

## **Rapid Assessment of Aquatic Habitat Restoration Opportunities for Juvenile Salmonids in the Delta Draft Scope of Work**

### **1. BACKGROUND/PURPOSE**

Restoring aquatic habitats in the Delta to improve rearing conditions and reduce predation for juvenile salmonids has been identified as a common goal in numerous programs and plans including the Delta Plan, EcoRestore, the Central Valley Project Improvement Act, the Delta Conservation Framework, the Sacramento Salmonid Resiliency Strategy and the 2008 Biological Opinions for operation of the State Water Project and Central Valley Project.

Under current conditions, relatively few juvenile salmonids that enter the Delta survive (generally <10%). As a consequence, investments to improve growth and survival upstream in areas are often lost in the Delta.

The purpose of this proposal is to conduct a rapid assessment of aquatic habitat restoration and predator disturbance opportunities for juvenile salmonids in the Delta, and identify near-term priority efforts that can be funded by Prop. 1 and other funding sources.

Project objectives include:

1. Compile information regarding juvenile salmon rearing habitat and predator hot spots in the Delta;
2. Establish habitat selection criteria for salmon rearing in the Delta; and
3. Identify near-term and long-term priorities for aquatic habitat restoration in the Delta that can be funded by Prop. 1 and other funding sources.

The project would be guided by the Collaborative Adaptive Management Team (CAMT) working closely with the San Francisco Estuary Institute, the Delta Conservancy and its partners in a collaborative team effort. The project would include in-kind technical support and other cost sharing through CAMT's member organizations, including engagement of agency and NGO scientist with expertise in salmonid biology and restoration. Additional technical expertise and resources would be provided through existing, ongoing initiatives including the Delta Stewardship Council's Delta Landscape Scenario Planning. Details regarding the proposed team are provided in Section 3 below.

### **2. SCOPE OF WORK AND BUDGET**

#### **Task 1. Compile and Review Existing Information Regarding Salmon Rearing Habitat in the Delta**

The purpose of this task is to define what suitable salmon rearing habitat is in the Delta based on existing information for the Delta and other systems, and to understand the scale of restoration necessary to see a population level effect. The task will include:

1. Reviewing available monitoring data from existing restoration projects in the Delta.
2. Compiling available information on habitat suitability and predator hot spots from the literature and other sources including, but not limited to:
  - a. Ecosystem Diagnosis & Treatment (EDT) modeling done for the Bay Delta Conservation Plan Habitat Plan;
  - b. IEP Technical Report on "Effects of Tidal Wetland Restoration on Fish";

- c. NMFS and USBR efforts (including the winter-run lifecycle model and CVPIA Science Integration Team models) to review habitat preferences and predation on juvenile Chinook salmon within the Delta; and
  - d. Existing restoration opportunity area mapping from previous evaluations.
3. Confirming existing environmental objectives relevant to salmon rearing habitat in the Delta.
4. Developing an estimate of habitat need based on the expectation of fish size classes and numbers expected to arrive from upstream using available life cycle models for winter and fall run chinook salmon.

Habitat features considered may include riverine and tidal velocity, water depth, submerged and emergent vegetation, proximity to a main channel and water export facilities, residence time, potential turbulence and vulnerability to predation (e.g., at a levee breach), salinity, and water temperature.

Ecological potential visioning based on the concepts in the Delta Renewed publication will be used to assess existing habitat (e.g., patch sizes, proximity to islands and channels, habitat type and function) and proximity among habitat parcels. These efforts may support refinement of primary constituent element definitions useful in future ESA consultations.

Expectations of fish size classes and numbers arriving will be generated from existing models and objectives developed from the watershed.

**Deliverable:** Short write up (5-10 pages) synthesizing what is currently known about salmon rearing habitat and predator hot spots in the Delta, the scale of restoration needed and key gaps in knowledge.

**Timeline:** Task to be complete within 3 months of contract execution.

**Cost:** Est. \$ 88,000

## **Task 2. Identify Habitat Selection Criteria and Map Potential Habitat Areas**

Information on habitat suitability compiled as part of Task 1 will be used to develop an initial, science-based habitat suitability index to rank potential habitat areas and assist in identifying where protection and restoration strategies could be pursued. A GIS-based or other BPJ best available science evaluation (with transparency) habitat assessment will be conducted to identify priority areas where current conditions suggest habitat for a given target species and life stage is suitable, and where habitat restoration could serve to increase the quantity and/or quality of habitat. The initial habitat suitability work will be done in consultation with the Science Advisory Panel with the intent of facilitating broader discussion and feedback through the science workshop described in Task 3 below.

**Deliverable:** Preliminary habitat opportunity mapping.

**Timeline:** Task to be completed within 4 months of contract execution.

**Cost:** Est. \$ 42,000

**Task 3. Organize Science Workshop and Identify Priority Restoration Areas**

After preliminary criteria have been developed (Task 2), the project team will host a scientific workshop to review and refine the habitat criteria and resulting habitat mapping to be used both in restoration site selection but also as design criteria for restoration planning. After the habitat criteria and mapping have been discussed, the team will engage in a planning exercise to prioritize restoration which would include reviewing land owner information (public vs private), levee planning, proximity to other sites, and other criteria to help prioritize projects for implementation. The selection and evaluation process will be performed for a number of potential restoration project sites to identify a list of high-priority projects that are compatible and complementary, and together, meet the goals and objectives of Delta habitat restoration to benefit target fish species and life stages. CVPIA decision support models will be used to test the potential affects of habitat restoration in the Delta.

