

**August 30, 2006**

**Work Plan for Fiscal Year 2007**

**I. Program Title** CVPIA Section 3406(b)(4) Tracy Pumping Plant Mitigation Program/Tracy Fish Test Facility Project

**II. Responsible Entities**

|         | Agency | Staff Name  | Role            |
|---------|--------|-------------|-----------------|
| Lead    | USBR   | Ron Silva   | Program Manager |
| Co-Lead | USFWS  | Dave Harlow | Program Manager |

**III. Program Objectives for FY 2007**

- A. Improve Fish Protection and Fish Salvage at Tracy Fish Collection Facility (TFCF). Action is in compliance with CVPIA 3406(b)(4), and CVP OCAP Biological Opinions for Winter-Run Chinook salmon, Delta smelt, and Central Valley Steelhead.”
  
- B. Determine Best Practical Fish Protection Technology for making Long-term Future Improvements at Tracy and Other South Delta Facilities Proposed by CALFED - Integral to CALFED’s South Delta Program and is in conformance with the ROD and Framework documents released previously and the CALFED South Delta Fish Facilities Forum recommendations.  
\* Species Benefitted - Chinook salmon, Steelhead, Delta smelt, Splittail, Sacramento blackfish, Longfin smelt, Striped bass, Threadfin shad and American shad.

**IV. Status of the Program.**

The Tracy Fish Test Facility (TFTF) as originally proposed was intended to be a new fish screening technology development and evaluation facility located adjacent to the existing TFCF in the South Delta. The TFTF was to develop critical information for new fish screens and salvage technology for the south Delta export facilities at Tracy and at Clifton Court Forebay, and a possible screened through Delta facility on the Sacramento River. The TFTF was to allow for the testing and evaluation of new facilities for fish screening, holding, sorting, and transportation in the South Delta which is influenced by tides, heavy debris loads, and a mix of 51 species. The completed facility was to include a 250-500 cfs test channel, new state-of-the-art fish screens, new fish friendly lifts, holding and sorter facilities in one large enclosed building, fish transfer/off loading facilities to fish tanker trucks, debris and sediment management structures, and support infrastructure including laboratory, office, and maintenance buildings. The TFTF was to be designed by Reclamation with the oversight and assistance of a multi-agency coalition of fish facility experts pursuant to a “Project Management and Organization Agreement” signed by

involved regulatory and water interests. The original TFTF Project was to be implemented as part of Section 3406(b)(4) of the CVPIA, and would have been integral to CALFED's South Delta and Conveyance Programs. Funding sources would have included appropriations from Reclamation, the State of California, and CALFED.

However, due primarily to large construction cost concerns, it has been recommended by the CALFED South Delta Fish Facilities Forum (SDFF) to not proceed with construction of a large scale fish test facility (TFTF) at this time. Instead, the SDFF recommended focusing on fixing up and improving the existing fish collection facilities in the south Delta as best as possible to meet original design criteria and minimize loss of fish and also implement other alternative actions outside of new fish screens to improve fish populations and assist in meeting agency fish population goals. Included in the recommendations was improvements to debris and predation management (e.g. new debris cleaning equipment and regular predator removals), phasing in replacement of a new secondary screening system, and continued facility research activities to better assess the existing facilities for current conditions and to implement and evaluate operational improvements. In essence, the existing facilities will be used as the "test facility" to develop and evaluate improvements in technology and fish protection. It is expected that it will take approximately seven to ten years to complete facility assessments and phase in improvements to the existing facilities.

- V. FY 2006 Accomplishments. (Note: Additional accomplishments have been included to facilitate reviewer's understanding of this complex and comprehensive program for developing new fish facility technology for the Delta of California.)
1. February 19, 1999 - NOI in Federal Register - **COMPLETED**
  2. March 17-18, 1999 - Public Scoping Meetings - **COMPLETED**
  3. April 6, 1999 - CALFED's Policy Group agreed that Reclamation should proceed with the planning of a 500cfs fish screen facility for testing and evaluating new technologies.
  4. June 1999 - CALFED Bay Delta Program Draft EIS included the proposed 500 cfs structure - **COMPLETED**
  5. September 1999 - Agreement on Project Management and Organization for the TFTF and Clifton Court Fish Facility was signed by Reclamation, Service, Department of Water Resources, CALFED, CDFG, and National Marine Fisheries Service (NMFS). - **COMPLETED**
  6. Monthly Tracy Technical Advisory Team (TTAT) meetings have been held since November 1998 which has resulted in a preferred option for the test facilities - **ONGOING**
  7. Value Engineering Study - February 10, 2000 identified a number of actions to reduce costs - **COMPLETED**
  8. Project Management Plan - May 15, 2000 road map to all activities and tasks for the Program, established 12 task teams - **COMPLETED**
  9. Draft EA/IS released for public comments July 28, 2000 - **COMPLETED**
  10. Framework and Agreements Document - provides a continuous record of all decisions

