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## SECTION 8

# Essential Fish Habitat

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## 8.1 ESSENTIAL FISH HABITAT BACKGROUND

Section 305(b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act, as amended (United States Code, 180 et seq.), requires Federal action agencies which fund, permit, or carry out activities that may adversely effect designated essential fish habitat (EFH) for Federally managed fish species to consult with the National Marine Fisheries Service (NMFS) regarding the potential adverse effects of their actions on EFH. In addition, this act also provides that the NMFS “shall coordinate with and provide information to other Federal agencies to further the conservation and enhancement of essential fish habitat” (16 United States Code, §1855(b)(1)(D)). The EFH regulations also require that Federal action agencies obligated to consult on EFH also provide NMFS with a written assessment of the effects of their action on EFH (50 Code of Federal Regulations §600.920).

The objective of this EFH assessment is to describe potential adverse effects to designated EFH for Federally managed fish species anticipated to occur within the proposed 2-Gates Action Area. It also describes proposed conservation measures designed to avoid, minimize, or otherwise offset potential adverse effects to designated EFH resulting from the 2-Gates Fish Protection Demonstration Project.

## 8.2 DESCRIPTION OF THE PROPOSED ACTION

This EFH assessment is based on the description of the 2-Gates Project and the Action Area described previously in Section 2.3 Project Description and Section 2.5 Project Area and Action Area of this BA. For complete description of the proposed Project and the Action Area used in this EFH assessment see Sections 2.3 and 2.5, respectively.

## 8.3 IDENTIFICATION OF ESSENTIAL FISH HABITAT

This section describes EFH designated by the Pacific Fishery Management Council (PFMC) within the Action Area for species managed under three different fishery management plans (FMPs). These FMPs are discussed in the following order: (1) the Pacific Groundfish FMP; (2) the Coastal Pelagic Species FMP; and, (3) the Pacific Salmon FMP. With regards to the Pacific salmon FMP, because previous sections of this BA provide habitat protection requirements for Sacramento River winter-run Chinook salmon and Central Valley spring-run Chinook salmon, this section pertains only to Central Valley fall and late-fall run Chinook salmon. Central Valley steelhead and Central California Coast steelhead are not managed by the PFMC and no EFH has been designated for these species.

EFH is defined as those waters and substrates necessary to fish for spawning, breeding, feeding, or growth to maturity. For the purposes of interpreting EFH, “waters” includes aquatic areas and their associated physical, chemical, and biological properties that are used by fish, and may include areas historically used by fish where appropriate; “substrate” includes sediment, hard bottom, structures underlying the waters, and associated biological communities; “necessary” means habitat required to support a sustainable fishery and a healthy ecosystem; and, “spawning, breeding, feeding, or growth to maturity” covers all habitat types used by a species throughout its life cycle. The Action Area considered for the proposed Project is within the region identified as EFH for starry flounder (*Platichthys stellatus*), in Amendment 11 of the Pacific Coast

Groundfish FMP, for Northern Anchovy (*Engraulis mordax*) in the Coastal Pelagic Species FMP, and for Pacific salmon in Amendment 14 of the Pacific Salmon FMP.

### 8.3.1 Pacific Coast Groundfish Fishery Management Plan

The Pacific Coast Groundfish FMP (PFMC 1998) has designated EFH for 83 species of groundfish, which taken together include all coastal waters, including to the upstream extent of saltwater intrusion in coastal rivers, along the Pacific coast. Starry flounder (*Platichthys stellatus*) is the most prevalent species managed under this FMP that is present within the described Action Area (see Section 2.3). Designated EFH for the Pacific groundfish FMP includes Suisun Bay, San Pablo Bay, and San Francisco Bay.

### 8.3.2 Coastal Pelagic Species Fishery Management Plan

Northern Anchovy (*Engraulis mordax*) is the only species managed under this FMP that may occur within the Action Area. Designated EFH for the Coastal Pelagic Species FMP includes Suisun Bay, San Pablo Bay, and San Francisco Bay.

### 8.3.3 Pacific Salmon Fishery Management Plan

The PFMC has identified and described EFH, Adverse Impacts, and Recommended Conservation Measures for salmon in Amendment 14 to the Pacific Coast Salmon FMP (PFMC 1999). Freshwater EFH for Pacific salmon in the California Central Valley includes waters currently or historically accessible to salmon within the Central Valley ecosystem as described in Myers *et al.* (1998), and includes the Sacramento River Basin hydrologic unit and the San Joaquin Delta (Delta) hydrologic unit (i.e., number 18040003). Sacramento River winter-run Chinook salmon (*Oncorhynchus tshawytscha*), Central Valley spring-run Chinook salmon (*O. tshawytscha*), and Central Valley fall-/late fall-run Chinook salmon (*O. tshawytscha*) are species managed under the Salmon Plan that occur in the proposed Action Area.

