Agreement for Coordination on California Bay/Delta Issues signed September 20, 1993. As noted in the preamble to the Proposed Rule, EPA believes that the implementation measures likely to be adopted to meet the target criteria values in these Fish Migration criteria, when combined with the other Federal actions in the Delta protecting the endangered winter-run Chinook salmon, are fully consistent with the protection of a broad range of anadromous and migratory fishes in the Bay/Delta.

Juvenile spring-run salmon and steelhead move through the Delta during the same period as winter-run and fall-run salmon, and are expected to be protected in the Delta by measures protecting these other runs (CDFG 1990a). Species other than salmon and steelhead seasonally migrate into and out of the Delta for spawning and as juveniles. These species include striped bass, Delta smelt, longfin smelt, white and green sturgeon, American shad and Sacramento splittail. With the exception of temperature, the factors that lead to successful migration of salmon and steelhead smolts are also important for successful migration of the juveniles of these species into the lower embayments. Therefore, EPA's proposed Fish Migration criteria, although specifically addressing fall-run Chinook salmon, will also help protect migration of these other migratory species.

## 3. Fish Spawning Criteria

## a. Proposed Rule

In California, striped bass spawn primarily in the warmer freshwater segments of the Sacramento and San Joaquin Rivers. Protection of spawning in both river systems is important to ensure the genetic diversity of the population as well as to increase the size of the overall striped bass population. The precise location and time of spawning appear to be controlled by temperature and salinity (Turner 1972a; Turner and Chadwick 1972). According to the California DFG, striped bass spawn successfully only in freshwater with electrical conductivities less than 0.44 millimhos 43 per

centimeter electroconductivity (mmhos/ cm EC), and prefer to spawn in waters with conductivities below 0.33 mmhos/ cm. Conductivities greater than 0.55 mmhos/cm appear to block the upstream migration of adult spawners (Radtke and Turner 1967; SWRCB 1988; SWRCB 1991; CDFG 1990b, WQCP-DFG-4). As explained in more detail in the Preamble to the Proposed Rule. salinity does not appear to be a serious limitation on spawning on the Sacramento River. However, in the smaller and shallower San Joaquin River, migrating bass seeking the warmer waters encounter excessive upstream salinity caused primarily by runoff. This salinity can block migration up the San Joaquin River, thereby reducing spawning, and can also reduce survival of eggs (Farley 1966; Radtke 1966; Radtke and Turner 1967; Turner and Farley 1971; Turner 1972a, 1972b).

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<sup>&</sup>lt;sup>43</sup> Salinity conditions upstream in freshwater are generally affected by dissolved salts from upstream water runoff. The salinity content of freshwater is traditionally measured by its electroconductivity or specific conductance standardized to 25°C, and is expressed in terms of millimhos per centimeter electroconductivity ("mmhos/cm EC") or micromhos per centimeter specific conductance. The Proposed Rule stated the Fish Spawning criteria in terms of mmhos/cm EC. In the final rule, EPA will state the criteria in terms of micromhos/

cm specific conductance, so as to be consistent with EPA's published guidance. *See* 40 CFR Part 136, Table 1B—List of Approved Inorganic Test Procedures, Parameter 64. The Proposed Rule's term "0.44 mmhos/cm EC" is equivalent to the final rule's term "440 micromhos/cm specific conductance". EPA will continue using the "0.44 mmhos/cm EC" term in this preamble, so as not to confuse the interested public.