agreed to by the TTAT, Central Valley Fish Facilities Review Team and Coordination Team - **COMPLETED**

11. Site Infrastructure Workshop - May 2000 - building, additions, upgrades, staffing, resources - **COMPLETED**
12. Site Infrastructure Workshop Final Report - August 14, 2000 – recommendation Final Feasibility Report - August 14, 2000 - **COMPLETED**
13. 30% and 60%, and preliminary 90% Design Reports - **COMPLETED**
14. Public Workshops for the Environmental Assessment Impact Statement - August 15-16, 2000 - **COMPLETED**
15. Developed Fishery Engineering Flumes at Denver where TFTF Research and Technology Development has been ongoing since 1998 - **ONGOING**
16. Research Studies at Tracy Site for TFTF including leaky louver efficiencies , traveling screens for debris control, and fish friendly pumping tests ETC.-ongoing since 1998 - **ONGOING**
17. Research Studies for TFTF at Red Bluff Pumping Plant on fish friendly lifts and screens have been ongoing since 1995 - **COMPLETED**
18. UCD Studies - working with the UCD to cooperate on laboratory studies needed to refine facilities to be built at the TFTF - **COMPLETED**
19. CDFG Studies- are exploring new fish distribution and stocking strategies to compliment the new facilities - **ONGOING**
20. Establishment of Research Team – Tracy Fish Research Evaluation and Development, for developing the test procedures and evaluations to be conducted at the TFTF - **ONGOING**
21. Specific research activities conducted in 2006 include the following:
  - XWhole facility evaluations for delta smelt - **ONGOING**
  - XPredator tracking using sonic tags - **ONGOING**
  - XRecessed holding tank stress tests – **ONGOING**
  - XDetermining Appropriate Loading and Hauling Densities for Fish Species of the Sacramento-San Joaquin Delta - **ONGOING**
  - XImproved debris management- **ONGOING**
  - XFacility hydraulic evaluations – **ONGOING**
  - XEvaluation of pumped fish bypass and above ground holding tank – **ONGOING**
  - XDistribution of Tracy Research Volume Series No. 31 - **COMPLETED**
  - XWater quality analysis at the TFCF - **ONGOING**
  - XEvaluation of Dual-Frequency Identification Sonar (DIDSON) for direct observation of fish movement and behavior near structures - **ONGOING**
  - XDevelopment of TFFIP technical web site and enhanced data accessibility – **ONGOING**

Biological Benefits – The data and information generated is invaluable towards understanding present day operation and efficiencies of the existing TFCF for multiple species of fish. Without this information, decisions on how to improve the existing TFCF could not be made. The data generated is also valuable to both the USBR and DWR if the decision is ever made to move forward with new fish screening facilities in the south Delta.

The results so far have shown the existing TFCF to be significantly less efficient towards screening and salvaging fish as originally designed in the 1950s. Monitoring of results is incorporated into the study plan efforts and will be evaluated as improvements are implemented and further tests conducted.