Factors limiting salmon populations in the Action Area include reduced instream flows due to water diversion and exports, loss of fish into unscreened diversions, predation by introduced species, and reduction in the quality and quantity of rearing habitat due to channelization, pollution, riprapping, etc. (Dettman *et al.* 1987; California Advisory Committee on Salmon and Steelhead Trout 1988, Kondolf *et al.* 1996a, 1996b). Factors affecting salmon populations in Suisun Bay include heavy industrialization within its watershed and discharge of wastewater effluents into the bay. Loss of vital wetland habitat along the fringes of the bay reduce rearing habitat and diminish the functional processes that wetlands provide for the bay ecosystem.

## 8.4 LIFE HISTORY, DISTRIBUTION, AND HABITAT REQUIREMENTS

### 8.4.1 Starry Flounder

The starry flounder is a flatfish found throughout the eastern Pacific Ocean, from the Santa Ynez River in California to the Bering and Chukchi Seas in Alaska, and eastwards to Bathurst inlet in Arctic Canada. Adults are found in marine waters to a depth of 375 meters. Spawning takes place during the fall and winter months in marine to polyhaline waters. The adults spawn in shallow coastal waters near river mouths and sloughs, and the juveniles are found almost exclusively in estuaries. The juveniles often migrate up freshwater rivers, but are estuarine dependent. Eggs are broadcast spawned and the buoyant eggs drift with wind and tidal currents. Juveniles gradually settle to the bottom after undergoing metamorphosis from a pelagic larva to a demersal juvenile by the end of April. Juveniles feed mainly on small crustaceans, barnacle larvae, cladocerans, clams, and dipteran larvae. Juveniles are extremely dependent on the condition of the estuary for

their health. Polluted estuaries and wetlands decrease the survival rate for juvenile starry flounder. Juvenile starry flounder also have a tendency to accumulate many of the anthropogenic contaminants found in the environment.

#### 8.4.2 Northern Anchovy

Northern anchovy are pelagic schooling fish found in coastal waters of the eastern Pacific Ocean. A small, short lived species, northern anchovy seldom live beyond four years. Spawning occurs during every month of the year, peaking from January through April (Richardson 1981). Eggs are pelagic, found near the water surface, and require two to four days to hatch, depending on water temperatures. Juveniles range in size from 25 mm to 140 mm in length and mature at two to three years of age. Northern anchovy feed diurnally, selectively feeding on larger zooplankton, fish eggs, and fish larvae. One of the most abundant and productive fishes in the San Francisco Bay area, northern anchovy occur throughout the San Francisco Bay-San Pablo Bay-Suisun Bay complex. Although most common downstream of Carquinez Strait, separating San Pablo Bay from Suisun Bay, they are often found in surveys of the lower brackish water portions of the Sacramento and San Joaquin Rivers (PFMC 1998).

#### 8.4.3 Pacific Salmon

General life history information for Central Valley Chinook salmon is summarized below. Information on Sacramento River winter-run and Central Valley spring-run Chinook salmon life histories is summarized in Section 3.1 of this BA. Further detailed information on Chinook salmon ESUs is available in the NMFS status review of Chinook salmon from Washington, Idaho, Oregon, and California (Myers *et al.* 1998), and the NMFS proposed rule for listing several Chinook salmon ESUs (63 Federal Rule 11482).

Adult Central Valley fall-run Chinook salmon enter the Sacramento and San Joaquin Rivers from July through December and spawn from October through December. Adult Central Valley late fall-run Chinook salmon enter the Sacramento and San Joaquin Rivers from October to April and spawn from January to April (USFWS 1998). Chinook salmon spawning generally occurs in clean loose gravel in swift, relatively shallow riffles or along the edges of fast runs (NMFS 1997).

Egg incubation occurs from October through March (Reynolds *et al.* 1993). Shortly after emergence from their gravel nests, most Chinook salmon fry disperse downstream towards the Delta and into the San Francisco Bay and its estuarine waters (Kjelson *et al.* 1982). The remaining fry hide in the gravel or station in calm, shallow waters with bank cover such as tree roots, logs, and submerged or overhead vegetation. These juveniles feed and grow from January through mid-May, and emigrate to the Delta and estuary from mid-March through mid-June (Lister and Genoe 1970). As they grow, the juveniles associate with coarser substrates along the stream margin or farther from shore (Healey 1991). Along the emigration route, submerged and overhead cover in the form of rocks, aquatic and riparian vegetation, logs, and undercut banks provide habitat for food organisms, shade, and protect juveniles and smolts from predation. Chinook salmon smolts generally spend a short time in the Delta and estuary before entry into the ocean. Whether entering the Delta or estuary as fry or juveniles, Central Valley Chinook salmon depend on passage through the Delta for access to the ocean.

