolute population size, rate of decline, and minimum viable or sustainable population size, none of which currently exist in a scientifically defensible form. Moreover, it must also be noted that the statutory and regulatory standard for ascertaining threatened status is not to determine whether or why a species will become extinct in the near future, but if, pursuant to section 3(19) of the Act, it ''* * * is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range''. An endangered species, pursuant to section 3(19) of the Act, is that ''* * * which is in danger of extinction throughout all or a significant portion of its range * * *''. Our analysis, including a nontraditional conservative approach to estimating population trends examines the factors identified in the Act and in fact we find that the splittail does not warrant listing at this time.

State Agency Comment 5: CDWR felt that we should not classify the Yolo and Sutter bypasses as a threat to the splittail, as we did in the January 12, 2001, reopening of comment period (66 FR 2828), based primarily upon the data found in Sommer *et al.* (1997) and Sommer (2001a). The bypasses have demonstrated the capability of producing large numbers of splittail when inundated.

Our Response: We have determined, based on consideration of scientific data and information provided by respondents, that the Yolo and Sutter bypasses are not, in and of themselves, a threat to the splittail. Our reevaluation of this issue is discussed in Factor E of the section entitled Summary of Factors Affecting the Species.

State Agency Comment 6: CDWR felt that our determination that the Sutter and Yolo bypasses would require inundation for at least 30 continuous days between March and April in order to for them to be considered a beneficial splittail spawning habitat was inaccurate and could affect water supply and flood management.

Our Response: We have not proposed inundation of the bypasses for any specific interval, duration, or frequency. Rather, we have speculated that the bypasses would have their greatest benefits to splittail if they became inundated at a frequency and duration that as closely as possible mimics the natural, precipitation-driven hydrograph. The reference to 30 days is a statement regarding how the inundation patterns of the bypasses at times do not meet the life history requirements of the splittail. Inundation of bypasses in dry years would reduce the effects of drought on the splittail. We also speculate that if the bypasses were inundated at a frequency and duration that as closely as possible mimics the natural, precipitation-driven hydrograph, then the numbers of non-native fish would be reduced, as non-native fishes favor ponded and continuously inundated habitats.

State Agency Comment 7: CDWR commented that our classification of the Yolo Bypass as a threat in the January 12, 2001, notice (66 FR 2828) would undermine potential ecosystem restoration actions that would benefit the splittail.

Our Response: In this notice, we determine that the Sutter and Yolo bypasses are not in and of themselves threats.

State Agency Comment 8: CDWR objected to our statements regarding the entrainment risks present in the bypasses based upon Sommer *et al.*'s (1997) findings that entrainment is not a significant threat within the bypasses. It is thought that the splittail's evolutionarily-derived ability to emigrate prior to stranding reduces the risk of stranding. CDWR also felt that the magnitude of the entrainment threats presented by the bypasses was overestimated when we cited in the January 12, 2001, notice (66 FR 2828), the death of a number of juvenile splittail in an approximately 0.8 hectare (ha) (2 acre (ac)) borrow pit as statistically-significant and that the classification of ''natural sinks'' as a threat was in error.

Our Response: We have considered these data and now agree that entrainment in the Yolo Bypass is less than was originally thought. Information presented at the January 29, 2001, CALFED Splittail Science Conference indicates that a modest degree of topographic variability within an inundated area may be beneficial, as it may create a diversity of flow patterns and velocities which in turn may allow juvenile splittail to evade predation and forage more effectively during egress.

State Agency Comment 9: CDWR believed that full implementation of the CALFED Program would preclude the need to list the splittail and indicated that over $10 million had been spent on actions that could improve conditions for splittail.

Our Response: We refer CDWR to the section entitled Summary of Factors Affecting the Species.

Other Public Comments and Responses

We address other substantive comments and accompanying information in the following summary. Relatively minor editing changes and reference updates suggested by commenters have been incorporated into this document, as appropriate.

Comment 1: The court directed that we provide a more thorough response to the California Resources Agency comments, specifically comments submitted by CDFG and CDWR in July 1998. The court also directed that we address the perceived biases from the Meng and Moyle (1995) method. We also received specific comments on issues related to prior statistical analyses of abundance.

Our Response: We have adopted a multiple linear regression approach proposed by CDFG and U.S. Bureau of Reclamation (USBR). CDFG, in comments submitted in association with the August 17, 2001, comment period, stated: ''Although CDFG reported Mann-Whitney U test results in previous comments (February 8, 2001), we now suggest greater reliance on a multiple regression approach to trend analysis, described in a following section of our comments. We no longer support use of the Mann-Whitney U procedure of time trend analysis.'' CDWR, in comments also submitted under the August 17, 2001, comment period, stated: ''A more defensible alternative would be to develop a multivariate model incorporating the effects of both flow and time.'' CDWR also made reference to the USBR application of regression techniques, which also were provided in USBR's comments. We have considered the CDFG, CDWR, and USBR recommendations to employ a multivariate, regression based model and have incorporated an analysis using the CDFG/USBR MLR Model data series as described in the section entitled Abundance. We will therefore forego providing responses to specific comments on the perceived bias of the Meng and Moyle (1995) and alternate methodologies previously employed because our analytical tools have been upgraded to utilize the modified methodology employed by CDFG and USBR.

The CDFG/USBR MLR Model provided in CDFG and USBR comments addresses the shortcomings of other methods, thus allowing our analysis using the CDFG/USBR MLR Model data series to supercede abundance analyses based upon methods appearing in prior rules. In combination with meta-analyses to analyze the distribution of MLR Model results across the 20 indices, statistical inferences based on the CDFG/USBR MLR data series are informative.

Our analysis using the CDFG/USBR MLR Model data series incorporates the results of seven surveys (Fall MWT, Bay Study OT, Bay Study MWT, Chipps Island, Suisun Marsh OT, CVP salvage, and SWP salvage), and includes separate indices of YOY, age 1 (juvenile) and age 2+ (adult) age class abundance. The independent examination of abundance of all age classes throughout these surveys helps mediate discrepancies among survey results, discrepancies that are a likely indication that splittail populations are not very evenly distributed over space and time and/or that different sampling methodologies are not very comparable. The model also does not require uninterrupted data; all available data from each survey's period of record is included. Further, our analysis controls for the confounding effects of hydrology, and involves no inherent or intentional bias towards either wet or dry water year types. Strict adherence to uniformity among all data series is also inconsistent with the precautionary nature of section 4 of the Act.

We recognize a distinct danger in controlling for hydrological effects in our analyses, because systematic changes in hydrological regimes, due to human manipulation or long term climate change, could just as feasibly be a causative factor as a confounding source of ''noise.'' If systematic changes in hydrological regimes were occurring, it would not be prudent to control for that factor. Our since-superceded polynomial regression analysis of abundance data (See Abundance section of the August 17, 2001, notice) controlled for influences of hydrological cycles without discarding hydrology as a potential directional factor determining long term trends of splittail abundance. We expect that the polynomial regression analysis presented in the August 17, 2001, notice may eventually inform the understanding of the effects of changed hydrology on the splittail, once the future, cumulative hydrologic analyses for potential water development projects have been developed by the responsible agencies.

Comment 2: The court directed us to show the relationship between the data used in our decision-making analysis and the original final rule and how we reached the conclusion that the splittail was threatened.

Our Response: We have provided a more detailed analysis in the section entitled Summary of Factors Affecting the Species. The threats to the species have also been summarized in an additional section entitled Conclusion Regarding Abundance, Distribution, and Factors Affecting the Species. We have also included in the Abundance section of this notice a discussion of our most recent statistical analysis of the species population trends.

Comment 3: Several respondents cited the draft White Paper (Moyle *et al.* 2001 in prep) for splittail as reporting a tentative population model result that stated, '' * * * a long series of dry years is unlikely to drive the splittail to extinction, even if the population is greatly reduced.''

Our Response: A species warrants listing as threatened under the Act if is in danger of becoming endangered in the foreseeable future throughout all or a significant portion of its range (16 U.S.C. 1532(20)). It is possible for the splittail to be undergoing threats or declines in a significant portion of its range without declines showing in all surveys. Alternatively, threats to the splittail may support listing even in the absence of our ability to document current population declines. Finally, we believe the conservation elements of the California State and Federal cooperative program (CALFED) and the Central Valley Project Improvement Act (CVPIA) programs adequately mitigate for these threats (refer to Factor A for a detailed discussion of the CALFED program and the CVPIA programs).

Comment 4: A respondent informed us that CDFG re-analyzed the striped bass egg and larval survey and found that splittail spawn in the mainstem of the Sacramento River, especially in dry years. This indicates that splittail occur in the Sacramento River upstream from the Delta.

Our Response: CDFG and our survey results confirm that splittail use river margin habitat in the mainstem Sacramento River. Indeed, recent indications are that river margin habitat is where splittail spawning occurs through periods of drought.

Comment 5: A respondent stated that young of the year (YOY) abundance was at near record levels in 2000, thus inferring the splittail is not in decline.

Our Response: Data presented in the Spring 2001 *Interagency Ecological Program Newsletter* (Baxter 2001a), provided as an attachment to public comment submitted on this rulemaking, do indicate that splittail spawning was highly successful in 2000. This spike of juvenile fish is to be expected given the relatively wet conditions of 2000, and the splittail's ability to exploit suitable habitat when available. Also, YOY are generally the most reliably sampled fish in any given survey, since their raw abundance is temporarily high and YOY splittail are likely less effective at evading sampling equipment. Population level conclusions drawn from such a spike must be made with caution because, though extremes in YOY abundance appear to be reflected in 2 to 3 year subsequent adult abundances, the splittail appears to exhibit no stock-recruitment relationship (Sommer *et al.* 1997). Possible reasons for the lack of a stock-recruitment relationship may be variation in female growth, survivorship and fecundity from such causes as inter- and intra-annual hydrologic variation, environmental contaminants, years of non-spawning, predation, etc., which may be exerting independent or synergistic influences on recruitment of splittail into the population. Regardless of cause, large portions of YOY fail to survive to the adult, spawning population age class. Juvenile abundance may therefore be inadequate to fully describe the size of the standing or future adult populations and may also be inadequate to describe the ability of the population to persist. Population abundance cannot be accurately predicted based upon examination of juvenile abundance alone.

We currently support use of the CDFG/USBR MLR Model because of the facility with which it can be applied to all sets of splittail age class data from all seven applicable abundance monitoring data sets (a total of 20 discrete sets of age-specific abundance monitoring data). This approach therefore includes consideration of YOY splittail without granting undue analytical weight to any single survey or age class or inappropriately combining different survey equipment types. Regardless of the strengths and weaknesses of year 2000 YOY abundance, these data were considered in our analysis using the CDFG/USBR MLR Model data series (*see* our Abundance section for a discussion of our most recent statistical analysis of the species population trends).

Comment 6: The Court and numerous commenters requested that we address and clarify the issue of splittail resiliency and that the species may be able to withstand drought and produce high numbers of young of year (YOY) during wet periods.

Our Response: We concur that splittail are a resilient species and that they can reproduce effectively in wet years. Sacramento splittail populations fluctuate annually depending upon the availability of shallow water habitat with submerged vegetation (Daniels and Moyle 1983). Meng and Moyle (1995) and Sommer *et al.* (1997) have found that splittail year-class abundance is positively correlated with freshwater outflow occurring during the species' late winter and spring spawning season. The evolutionary strategy of the splittail therefore appears to be one of opportunism, whereby the population collectively invades and exploits spawning habitats if and when they become available. Historically, this resilience is likely to have maintained the population of splittail through extended droughts. This resilience also has allowed the splittail to persist in spite of the significant loss of habitat that has occurred since the species was first described by Ayres.

