(i) Shift from water year categories to a "sliding scale". Rather than basing the number of days on data reflecting average salinity for each of the five water year types, EPA is basing the number of days on a "sliding scale" or "smooth function" that more precisely states the correlation between precipitation and the number of days of the 2 ppt value. For example, whereas the previous approach would require the same number of days of the 2 ppt value for all "above normal" years, the sliding scale requires fewer number of days for a dry "above normal" year than for a wet "above normal" year. In other words, rather than stating the criteria as five discrete points representing water year types, the sliding scale uses all the data underlying those five points to construct a continuous function or line reflecting salinity as a function of flow. The sliding scale is a more realistic description of the relationship between salinity and flow as it existed at the time during which the estuary attained its designated uses.

(ii) Shift from yearly hydrology to monthly hydrology. Instead of basing the number of compliance days at Chipps and Roe Islands on the expected hydrological conditions for the entire year, the final criteria base the current month's requirements only on the previous month's hydrological conditions. This change requires that these criteria specify a "sliding scale" for each month, but allows a much more accurate reflection of variations in natural hydrology.

(iii) Revising the data used to reflect more accurately conditions in the estuary during the reference period. As explained above, the reference period is the historical time period when the estuary attained its designated uses. In the Proposed Rule, EPA used the late 1960's to early 1970's as the reference period because the available information about the fish and wildlife resources in the Bay/Delta suggests that this time period encompasses the most recent time period during which the designated uses were attained. To describe hydrological and salinity conditions in this late 1960's to early 1970's reference period, the Proposed

Rule used data from 1940 to 1975. This longer period was used because the actual conditions in the late 1960's to early 1970's did not provide representative samples of the possible broad range of hydrological conditions in the estuary. The Proposed Rule suggested that the period 1940–1975 could be considered representative of the late 1960's to early 1970's because the longer period was one of fairly consistent hydrological conditions bracketed by the completion of Shasta Dam on the Sacramento in the early 1940's and by the severe drought of the mid-1970's.

EPA received much comment on the approach in the Proposed Rule, with some commenters arguing convincingly that the 1940 to 1975 was in fact not one of consistent hydrological conditions, since the "level of development"-the change in the facilities used for water diversion and storage-changed over time during this period due to additional construction activities at the state, federal, and local levels. EPA agrees with these comments and has reevaluated the historical data to account for the effects of the level of development on the salinity regime in Suisun Bay. As discussed below, EPA has determined that it is appropriate to use the level of development—and corresponding salinity regimerepresented by calendar year 1968 as a surrogate for the late 1960's to early 1970's reference period when the estuary attained its designated uses.

(iv) Alternative measures of attainment. Under the CWA, the State Board has the responsibility for developing an implementation plan, including the methodology for measuring attainment. Based on the comments received as discussed below, EPA believes that attainment could be measured at the Roe Island and Chipps Island monitoring sites by any of (1) the daily salinity value, (2) the 14-day average salinity, or (3) the "flow equivalence" of the salinity value, as predicted in the recent Contra Costa Water District (CCWD) model described below. For reasons that are peculiar to that model, attainment at the Confluence monitoring site could be

measured by either of the first two of these approaches only.

b. Detailed Discussion

(1) Proposed Estuarine Habitat Criteria

The Estuarine Habitat criteria included in the Proposed Rule specified the location and number of days that the 2 ppt salinity value would need to be met to protect the designated use. EPA's proposed criteria are shown in Table 1. They consisted of 2 ppt salinity criteria¹² to be attained for a specified number of days at Roe Island, Chipps Island, and at the Sacramento/San Joaquin River confluence during the period of February through June. The Proposed Rule provided that the 2 ppt salinity value must be met at the Sacramento/San Joaquin River confluence monitoring station for the entire 150 day period from February through June. The number of days of compliance with the 2 ppt value at Chipps and Roe Islands were based on the late 1960's to early 1970's "reference period" representing a time in which the conditions in the estuary were adequate to protect the designated uses. To represent this reference period, the criteria replicated the average number of days in each of the five water year types during which the 2 ppt salinity value occurred at or downstream from each of these locations during the historical period 1940–1975. Because no critically dry years occurred in the period from 1940 to 1975, the required number of days for critically dry years was based on an extrapolation of the data. In addition, in a number of years in the 1940–1975 period, data existed for flow conditions in the estuary but not for salinity. For these years, the Kimmerer-Monismith model (SFEP 1993) was used to estimate the salinity regime based on the existing flow data.

The proposed criteria were to be measured using a 14-day moving average.¹³ The use of a 14-day moving average allowed the mean location to be achieved despite the varying strength of tidal currents during the lunar cycle, because any 14 day period would include the full range of spring and neap tidal conditions.¹⁴

¹² EPA's proposed Estuarine Habitat criteria were stated as a certain number of days when the average daily near-bottom salinity at each of three locations in the estuary is less than 2 parts per thousand. This salinity is approximately equivalent to electrical conductivity less than 2.640 mmhos/cm EC when corrected to a temperature of 25°C.

¹³ A 14 day moving average would compute the salinity for a given day by taking the overall average of daily averages of salinity values for the measurement day and each of the previous 13 days. At the monitoring sites used in the Estuarine Habitat criteria, salinity is generally measured at

least hourly, thereby facilitating computation of daily averages.

¹⁴ Spring and neap tides refer to the times during the 28 day lunar cycle when tides are strongest and weakest, respectively.