## VI. Tasks, Costs, Schedules and deliverables.

### A. Narrative Explanation of Tasks.

1. Program Management
  - 1.1 Program Management - Planning, budget oversight, and coordination of all activities and offices associated with this multi-year program is accomplished by the Program Manager.
  - 1.2 Public Involvement - Reclamation staff from the Public Affairs Office are responsible for public outreach activities, press releases, and updating the website.
  - 1.3 Tracy Office Program Implementation - Reclamation staff from the Tracy Office are responsible for assisting the planning and coordination of all activities and offices associated with this multi-year program.
- 2 Fisheries Engineering Research Program - Research continues on a number of subtasks at either the Denver Technical Service Center/Research Hydraulics Laboratory or at the TFCF. Study Plans are currently under development which will then be provided in August 2007 to the interagency Tracy Technical Advisory Team which oversees activities associated with improving or researching new technologies for the TFCF. The following are some of the proposed research activities for FY 2007. Studies are conducted within available funding limits and reductions, thus not all studies are able to be completed/conducted within the fiscal year.
  - 2.1 Evaluations of a pumped fish bypass and above ground holding tank

In 1998 a research project on fish friendly pumps and above ground holding tanks was funded under the Tracy Research Program. As part of the project, Tracy Fish Facility holding tank no.1 was taken out of normal service. In place of using the in-ground holding tank, a 16-inch Hidrostral pump was installed on the holding tank influent line and bypass flow pumped to an above ground holding tank. The above ground holding tank was designed for collecting fish during short-term fish pump evaluation tests. Three years of fish passage tests on the Hidrostral pump have shown this type of pump can be used with low injury and mortality to delta fish species. During the same period, laboratory testing and development of improved designs for fish holding tanks was conducted in Reclamation's Water Resources Research Laboratory. This proposal builds on prior work by constructing and evaluating a demonstration facility of a state of the art pumped bypass fish salvage and holding facility.

## 2.2 Evaluation of holding tank influences on delta smelt.

Fish are collected and held for up to 24 hr in large, circular, concrete tanks (about 20-ft diameter, 15-ft high) in moderate velocity (0.6-3.1 ft/s) with ambient debris. Fish holding time is dependent on fish density and time of year. Typically, fish are held for 8 hr in the spring when Delta smelt are present, and 24 hours the remainder except when either fish density or debris load is high (based on guidelines in Bates et al. 1960). Fish are further concentrated into a 500 gallon lift bucket one, two, or three times per day and moved to a transport truck. The influence of holding conditions on fish condition and survival is not well understood and believed significant.

The objective of this study is to complete holding/swirl experiments using Delta smelt. Prior experiments with Sacramento blackfish and Winter-run Chinook salmon suggest some external damage occurs during high velocity/high debris conditions but immediate mortality is low.

Reclamation will evaluate holding influences on diverted fish at the Tracy Fish Facility and document areas that could be improved.

## 2.3 Fish Holding Associated Stress in Sacramento River Chinook Salmon at South Delta Fish Salvage operations.

During the past twenty years, several fish species in the Sacramento-San Joaquin Delta have declined in abundance, including Sacramento River winter-run chinook salmon (*Oncorhynchus tshawytscha*), delta smelt (*Hypomesus transpacificus*), and striped bass (*Morone saxatilis*). Water diversions are suspected of being one of the causes of declines in fish populations throughout California (Brown and Moyle 1993, Bennett and Moyle 1996, Danley et al. 2002). These federally and state-listed threatened and endangered fish species, and those of concern because of an economically viable sport fishery are frequently recovered during salvage operations. Reclamation's Tracy Pumping Plant (TPP) along with its sister facility, the State's Harvey Banks Pumping Plant, divert approximately 24% of the Delta's average annual inflow (Mitchell 1996). The magnitude of the water volume that passes through these pumps can create flows that attract fish. This results in an increased concentration of fish in the vicinity of the pumping facilities (Arthur et al. 1996, Bennett and Moyle 1996, Brown et al. 1996). Operations of the south Delta State and Federal fish salvage facilities in California require daily collection and holding of fish, and the transport of these fish back to the Sacramento-San Joaquin River Delta, away from the facilities. These functions are of major importance for efficient return and survival of salvaged fishes; however collecting, holding, and transport methods associated with entrainment of the fishes inadvertently may cause harm that the fish salvage facilities are attempting to minimize.

Measuring the acute physiological stress and potential direct and indirect mortality experienced by fishes during the different components of the salvage process is vital to understanding negative impacts the process may have on fish. The response to stressors causes an extension of a fish's physiological condition beyond the normal state to a point that, if extreme or prolonged, may compromise its chances for survival (Barton et al. 2002). Exposure of fishes to environmental stressors, such as capture and handling, can be a great concern to fisheries biologists, in that extreme or prolonged stressors may plague fish performance (i.e. growth, metabolism, reproduction, immune system, predator evasion) and overall health (Barton et al. 2002), adversely affecting population size and sustainability. Abated performance due to sublethal stresses may increase the susceptibility of these fishes to predators (indirect mortality; Olla et al. 1992, Strange and Cech 1992, Mesa 1994, Mesa et al. 1994). For example, predation by striped bass has been identified as a major source of mortality for chinook salmon entrained at the State's Harvey Banks Pumping Plant (Moyle 2002).