Comment 7: A respondent wished to know why the Bay Study and CVP and SWP salvage data showed an increase in splittail abundance, and the commenter requested that we explain the variation in the study results.

Our Response: This comment pertains to the Meng and Moyle (1995) methodology employed in our previous analyses of splittail population. We refer the respondent to our Abundance section for a discussion of our most recent statistical analysis of the species population trends.

We believe that trends noted in the Bay Study are likely due to the large numbers of YOY fish that were collected during certain wet years. High outflows may transport juveniles from the Estuary to locations where Bay Study samples are collected. It is unclear what happens to these fish once they are transported to these areas. Fish transported to San Pablo Bay may survive to join, if not sustain, the Napa River and Petaluma River and Marsh subpopulations. Once located in these areas, it is not known what contribution is made to the Central Valley population as a whole.

In regard to trends in CVP and SWP salvage data, we believe that these too are driven by seasonal variation in hydrology. Though it is true that hydrology and production are strongly correlated, and that salvage would be expected to rise as populations rise, there are concerns with the data's application (see discussion of surveys under Abundance section, above).

In the case of splittail salvage, entrainment is likely influenced by the rate, or volume per unit of time, of export. As stated before, salvage data are expressed as fish captures per acre foot and lack a time value. At higher rates of export, splittail are likely to be disproportionately entrained because of higher velocities in the channels adjoining or approaching the facilities and thus, abundance could be overestimated. All sampling gears may be more effective at capturing splittail during high outflows due to increased velocity and turbidity, but only the pumps have the ability to draw fish towards them at different rates. The rate at which fish may become pulled towards the pumps cannot be described using existing data. Differing rates of export also introduce variability, which cannot be discerned without a time factor. Salvage data, as mentioned previously, do not effectively sample a large extent of the splittail population, as fish reared in the Sacramento River and/or Yolo Bypass are likely to largely avoid the pumps. Salvage data do however collect the largest number of splittail of any survey.

Comment 9: Several respondents cited an analysis that took issue with us for adopting a non-traditional alpha-value of 0.20 (instead of 0.05) for evaluating results of the CDFG/USBR MLR Model.

Our Response: Available literature customarily demands a rigid adherence to the traditional alpha value of 0.05. In this particular analysis, we chose to take a far more conservative approach in terms of how we evaluated the splittail's abundance. Accordingly, we used the non-traditional alpha value of 0.20. We believe while unusual it is conservative, and results in a more robust determination of whether the species should be listed.

Comment 10: Several respondents cited an analysis that criticized our treatment of separate surveys of splittail abundance indices as statistically independent.

Our Response: We followed a long established practice in the peer-reviewed literature on splittail of treating these surveys as statistically independent (*e.g.*, Meng and Moyle 1995; Sommer *et al.* 1997) including papers repeatedly cited by the respondents in previously submitted comments. We accept at face value Manly's (2002) conclusion that an analysis of corrections among residuals provides evidence for some degree of interdependence among the different sets of survey data (Manly 2002:4–6). We also accept at face value Manly's (2002) attempt to correct our meta-analysis of survey results to account for the interdependence in the data sets. We have consistently stated that the abundance index data for splittail suffer from several fundamental inadequacies that make them far from ideal for decision-making purposes (an opinion with which the respondents and their statistical consultant concur (Manly 2002:3,8)).

Comment 11: Several respondents criticized us for evaluating the results of the CDFG/USBR MLR Model for all 20 data series of splittail abundance index data, instead of limiting the evaluation to the nine data series that the respondents view as most representative of overall splittail populations.

Our Response: We note that these and other respondents have previously criticized us, while employing different analysis, for not treating all 20 data series equally and for not including all available data series in statistical evaluations of abundance trends.

We are aware of no other party who has rigorously evaluated abundance index data (*e.g.*, Sommer *et al.* 1997; Meng and Moyle 1995; Moyle *et al.* 2001 in prep.) that has deemed it appropriate to limit the evaluation to the nine data series favored by the respondents. Further, CDFG and USBR elected to include all 20 data series in the CDFG/USBR MLR Model applications submitted to us as part of earlier comments.

We disagree with the respondent's suggestion that only data from a select group of nine survey indices that sample a wide geographic area (we assume the respondent is referring to three age classes each of the Bay Study MWT, Bay Study OT, and Fall MWT) should be given greater weight for making population-scale determinations. Weighting such a select group of surveys necessarily could require inappropriately combining their indices. The nine surveys are a composite of appreciably different gear types, some of which suffer from the same detection limitations as were used by other respondents to advocate against accepting certain other surveys. Mid-water trawling is an inappropriate match to splittail habitat preferences and other aspects of splittail biology, so even geographically extensive mid-water surveying would not necessarily be any more representative of overall splittail populations than geographically more restricted surveys better matched to splittail biology.

We disagree with respondents' claims that Bay Study MWT, Bay Study OT, and Fall MWT data are more indicative of splittail abundance trends than are those found in data collected at the SWP and CVP salvage facilities, Chipps Island, and in Suisun Marsh because they each suffer from gear or location difficulties. We postulate that each of these surveys is, to varying degrees, unsuited to the task of assessing splittail abundance. The Bay Study OT employs the efficient otter trawling technique but only infrequently captures splittail; surveys are conducted on the periphery of the species' range. The Bay Study MWT employs an inefficient (at capturing splittail) mid-water trawl. The Fall MWT fails to sample near-shore areas and the benthos (bottom), where splittail are most likely to occur. The Fall MWT does not sample shallow waters; in Suisun Bay/Marsh 8 of 25 sites are shallow, 1 of 38 in the Delta are shallow. We acknowledge that the Chipps Island Survey is a midwater trawl of deep channels and that it too would suffer from a similar bias. The CVP and SWP salvage data may suffer from an unquantifiable differential entrainment based on export rates (*see* Abundance section, above).

We also do not believe it is necessarily correct to infer that the wider geographical coverage of the nine surveys in question, alone, is sufficient to guarantee that those surveys are more representative of overall splittail populations. The Bay Study MWT, Bay Study OT, and Fall MWT are geographically wider in distribution, but given that estuarine conditions are specifically managed to maintain optimum habitat conditions within Suisun Marsh, the wider survey areas of the Bay Study MWT, Bay Study OT, and Fall MWT are not likely to contribute to a more informed trend analysis. Surveys need not cover large areas if a fixed point is likely to result in detection of an appreciable number of individuals of a migratory species; splittail are as likely to arrive at a static survey point in a key location as they are to be captured by a mobile survey of varied habitats.

We understand the respondent's logic in formulating a hypothesis that the nine surveys in question might be most representative of the overall splittail population due to geography, but note that at this point such an opinion is only a working hypothesis with no actual data available to either support or refute it. Until such data become available, we believe it is most conservative to follow the practice of evaluating all the data series rather than combining or rejecting discrete sets. We continue to believe that, of the individual indices, the Suisun Marsh Otter Trawl should be the most appropriate sampling method because it samples core splittail habitat, utilizes an effective, bottom-trawling gear, and samples a greater relative proportion of the habitat at the sampling site.

Comment 12: A respondent claimed we employed ''Shifting approaches to the splittail listing'' in regard to statistical testing of available data.

Our Response: Since we have published one listing notice for the splittail, on February 8, 1999 (64 FR 5963), we assume that this respondent is actually referring to our evolving evaluations of data relevant to the issue of whether the splittail should be listed or not, as have appeared in the January 12, 2001 (66 FR 2828); May 8, 2001 (66 FR 23181); August 17, 2001 (66 FR 43145); and March 21, 2002 (67 FR 13095); and October 31, 2002 (67 FR 66344), notices reopening public comment periods.

It is common practice in science to continually formulate and revise hypotheses in response to new information. We have applied this scientific process during the review of the splittail's status, as have certain respondents (*i.e.* CDFG, CDWR, USBR). The evolving results of our various statistical analyses and the background information describing the bases for those analyses have each appeared in successive notices. Notices are solicitations for public comment and information, not final agency actions. As a result of new scientific information and comments received during the many comment periods, we have updated our analytical methodology based on the best scientifically and commercially available information. Note also that neither we, nor respondents, have advocated nor implemented a return to the superceded techniques used by Meng and Moyle (1995), Sommer *et al.* (1997), or the permutation-based exact calculations of p-values for stratified Mann-Whitney U-tests, published on August 17, 2001 (66 FR 43145).

Comment 13: A respondent claimed that we were incorrect in departing significantly from the analysis of CDFG and USBR.

Our Response: We did not depart at all from the statistical analysis provided by CDFG and USBR in the form of the CDFG/USBR MLR Model. We have fully accepted the model results submitted by CDFG and USBR. We have noted earlier in our analysis where we have departed from the CDFG and BOR analysis and our reasons for doing so.

Comment 14: Several respondents stated that the extended drought of 1984 to 1992 created only a perception of decline and that it was the ''* * * accidental juxtaposition of a series of wet, strong splittail years with a series of dry, weak years that prompted [our] interest in the first place.''

Our Response: We disagree with the respondent's claims that the period of extended drought has been ignored, as well as with the contention that the splittail's drought-driven declines are the sole factor under consideration in our determination. We first note that the period of continuous drought is considered by most authoritative sources to have begun in 1987 (Moyle *et al.* 2001; Baxter 1999a; Sommer *et al.* 1997), not 1984 as reported by the respondent. We note, however, that 1985 and 1986 were dry years (Cannon 2001 in prep.).

The declines noted during the 1987 to 1992 drought were the likely result of a paucity of spawning habitat being available. The drought decreased the amount of floodplain (*i.e.* Yolo Bypass and mainstem river margins) available for spawning and thus, spawning output was lower. Low splittail population densities were aggravated by the CVP and SWP's diversion of a greater proportion of water from the Delta than in prior years; fish were entrained at the facilities and the entrapment zone (location where fish become vulnerable to the export facilities' effect on currents in the Delta), was located well upstream of Suisun Marsh in increasingly suboptimal habitat. These events are described in detail in our February 8, 1999, final listing rule (64 FR 5963).

The basis for the respondent's claim that we are disproportionately concerned with splittail declines noted during the 1984 (or 1987) to 1992 drought is unclear. True, the ''accidental juxtaposition'' of wet and dry years resulted in abundance data that appeared to illustrate a precipitous drop in the splittail population. There are, however, up to 10 years of pre-drought as well as up to 8 to 10 years of post-drought data. The data collected during six years of continuous drought are but a subset of the nearly 20 years of extant splittail data. The splittail's relatively long life span and resilience following unfavorable conditions renders the declines exhibited during a discrete drought unlikely to influence the analytical findings from an ever-lengthening period of record. Most importantly, we now employ the CDFG/USBR MLR Model, which explicitly controls for potential confounding effects of hydrological year type. The respondent's concern would be more applicable to abandoned analytical techniques. The arbitrary pre- and post-decline cut point approach of Meng and Moyle (1985) was driven by trends noticed during the 1987 to 1992 drought, as was a formerly touted alternative analysis that involved the use of 1987 (the beginning of the drought) as a cut point (Sommer *et al.* 1997) for determining percent declines.

We also disagree with the contention that the 1984 to 1992 drought serves as the only factor which triggered our investigations of the splittail's status. Our interest in the splittail was prompted initially by the statement in Daniels and Moyle (1983) that the splittail's and delta smelt's ''* * * abundance could decline rapidly if environmental conditions become unfavorable for them, possibly making them candidates for listing as threatened species.'' We subsequently included the Sacramento splittail as a category 2 candidate species for possible future listing as endangered or threatened in the January 6, 1989, Animal Notice of Review (54 FR 554). The candidate category system was abandoned on February 28, 1996 (61 FR 7457), and species meeting the definition of the former category 2 (such as splittail) were no longer considered candidates. Our administrative proceedings on splittail resumed on November 5, 1992, when we received a petition from the Natural Heritage Institute to add the Sacramento splittail to the List of Endangered and Threatened Wildlife and to designate critical habitat for this species in the Sacramento and San Joaquin Rivers and associated estuary.

