

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 The CDFG/USBR MLR Model thus superceded the permutation-based exact calculations of p-values for stratified (as opposed to unstratified) Mann-Whitney U-tests.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