

# Identifying Suitable Rearing Habitat for Chinook Salmon

in the Sacramento-San Joaquin Delta

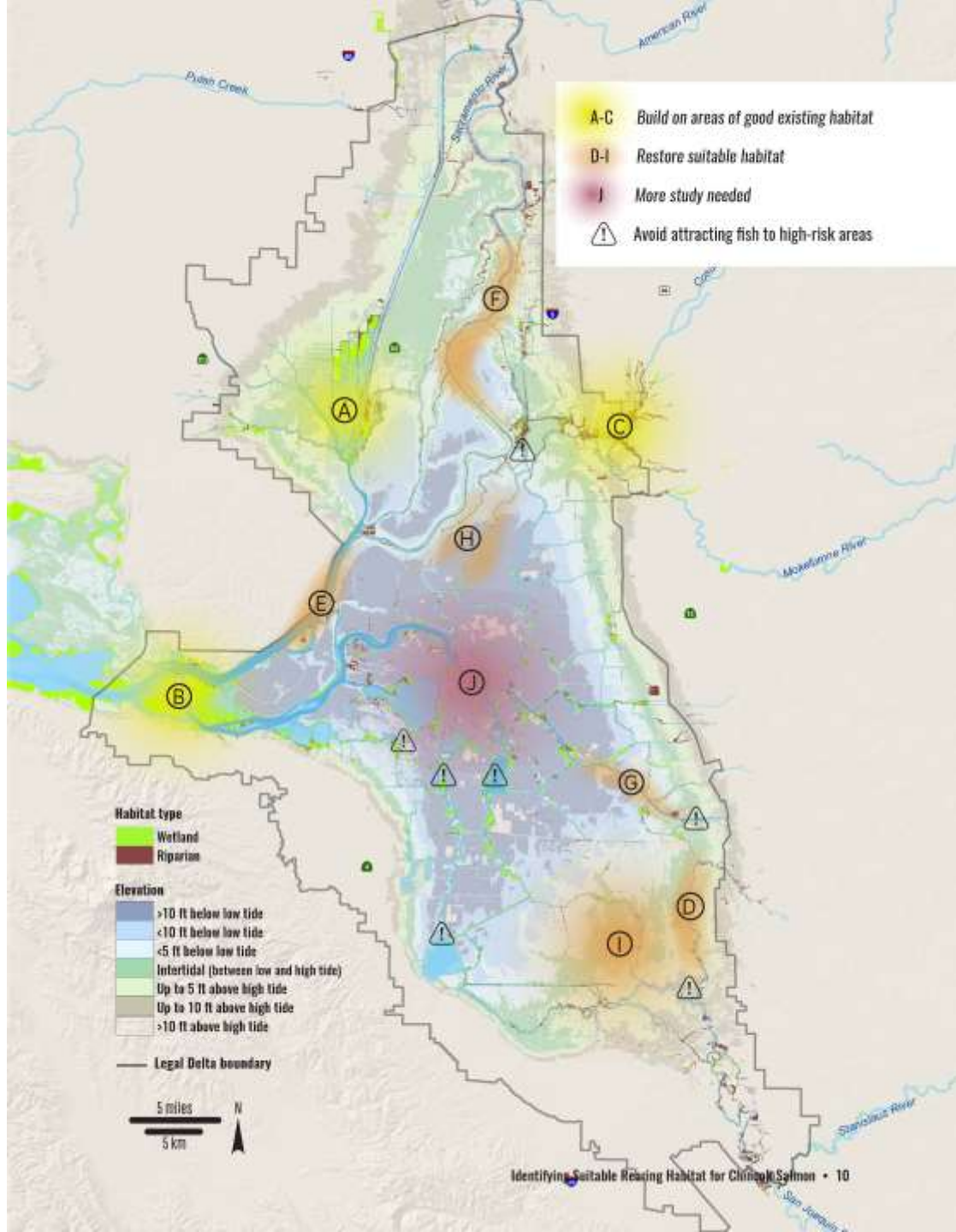
## Purpose

1. Provide a resource for future restoration planning
2. Support future Prop 1 submittals and evaluations
3. Improve the effectiveness of restoration investments

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The Delta Conservancy  
Delta Science Program  
CSAMP





### A. Northwest Delta

- Good habitat for rearing salmon, as indicated by habitat parameter mapping and input from project advisors and workshop participants.
- Proximity to good floodplain rearing habitat upstream, in the Yolo Bypass

### B. Sacramento and San Joaquin river confluence

- Good habitat for rearing salmon, as indicated by habitat parameter mapping and input from project advisors and workshop participants.
- All salmon migrating through the Delta pass this region.
- Habitat in the low salinity zone, important for smoltification

