The State Board's 1991 Bay/Delta Plan established objectives of 1.5 mmhos/cm EC at Antioch and 0.44 mmhos/cm EC at Prisoners Point in April and May. EPA disapproved these objectives, in part, because they are not adequate to protect spawning habitat in the reach farther upstream between Prisoners Point and Vernalis. EPA also disapproved the 1991 Bay/Delta Plan spawning criteria because they were not based on sound science. The State Board explained that the 1.5 mmhos/cm EC criteria at Antioch was intended to protect spawning habitat upstream of Antioch (near Jersey Point), not at the Antioch location itself. The State Board acknowledged that "the use of 1.5 [mmhos/cm] EC at Antioch appears not to be generally appropriate, and proposed that a thorough review of this [criterion] be undertaken at the next triennial review" (1991 Bay/Delta Plan, p. 5–32). EPA found this unproven approach of setting criteria downstream in hopes of attaining different criteria upstream deficient, and disapproved it.

In the Proposed Rule (40 CFR 131.37(b)), EPA proposed salinity criteria of 0.44 mmhos/cm EC in the lower San Joaquin River in the reach from Jersey Point to Vernalis in wet, above normal, and below normal water years. In dry and critical water years, EPA proposed the 0.44 mmhos/cm criteria for only the reach from Jersey Point to Prisoners Point.

b. Comments on Proposal and Final Criteria

EPA received a number of comments on its proposed Fish Spawning criteria. California DFG was generally supportive of the proposed criteria, but believed that the criteria would need to be supplemented by a range of additional management techniques in order to have any substantial benefit for spawning (California DFG 1994). Several parties noted that striped bass are an introduced predatory species, and that efforts to increase striped bass populations would work at crosspurposes with efforts to enhance other species such as salmon and Delta smelt (City and County of San Francisco Public Utilities Commission 1994; Bay/ Delta Urban Coalition 1994; California Farm Bureau Federation 1994). Other commenters raised the possibility that extending the acceptable spawning habitat upstream could result in more striped bass being entrained at the State and Federal water project pumps in the southern Delta. (California DWR 1994). Finally, some commenters believed that emphasizing the striped bass as an individual species was inconsistent

with the multiple species approach to habitat protection. (CUWA 1994a).

Although EPA believes there is some merit to each of these comments, EPA is not making any changes to the Fish Spawning criteria in the final rule stated at 40 CFR §131.37(b). EPA believes there is substantial scientific evidence indicating that increased salinities in the designated reaches of the San Joaquin River do in fact have an adverse effect on fish spawning. This problem of increased salt loadings has been recognized by virtually all the parties (CUWA 1994b; ACWA 1994) and recommendations on how to address it have been developed by, among others, the San Joaquin Valley Drainage Program (SJVDP 1990)

The possibility that healthier populations of predatory fishes such as striped bass would adversely affect other species of concern needs to be considered in the context of the whole range of protective measures being developed for the fishery. The package of project management measures, water quality standards, and implementation programs being developed under the CWA, ESA, CVPIA, and counterpart State authorities are intended to address the entire Bay/Delta ecosystem. For that reason, EPA believes that healthier predatory species populations should not interfere with the protection of other species of concern. EPA further believes that, if the State Board adopts and/or implements these criteria, the State Board can address the impact of entrainment at the pumps in its implementation measures. Finally, EPA believes that salinity problems in the lower San Joaquin affect aquatic species other than the striped bass. Recent research findings of USFWS (Meng 1994) suggest that the spawning habitat for the Sacramento splittail (currently proposed for listing as threatened under the ESA) is also being adversely affected by increased salt loadings in the lower San Joaquin. Accordingly, these criteria are consistent with a multiple species approach.

ÈPA believes that clearly stating the salinity conditions necessary for protection of the designated fish spawning uses on the lower San Joaquin provides the foundation for implementation plans by the State Board and other regulatory agencies. EPA believes that these implementation plans should build upon the recommendations of the San Joaquin Drainage Program, to the end that compliance with these criteria can be effectively and efficiently achieved.

One change has been made to the final Fish Spawning criteria. In the Proposed Rule, the Fish Spawning criteria were stated with reference to the five standard water year types, with one criterion required for dry and critical dry water years and another criterion required for the remaining water year types. In the final rule, reliance on water year types is eliminated. Instead, deciding which of the two different criteria applies is made by reference to the San Joaquin Valley Index, the standard index of San Joaquin Valley flows. This change merely eliminates the unnecessary middle step of translating the San Joaquin Valley Index into the five water year types.

4. Suisun Marsh Criteria

The tidal wetlands bordering Suisun Bay are characterized as brackish marsh because of their unique combination of species typical of both freshwater wetlands and more saline wetlands. Suisun Marsh itself, bordering Suisun Bay on the north, is the largest contiguous brackish water marsh in the United States. These large tidal marshes are distinct from the approximately 44,000 acres of "managed" marshes in the Suisun Bay, which are currently diked and managed for waterfowl use and hunting. Approximately 10,000 acres of marshes, both along channels within Suisun Marsh and bordering Suisun Bay, are still fully tidal (Meiorin et al. 1991).

These tidal marshes provide habitat for a large, highly diverse, and increasingly rare ecological community. The recent "Status and Trends" reports published by the SFEP listed 154 wildlife species associated with the brackish marshes surrounding Suisun Bay (Harvey, et al. 1992), including a number of candidates for listing under the ESA. These include the Suisun song sparrow (Melospiza melodia maxillaris) and the Suisun ornate shrew (Sorex ornatus sinuosus), as well as the plants Suisun slough thistle (Cirsium hydrophilum var. hydrophilum), Suisun aster (Aster chilensis var. lentus), delta tule pea (Lathyrus jepsonii), Mason's lilaeopsis (Lilaeopsis masonii), and softhaired bird's beak (Cordylanthus mollis mollis). These rare species are all found exclusively in tidally inundated marsh.

Recent studies indicate that increases in salinity caused by a combination of upstream diversions and drought have adversely affected the tidal marsh communities (Collins and Foin 1993). As salinity has intruded, brackish marsh plants which depend on soils low in salt content (especially the tules *Scirpus californicus* and *S. acutus*) have died back in both the shoreline marshes and in some interior marsh channel margins of the western half of Suisun Bay. These plants have been replaced by plants