**Deliverable:** Final selection criteria and priority areas for aquatic restoration for salmonids in the Delta.

**Timeline:** Task to be completed within 6 months of contract execution.

**Cost:** Est. \$ 27,000

**Task 4. Prepare Technical Report**

Prepare a draft and final technical report documenting the process used and outcomes of the project, including maps showing priority restoration locations for aquatic habitat designed to benefit juvenile salmonids. The target audience for the report will be future Prop 1 applicants and others seeking to restore aquatic habitat in the Delta. The contractor will provide a two-week comment period for participants and will incorporate edits based on comments to prepare a final report.

**Deliverable:** Draft and final technical reports

**Timeline:** Task to be completed within 9 months of contract execution.

**Cost:** Est. \$ 44,000

**Task 5. Project Management and Travel**

Oversee and manage project team and activity, including progress reports and invoices, budgets and planning, communication and coordination.

**Deliverable:** Progress reports and CAMT and Delta Conservancy update presentations. A final presentation will also be provided to the Delta Stewardship Council.

**Timeline:** Ongoing.

**Cost:** Est. \$ 34,000

**Total Project Budget:** \$ 235,000

### Cost Sharing Summary

The table below shows proposed cost sharing. CAMT funding would be directed toward the science advisors and assistance with facilitation and management of the team and project workshops. In addition to direct CAMT funding for advisors, CAMT will also arrange for additional expertise in salmonid biology through in-kind contributions of agency staff from Metropolitan Water District and the Department of Water Resources.

Task	Conservancy Funds	CAMT Funds	In-Kind Contribution
1. Compile and Review Existing Information Regarding Salmon Rearing Habitat in the Delta	\$ 54,000	\$ 34,000	40 hours
2. Identify Habitat Selection Criteria and Map Potential Habitat Areas	\$ 36,000	\$ 6,000	20 hours
3. Organize Science Workshop and Identify Priority Restoration Areas	\$ 3,000	\$ 24,000	20 hours
4. Prepare Technical Report	\$ 29,000	\$ 15,000	10 hours
5. Project Management and Travel	\$ 21,000	\$ 13,000	
<b>Total</b>	\$ 143,000	\$ 92,000	90 hours

### 3. PROJECT TEAM

The project team will be led by SFEI and supported by a Science Advisory Panel. Key project personnel and their experience are briefly described below.

#### 3.1 SFEI Staff

The project team will be led by **Letitia Grenier** at SFEI. Dr. Grenier will be supported by Robin Grossinger, Sam Safran, April Robinson, Micha Salomon and Ruth Askevold.

**Letitia Grenier, Senior Scientist and Program Director.** Dr. Grenier co-directs SFEI's Resilient Landscapes Program. Letitia holds a PhD in Conservation Biology from the University of California at Berkeley and has previously worked on investigating bioaccumulation of contaminants in estuarine food webs, the condition of California's wetlands, and other ecological questions about the Bay and Delta. Her focus now is to work with partners to conserve California's living resources by developing landscape-scale, collaborative, science based visions and solutions.

**Robin Grossinger, Senior Scientist and Program Director.** For over twenty years, Robin Grossinger has analyzed how California landscapes have changed since European contact,

using these data to guide landscape-scale restoration strategies. Robin leads efforts throughout the state to reintegrate natural processes within our highly modified landscapes, creating healthier and more adaptive neighborhoods, cities, and surrounding landscapes. He has advised restoration strategies for San Francisco Bay, the Sacramento-San Joaquin Delta, urban landscapes such as the Google campus, and rivers throughout California.

**Sam Safran- Associate Environmental Scientist.** Sam Safran's work focuses on understanding how ecosystems functioned in the past and how best to use this knowledge to inform present-day landscape-scale restoration and management. At SFEI he has helped lead the development strategies and guide-lines for process-based restoration in the Delta (published in "A Delta Renewed") and developed GIS-based landscape metrics to assess the provision of Delta ecosystem functions (published in "A Delta Transformed"). He is also skilled at cartography and other forms of data visualization.

**April Robinson, Environmental Scientist.** April Robinson has a background in wetland ecology and more than ten years' experience monitoring and studying the wetlands of the San Francisco Estuary and its watershed. Her work with SFEI includes co-authoring the Delta Landscapes reports. April has a Master's Degree in Ecology and Conservation Biology from San Francisco State University.

**Micha Salomon, GIS specialist.** Micha Salmon has over a decade of experience using geographic information systems (GIS) for environmental research. Micha's expertise includes cartography, mapping historical and contemporary wetlands, development and testing of GIS and mapping and analysis methodologies, and the acquisition, QAQC, publication and stewardship of geodata. He has extensive knowledge of the historical and contemporary geography of the Bay Area and California.