Comment 15: A respondent questioned how the data collected relate to a conclusion that the species is threatened. We had not provided analyses of population level outcomes that could be linked to threats analyses. Another respondent believed that our threats analysis is speculative, imprecise, and meaningless absent any data or analysis concerning population level effects and that the threats analysis does not show why the species is threatened because of the factors, as required under section 4 of the Act

Our Response: We refer the respondent to the sections entitled Summary of Factors Affecting the Species and Conclusion Regarding Abundance, Distribution, and Factors Affecting the Species. We believe that the splittail does not qualify for threatened status at this time based on our analysis of the threats.

Comment 16: Several respondents asserted that the peer review process for scientific publications doesn't necessarily ensure that published papers are unbiased, scientifically sound, and without errors. The *Transactions of the American Fisheries Society* does not use the double-blind method for peer review. This issue was raised in regards to our past use of the Meng and Moyle (1995) methodology to determine splittail abundance.

Our Response: We agree with this assertion. Each piece of scientific work, whether a peer reviewed published paper or an unpublished, unreviewed, draft report, must be objectively evaluated for the scientific merit of its content alone. Peer reviewed publication provides no guarantee of scientific merit. The test of time, following publication, provides the ultimate measure of scientific merit. Indeed, subsequent iterative examination of the splittail's status has resulted in our abandonment of Meng and Moyle (1995), Sommer *et al.*, (1997) and our permutation-based exact calculations of p-values for stratified (as opposed to unstratified) Mann-Whitney U-tests (66 FR 43145).

Comment 17: Several respondents claimed we ignored the ''White Paper'' published by Moyle *et al.* (2001)

Our Response: We agree with and use the various findings and hypotheses found in the draft and revised White Paper (Moyle *et al.* 2001) extensively throughout this document. We believe that the draft White Paper is a useful resource and contributes to the knowledge on splittail biology, though it has not yet been finalized. The paper has been referenced throughout this document.

Comment 18: A respondent requested that we acknowledge that the Interagency Ecological Program (IEP) provides oversight for fisheries data collection.

Our Response: We concur that the IEP has oversight of the various fishery programs. However, various agencies collect the data for the surveys mentioned previously in this document. CDFG conducts the Fall Midwater Trawl, summer townet, and the Bay study; we conduct the beach seine and Chipps Island Survey; UC Davis conducts the Suisun Marsh OT, and USBR and CDFG collect the salvage and creel census data.

Comment 19: A respondent felt the 2000 Service beach seine survey data supported the respondent's earlier comments that splittail were not declining. The respondent stated that new insights include: (1) YOY abundance was at a near record level in 2000; (2) distribution data show that in years of low spring outflow (*e.g.*, 1992, 1994, and 1997), the largest catches of young splittail occurred upstream in the Sacramento River, upstream of many sampling programs; and (3) splittail spawn and recruit even in dry years.

Our Response: YOY abundance for a species with naturally high juvenile mortality does not necessarily equate with high recruitment. The respondent's statement that distributional data show that in years of low spring outflow (*e.g.* 1992, 1994, and 1997), the largest catches of young splittail occurred upstream in the Sacramento River, is inaccurate for two of the three years referenced, and faulty conclusions are drawn from the data.

Water year 1992 exhibited similar abundances of splittail in upper Sacramento River and Far North Delta locations, and moderate abundance overall. Water year 1994 did exhibit relatively higher abundance in upstream locations, but abundance was low throughout all locations. Water year 1997 was wet, not dry as stated by the respondent. Also, regardless of being a wet year, water year 1997 exhibited low splittail abundance in all locations. Further, we expect that YOY spawned higher in the Sacramento River to suffer higher mortality, relative to fish spawned in the Delta, as they migrate downstream through progressively-worsening habitat conditions to rejoin the core population. Increased mortality among splittail spawned upstream may explain why YOY tend to be captured less frequently in downstream trawl-based surveys in certain dry years. The final statement, that splittail spawned upstream exhibit successful spawning and recruitment in dry years, is not supported by survey data. While spawning success can be inferred from YOY abundance, YOY fish do not necessarily recruit to the adult population. There is some evidence that high or low YOY abundance is correlated, with a two to three year time lag, with adult abundance. For this reason, YOY abundance cannot be excluded entirely. Our we believe our analysis using the CDFG/USBR MLR Model data series (see section entitled Abundance) incorporates all applicable YOY and adult abundance data, though excludes the beach seine due to its lack of a reliable catch per unit time indicator (seine hauls do not accurately account for time, or unit area per time sampled). Beach seine data are best employed with regard to the splittail for determining range and timing of occurrence.

Comment 20: A respondent stated that while splittail are able to persist in a few key areas, such as Suisun Marsh and the lower Sacramento River, during periods of low flow, the relatively smaller populations would be vulnerable to a large scale disaster (*e.g.*, toxic spill), habitat loss, entrainment mortality, reduced outflows, non-native species predation, and contaminants.

Our Response: We refer the respondent to the section entitled Summary of Factors Affecting the Species.

Comment 21: The respondent stated that the court requested that we provide: (1) An estimate of the current population size of the splittail; (2) determine whether or why the current populations size is inadequate to prevent extinction in the near future; (3) determine the rate of population decline of splittail; and (4) identify the minimum viable population size. In addition, a respondent stated that the hypothetical analytical model presented at the January 29, 2001, CALFED Bay-Delta Program (CALFED Program) Splittail Science Conference and described in the White Paper (Moyle *et al.*, 2001) indicates that the splittail, even during severe and lengthy drought, is unlikely to be driven to extinction.

Our Response: There remains no proven scientific method for determining the current splittail population size primarily because no extant survey was designed specifically to monitor splittail populations or to determine their absolute numbers. Further, the splittail exhibits relatively wide variation in annual abundance in response to prevailing hydrologic conditions; it is likely that the population size exhibits appreciable year to year variability which would confound size estimates.

Calculating the current population's risk of and/or time to extinction would require estimates of absolute population size, rate of decline, and minimum viable or sustainable population size, none of which currently exist in a scientifically defensible form. Moreover, it must also be noted that the statutory and regulatory standard for ascertaining threatened status is not to determine whether or why a species will become extinct in the near future, but if, pursuant to section 3(19) of the Act, it ''* * * is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range''. An endangered species, pursuant to section 3(19) of the Act, is that ''* * * which is in danger of extinction throughout all or a significant portion of its range * * *''.

As stated above, analytical techniques do not exist to determine the rate of splittail population decline with current splittail data. Again, the absence of survey methodologies specifically designed to monitor splittail populations is a limiting factor in determining rate of decline. An estimate of splittail population decline, in the form of an exponential decay model, was included by in our August 17, 2001, notice (66 FR 43145) but was not used in this document because of respondents' concerns that it is insufficient to describe the interactions in a complex aquatic ecosystem. Further our exponential decay model relied upon the results of the CDFG Mann-Whitney U test results. The CDFG Mann-Whitney U test results have since been superceded by the CDFG/USBR MLR Model. Lastly, there exists no method to determine the splittail's minimum viable population because, again, no current survey was designed specifically to monitor splittail population size.

Since the publication of the Final Rule listing the splittail as threatened, a hypothetical analytical model was developed and presented at the January 29, 2001, CALFED Bay-Delta Program (CALFED) Splittail Science Conference. The model is described in detail in the White Paper (Moyle *et al.*, 2001). Service staff attended the aforementioned conference and are aware of the model. A second review draft was provided to us on June 18, 2001.

We believe that the model is, at present, only a tool for testing existing hypotheses and for generating new hypotheses. Certain findings may be interpreted to support listing and others may counter it, but we have determined that neither is sufficiently robust to be included in this final document. Indeed, once refined by the incorporation of more accurate data, the model may be useful for determining those mitigation and restoration efforts likely to have the greatest benefit to the splittail.

Comment 22: A respondent claimed that any decline evident in the Suisun Marsh OT data, or in any other survey demonstrating a decline, might be due to a shift in the splittail's distribution, rather than a decline in numbers.

Our Response: Data do suggest that splittail shift their distribution in response to salinity conditions, and that they are quick to respond and move into an area when conditions become favorable (see Background section). However, we believe our survey information is robust enough to detect a decline (see Abundance section)

Comment 23: One respondent objected to our determination in the January 12, 2001, notice (66 FR 2828), that rock revetment, or riprap, as it presently exists or is proposed, would have any significant impact upon the splittail.

Our Response: While a general dismissal of riprap and other types of levee and bank protection is likely overly broad, the application of riprap and other bank treatments that has occurred throughout the splittail habitat has resulted in the decreases in habitat that have led to this examination of the status of the species. Bank protection can be placed on levees and riverbanks without damaging habitat, but it must be done so with explicit considerations for the habitat needs of the affected species. Our analysis in this rule accepts that premise as part of our underlying review of the CALFED and CVPIA contemplated actions.

Comment 24: A respondent asked if we would address the impacts of boating and other activities affecting near-shore habitat.

Our Response: The impacts of boating are not considered a significant source of habitat loss. In many regions of the Delta, wave wash is a natural phenomenon related to winds crossing areas of great fetch (open areas). The splittail evolved with the effects of wave wash within near-shore habitat.

Comment 25: One respondent differed with the determination in our January 12, 2001, notice (66 FR 2828), that California's variable Mediterranean climate is a threat to native fish, and contended instead that it favors native fish over non-native fish. The respondent also stated that the splittail had evolved subject to the vagaries of California's climate and was adapted to survive them.

Our Response: Our notice stated that ''The variability of California's Mediterranean climate *exacerbates the threats* (emphasis added) * * *'' to the splittail. The Mediterranean climate includes periods of extended normal and above-normal precipitation but may also include periods of extended drought. Splittail evolved under these conditions and are adapted to them. We agree with the respondent that the splittail had evolved subject to the variability of California's climate and has adapted to survive this variability.

Comment 26: One respondent stated that pesticide application is not a threat to the splittail because no data were presented to support the assumption that pesticides bioaccumulate in fish to the point of causing morbidity, mortality, or reduced reproduction. Several respondents took similar exception to our statements regarding the need for pesticide use on crops to be assessed and possibly regulated. The respondent also claimed pesticides were no more of an environmental problem within the bypasses than in other areas and that there was no reason to justify separate or additional regulatory programs that would apply only to the bypasses. A respondent stated that pesticides may be present, but that they have been flushed from the bypasses prior to spawning. Another respondent stated that much of the pesticide loading in the Yolo Bypass was due to runoff from upstream sites.

Our Response: Please see our discussion under threats. In general, there are findings that have heightened our concern regarding these substances. However, there is little data on the direct affects to splittail.

Comment 27: A respondent felt that we were inconsistent when it was stated in the January 12, 2001, reopening of comment period (66 FR 2828), that wetland rehabilitation could be deleterious to the splittail, but that wetland habitat improvements within the species' range would be beneficial. The respondent felt we had not ''* * * integrated its concepts and concerns in a manner that weighs relative risks and concepts.''

Our Response: We agree with the respondent that wetland restoration projects are generally beneficial to splittail.

Comment 28: A respondent felt that our statement that the present operation of Federal, State and private water development projects, that entail water storage, diversions, re-diversions, and agricultural return flows, destroy splittail habitat was incorrect.

Our Response: We refer the respondent to the section entitled Summary of Factors Affecting the Species.

