

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 Our since-superseded polynomial regression analysis of abundance data (See Abundance section of the August 17, 2001, notice) controlled for influences of hydrological cycles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 it 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.