### C. Northeast Delta

- Good habitat for rearing salmon, as indicated by habitat parameter mapping and input from project advisors and workshop participants.
- Proximity to good floodplain rearing habitat upstream along Cosumnes
- Not on a major migration corridor, relatively few salmon compared to other parts of the Delta, according to workshop participants

### D. San Joaquin River south of Stockton

- Areas of good habitat as indicated by habitat parameter mapping, workshop participants suggested improvements here
- Important corridor for San Joaquin salmon, less benefit for salmon runs entering the Estuary in the north Delta
- Workshop participants and advisors suggest prioritizing restoration on the mainstem SJ, over Middle and Old Rivers because of reverse flows

### E. Lower Sacramento River Mainstem

- Restoration actions here would aid fish traveling between existing good habitat in the northwest delta and the confluence.
- Deep channel with limited off-channel habitat
- Along a major migration corridor

### F. Sacramento River Mainstem

- Habitat parameter maps show this as a long stretch with little existing suitable habitat
- Deep channel with limited off-channel habitat
- Along a major migration corridor

### G. San Joaquin Mainstem north of Stockton

- Habitat parameter maps show little existing suitable habitat in this stretch
- Important corridor for San Joaquin salmon, less benefit for salmon runs entering the Estuary in the north Delta
- Workshop participants and advisors suggest prioritizing restoration on the mainstem SJ, over Middle and Old Rivers because of reverse flows

### H. Georgiana Slough and North Mokelumne River

- Habitat parameter mapping and input from workshop participants suggest there are gaps in suitable rearing habitat in this area
- Restoration actions here would increase connectivity between suitable habitat in the NE Delta with the Central Delta
- Along migration corridor, but concerns about fish here being routed to the pumps

### I. South Delta

- Habitat parameter mapping shows the lack of large wetlands in this region
- Opportunity for intertidal elevations to support a large marsh in this area
- Concern about high temperatures in the South Delta may decrease the likelihood of creating suitable rearing habitat

### J. Central Delta

- Further study needed about how the habitat types in this area (small remnant marshes, submerged and floating aquatic vegetation, flooded islands) support or negatively impact juvenile salmon, according to workshop participants
- Along migration corridor, but concerns about fish here being routed to the pumps

### ! Risky areas identified in the workshop !

- Risk of diversion and entrainment at the Delta cross channel, Middle and Old River, Clifton Court forebay
- Predation hotspots identified along the San Joaquin and near Bethel Island
- Low dissolved oxygen barrier in the Stockton Ship Channel

The place-based recommendation map on the facing page does not take land ownership or restoration feasibility into account.

# DATA AND KNOWLEDGE GAPS

In identifying and mapping parameters related to salmon rearing in the Delta, we identified key data and knowledge gaps, listed below. This is not meant to be an exhaustive list of knowledge gaps, but rather those particularly highlighted by this effort.

- Which areas in the Delta do fry use at which times for feeding, nesting, and hiding from predators? What landscape-scale habitat patterns are important to fry? Less is known about how fry move through the Delta than smolt, due to practical difficulties in studying smaller fish.
- SAV/FAV is known to harbor dense predator populations, but are also highly productive and have the potential to provide cover for salmon. Where does SAV/FAV benefit for rearing salmon, and where does it create more harm? How long do or can salmon remain in these areas until they are no longer beneficial?
- What is the impact of contaminants, such as pesticides and mercury, on juvenile salmon in the Delta? Can current sampling be used to better understand contaminant concentrations in fish?
- How do hydrodynamics influence rearing salmon in the Delta, and what are the appropriate criteria for identifying suitability? Most research on velocity looks at riverine rather than tidal systems, so we did not include velocity in our suitability map. What additional information is needed for hydrodynamic criterion so they can be included in suitability analyses?
- What are the appropriate Delta-wide spatial data needed to map substrate and shoreline type?
- What is the relative importance of different habitat parameters (e.g., temperature, water depth, etc.)? How should the individual parameters be weighted and combined to create suitability maps? How does suitability differ as parameter weights change, and what do the maps say about habitat in the Delta?
- How can assumptions about habitat suitability criteria made in this report be ground truthed? Are areas that are identified as being suitable actually being used by rearing salmon?
- How much habitat is needed in the Delta to recover salmon populations (see sidebar on next page)?
- What is the risk from predation, entrainment, and other stressors? How can mapping these stressors at a relevant scale be used to understand survival patterns within the Delta?
- How will climate change impact suitable rearing habitat in the Delta, particularly as water temperature increases and sea level rise and changing precipitation alter water depth and velocities?

## Next Steps

1. Make mapping more accessible for restoration planning
2. Elevate awareness of report - outreach
3. Improve mapping of hydrodynamic criteria (e.g. velocity), shoreline conditions and substrates (e.g. shoals)
4. Consider how to reflect other stressors (e.g. predation, contaminants)