Comment 29: A respondent felt that we did not adequately acknowledge the positive environmental effects of the CVP and SWP. The respondent specifically noted that the inland extent of saltwater intrusion into the Delta is currently lower than with the ''without-project'' condition.

Our Response: We do not consider the pre-SWP and CVP extent of saltwater intrusion to be detrimental to splittail. Saltwater intrusion was defined by the respondent as the location of the chloride concentration of 1000 milligrams per liter (mg/L)(1000 parts per million (ppm)), measured 90 minutes after high tide. It is not clear if the inference is that brackish water such as this is detrimental to the splittail. Splittail occupy brackish water at various stages of their life and such habitat may actually be essential to the species' life history. The 1000 parts per million value is equivalent to 1 part per thousand (ppt), which differs little from the 2 ppt standard identified as X2. The White Paper (Moyle *et al.* 2001) includes numerous references to the use of brackish water near X2 by splittail, indicating that it may actually characterize optimal rearing habitat for fish greater than 75 mm (3.0 in) in standard length (typically late year 0 or early year 1 fish). Non-reproductive (rearing juvenile and adult) splittail are most abundant in shallow brackish tidal sloughs, such as those found in Suisun Marsh. Growth of splittail in brackish sloughs is rapid in the first year of life, with fish reaching a size of 12 to 14 cm (4.7 to 5.5 in) TL. Further, historic, pre-reclamation conditions in the Delta would have allowed the ''natural'', non-SWP and CVP manipulated X2 location to exist within extensive flooded wetlands. Also note that splittail have wide salinity tolerance (10 to 18 ppt) (Moyle 1976; Moyle and Yoshiyama 1992), with an absolute observed tolerance of 29 ppt for short periods (Young and Cech 1996). Inland brackish water intrusion may have thus been at tolerable or even desirable concentrations for the species. We do not consider the changes in estuarine hydrology induced by the SWP and CVP to be beneficial to the splittail and traditionally the Service and other wildlife agencies have accepted as fact the supposition that splittail habitat was degraded as a result of the operation of these projects (see the section entitled Summary of Factors Affecting the Species).

Comment 30: The court directed that we respond to the issue that splittail have a broader distribution than previously thought, including a broader range in the Sacramento and San Joaquin Rivers. Another respondent noted that larval, Age 0 and Age 1 splittail have all been collected above the Delta.

Our Response: The greater range of the splittail was acknowledged in the January 12, 2001, notice (66 FR 2828). The above Background section of this final document contains a discussion of the range of the splittail.

Comment 31: Nearly all respondents felt that we should not classify the Yolo and Sutter bypasses as a threat to the splittail, as we did in the January 12, 2001, reopening of comment period (66 FR 2828), based primarily upon the data found in Sommer *et al.* (1997) and Sommer (2001a). The bypasses have demonstrated the capability of producing large numbers of splittail when inundated.

Our Response: We have determined, based on consideration of scientific data and information provided by respondents, that the Yolo and Sutter bypasses are not, in and of themselves, a threat to the splittail. Our reevaluation of this issue is discussed in Factor E of the section entitled Summary of Factors Affecting the Species.

Comment 32: Some respondents stated that the bypasses, the Sacramento River Flood Control System, and other reclamation and flood control efforts are beneficial to the splittail because they redirect water into the Sacramento River that, prior to the 1920s, would have spilled into the Colusa, Yolo, Butte, Sutter, and American basins, thus entraining significant numbers of fish.

Our Response: Splittail evolved in the Central Valley and we postulate that the species is likely evolutionarily equipped to exist in the presence of natural flood basins inundated during unaltered hydrologic conditions. The splittail's high salinity tolerance (*see* Background section, above) also indicates its ability to persist in detached, increasingly saline waters. The number of confounding factors as well as lack of any historic data severely limits our ability to assess with any real authority the ultimate effect of the Sacramento River Flood Control System, the CVP and the SWP. Following is our assumed scenario regarding the effects on splittail of past reclamation and flood control efforts. However, we acknowledge that alternative assumptions and conclusions could be drawn from existing information.

Reclamation activities, including the Sacramento River Flood Control Project and similar efforts to prevent flooding of urban and agricultural lands, have resulted in the confinement of the Sacramento River primarily to a single, leveed or otherwise artificially-confined channel, with much of the former American and Colusa basin habitat no longer available to fish occupying the mainstem river. The respondent claimed this was a benefit in that splittail were no longer subject to entrainment in these basins. While it is true that splittail are no longer subject to stranding in these basins, no data were provided to indicate that these basins, in their unaltered state, were a source of mortality sufficient to cause a decline of the species. There were no hydrologic data provided to indicate when the historic basins would have become connected or isolated from the Sacramento River in a typical year. These basins, being situated lower than the adjoining river and likely maintaining an alluvial (stream bed sediment) water connection, may have existed as perennial marshes wherein splittail could persist until inundation was restored. Indeed, the White Paper (Moyle *et al.* 2001) states that splittail historically occurred in alkaline lakes on the valley floor. The Butte Basin remains connected to the Sacramento River via the Sutter Bypass and Butte Creek; splittail are known to spawn in this area (Baxter 1999a).

It is also possible that, for the American River, Feather River, and other eastside streams, pre-European habitat conditions contained more complete and/or longer duration surficial (surface water) hydrologic connections between rivers and sinks than they did following the period of massive hydraulic mining. Hydraulic mining resulted in massive deposition of sediments in the beds of many eastside streams. The streambeds then became elevated. Rivers began to meander, as gradient and sinuosity are inversely related. When hydraulic mining ceased, the rivers began to straighten, eroding back through the deposits, and leaving elevated banks as effective barriers for the basins' receding flood waters. These elevated banks could have exacerbated the tendency for the rivers to become disconnected from the natural basins.

Comment 33: Several respondents felt that our determination that the Sutter and Yolo bypasses would require inundation for at least 30 continuous days between March and April in order for them to be considered a beneficial splittail spawning habitat was inaccurate and could affect water supply and flood management. Another respondent indicated that constant flows, related to inundation of the bypasses, would favor non-native fish.

Our Response: We have not proposed inundation of the bypasses for any specific interval, duration, or frequency. Rather, we have suggested that the bypasses would have their greatest benefits to splittail if they became inundated at a frequency and duration that as closely as possible mimics the natural, precipitation-driven hydrograph. The reference to 30 days is a statement regarding how the inundation patterns of the bypasses at times do not meet the life history requirements of the splittail. Inundation of bypasses in dry years would reduce the effects of drought on the splittail. We also speculate that if the bypasses were inundated at a frequency and duration that as closely as possible mimics the natural, precipitation-driven hydrograph, then the numbers of non-native fish would be reduced, as non-native fishes favor ponded and continuously inundated habitats.

Comment 34: Certain respondents felt that compensation should be provided to land owners when habitat restorations affected land use.

Our Response: If habitat restorations affect land use, there is a separate process available to landowners for redress. While we do not anticipate that efforts to restore the habitat will result in substantial changes in the land use practices in the bypasses, the regulations governing listing [50 CFR § 424.11(b)] state that listing of a species as threatened or endangered is made ''* * * solely on the basis of the best available scientific and commercial information regarding a species' status, without reference to possible economic or other impacts of such a determination.'' Accordingly, we do not consider or address this issue in our listing decision.

Comment 35: Several respondents commented that our classification of the Yolo Bypass as a threat in the January 12, 2001, notice (66 FR 2828) would undermine potential ecosystem restoration actions that would benefit the splittail.

Our Response: In this notice, we have determined that the Sutter and Yolo bypasses are not in and of themselves threats.

The bypasses remain important splittail spawning and rearing habitat during wet periods. Sommer *et al.* (1997) and Sommer *et al.* (2001a, 2001b) found that the bypasses as they exist today, and when flooded, already provide substantial amounts of habitat.

Comment 36: A respondent claimed that this determination could not be promulgated because it was not likely to include the required critical habitat designation or the preparation of a recovery plan.

Our Response: We have determined that listing as a threatened species is not warranted for the splittail, and therefore the designation of critical habitat is not warranted.

Comment 37: A respondent claimed that we must consider the cumulative impacts of multiple species listings and critical habitat designations.

Our Response: The ESA does not allow us to consider cumulative impacts of multiple species listings and critical habitat designations when making a listing determination.

Comment 38: A respondent stated that sport fishing take of other listed species, specifically salmonids, is a significant source of mortality of splittail caught unintentionally and asked if the listing of splittail would include measures to protect the species from this threat.

Our Response: We concur that sport fisheries can be a source of mortality for splittail caught unintentionally. However, since we have determined that listing as a threatened species is not warranted for the splittail, this notice does not include restrictions on sportfishing.

Comment 39: Several respondents objected to our statements regarding the entrainment risks present in the bypasses based upon Sommer *et al.*'s (1997) findings that entrainment is not a significant threat within the bypasses. It is thought that the splittail's evolutionarily-derived ability to emigrate prior to stranding reduces the risk of stranding. Respondents felt that the magnitude of the entrainment threats presented by the bypasses was overestimated when we cited in the January 12, 2001, notice (66 FR 2828), the death of a number of juvenile splittail in an approximately 0.8 hectare (ha) (2 acre (ac)) borrow pit as statistically-significant and that the classification of ''natural sinks'' as a threat was in error.

Our Response: We have considered these data and now agree that entrainment in the Yolo Bypass is less than was originally thought. Information presented at the January 29, 2001, CALFED Splittail Science Conference indicates that a modest degree of topographic variability within an inundated area may be beneficial, as it may create a diversity of flow patterns and velocities which in turn may allow juvenile splittail to evade predation and forage more effectively during egress.

Comment 40: A respondent described that many of the non-native species of the Delta have arrived via the discharge of ballast water from seagoing vessels and asked if the listing of the splittail would result in the regulation of maritime trade.

Our Response: As we have determined that listing as a threatened species is not warranted for the splittail, this notice does not include restrictions on maritime trade.

Comment 41: A respondent stated that we should consider only project-induced effects associated with existing projects and their associated operations. The respondent discouraged assessments of effects to splittail that would occur based upon implementation of projects that will be constructed and/or operated in manners that cannot be substantially verified at present, such as those in CALFED and the CVPIA.

Our Response: We agree and have revised and reevaluated the threats presented by existing conditions and projects (*see* Summary of Factors Affecting the Species section).

Comment 42: Several respondents believed that full implementation of the CALFED Program would preclude the need to list the splittail and indicated that over $10 million had been spent on actions that could improve conditions for splittail.

Our Response: We agree that actions taken under the CALFED program have contributed to the current improvements in habitat that affects the splittail and anticipate that other actions of that type are forseeably likely to occur. (We refer the respondent to the sections entitled Summary of Factors Affecting the Species.)

Comment 43: Various respondents informed us of the contents of an April 24, 2001, *Sacramento Bee* article wherein Dr. Peter B. Moyle, a recognized expert in aquatic ecology, fisheries science, and the splittail, discussed the February 8, 1999, listing of the splittail as threatened. Respondents related Dr. Moyle's statement that ''Things were getting better'' and argued that it constituted an opinion that the species should not have been, and by inference, should not now be listed.

Our Response: We have read the article in question. We cannot conclude that Dr. Moyle was making a statement on the listing status of splittail. However, we do note that ecosystem improvements are a primary reason why we are removing the listing. We have cited several of Dr. Moyle's scientific publications and conclusions within this document.