One of the most broadly used approaches to evaluating physiological responses of fish to environmental stressors is measuring blood plasma constituents such as cortisol, lactate, glucose, osmolality, chloride, sodium, potassium, and pH (Pickering 1981, Barton and Iwama 1991, Iwama et al. 1995). However, because some of these reflect a normal response to less extreme or prolonged stressors, from which a fish can quickly recover, an assessment of fish well being and performance should not be restricted to an examination of internal chemo-physiological changes, alone. A more complete assessment would include an examination of chemo-physiological changes and compromised performance over a functional spectrum, covering proximate (e.g., blood plasma constituents), performance (e.g., burst swimming speed), and ecological measurements (e.g., predator avoidance). If the biochemical changes are not linked to the organismal level responses, then the validity of applying such measures to the population or ecosystem levels become more remote. Therefore, a combination of physiological changes in plasma constituents and the ability to perform under controlled challenge tests should assess, more accurately, stress-related effects of the fish salvage process. Furthermore, the probability of developing a widely usable, low-cost indicator of salvage-activities-induced physiological impairments or mortality on salvaged fishes is increased. Finally, information will be used to identify and compare the impacts of components of the salvage operation that are causing the most "harm" and help to design alternative salvage methods or equipment.

#### 2.4 Studies on tracking fish movements inside fish salvage facilities using telemetry.

Studies to develop potential methods for accurately assessing fish predator and prey movements and positioning inside salvage facilities will

continue. Both radio tagging and sonic tagging have been utilized for tracking of predator fish at the TFCF. (Fish are fitted with a small sonic emitting device and the signal is picked up with sonic receivers; now being used in the Pacific Northwest to track salmon around dams). New techniques using Submersible Ultrasonic Receivers (SURs) for striped bass will be given special consideration in 2007. Ability to deploy these tracking techniques in the TFCF is extremely valuable in determining where fish are “residing” or “hanging out” in the system, under what hydraulic conditions, and how best to manage them within the confines of the TFCF.

2.5 Design and evaluation of improved louver cleaning technology for the TFCF.

This study will investigate using medium to high-pressure spray to clean debris off the primary and secondary louvers at the Tracy Fish Facility. The goal of the study is to determine the best combination of spray nozzle shape, size and spray pressure required to fragment and dislodge aquatic debris impinged on the louvers. Rather than trying to remove the small fragmented debris (mainly *Egeria*), the material will be allowed to flush through the louvers carried by the flow. The first phase of the study will be conducted in the Hydraulics Laboratory using a prototype size section of louver and elodea as the primary debris.

2.6 Fish sorting and debris handling research.

The US Bureau of Reclamation (USBR) has an active fish salvage evaluation program that is investigating ways to improve operations and salvage efficiency of the existing facility (TFCF) and to assist with the design of various elements for proposed on-site Tracy Fish Test Facilities. A model will be used to test the effectiveness of fish sorting and holding designs to meet modern fish protection requirements prior to constructing improvements or replacement of fish salvage facilities for the state and federal water diversions in the South Delta.

Holding and fish sorting systems are critical to the process of returning healthy fish to the Delta. Currently, the in-ground circular collection system is believed inadequate because fish are confined in multispecies assemblages with varying debris type and load for 8 to 24 hours. It is believed that fish may be more vulnerable to stress and predation because of these holding conditions.

A 1:3 scale physical model of a proposed on-site fish sorting and holding facility has been constructed in the USBR’s Water Resources Research Laboratory in Denver. Several concepts for fish sorting and holding will be tested to determine which methods or designs provide the best performance. In addition, the model will provide continuous hydraulic design data, operation data, and will examine methods for debris control using a fisheries-engineering approach.

