(III) Revised San Joaquin Fish Migration Criteria. The criteria index value line is being stated in the final rule as follows:

For years in which the SJVIndex is > 2.5:

SJFMI = (-0.012) + 0.184*SJVIndex In other years:

SJFMI = 0.205 + 0.0975*SJVIndex where SJFMI is the San Joaquin Fish Migration index, and SJVIndex is the 60-20-20 San Joaquin water year index in million acre feet (MAF).

These criteria are displayed graphically in Figure 6.

(IV) Implementation of San Joaquin River Fish Migration Criteria.

The following discussion is intended to assist the State Board's consideration of the issues involved in implementing these or similar, equally protective, criteria.

The San Joaquin River Fish Migration criteria provide an annual survival goal that varies depending on the 60-20-20 San Joaquin water year index. EPA anticipates that the State Board implementation plan would provide for a sufficient number of tagged fish releases to verify that the applicable criterion is being met in each year. EPA recognizes that there may be substantial variation in fish migration criteria values resulting from these experimental releases. Accordingly, the final rule provides that attainment can be measured using a three-year moving average (the current year and two preceding years). Three year periods should provide time to complete sufficient releases to determine whether the implementation measures are, on average, attaining the stated criteria values.

As stated above, the USFWS model is the best available model of salmon smolt survival through the Delta, and EPA encourages the State Board to use the recently revised USFWS San Joaquin model as guidance for setting implementation measures. Nevertheless, it is important to recognize that there may be constraints on the model's use. Further monitoring and experimental releases under the chosen implementation regime are essential to verify and refine the model, and will ensure that the smolts are actually surviving at the expected level. In addition, it will be particularly important to protect the base conditions assumed in the model, such as flows during the time the Upper Old River barrier is not in place, flows at Jersey Point, and temperature.

The expected criteria index values are unlikely to be achieved if these base conditions deteriorate.

One additional refinement to the implementation measures should be considered on the San Joaquin River. As discussed above, the Sacramento River criteria include a ceiling value on the maximum salmon smolt survival. This was included because there appears to be a point where incrementally lower temperatures do not significantly increase salmon smolt survival. In theory, there may be a similar point on the San Joaquin River where incrementally higher flows in very wet years do not yield significantly higher salmon smolt survival. Nevertheless, the existing data do not allow quantification of what those flow levels are. EPA is supportive of another mechanism for dealing with this issue. It is EPA's judgment that in very wet years (those in which the flows exceed 10,000 cfs during the relevant period) it may be appropriate to meet the flow requirements associated with the targeted Fish Migration criteria index solely through natural storm events and restricted diversions, and not by upstream reservoir releases. In other words, the implementation flows could be provided at these higher flow periods by natural hydrology rather than by reservoir releases. In this way, the natural "flood events" that appear to be so beneficial to the salmon would be protected, but the water supply system would not have to bear the water costs of generating artificial flood events through reservoir releases.

(ii) Use of Continuous Function

The second principal difference in the final criteria is to state the criteria as a "continuous function" or "sliding scale." As discussed in EPA's alternative formulation of the Fish Migration criteria made available in the Notice of Availability, this approach replaces the Proposed Rule's statement of the criteria as single fixed index values for each of the five water year categories (59 FR 44095). The proposed approach did not account for the substantial differences in hydrological conditions within water year types. For example, an "above normal" water year type could range from a *wet* "above" normal" year to a *dry* "above normal" year. Given the extreme variation of hydrological conditions in the Bay/ Delta, these variations within each of the five standard water year types are substantial, and should be factored into the calculation of the applicable Fish Migration criteria index value. The continuous function approach addresses this problem by transforming the five discrete water year categories into a more precise equation (graphically, a single line or curve) correlating the Fish

Migration criteria index value with each year's specific observed hydrological conditions. The continuous function approach provides the same degree of protection for the designated uses as the proposed approach using average survival values. However, the continuous function approach provides a more precise approximation of hydrological conditions and facilitates implementation and compliance. EPA explained the rationale for using the continuous function approach in more detail in the technical documents referenced in the Notice of Availability (59 FR 44095). The derivations of the actual continuous functions for the Sacramento and San Joaquin River systems are explained above.

(iii) Measuring Attainment Through Actual Test Results

The Proposed Rule relied on the criteria index equations to determine whether the criteria were being attained. In effect, attainment would be assumed if the State adopted an implementation plan with a set of measures (export restrictions, flow requirements, etc.) that, when computed in the index equations, resulted in the criteria index value.

Many commenters believed that reliance on the criteria index equations for this purpose was inappropriate because factors other than those implementation measures included in the model may affect smolt survival. To address this concern, in the final criteria, direct experimental measurements of smolt survival through the Delta will be used to estimate attainment of the criteria, instead of relying on modeled estimates. Survival is to be measured through tagged smolt release and recapture studies. This approach assures that factors significantly affecting survival will be reflected in survival measurements, even if they are not well described by the criteria index equations. This more direct approach gives the State greater latitude to develop implementation measures outside of the equation parameters. It also ensures that the implementation measures are actually providing the intended protection for the Fish Migration designated use.

(3) Fish Migration Criteria as Multispecies Protection

The Fish Migration criteria outlined above are based on protection measures required for a single run of salmon, the fall-run Chinook salmon. Some commenters questioned whether this approach conflicts with the habitat or multispecies approach recommended by the Club FED agencies in their