Summary of Factors Affecting the Species

After a thorough review and consideration of all the best scientific and commercial information available, we have determined that the listing of the Sacramento splittail as a threatened species should be removed. We followed procedures found at section 4(a)(1) of the Act and regulations (50 CFR part 424) implementing the listing provisions of the Act. 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 our decision to remove from the list the Sacramento splittail as threatened, are as follows:

A. *The present or threatened destruction, modification, or curtailment of its habitat or range.* We have identified, as threats to the splittail, the present operation of Federal, State, and private water development projects entailing water storage, diversions and re-diversions, releases, flood control, and export and agricultural return flows, which destroyed splittail habitat (59 FR 682, 64 FR 5963, 66 FR 2828). Each is discussed briefly below as are the beneficial effects of CALFED and the CVPIA, which offset some of these threats.

Habitat Loss: The Bay Institute (1998) has estimated that intertidal wetlands in the Delta have been diked and leveed so extensively that only approximately 3,237 ha (8,000 ac) remain of the 161,875 ha (400,000 ac) that existed in 1850, and that 90 percent of the riparian forest and riparian wetlands of the Sacramento Valley have been cleared, filled, or otherwise eliminated. Diking, dredging, filling of wetlands, and reduction of freshwater flows through more than half of the rivers, distributary sloughs, and the estuary for irrigated agriculture and urban use have widely reduced fish habitat and resulted in extensive fish losses (Moyle *et al.*, 1995; Nichols *et al.*, 1986).

There has been loss and degradation of the near-shore habitat required by splittail. Riparian and natural bank habitats are features that historically provided natural function to the stream banks and flood plains for splittail by providing spawning substrate, organic material, food supply, and cover from predators. Vast stretches of the Sacramento and San Joaquin Rivers, their tributaries, and distributary sloughs in the Delta have been channelized and the habitat converted or destroyed.

Delta water diversions and exports currently total 1.1 hectare-meters (ha-m) (9 million acre-feet (MAF)) per year. These diversions and exports also harm the splittail. The Federal and State water projects presently export as much as approximately 740,000 ha-m (6 MAF) per year from the Delta when sufficient water is available. Agricultural diversions for lands within the Delta range from 7,400 to 160,000 ha-m (60,000 acre-feet to 1.3 MAF); approximately 123,000 ha-m (1.0 MAF) per year in the long term period, 136,000 ha-m (1.1 MAF) in critical and dry years (CALFED 2000b). The draft White Paper entitled *Factors Relating to Salvage of Splittail at South Delta Pumping Plants* (Cannon 2001 in prep.) states that ''* * * lower population levels occurring as a consequence of salvage-entrainment related mortality may be reducing population resilience (*e.g.*, less dependence on a single age class) and jeopardizing the long-term viability and ecological role of splittail in the estuary.'' If entrainment mortality increases further, it could be expected to have even greater adverse effects on the splittail. In addition, reservoir operations and ramping rates for flood control inadvertently drain shallow water spawning habitat along river corridors and exacerbate stranding of splittail.

Beneficial Actions Offsetting Adverse Affects

A number of beneficial actions offset the above described adverse affects. Below are some of the specific actions or programs describing the beneficial actions.

CALFED Habitat Restoration: The CALFED Bay-Delta Program (CALFED) exists as a multi-purpose (water supply, flood protection, and conservation) program with significant ecosystem restoration and enhancement elements, and is well into its implementation phase (CALFED 2000a, 2000b). The stated mission of CALFED is to develop a long-term comprehensive plan that will restore ecological health and improve water management for all beneficial uses of the Bay-Delta system (CALFED 2000a, 2000b). The plan specifically addresses ecosystem quality, water quality, water supply, and levee system integrity (CALFED 2000a, 2000b). CALFED encompasses eight separate program elements; each having disparate potential effects to the splittail (CALFED 2000a, 2000b).

CALFED is a cooperative effort of the U.S. Department of the Interior, the U.S. Department of Commerce, the Environmental Protection Agency, the California Environmental Protection Agency, and the California Resources Agency, as well as other State and Federal agencies, with the involved public formally participating originally through the Bay-Delta Advisory Council, and currently through the Bay-Delta Public Advisory Committee (CALFED 2000a, 2000b). CALFED is a long term effort with an initial, shorter term implementation strategy (CALFED 2000a, 2000b). The Record of Decision (ROD) for CALFED was signed in August, 2000.

CALFED has has received sufficient funding (approximately 80 percent of funding required from the State of California, from CVP and SWP water project users and local entities, and from Federal funding), to make progress toward achieving its goals which include restoration and enhancement of splittail habitat (CALFED 2000a, 2000b). While CALFED is not meeting the expected schedules, the individual actions are occurring generally within the scope of their own schedules (CALFED 2000a, 2000b). With respect to splittail actions, CALFED has identified the plan to be implemented, as well as the funding level, funding sources, and other resources necessary to implement it (CALFED 2000a, 2000b). In addition, CALFED has identified the appropriate authorities as well as the legal, regulatory, and procedural requirements necessary to implement the conservation effort. Importantly, CALFED has completed the environmental reviews and consultations necessary to proceed with its proposed actions. CALFED describes the nature and extent of threats being addressed, and addresses the threats to the splittail through its tidal and riparian habitat restoration projects, fish screen projects, environmental water program, water quality program and numerous other programs (CALFED 2000a, 2000b). CALFED defines its conservation objectives in terms of recovery of targeted species, including the splittail, and has identified the steps necessary to implement the program (CALFED 2000a, 2000b). The goal of CALFED to recover the splittail will remain whether the splittail is listed or not (CALFED 2000a, 2000b). CALFED has identified and employed quantifiable, scientifically valid parameters to demonstrate achievement of objectives and the standards by which progress is to be measured (CALFED 2000a, 2000b). CALFED monitors and reports on progress towards implementation (based on compliance with the implementation schedule) and effectiveness (based on evaluation of quantifiable parameters) of the conservation effort (CALFED 2000a, 2000b). Adaptive management has been incorporated into CALFED (CALFED 2000a, 2000b).

Although the splittail reared in the Sacramento River and/or Yolo Bypass are likely to largely avoid the CVP and SWP pumps, in the absence of any consideration of the splittail in the CALFED process, the splittail's status could be adversely affected by program elements to increase water storage in the Central Valley upstream of the Delta; modify Delta hydrologic patterns to convey additional water south, and upgrade and maintain Delta levees. However, as noted previously CALFED has an explicit goal to balance the water supply program elements with these the restoration of the Bay-Delta and tributary ecosystems and recovery of the splittail and other species. Because achieving the diverse goals of the program is iterative and subject to annual funding by diverse agencies, CALFED has committed to maintaining balanced implementation of the program within an adaptive management framework (CALFED 2000a, 2000b). Within this framework of implementation, it is intended that the storage, conveyance, and levee program elements would only be implemented in such a way that the splittail's status would be maintained and eventually improved (CALFED 2000a, 2000b). The restorative components of CALFED will positively influence the status of the splittail; these are the Ecosystem Restoration Program (ERP), the Multi-Species Conservation Strategy (MSCS,) and the Environmental Water Account (EWA) (CALFED 2000a, 2000b). CALFED has identified 29 species enhancement conservation measures for splittail (CALFED 2000a, 2000b). These measures include a variety of actions consistent with our conservation strategy.

CALFED's Ecosystem Restoration Program includes the development and implementation of a program to address flows resulting from the present operation of Federal, State, and private water development projects, entailing water storage, diversions and re-diversions, releases, export and agricultural return flows (CALFED 2000a, 2000b). This includes the development of a methodology for evaluating Delta flow and hydrodynamic patterns and implementation of an ecologically based plan to restore conditions in the rivers and sloughs of the Delta sufficient to support targets for the restoration of aquatic resources, including splittail (CALFED 2000a, 2000b).

The EWA's stated purpose is to provide benefits to threatened or endangered fish without causing additional adverse impacts on water deliveries from diversions and the export facilities (CALFED 2000a, 2000b). The EWA, not analyzed in the February 1, 1999, final rule (64 FR 5963), or in the January 12, 2001, notice (66 FR 2828), purchases water from willing sellers, then banks, stores, transfers and releases it as needed to protect fish and compensate water users (CALFED 2000a, 2000b). The EWA has set a goal of acquiring at least 23,400 ha-m (190,000 acre-feet) of water each year through purchases, but also expects to obtain additional 23,400 ha-m (190,000 acre-feet) of water on average each year through additional pumping at times safe for fish (CALFED 2000a, 2000b). Already the EWA has demonstrated some success. In its first year, the account provided 35,400 ha-m (287,000 acre-feet) of water for environmental purposes without reducing allocations to agricultural and urban users. The EWA thus has functioned as a mechanism for providing for improved Delta conditions for splittail.

A review of the CALFED ERP projects shows that as of June 2002, the ERP has funded: 58,300 acres of habitat proposed for protection, including 12,000 acres dedicated to wildlife friendly agriculture and 16,000 acres of floodplain; 39,000 acres of habitat proposed for restoration, including 9,500 acres of shallow water tidal and marsh habitat; 63 miles of upstream habitat proposed for protection and/or restoration; 93 miles of riparian corridor proposed for protection and/or restoration; 72 fish screens accounting for an additional 2,565 cfs of diversion capacity screened; 15 fish ladders and 10 dam removals to provide better upstream passage; 31 projects involving analysis of environmental water and sediment quality; 18 projects intended to specifically address nonnative invasive species; and 75 projects supporting local watershed stewardship and environmental education (CALFED 2002). Clearly substantial efforts are underway to continue to restore and develop optimum splittail habitat.

Full implementation of the 30 year program will require both State and Federal funding and is expected to require both annual appropriations by Congress and continued funding by the State of California. To date, the federal government has spent over $700 million on CALFED, and the overall expenditures for the first 3 years of the program exceeds $2 billion; all of which has been spent for environmental restoration.

CVPIA Habitat Restoration: The Central Valley Project Improvement Act (CVPIA) (Public Law 102–575) signed October 30, 1992, amends previous authorizations of the Central Valley Project (CVP) (16 U.S.C 695d-695j) to include fish and wildlife protection, restoration, and mitigation as project purposes having equal priority with irrigation and domestic water supply, and fish and wildlife enhancement having equal priority with power generation. Two of the stated purposes of the CVPIA are to ''protect, restore, and enhance fish, wildlife, and associated habitats in the Central Valley * * * 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.'' We also note that the CVPIA is a mitigative effort for past impacts of the CVP, and like CALFED, is a multi-purpose program that, at full implementation, will include both beneficial ecosystem restoration elements as well as water supply, water conveyance, and flood control projects, all of which are required to be implemented in a manner that considers the needs of the environment, rather than just maximizing flood control and water supply and delivery which was the case in the past.

The CVPIA exists as a multi-purpose (water supply, flood protection, and conservation) program with significant ecosystem restoration and enhancement elements and has been approved by all the affected parties including the FWS. It is well into its implementation phase and is fully funded. While the CVPIA is not meeting the expected schedules, the individual actions are occurring generally within the scope of their schedules. The CVPIA has identified the plan to be implemented, as well as the funding level, funding source, and other resources necessary to implement it. In addition, the authorities, and the legal, regulatory and procedural requirements necessary to implement the conservation effort have been identified. Finally the necessary environmental reviews and consultations have been completed. The CVPIA describes the nature and extent of threats being addressed, and addresses the threats to the splittail through its tidal and riparian habitat restoration projects, fish screen projects, environmental water programs and numerous other programs. The CVPIA's conservation objectives are defined in terms of recovery of targeted species, of which the splittail is one, and has identified the steps necessary to implement the program. The program has identified and employed quantifiable, scientifically valid parameters to demonstrate achievement of its objectives and the standards by which progress is to be measured. The CVPIA monitors and reports on progress towards implementation (based on compliance with the implementation schedule) and effectiveness (based on evaluation of quantifiable parameters) of the conservation effort.