2.7 TFCF Collection Efficiency for Delta Smelt, and Splittail

TFCF facility overall salvage efficiency for Delta smelt and splittail is poorly known. Little information exists on primary louver efficiencies. Some previous secondary louver efficiency work has been done for Delta smelt.

The primary objectives of this study are two: 1) determine the Tracy Fish Collection Facility's whole facility efficiency for salvaging Delta smelt and splittail and 2) Determine if bypass ratio is more important to salvage efficiency than bypass velocity.

2.8 Feasibility Studies for Various New Concepts to Phasing In of a New Secondary Screening System at the TFCF.

This study will investigate rehabilitating the secondary fish collection system at the Tracy Fish Collection Facility. The secondary system provides further dewatering of flow from the four bypasses located on the primary louver. A dual-louver system within the secondary flow channel guides fish into below ground holding tanks. The fifty-plus year old facility no longer provides fish salvage efficiencies near its original design goals. Changing hydraulic, debris and biological conditions in the delta have negatively impacted the facility. This study will develop an engineering feasibility report defining viable options for improving the secondary dewatering, fish holding and fish loading facility. Options will be considered ranging from component modifications to total facility replacement. Feasibility level drawings and costs will be presented for the options studied.

2.9 Determining Appropriate Loading and Hauling Densities for Fish Species of the Sacramento-San Joaquin Delta.

The primary objective of this study is to determine the maximum holding (transporting) densities for fish species of the Sacramento-San Joaquin Delta region, focusing on Delta smelt (*hypomesus transpacificus*), Sacramento splittail (*Pogonichthys macrolepidotus*) and Threadfin shad (*Dorosoma petenense*). The purpose of this study is to develop a table that the Tracy Fish Collection Facility (TFCF) diversion workers will use to determine the maximum densities of fish that could be transported at various temperatures in a 2,000 gallon fish haul truck. This work is to be an update of The Bates Tables, developed in 1957 for determining the maximum hauling densities of Chinook Salmon (*Oncorhynchus tshawytscha*), Striped Bass (*Morone saxatilis*) and white catfish (*Ameiurus catus*). Dependent upon fish size (mm FL), variation of species salvaged and water temperature (deg. C) the tables will use estimated salvage numbers generated from the 10-minute-count procedures to evaluate the appropriate times that holding tanks should be emptied and fish hauled out of the TFCF. Through this study we will determine if Bates' historic classification of all non-salmonids as "fish" is



appropriate in determining hauling densities of the ESA listed Delta smelt and Threadfin and American shad, the highest contributors of biomass salvaged at the TFCF. We will also seek to determine if the current suggested holding densities for salmonids at the TFCF (winter-run C.S., fall-run C.S., spring-run C.S. and steelhead) are appropriate for the current truck hauling system.

2.10 Publish Tracy Volume Series Nos. 27, 32 - 37.

Publish various Tracy Research Volume Series reports.

3. Complete Section 10 Permits and Scientific Collection Permits.

USBR staff from the Tracy Office and Denver Technical Service Center are responsible for the preparation of all documentation necessary for compliance with the federal and state Endangered Species Act.

4. Land Development

- 4.1 Abandoned Intake Channel (AIC) - USBR staff are responsible for all the negotiations and documentation for all land development activities, including the filling in of the AIC located adjacent to the TFCF.

Should funds become limited and not allow total program accomplishment in FY07 as provided in this Work Plan, certain minimum levels of funding will be necessary to prevent either abandonment of the Program or seriously delaying the Program, thus resulting in delays to improving the TFCF pursuant to the CVPIA 3406(b)(4), CVP OCAP Biological Opinions and CALFED SDFP Forum recommendations.

Priority tasks that need to be funded as a minimum in FY07 include:

1. Program Management
2. Fisheries Engineering Research Program
3. Complete Section 10 Permits and Scientific Collection Permits.

