

## South Delta Base Condition Problem Statements

### Flood Management

- The existing flood infrastructure in the South Delta is aging, insufficient in many areas, and contributes to degraded habitat conditions and restriction of natural physical processes.

### Native Species Habitat

- Spawning and rearing habitats for native fishes are limited or of poor quality in the south Delta.
- Rearing habitat for salmonids is very limited along the main corridor of the San Joaquin River, particularly between Mossdale and Jersey Island, but also between Vernalis and Mossdale.
- Conditions in the S. Delta favor invasive fish species that prey on native fishes. Predation may be a large source of indirect mortality for native fishes. Indirect mortality in the S. Delta is associated with the hydrodynamic conditions, which draw juvenile fish into high predation zones. Predation is the proximal cause of entrainment, while habitat alteration (including hydrodynamic changes due to exports) and exotic species are the ultimate causes.
- Lack of habitat continuity and a natural ecological gradient between upper rivers and the Bay make it more difficult for migratory species to successfully migrate up or down stream.
- Altered and unnatural channel morphology along the San Joaquin and Delta channels results in lack of channel habitat complexity and cover for native fish, hydraulics that favor exotic species, infrequent overbank flows, and limited riparian habitat.

### Natural Processes

- Substantial reductions in **flow**, particularly **channel altering and floodplain inundating high flows** in the winter and spring, has resulted in degraded habitat and water quality.
- Lack of **floodplain inundation** due to levees, berms, ditches, and hydrologic alteration.
- Limited **groundwater recharge and hyporheic flow** due to unnatural channel morphology combined with infrequent floodplain inundation reduces the potential for pockets of cool upwelling water that would otherwise serve as thermal refugia for migrating salmonids in lower flow conditions.
- As the frequency of **prolonged inundation** is 1 in 7 years, these areas are generally unavailable for two successive generations of Chinook salmon.

### Entrainment

- The benefit of aquatic habitat restoration in the S. Delta is currently limited by entrainment effects associated with existing S. Delta diversions and operations. High potential for entrainment of fish species (salmon, Delta smelt, longfin smelt, splittail, sturgeon), even with a new dual conveyance system in the future, may still limit or constrain the potential for restored ecosystem function in the south Delta.
- Food resources produced in the south Delta are vulnerable to entrainment, and therefore, may become unavailable to native fishes.
- Juvenile fish and production of native species in the south Delta are vulnerable to entrainment at the SWP and CVP and other smaller diversions.

### Water Quality and Flow

- Reduced San Joaquin River inflows, mainly in the summer and fall, create poor water quality conditions such as low dissolved oxygen and microcystis blooms in the main stem of the San Joaquin River near Stockton and interior channels of the south Delta, which have adverse effects (direct and indirect) on native fishes and drinking water quality.
- Poor water quality resulting from agricultural and urban discharges in the San Joaquin River system, other tributaries to the south Delta, and local sources increases the exposure of aquatic organisms to contaminants and adversely impacts human use of water in the South Delta for municipal, agricultural, and industrial purposes.
- Unnatural channel features including the deep water ship channel and barriers reduce circulation resulting in low dissolved oxygen levels in some areas of the S. Delta during lower flow conditions.
- Poor water quality in the interior South Delta channels (Old and Middle rivers, and Grant Line canal can occur with the proposed operations of the Agricultural Barriers and the Head of Old River Barrier. This results in increased salinity and reduced dissolved oxygen conditions.
- Average daily temperatures exceed 20-21°C during May in approximately 1/3 of years. In June, average daily temperatures exceed this critical threshold in almost every year. With warming that may occur under climate change projections, high temperatures may become more frequent and more extreme, even during April.
- Unnaturally clear water inflow from the San Joaquin River may also contribute to increased predation of juvenile salmon. Upstream reservoirs trap suspended sediment and release clear water. Low to moderate releases from the reservoirs in most years are not large enough to recruit suspended sediment downstream of the reservoirs.

### Non-Native Invasives

- Tidal channels are colonized by non-native macrophytes, which provides limited rearing space for most native fishes and favors predators that might consume native fishes. Macrophytes, such as *Egeria densa* and *Myriophyllum spicatum*, also increase sedimentation rates, resulting in high water clarity (i.e., less turbidity) that degrades habitat conditions for pelagic and anadromous species in the south Delta. Higher water clarity can either reduce feeding success for pelagic species or increase predation upon juvenile salmonids.
- Many non-native species were introduced for sportfishing, such as striped bass, largemouth bass, smallmouth bass, bluegill sunfish, common carp, brown bullhead, white catfish threadfin shad, golden shiner and fathead minnow.

## Objectives for the South Delta

### Native Aquatic Habitat Restoration

1. Restore habitats and river conditions (i.e., the magnitude and direction of flow in fluvial regimes) that favor survival and growth of juvenile salmonids, sturgeon, delta smelt, longfin smelt, and other native fishes.
2. Create or restore critical habitats for splittail, sturgeon, and other native fishes along the mainstem of the San Joaquin River, with an emphasis on increasing flow-related survivorship.
3. Increase frequency of floodplain inundation to support Sacramento splittail reproduction and viability.
4. Improve conditions for other native resident fish species including Hitch, Blackfish, Hardhead, and Tule Perch.
5. Create a natural gradient of fluvial and tidal habitats and water quality constituents along one or more corridors in the South Delta to improve the upstream and downstream migration of native fishes between Vernalis and the Western Delta to:
  - a. facilitate the upstream and downstream migration of native fishes between Vernalis and the western Delta.
  - b. provide habitat that will increase the survival and numbers of native fish species
6. Reduce entrainment mortality of juvenile salmonids, smelt, sturgeon, splittail, and other native fishes

### Terrestrial and Avian Species Habitat Restoration

7. Restore tidal marshes and riparian corridor habitat for terrestrial and avian species including waterfowl.

### Geomorphic Processes

8. Restore more natural channel morphology to create more diverse and complex channel habitats, increase the frequency of side channel inundation, and restore hyporheic flow.
9. Create conditions that allow physical processes to generate suspended sediment and turbidity.
10. Create habitat and/or hydrodynamic conditions that do not favor macrophytes and degrade the sediment pool, but rather promote marsh building processes.

### Flood Management

11. Maintain consistency with applicable regional flood management plans (e.g., CVFPP).
12. Reduce flood hazard on the lower San Joaquin River and the communities of Manteca, Lathrop, Stockton, and unincorporated San Joaquin County through the development of various habitat options that provide reduction of flood stage and velocity as well as seasonal and year-round aquatic and terrestrial habitats.
13. To reduce maintenance costs and conflicts with listed species, increase flood management system resilience / sustainability through the use of more-natural/less-structural approaches such as a corridor management strategy (CMS).

### Water Quality

14. Increase export of nutrients from the San Joaquin and south Delta habitats in a manner that does not create eutrophication or dissolved oxygen problems.

15. Avoid the degradation of water quality for municipal, agricultural, industrial users in the South Delta and aquatic species.

Recreation

16. Improve or create recreational opportunities for the general public