Provisions of the CVPIA to benefit fish and wildlife habitat include protection and restoration of natural channel, riparian, and wetland habitats (sections 3406(b)(1) and 3406(d)), dedication and management of 98,680 ha-m (800,000 ac-ft) of CVP yield (section 3406(b)(2)), acquisition of additional water supplies to supplement the amount dedicated (section

3406(b)(3)), modification of CVP operations (sections 3406(b)(1) and 3406 (b)(19)), removal of fish migration barriers (sections 3406(b)(10) and 3406(b)(17)), screening of water diversions (section 3406(b)(21)), and acquisition of land and associated water rights (section 3408(h)), among others. Funding sources for CVPIA mitigation and restoration actions include the CVPIA Restoration Fund; State funds provided to meet CVPIA cost share requirements; and additional Federal funds appropriated by Congress.

Two programs, the CVP Conservation Program, and the CVPIA Habitat Restoration Program, were created to proactively restore and improve the Central Valley environment that was or is being impacted by the operations of the CVP. These two programs have provided funding to a number of projects which collectively would double the acres of riparian forest on the Sacramento River (from approximately 8,093 ha (20,000 ac) to 16,188 ha (40,000 ac)) and to contribute to the recovery of threatened and endangered species (Carlton 2003 in prep.). Combined efforts of Federal, state, and nonprofit partnerships have reforested almost 1,619 ha (4000 ac) between Red Bluff and Colusa during the last 15 years (Carlton 2003 in prep.). Riparian forest restoration would, over time, also increase the amount of large woody debris habitat available to splittail.

Section 3406(b)(2) of the CVPIA dedicates 98,680 ha-m (800,000 ac-ft) of CVP yield annually to implement fish, wildlife, and habitat restoration, and to help federally listed species. A portion of the 98,680 ha-m (800,000 ac-ft) identified in the CVPIA may be used to meet the Department of the Interior's obligations under the Bay-Delta Accord (discussed below). The rest of the water can be used for instream flows, additional Delta outflow, and the other purposes of the CVPIA. Management of dedicated, supplemental, and reoperated CVP yield will benefit splittail when water releases are made at times and locations that coincide with splittail spawning and rearing, and in such a manner that the releases are adequate to flood vegetated areas adjacent to stream channels. The provisions of section 3406(b)(2) are to be implemented for five years and involve not only upstream actions but also actions in the Delta which may benefit splittail.

Other Habitat Restoration Projects: Ecosystem restoration efforts have been undertaken within the splittail's range. USACE began implementation of an ecosystem restoration project on Prospect Island in the northwestern Delta in 2001 (Coastal America 2000). The project is likely to result in the restoration of approximately 243 ha (600 ac) of open water, 134 ha (330 ac) of tidal emergent marsh, and 95 ha (235 ac) of mud flat within Prospect Island's approximately 486 ha (1,200 ac) interior. These may represent habitat enhancements for splittail.

Restoration efforts have been undertaken at the Cosumnes River Reserve under management by the Bureau of Land Management (BLM), The Nature Conservancy, and a number of other agencies and private organizations (The Nature Conservancy 2002a). Restoration activities that benefit splittail include riparian enhancement and intentional breaching of levees to restore floodplain function. Restoration is ongoing and splittail are likely to benefit from any efforts, as the area has also been described as among the most important floodplain habitats still available to the species (Moyle *et al.* 2001).

CDWR has also completed an ecosystem restoration on Decker Island, located on the Sacramento River, adjoining Sherman Island near the confluence with the San Joaquin River (CDWR 1998). The project has restored approximately 4.45 ha (11 ac) of shallow water habitat that is likely to be utilized by the splittail. The California Department of Transportation has committed to restore 190 ha (470 ac) of tidal marshes within the range of splittail for the benefit of splittail as compensation for impacts resulting from the construction of the Benicia Martinez New Bridge (USFWS 2003a).

USACE and CDFG are currently in the final stages of planning the Napa River Salt Marsh Restoration Project (USFWS 2003b). Approximately 1,262 ha (3,120 ac) of diked salt ponds would be restored to tidal marshes usable by splittail.

The 44 ha (109 ac) Kimball Island Mitigation Bank reestablished riverine aquatic bed, riparian forest, shaded riverine aquatic, and tidal marsh habitat at the mouth of the Delta usable by splittail (Wildlands, Inc. 2002).

In early 2002, our Sacramento River National Wildlife Refuge Complex (SNWRC) began implementation of the Environmental Assessment for Proposed Restoration Activities on the Sacramento River National Wildlife Refuge. The restoration activities will result in the reestablishment or enhancement of approximately 960 ha (2,372 ac) of land on 11 units or subunits of the SNWRC. Restoration and enhancement will involve the removal of crops, orchards, and related infrastructure (pumping units, barns, sheds, etc.) followed by replacement with native vegetation appropriate to each site (USFWS 2002a). A portion of these actions are expected to benefit splittail through the improvement of vegetative conditions on floodplains and the eventual creation of large woody debris (via riparian tree mortality and entrainment).

The Vic Fazio Yolo Bypass Wildlife Area (Wildlife Area), located within the Yolo Bypass, will increase in size from its current approximately 1,497 ha (3,700 ac) to approximately 5,261 ha (13,000 ac) (The Nature Conservancy 2002b). This increase was not analyzed in the February 1, 1999, final rule (64 FR 5963), or in the January 12, 2001, notice (66 FR 2828). Though the Wildlife Area does contain entrainment hazards, and is located along the slightly less infrequently inundated western edge of the Yolo Bypass, it will incorporate opportunities to restore the lower reaches of Putah Creek. The added area may allow restorations to proceed that benefit splittail to a greater degree than possible with the current shorebird and waterfowl-intensive management regime.

Other State efforts may contain actions beneficial to the splittail which were not analyzed in the February 1, 1999, final rule (64 FR 5963), or in the January 12, 2001, notice (66 FR 2828). Assembly Bill (AB) 360, the State Delta Flood Protection Act, has a primary purpose of strengthening Delta levees with various ''hard'' measures, including riprap. Habitat restoration components of AB 360, more properly considered mitigation for concurrent State projects' impacts to aquatic and terrestrial ecosystems in the Delta do require improvement rather than a strict mitigation approach which results in an increased habitat benefit and a net increase in habitat. The State Senate Bill (SB) 1086-funded Sacramento River Conservation Area is an interagency group chartered to promote and guide protection and enhancement of riparian resources and fluvial function the reach of the lower Sacramento River between Red Bluff and Colusa. The Nature Conservancy, working with the Sacramento River Conservation Area and local stakeholders, has acquired appreciable amounts of land for restoration. This and other future Sacramento River Conservation Area actions may be beneficial to splittail.

Conclusion: The loss of spawning and rearing habitat remains a potential threat the splittail. However, the implementation and magnitude of the CALFED, and CVPIA programs, and other habitat restoration activities, which focus on the restoration of habitats which directly and indirectly benefit splittail go far beyond any forseeable habitat losses (particularly in the context of the state's Environmental Quality Act (CEQA) which explicitly requires mitigation for habitat loss. The overall effect of such habitat restoration activities is also expected to continue to be beneficial for splittail at present and into the foreseeable future.

B. *Overutilization for commercial, recreational, scientific, or educational purposes.* We believe that overutilization (*i.e.*, recreational and commercial harvest) is not a factor affecting the splittail. As noted in the January 6, 1994, proposed rule (59 FR 862) and the 1999 final rule (64 FR 5963), some scientific collecting is conducted for splittail, but these activities do not adversely affect the species. In addition, striped bass anglers report occasional use of splittail as bait, but we think this usage has little affect on the species.

In the January 6, 1994, proposed rule, and the 1999 final rule, we also noted that the small splittail fishery (Daniels and Moyle 1983; Caywood 1974) was poorly documented and that no evidence suggested it was a threat to splittail. At present, we do not consider the threat of recreational fishing to be significant. Baxter (2001b) analyzed 1999 and 2000 creel census data from the Sacramento River from Garcia Bend to Redding. Monthly catch amounted to 103 and 232 splittail, respectively. However, no abundance indices were calculated by any agency, organization, or individual from these data, as they fail to meet the criteria established by Meng and Moyle (1995) and are generally considered inadequate to the task of quantifying splittail abundance.

The largest splittail are the first to engage in the spawning migration (Caywood 1974; Moyle *et al.* 2001). The early season fishery thus targets and removes females with high reproductive potential. The effect of this fishery in the Sacramento River may be relatively greater in dry years, when splittail spawning is largely confined to river margins. However, at present, there is no evidence of any trend in the available data suggesting that larger fish are being removed from the population or that the size structure of the population have been altered by this or other fisheries.

C. *Disease or predation.* In our 1994 proposed rule we indicated that this factor was not applicable to splittail (59 FR 862). Since that time, we have questioned whether that disease may be a threat due to high incidences of adult splittail in poor health being captured in the State and Federal water project facilities in the south Delta. The south Delta is dominated by water from the San Joaquin River, where pesticides (*e.g.*, chlorpyrifos, carbofuran, and diazinon), salts (*e.g.*, sodium sulfates), trace elements (boron and selenium), and high levels of total dissolved solids are prevalent in agricultural runoff (59 FR 862, 64 FR 5963). We are unwilling to dismiss the potential that disease is related to the presence of environmental contaminants. Of specific concern are the threats posed by metals, mercury, selenium, and pesticides. We speculate that there is some possibility that disease in splittail could be a function of increased contaminant loading and subsequent immune system depression. However, offsetting this concern is information found in the White Paper (Moyle *et al.* 2001) indicating that disease and parasite infestation may be a natural function related to the heavy cost of migration and spawning. Post-spawn adult splittail, and male fish in particular, are substantially weakened when outmigrating. We have considered whether selenium exposure can reasonably be expected to exacerbate this condition. No research is known to be conducted on disease occurrence in splittail; the only information we found on disease in splittail was in the White Paper (Moyle *et al.* 2001). Therefore, given the lack of available information, we are unable to determine that splittail are impacted by disease.

In the past, we have considered threats of predation to be minor because striped bass had coexisted with splittail for decades and because CDFG had forgone hatchery rearing and release of striped bass (59 FR 862, 64 FR 5963). We have determined that predation may be a minor factor in the decline of the splittail. Additionally, CALFED includes numerous studies on the threats posed by predators (CALFED 2000a, 2000b) (*see* Factor A for a discussion of CALFED).

D. *The inadequacy of existing regulatory mechanisms.* In the past (59 FR 682, 64 FR 5963), we did not consider the suite of available regulatory mechanisms to be adequate to protect the splittail. Our primary concerns involved the likelihood that the CVPIA, the Bay-Delta Accord and CALFED, though not regulatory programs, would be sufficient to control water movement in a way that would protect splittail. At that time, the funding and implementation of the Bay-Delta Accord and CALFED had just begun, and it was too early to know if their funding and implementation would continue. We now believe that progress to date indicates that these mechanisms are likely to allow effective management of water for the benefit of splittail. In addition, we believe that some benefits will accrue from efforts associated with these programs (*see* Factor A above for a discussion on CALFED and the CVPIA).

We also note that splittail's habitat, the loss of which constitutes the single largest threat to the species, is protected by the State under CEQA and by state statutes specific to Delta levees which protect levee habitat. Finally, plittail are listed as a Species of Special Concern requiring special considerations for mitigation and protection under CEQA.

To the extent that projects may sometimes be constructed without proper authorization under section 10 of the Rivers and Harbors Act and section 404 of the Clean Water Act, this could result in threats to the splittail. Implementation of the unpermitted projects could have negative effects on near-shore splittail habitat similar to those described under Factor A , and would not necessarily include mitigative features.