B. Schedule and Deliverables.

| Task |                                     | Dates    |          | Deliverables  |
|------|-------------------------------------|----------|----------|---|
|      |                                     | Start    | Complete |   |
| 1    | Program Administration              | 10/01/06 | 09/30/07 | Program Coordination, Program Planning, Budget Oversight, TTAT Chairperson                        |
| 1.1  | Public Involvement                  | 10/01/06 | 09/30/07 | Public Involvement, Public Outreach, Press Releases   |
| 1.2  | Tracy Office Program Implementation | 10/01/06 | 09/30/07 | Program support from other managers/staff.  |
| 2    | Research Program                    | 10/01/06 | 09/30/07 | Complete study plans, implement studies, monitor development, recommend operational changes.      |
| 3    | Environmental Documentation         | 10/01/06 | 11/01/07 | Complete ESA Section 10 Permits and State of California Scientific Collection Permits             |
| 4    | Land Development                    | 10/01/06 | 10/01/07 | Complete design data, obtain permits from regulatory agencies, and award contract to fill in AIC. |

C. Summary of Program Costs and Funding Sources

| #                           | Task                                | Total Cost         | RF | W&R                |
|-----------------------------|-------------------------------------|--------------------|----|--------------------|
| 1                           | Program Management                  | \$200,000          |    | \$200,000          |
| 1.2                         | Public Involvement                  | \$10,000           |    | \$10,000           |
| 1.3                         | Tracy Office Program Implementation | \$10,000           |    | \$10,000           |
| 2                           | Research Program                    | \$1,689,000        |    | \$1,689,000        |
| 3                           | Environmental Documentation         | \$5,000            |    | \$5,000            |
| 4                           | Land Development                    | \$0                |    | \$0                |
| <b>Total Program Budget</b> |                                     | <b>\$1,914,000</b> |    | <b>\$1,914,000</b> |

D. CVPIA Program Budget

| #   | Task                                | FTE | Direct Salary and Benefits Costs | Contract Costs | Miscellaneous Costs | Administrative Costs (Incl. O/H & Indirect) | Total Costs |
|-----|-------------------------------------|-----|----------------------------------|----------------|---------------------|---|-------------|
| 1   | Program Management                  | 1.0 | \$103,000                        |                | \$5,000             | \$92,000                                    | \$200,000   |
| 1.1 | Public Involvement                  | 0.1 | \$5,000                          |                | \$2,000             | \$3,000                                     | \$10,000    |
| 1.2 | Tracy Office Program Implementation | 0.1 | \$5,000                          |                | \$2,000             | \$3,000                                     | \$10,000    |

|                          |                             |             |                    |                 |                 |                  |                    |
|--------------------------|-----------------------------|-------------|--------------------|-----------------|-----------------|------------------|--------------------|
| 2                        | Research Program            | 14.0        | \$1,158,000        | \$50,000        | \$50,000        | \$431,000        | \$1,689,000        |
| 3                        | Environmental Documentation | 0.1         | \$3,000            |                 |                 | \$2,000          | \$5,000            |
| 4                        | Land Development            | 0.0         |                    |                 |                 |                  | \$0                |
| <b>Total by Category</b> |                             | <b>15.3</b> | <b>\$1,274,000</b> | <b>\$50,000</b> | <b>\$59,000</b> | <b>\$531,000</b> | <b>\$1,914,000</b> |

**Table E**

**DRAFT CVPIA 5-Year Budget Plan  
FY 2008 – 2012  
(\$ Thousands)**

| <b>Program Description and Section</b> |        | <b>FY 2007</b> | <b>FY 2008</b> | <b>FY 2009</b> | <b>FY 2010</b> | <b>FY 2011</b> | <b>Total (\$)</b> |
|--|--------|----------------|----------------|----------------|----------------|----------------|-------------------|
|  |        | W&RR           | 1,914          | 2,083          | 1,883          | 1,883          | 1,823             |
|  | RF     | 0              | 0              | 0              | 0              | 0              | 0                 |
|  | State  | 0              | 0              | 0              | 0              | 0              | 0                 |
| <b>CVPIA Section 3406(b)(4)</b>        | CALFED | 0              | 0              | 0              | 0              | 0              | 0                 |
| <b>Total:</b>                          |        | 1,914          | 2,083          | 1,883          | 1,883          | 1,823          | 9,586             |

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WRR – Water and Related Resources Appropriations

RF – Restoration Fund (Section 3407)

State – State of California cost share funding

FY 2008 – 2012 WRR Appropriations are displayed as amounts that might be reasonable appropriated each year. These figures could significantly change in the Congressional Appropriations process. The annual RF budgets were estimates taking into account the three-year rolling average. All of these estimates will be adjusted annually as RF collections are realized.