**Ruth Askevold, Program Manager and Senior Designer.** Ruth Askevold is responsible for designing SFEI publications and educational and outreach materials. She is experienced in using historical maps and photo-graphs to assist in visualizing the past. She has over twenty years of experience in geographic information systems, design, and cartography. Her experience includes project management, spatial analysis, and information design. She received her master's degree from San Francisco State University in Geography and Human Environmental Studies, where she specialized in geographic information systems and historical geography and studied design and visualization at the City College of San Francisco.

### **3.2 Science Advisory Panel**

The project will be supported by a standing Science Advisory Panel consisting of experts in salmonid biology and restoration. The Science Advisory Panel will consist of:

1. Dr. Rene Henery – California Science Director, Trout Unlimited (TU) - Dr. Henery is an Ecologist and Ecogeographer who holds a joint position as the California Science Director for Trout Unlimited (TU), and Assistant Research Professor at the University of Nevada, Reno (UNR). Rene completed his B.A. at Reed College in Portland Oregon and his PhD at the University of California, Davis. His dissertation investigated opportunities

to recover Pacific salmon through the restoration of connectivity, with an emphasis on Central Valley Chinook salmon and floodplain restoration.

2. Dr. John Ferguson – Principal Fisheries Biologist, Anchor QEA - Dr. Ferguson has 40 years of experience evaluating the behavior and survival of salmon in large river systems and applying this information to water management decisions. He is recognized internationally as a fish passage expert and has authored or coauthored more than 45 peer-reviewed publications, Technical Memoranda, and contract reports. From 2003 to 2011, Dr. Ferguson directed the Fish Ecology Division of the National Oceanic and Atmospheric Administration's (NOAA's) Northwest Fisheries Science Center and oversaw Riverine Survival, Migration Behavior, Estuary and Ocean Ecology, Fish Passage Engineering, and Watershed programs.
3. Dr. Chuck Hanson – Hanson Environmental - Dr. Hanson has more than 30 years of experience in freshwater, estuarine, and marine biological studies. Dr. Hanson has contributed to the study design, analysis, and interpretation of fisheries, stream habitat, and stream flow (hydraulic) data used to develop habitat restoration strategies, Habitat Conservation Plans, Endangered Species Act consultations, and environmental analyses. He has directed numerous investigations and environmental impact analyses for projects sited in freshwater, estuarine, and marine environments of the San Francisco Bay/Delta, the central and northern California Coast, Puget Sound, Hudson River, and Chesapeake Bay. Dr. Hanson served as a member of the USFWS Native Delta Fish Recovery Team, numerous technical advisory committees, and as science advisor to settlement negotiations. Dr. Hanson has also participated in the development of adaptive management programs including real-time monitoring, management of power plant cooling water and other diversion operations, and the San Joaquin River Vernalis Adaptive Management Plan (VAMP).
4. Alison Collins – Senior Resource Specialist, Metropolitan Water District (MWD) - For the past 10 years, she has worked in academia, as a private consultant, and with the federal National Marine Fisheries Service focusing her research on salmon, steelhead, and trout ecology along the west coast. Alison received her B.S. in Marine Biology from U.C. Santa Cruz and her M.S. from the University of British Columbia. Her research covers a range of topics, including isotope analysis to determine the contribution of marine subsidies to steelhead diet, acoustic tagging of salmonids to track migration, distribution, and mortality, population assessments of native fishes and aquatic communities to evaluate potential impacts of hydropower facilities on freshwater ecosystems, and the synthesis and evaluation of long term time-series status and trends of fish habitat across the California Current Ecosystem.
5. Merri Martz – Senior Scientist, Anchor QEA - Merri Martz has 25 years of biology, habitat restoration design, and project management experience, including expertise in wetland ecology; restoration planning and design for wetlands, floodplains, riparian zones, rivers, estuaries, and marine nearshore habitats; fish passage; and construction oversight of habitat restoration features. She has worked in major river systems and estuaries throughout the United States, including the Columbia, Willamette, Chehalis, Sacramento, Colorado, Platte, Missouri, and Mississippi rivers; the Rio Grande; Puget Sound; Neuse/Pamlico Sound; and Chesapeake Bay.

6. Brett Harvey – Senior Environmental Scientist, California Department of Water Resources (DWR) Division of Environmental Services - Brett Harvey develops and leads experimental studies and serves on interagency science synthesis teams supporting water and fisheries resource management decisions. He received his PhD in Ecology from UC Davis studying nutrient dynamics in coastal salmon-bearing streams, and before that worked at Center for Ecosystem Management and Restoration developing comprehensive reports on historical salmonid distributions in San Francisco Estuary streams. His current interests focus on developing research approaches to inform integration of juvenile salmon growth, survival and life history diversity response metrics into management decision frameworks. His service activities include the Salmon Scoping Team of the Collaborative Adaptive Management Team (2013-present), CVPIA Science Integration Team (2016-present), Salmon and Sturgeon Assessment of Indicators by Life Stage (2015-present), Integrated Modeling Steering Committee (2017-present), and Structured Decision Making for Scientific Management in the Bay-Delta (2017-present).