In summary, there is a slight potential that some residual threats still face splittail due to of inadequate application or enforcement of RHA and CWA regulatory mechanisms. However, we have been unable to document these threats in other than the most nebulous and anecdotal manner. Notwithstanding this potential, as the CALFED program is designed to improve habitat for the splittail as well as offset any adverse effects of its own actions and provide for recovery of a number of species including splittail, we believe it ameliorates the bulk of the minor threats associated with this factor.

E. *Other natural or manmade factors affecting its continued existence.* In our past rules and notices concerning the splittail (59 FR 682, 64 FR 5963, 66 FR 2828), we identified the risk of drought, invasive species (including interference in CVP and SWP salvage operations by the introduced Chinese mitten crab (*Eriocheir sinensis*)), detrimental flood bypass operations, the lack of screened water diversions, poor water quality and environmental contaminants including mercury, selenium and pesticides, bioaccumulation of selenium in the introduced Asiatic clam (Potamocorbula amurensis) as threatening the splittail. These topics and our current viewpoint of their affect on the splittail are further discussed below.

Drought: The variability of California's Mediterranean climate is not a threat to the species; it represents a baseline condition. This climate, however, may exacerbate the effects of the threats discussed above. Since the proposal to list the splittail, California has had relatively wet hydrologic conditions that benefit fish species, though water year 2001 was below normal. Because the splittail is a floodplain adapted species, a dramatic decline in abundance was observed during the 1987 to 1992 drought. Similarly, abundance peaks during years when there is extensive floodplain inundations, and of the Yolo and Sutter bypasses in particular (Sommer *et al.* 1997) (*see* below for a discussion of Yolo and Sutter bypasses). When another drought occurs, splittail indices will again invariably drop. We have speculated the drought cycle may at some point stress the species to extinction if populations are too depressed. However, we have no direct evidence this is the case, and in the context of the significant habitat improvements being undertaken, are far less concerned that populations will fall to levels that makes this a concern.

Invasive species: Chinese mitten crabs (*Eriocheir sinensis*) could reach concentrations sufficient to intermittently impede the operation of fish screens and salvage facilities, thus reducing the effectiveness of splittail salvage and repatriation efforts. Since the January 12, 2001, notice (66 FR 2828), USBR has installed a device, known as Crabzilla, to remove the Chinese mitten crab from their CVP fish salvage facilities. In addition, Chinese mitten crabs have not appeared in large numbers at either of the fish salvage facilities in recent years. Therefore, the Chinese mitten crab does not appear to be a current threat to splittail, as they have not appeared in large numbers at the fish salvage facilities and those that do are efficiently removed and destroyed before they are able to clog the pipes and intakes at the fish salvage facilities.

Of some concern is the presence of Brazilian pondweed (*Egeria densa*) and water hyacinth (*Eichhornia crassipes*), both of which tend to form dense near-shore and slough-wide mats of vegetation which serves as a retreat, foraging, and ambush site for splittail predators and which may divert upstream- and downstream-migrating splittail into channels rather than the more-productive bankside habitat (Moyle *et al.* 2001 in prep). The California Department of Boating and Waterways (CDBW) and the United States Department of Agriculture (USDA) Agricultural Research Service (ARS) are presently and have been for at least 10 years, engaged in a program to control these invasive plant species. To date, the control effort has not had a measureable effect on splittail.

CALFED includes numerous studies on the threats of non-native competitors (CALFED 2000a, 2000b)(*see* Factor A for a discussion of CALFED).

Detrimental flood bypass operations: It has been documented that splittail make use of the Sutter Bypass, and particularly heavy use of the Yolo Bypass for spawning under certain hydrologic conditions and that the shallow, vegetated waters provide excellent rearing conditions for juvenile fish (Sommer *et al.* 1997, 2001a, 2001b). The bypasses are primarily flood control facilities and secondarily agricultural lands, and are passively operated as such. Splittail using the bypasses are subject to many of the same threats found elsewhere, such as habitat loss, environmental contamination, harmful reservoir operations, pesticide loading, competition with and predation by non-native fish, etc.

The flood bypasses are only flooded when flows in the Sacramento River reach a certain level. This inundation tends to occur at the correct time of year for splittail spawning, but may be reduced in frequency and duration (Yates 2001), with direct implications for splittail spawning. This constitutes a threat in that adult fish, having migrated to suitable spawning habitats on a floodplain, could be denied the opportunity to spawn. In those cases where adult splittail have successfully spawned, the resulting eggs or larvae could become trapped and killed. Insufficient floodplain inundation could also force egress of juvenile splittail before they have attained a size and swimming ability sufficient to avoid predation.

Since the publication of our January 12, 2001, notice (66 FR 2828), we have determined, based on consideration of scientific data and information provided by the public, that the Yolo and Sutter bypasses are not, in and of themselves, a threat to the splittail. A threat is that which, if removed, will result in improvements in a species' status. The removal of the Yolo and Sutter bypasses would be highly detrimental to the splittail, as the bypasses constitute a substantial portion of the species available spawning habitat. We agree that the bypasses are presently important to the splittail when inundated and that they produce more fish than they harm. The bypasses likely have helped this resilient species to persist through over a century of largely unmitigated habitat destruction.

CALFED's ERP includes the development of a program to eliminate fish stranding in the Sacramento, Feather, and Yuba rivers and the Colusa Basin Drain and Sutter Bypass in the active stream channels, floodplains, shallow ponds, and borrow areas (CALFED 2000a, 2000b) (*see* Factor A for a discussion of CALFED). In addition, the program will conduct instream flow studies to determine the flows necessary to support all life stages of anadromous and estuarine fish species, including splittail (CALFED 2000a, 2000b).

Entrainment as a result of *water diversions:* We conclude that diversion of water from any river or stream or other water course that results in the entrainment, injury or death of Sacramento splittail, including stranding of eggs, larvae, juveniles or adults; or diversions and subsequent runoff that results in the degradation of waters containing splittail is no longer a threat to splittail. Entrainment of splittail at diversions is reduced if fish screens are installed at diversions in splittail habitat areas. Two programs implemented under CVPIA, particularly the Anadromous Fish Restoration Program (AFRP) and allied Anadromous Fish Screen Program (AFSP), which were not analyzed in the January 12, 2001, notice (66 FR 2828), have had a net benefit to the splittail. Removal of migration barriers and placement of fish screens on water diversions is ongoing under the AFRP and AFSP, and several actions with adjunct benefits to splittail have been completed. Removal of migration barriers can provide additional splittail habitat where potential habitat is blocked, and entrainment of splittail at diversions can be reduced if fish screens are installed in splittail habitat areas. Though many small diversions remain unscreened, approximately 95 percent of water annually diverted has been or is in the process of being screened, including all water diversions greater than 40 cubic feet per second, and many of the remaining unscreened diversions are small and intermittently operated (O'Leary 2003 pers. comm.). CALFED's Ecosystem Restoration Program includes a program to consolidate and screen the remaining small agricultural diversions in the Delta, and the Sacramento and San Joaquin rivers. The NOAA Fisheries Restoration Center has also begun to fund small fish screen projects in the Sacramento River within the range of the splittail. This represents a near-total reduction in the threat of entrainment in unscreened diversions to the splittail, and thus removal of the threat.

Water quality and environmental contaminants: Metals such as copper, zinc and cadmium (Environmental Protection Agency (EPA) 1976) can be directly toxic to fish, and presumably to splittail, especially in their sensitive larval stages, with the effects particularly deleterious near inputs of acid mine drainage within the Sacramento River watershed and in the vicinity of highly industrialized near-shore areas of the lower San Francisco Bay Estuary. These metals damage gills and alter liver and nervous system functions causing death, behavioral changes, and reduced growth and reproduction (EPA 1976). These metals can have the same effects on food items of the splittail, reducing their prey base and placing additional stress on the splittail (EPA 1976). However, we are not aware of any evidence suggesting that splittail are at any higher risk of suffering direct or indirect adverse effects from metals exposure than other fish species within the Sacramento River and San Francisco Bay estuary systems. For all such species, the potential for at least periodic adverse impacts from exposure to metals is of substantive concern, but poorly understood.

Three other potential contaminant threats are of concern specifically with respect to the splittail: (1) mercury; (2) selenium; and (3) pesticides (persistent organochlorines and currently used organophosphates). In part, these contaminant threats are of concern because they may be focused, to varying degrees, on habitat features and biological characteristics tentatively identified as particularly relevant to splittail conservation (Moyle *et al.* 2001).

Recent analytical data indicate that mercury concentrations in aquatic biota in the San Joaquin River are exceeding screening thresholds and may pose ecological and human health risks (Davis *et al.*, 2000). A benthic-foraging, longer-lived fish such as splittail would be likely to acquire higher and more toxic levels of whole body mercury concentration. We are concerned the combined data from these monitoring and research efforts may indicate that mercury in the San Joaquin River poses a threat to ecological health in general, and the splittail, as a benthic forager, in particular. Some findings have linked elevated mercury to the Consumnes and Yolo Bypass (Slotten *et al.* 2000), which are both primary spawning areas for splittail (Moyle *et al.* 2001). Furthermore, the Yolo Bypass may be hydrologically connected to Suisun Marsh, the likely core rearing area for splittail (Moyle *et al.* 2001). Suchanek *et al.* (2000) is investigating the role of wetland restoration involving re-flooding of mercury-contaminated soils.

Significant exposure to selenium could potentially pose a threat to splittail throughout much of its range, including the Yolo Bypass. Recent samples of splittail from Montezuma Slough collected by USGS scientists (Stewart *et al.* 2000, Stewart *et al.* unpubl. data) have revealed elevated muscle selenium concentrations ranging as high as 4 to 5 mg/kg (5 ppm), and liver concentrations ranging as high as 20 mg/kg (20 ppm). The relationship between the bioaccumulation of selenium in the Asiatic clam and its predation by splittail could become significant in the near-term future because the clam, via its predation on typical splittail prey items such as estuarine copepods (*Eurytemora affinis*, and *Acartia* spp.) (Kimmerer and Peñalva 2000), is creating conditions that promotes increasing reliance of splittail on the clam as an alternate food source (Feyrer and Matern 2000). Thus, a potential scenario for the future is greater reliance of splittail on Asiatic clams as a food supply and possibly further increases of selenium concentrations in both Asiatic clams and splittail. Selenium threats to splittail are not confined to the Yolo Bypass/Suisun Marsh systems. We speculate that when splittail are exposed to this level of selenium, there is potential that a reduction in reproductive performance will occur, which would then result in poor post-hatch survivorship. This means that less splittail young would be able to recruit to adulthood. There are 1998 splittail data which confirm that these fish are being exposed to harmful levels of selenium in their range along the San Joaquin River.

Splittail apparently experience substantial post-spawning stress, and are subject to substantial stress during salvage operations at the State and Federal pumping facilities. In addition to weakening the immune defenses of fish and wildlife, excessive environmental selenium can also trigger pathogen and toxin challenges that would not otherwise have occurred. At this point, we have no direct information on the potential effects of selenium with respect to splittail. However we have considered the selenium-mediated vulnerability to non-chemical stressors when assessing the threats presented by exposure of splittail to selenium.

Several of the pesticides present in the rivers of the Central Valley have been documented to have adverse effects on animal life. However, we have no direct evidence that pesticides are a pervasive threat to the splittail throughout its range. If there is a threat it may be relatively greater in the bypasses due to the large amount of spawning and early rearing that occurs there in wet years. All major rivers that are tributary to the Estuary are exposed to large volumes of agricultural and industrial chemicals that are applied in the Central Valley watershed (Nichols *et al.* 1986) as agricultural chemicals and their residues, as well as chemicals originating in urban runoff find their way into the rivers and estuary.

In addition, re-flooding of the Sutter and Yolo Bypasses and the use of other flooded agricultural lands by splittail for spawning can result in agricultural-related chemical exposures depending on the circumstances.