### 8.5 EFFECTS OF THE PROPOSED ACTION

#### 8.5.1 Starry Flounder

Starry flounder salvage does occur at the State and Federal export pumps on Old River south (upstream) of the Project sites. Therefore, starry flounder may be adversely affected by the proposed Project. Most salvage

occurs in the months of May through July and is made up of young-of-the-year fish with the largest between 3 and 4 inches long (Lloyd Hess, pers. comm. as reported in Bureau of Reclamation 2008).

The general effects on the quality of EFH for starry flounder are expected to be similar to those described previously for green sturgeon due to their benthic life history. Benthic dwelling fish will have direct contact with sediment and may ingest contaminated sediment exposed during the construction phase of the proposed Project along with benthic invertebrates during their foraging activities. It is anticipated that starry flounder will spend more time as juveniles rearing in the Action Area than Chinook salmon smolts expected to pass through the area. Therefore, this fish species will have a greater duration of potential exposure to contaminants of concern during construction activities than juvenile Chinook salmon, leading to potentially greater levels of adverse effects to the individual organisms.

Essential Fish Habitat designated in the Groundfish FPM ends at the eastern boundary of Suisun Bay, 30 river miles (RM) downstream of the Project site. The proposed Project may adversely affect starry flounder habitat in the Delta by changing flow and water quality within the Action Area; however, it is unlikely that the Project will adversely affect designated EFH as far downstream as Suisun Bay.

Effects to starry flounder habitat are anticipated to be minor, as the majority of their habitat is some distance downstream of the Project site, in Suisun Bay, San Pablo Bay, San Francisco Bay, and the marine environment. In addition, no commercial fisheries for groundfish will be affected by localized effects of the Project.

## 8.5.2 Northern Anchovy

Northern anchovy is primarily a marine and estuarine species and only occasionally occur within the Action Area. There are no records of northern anchovy salvage at the State and Federal export pumps on Old River south (downstream) of the Project sites. Therefore, no adverse effects to northern anchovy are expected within the Project area.

EFH designated in the Coastal Pelagic FMP ends at the eastern boundary of Suisun Bay, 30RM downstream of the Project site. Therefore, no adverse effects to Coastal Pelagic EFH are expected as a result of the Project.

## 8.5.3 Pacific Salmon

The effects of the proposed action on Pacific salmon habitat are described at length in Section 5. Effects of the Action, and generally are expected to apply to Pacific salmon EFH as well.

## 8.6 CUMULATIVE EFFECTS

Potential impacts of river modification due to the proposed 2-Gates Project include effects on flow, water quality, fish migration pattern, spawning habitat and species diversity within the Action Area. These interactions may have an influence on the abundance and distribution of prey or food items for benthic and pelagic fish species as well as predators of these species within the Action Area. Changes in flow patterns and water quality within the Action Area may affect habitat essential to benthic and pelagic fish species managed under FMPs; however, effects to designated EFH as a whole is expected to be less than significant. This is because either designated EFH does not occur within the Action Area of the Project (Ground Fish and Coastal Pelagic) or the effects are localized, affecting a relative small portion of designated EFH (Pacific salmon).

## 8.7 PROPOSED CONSERVATION MEASURES

Proposed conservation measures include recommendations that: (1) all intake or other Project structures such as the gates be designed to minimize entrainment or impingement of fish; (2) mitigation be provided for the net loss of habitat from placement of the gate structures and associated components (i.e. sheet pile, rip-rap, etc.); and, (3) the gates are to be operated in a way that allows migrating salmon to pass through the Project sites in both upstream and downstream directions.

## 8.8 CONCLUSION

Based on the best available information as described in this section it is believed that the Project may adversely affect designated EFH for Pacific salmon during initial construction and normal long-term operations and annual construction activities. Although there may be effects to Starry Flounder within the Action Area, this area is not designated EFH in the Groundfish FPM, therefore, no Groundfish EFH will be adversely effected by the Project. In addition, while Northern Anchovy may occasionally occur within the Action Area, this area is not designated EFH in the Coastal Pelagic FPM; therefore, no Coastal Pelagic EFH will be adversely affected by the Project.