Toxicology studies of rice field irrigation drain water of the Colusa Basin Drainage Canal have documented significant toxicity of drain water to striped bass (*Morone saxatilis*) embryos and larvae, *Oryzias latipes* larvae (in the Cyprinodontidae family), and opossum shrimp, which is the major food organism of striped bass larvae and juveniles (Bailey *et al.* 1991), as well as all age classes of splittail. 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); this was the third consecutive year rice irrigation drain water from the Colusa Basin was acutely toxic (Bailey *et al.* 1991). Splittail may be similarly affected by agricultural and industrial chemical runoff, particularly, because like striped bass, adults migrate upriver to spawn and young rear upriver until waters recede in late spring.

While we have considered these contaminants as possible threats to the splittail, it must also be noted that we have no information on the splittail's thresholds for metals and pesticides. We are unwilling to accept the use of a surrogate species to determine acceptable thresholds for splittail. While there are abundant non-native cyprinids available (fathead minnows [*Pimephales promelas*] and golden shiners [*Notemigonus crysoleucas*]), we assert the splittail is behaviorally unlike these non-native fishes and most likely physiologically distinct from them as well. Further, potential surrogate native cyprinids (hardhead [*Mylopharodon conocephalus*], blackfish [*Orthodon microlepidotus*], pikeminnow [*Ptychocheilus grandis*]) are piscivorous (fish-eating) when adults, and therefore likely distinct from splittail. Splittail may have its closest relative in the Rhinichthys complex (speckled dace [*Rhinichthys osculus*] and others) but use of these diminutive, short-lived, small-stream species would be similarly unadvisable. Lastly, we would have serious concerns with results obtained from non-cyprinids surrogate species, such as white sturgeon, bluegill, inland silverside, mosquito fish, and lake trout, as they would certainly be both physiologically and behaviorally distinct from splittail and therefore useless in determining thresholds for the splittail. We therefore have determined that the above mentioned thresholds for other fish species are not indicative of the thresholds of the splittail. For all fish species, the potential for at least periodic adverse impacts from exposure to metals and pesticides is of potentially substantive concern, but poorly understood and poorly documented. Thus we have no real basis for concluding that these substances represent a particular threat to the splittail.

Finally, Moyle *et al.* (2001) hypothesize that success of juvenile downstream migration is strongly linked to the size that juvenile splittail achieve prior to exiting the spawning areas. It was suggested that a minimum size of 25 mm (1 in) greatly enhances success of downstream migration. Moyle *et al.* (2001) have already presented data demonstrating statistically-significant declining growth rates in Suisun Marsh splittail between 1980 and 1995. The apparent declines in growth rate appear to correlate to the invasion of the estuary by the Asiatic clam, and the subsequent shift of splittail to an Asiatic clam-dominated diet. Moyle *et al.* (2001) suggested that this trend might reflect poorer energetics of a non-mysid shrimp-dominated diet, but it can just as plausibly be suggested that it reflects the cachexia (contaminant-induced weight loss despite calorically sufficient dietary intake) that is a classic symptom of non-lethal selenium poisoning. However we have no particular basis for finding the growth rates are the result of any contaminent induced mechanism.

CALFED's Water Quality Program, which was not analyzed in the January 12, 2001, notice (66 FR 2828), will have a net benefit for the splittail when implemented (*see* Factor A for a discussion of CALFED). The Water Quality Program includes the following actions: (1) Reduce the impacts of pesticides through development and implementation of Best Management Practices (BMPs) for both urban and agricultural uses, through support of pesticide studies for regulatory agencies, and through providing education and assistance in implementation of control strategies for the regulated pesticide users; (2) reduce the load of organochlorine pesticides in the system by reducing runoff and erosion from agricultural lands through BMPs; (3) reduce the impacts of trace metals, such as copper, cadmium, and zinc, through source control at inactive and abandoned mine sites, urban storm water programs and agricultural BMPs; (4) reduce mercury levels in rivers and the estuary by source control at inactive and abandoned mine sites; (5) reduce selenium impacts through reduction of loads at their sources and through appropriate land fallowing and land retirement programs; (6) reduce salt sources in urban and industrial wastewater and facilitate development of successful water recycling, source water blending, and groundwater storage programs; (7) manage Delta salinity by limiting salt loadings from its tributaries and through managing seawater intrusion by such means as using storage capacity to maintain Delta outflow and adjust timing of outflow, and by export management; (8) reduce turbidity and sedimentation; (9) reduce the impairment of rivers and the estuary from substances that exert excessive demand on dissolved oxygen; and, (10) through research and monitoring, to identify parameters of concern in the water and sediment and impairment actions, to reduce their impacts to aquatic resources.

Conclusion: Splittail are no longer threatened by interference in CVP and SWP salvage operations by the introduced Chinese mitten crab and unscreened diversions. The Yolo and Sutter Bypasses are a net benefit to the splittail. CALFED's Ecosystem Restoration Program (discussed in Factor A above) will conduct instream flow studies to determine the flows necessary to support all life stages of anadromous and estuarine fish species, including splittail, which will offset the threat of drought and flow regime changes resulting from water project operations. The threats of poor water quality from contaminants including mercury, selenium and pesticides, and bioaccumulation of selenium in the introduced Asiatic clam, appear to be reduced by CALFED's Water Quality Program (discussed in Factor E above). At present, although environmental contaminants are pervasive throughout the range of the splittail, and many contaminants have the potential to pose a significant threat to splittail, there is insufficient scientific evidence at this time to indicate that environmental contaminants impair splittail growth and reproduction at all; much less to a magnitude that would warrant listing splittail due to that threat alone or in combination with others.

Finding

We have carefully assessed the best scientific and commercial information available regarding the abundance and distribution of; and the past, present, and future threats faced by the splittail in this listing determination. The following narrative will summarize the pertinent data regarding abundance and threats.

Based upon our statistical analysis using a relaxed standard for significance, we conclude that splittail populations may have declined over the period of analysis. We recognize that other agencies, including USBR and CDFG, believe that the available data do not indicate a population decline. However, the magnitude, certainty, and ecological significance of the apparent population decline remain unclear.

We believe that above all else, the primary threat to splittail is the loss of spawning and rearing habitat. Past habitat losses are offset by the implementation programs of CALFED and the CVPIA which are restoring significant amounts of habitat previously lost. In addition, those programs ensure that future water operations and development will protect and improve existing habitats. The many additional ongoing and future habitat restoration projects throughout the range of the splittail include, either as direct or indirect effects, spawning and rearing habitat for the splittail, or enhancement of such habitat. The restoration of splittail habitat enables greater spawning and rearing opportunities and thus increases the population size, ameliorating all of the remaining threats to a level below the point at which the splittail would meet the definition of a threatened species.

We therefore have determined that the splittail is not in danger of extinction through all or a significant portion of its range either now or in the foreseeable future. It therefore does not meet the definition of an endangered or threatened species. As a result, we have determined that listing the splittail as endangered or threatened under the Act is not warranted.

In making this finding, we recognize that the Sacramento splittail may be experiencing a decline in population size based upon our conservative statistical analysis, and that the species continues to face potential threats from habitat loss. We also recognize that the full implementation of CALFED and the CVPIA restoration programs are not 100 percent certain. Finally, we recognize other threats to the species, its habitat, and its prey exist, including effects of drought and climate change on habitat; non-native competitors and predators; and possible threats of disease and environmental contaminants. We will continue to monitor the status and management of the species. We will continue to accept additional information and comments from all concerned governmental agencies, the scientific community, industry, or any other interested party concerning this finding. If we find that circumstances change to the point that any of these threats change significantly, we will reexamine the status of the splittail.

Coordination With the State of California

The State of California administers, via CDFG, the California Endangered Species Act (CESA) (Fish and Game Code sections 2050 to 2116, *et seq.*). The purposes of the CESA are to conserve, protect, restore, and enhance any bird, mammal, fish, amphibian, reptile, or plant meeting CESA criteria for threatened or endangered status, and to acquire lands for habitat for these species.

Procedures governing the submission and review of petitions for listing, uplisting, downlisting, and delisting of CESA endangered and CESA threatened species of plants and animals are described in section 670.1, Title 14, California Code of Regulations.

Under CESA, a State ''threatened'' species is a California native species that, although not presently threatened with extinction, is likely to become an endangered species in the foreseeable future in the absence of special protection and management efforts (Fish and Game Code section 2067). A State ''endangered'' species is that which is in serious danger of becoming extinct throughout all, or a significant portion, of its range due to one or more causes, including loss of habitat, change in habitat, overexploitation, predation, competition, or disease (Fish and Game Code section 2062). The splittail is not listed as threatened or endangered by the State of California under the authority of CESA. There appears to be substantive similarity between the Federal requirement under section 4(a)(1) of the Act and the State requirement under section 14(i)(1)(A) of the of the California Code of Regulations to consider all factors affecting a species. There also appears to be a high degree of similarity between the definition of a ''threatened species'' under both section 3(20) of the Act and CESA (Fish and Game Code section 2067).

CDFG submitted comments regarding the status of the splittail during the January 12, 2001, May 8, 2001, and August 17, 2001, comment periods (66 FR 2828, 66 FR 23181, and 66 FR 43145, respectively) subsequent to the court's June 23, 2000, summary judgement. Further, CDFG staff were involved in an interagency peer review effort undertaken concurrent with the August 17, 2001, comment period. CDFG comments were limited only to alternate analyses of species abundance (see the Summary of Comments and Recommendations section).

We are actively coordinating with California Environmental Protection Agency (CalEPA), the State Water Resources Control Board (SWRCB), and the Regional Water Quality Control Boards (RWQCBs) through public comment periods on their regulatory program actions (USFWS 2002b). The CalEPA, SWRCB, and OEHHA provided no comments regarding the listing, however. The CDWR and the Reclamation Board did comment to a certain degree regarding the factors affecting the splittail (*see* the Summary of Comments and Recommendations section).

We have given full consideration to CDFG as well as CDWR recommendations to employ an alternate abundance analysis (see Abundance and our response to Comment 1). Indeed, we used the CDFG/USBR MRF model, the result of a joint State and Federal scientific undertaking, to determine if a trend exists for the species. Based on our evaluation of conservation efforts completed, currently underway, and likely to stem from CALFED and the CVPIA, we now agree with the State that listing of the splittail as a threatened species is not warranted at this time.

National Environmental Policy Act

We have determined that we do not need to prepare an Environmental Assessment and/or an Environmental Impact Statement as defined by the National Environmental Policy Act of 1969 in connection with regulations adopted pursuant to section 4(a) of the Endangered Species Act. We published a notice outlining our reason for this determination in the **Federal Register** on October 25, 1983 (48 FR 49244).

Paperwork Reduction Act

This rule does not contain any information collection requirements for which OMB approval under the Paperwork Reduction Act is required. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a valid OMB control number. For additional information concerning permits and associated requirements for threatened wildlife species, *see* 50 CFR 17.21 and 17.22.

References Cited

A complete list of all references cited in this final rule is available upon request from the Sacramento Fish and Wildlife Office (*see* **ADDRESSES**).

Authors

The primary authors of this document are staff of the Sacramento Fish and Wildlife Office.

List of Subjects in 50 CFR Part 17

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

Regulation Promulgation

■ For the reasons given in the preamble, we amend part 17, subchapter B of chapter I, title 50 of the Code of Federal Regulations, 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 removing the entry ''Sacramento splittail'' under ''FISHES'' from the List of Endangered and Threatened Wildlife and Plants.

Dated: September 15, 2003.

Marshall P. Jones, Jr.,

Acting Director, Fish and Wildlife Service.

[FR Doc. 03–23919 Filed 9–18–03; 12:01 pm]

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