Draft CVPIA Fiscal Year 2015 Annual Work Plan, CVPIA Section 3406(b)(4) - Tracy (Jones) Pumping Plant Mitigation Program

Responsible Entities:

Staff Name	Agency	Role
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		State Partner

The Tracy (Jones) Pumping Plant Mitigation Program was established in 1992 under the 1992 Central Valley Project Improvement Act (CVPIA) which directed, "The Secretary, in consultation with other State and Federal agencies, Indian tribes, and affected interests, is further authorized and directed to…develop and implement a program to mitigate for fishery impacts associated with operations of the Tracy Pumping Plan. Such program shall include, but is not limited to improvement or replacement of the fish screens and fish recovery facilities and practices associated with the Tracy Pumping Plant.

Program Goals and Objectives for FY 2015:

1. Improve Fish Protection and Fish Salvage at Tracy Fish Collection Facility (TFCF). Action addresses CVPIA 3406(b)(4), and Central Valley Project (CVP) OCAP Biological Opinions for Winter-Run Chinook salmon, Delta smelt, Central Valley Steelhead and Green Sturgeon."

2. Determine Best Practical Fish Protection Technology for making Long-term Future Improvements at Tracy and Other South Delta Facilities.

* Species benefited - Chinook salmon, Steelhead, Delta smelt, Splittail, Sacramento blackfish, Longfin smelt, Striped bass, Threadfin shad and American shad.

Status of the Program:

The initial focus of 3406(b)(4) starting in early 1990s was construction of the Tracy Fish Test Facility (TFTF). The 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 different fish species. 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 and did include appropriations from Reclamation, the State of California, and CALFED.

However, due primarily to very high construction cost concerns, it had been recommended by the CALFED South Delta Fish Facilities Forum (SDFF) in 2005 not to proceed with any further construction of a large scale fish test facility (TFTF) but to instead to focus on fixing and improving the existing fish collection facilities located at the export pumps in the South Delta as best as possible to meet original design criteria and minimize loss of fish. The SDFF also recommended implementing other alternative actions outside of new fish screens to improve fish populations and assist in meeting agency fish population goals. Included in the SDFF recommendations were improvements in 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 themselves 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 six to nine years to complete facility assessment and research efforts and phase in improvements to the existing facilities.

To date, Reclamation in coordination with Fish Agencies have identified 28 "actions" related to improving fish protection at the existing TFCF. Implementation of these actions has been ongoing since 1992 at TFCF and full implementation is not expected until 2016 at the earliest. Additional actions could be added to the program as needed, in response to any unforeseen issues or concerns that may require further analysis, assessment and improvements. The program has not defined fish loss reduction targets; rather, the program's present goal is to implement and complete the 23 identified actions (See Table A, below) to reduce fish losses.

Table A: Actions to Improve Tracy Fish Collections Facility

	Actions	Start	Completion
1	Implemented periodic predator removals	1992	ongoing
2	Upgraded instrumentation at the TFCF	1992	1996
3	Replaced high pressure utility pump with low pressure utility pump	1995	1996
4	Epoxy coated recessed collection tanks	1997	1997
5	Constructed aquaculture facility onsite	1997	2005
6	Constructed extraction device for Chinese mitten crab / debris removal	1998	1999
7	Installed air system in recessed collection tanks	1999	1999
8	Developed onsite laboratory for fish taxonomic work	1999	1999
9	Added air system to fish haul trucks	2000	2000
10	Upgraded fish count area to accommodate DNA sampling & fish ID	2000	2000
11	Updated fish identification key for training of operators	2000	2000
12	Replaced worn (“leaky”) bypass transition boxes	2003	2004
13	Replaced fish transfer bucket with new/improved fish transfer bucket	2006	2008
14	Replaced fish haul trucks with new/improved fish haul trucks	2006	2008
15	Constructed new biological resources building	2006	2010
16	Replace existing trash rack cleaner with new/improved trash rack cleaner	2006	2010
17	Replace primary louvers/cleaners with new system	2006	2017
18	Replace secondary louvers/cleaners with new system	2006	2014
19	Develop area onsite to improve ability to conduct research and operate TFCF	2006	2018
20	Construct new secondary screening and transfer system**	2010	2018
21	Construct new aquaculture facility onsite*	2013	2018
22	Automate velocity control pumps for the fish bypass system**	2013	2015
23	Construct third fish release site**	2014	2016

*Construction of new aquaculture facility is actually the renovation of the ageing facility in place.
**Actions 20, 22 and 23 are in jeopardy of completion without funding.

To date, the program has completed 15 of 28 actions, or a little more than half of the program’s present goal.
The project to replace the existing secondary louvers and construct new secondary

screening system (Action No. 20) will be complete by the end of fiscal year 2014. However the break-in and testing will continue into FY2015.

Studies/Construction Beginning this Year

No new construction will take place in FY2015. All construction activities will be diverted to renovation of the Tracy Aquaculture Facility (TAF). The TAF is essential for continuation of the onsite fisheries research activities.
TAF improvements include:

- Consistent and reliable water supply
- Improved quality and disinfection of water supply
- Acquisition and implementation of alternative water supply
- Ability to control salinity and temperature going to all/most holdings
- Alarm system tied in to TAF systems (includes staff alerts)
- Automatic power restart system
- Improved, automatic back-up aeration system
- Eradication of outstanding repair issues
- Eradication of lingering safety issues

If we complete these renovations, including the north well field development we may be ahead of the 2018 deadline for this action.

Studies continuing this year

Fish Handling & Predation Studies

Injury and exposure of fishes to stressors during the salvage process is a concern. Sub-lethal stressors that inhibit disease resistance and predator evasion are also a concern. The current lift bucket fish conveyance method has been implicated as one of the greatest sources of stress for fish in the salvage process

At the TFCF, fish are collected and held in 6.1-m diameter holding tanks for 8–12 h before they are released in a process known as the "haul-out". During the 8–12 h collection and holding time, large amounts of Brazilian elodea or woody debris can accumulate in the holding tanks and may impact fish survival when the fish count or haul-out buckets clog or complicate the fish count and haul-out procedures when extra labor is needed to remove the debris from the clogged buckets. Large amounts of debris in the fish count station can also cover or hide fish, which, when uncounted, could potentially result in reduced accuracy of fish salvage estimates used to determine when haul-outs are necessary. The primary objective of this study is to determine if quickly lifting and reseating the holding tank screen prior to collecting fish in the fish count and haul-out buckets is a cost efficient, effective and time conserving debris removal technique for periods when debris loads are excessive in the TFCF holding tanks.

In this study, our goal is to determine the range of debris load in the holding tank in which the "Holding Tank Screen Lift" prevents each bucket from clogging, and to determine the range of debris load in the holding tanks in which the percent fish loss for the "Holding Tank Screen Lift" is below that for the routine fish count process when fish are lost in debris and left uncounted. We will also determine the range of debris load in the holding tanks in which the time it takes to complete the fish count and haul-out processes, using the "Holding Tank Screen Lift," is less than that required to complete the fish count or haul-out processes using the normal method.

The current holding tank mesh size was selected in the early 1950s as it was the smallest screen size shown to operate successfully most of the year and not clog with peat fibers (USBR 1956). This still holds true today, and the holding tank screen only clogs a few days per year.

In recent years, predator removal activities have slowed because of logistics and the length of time the facility is down to complete the fish removal effort. Removing these fish with the current methods is dangerous for employees; it also decreases daily salvage, and causes damage to the fish and/or fish mortality. An alternate method to remove predators is needed for the facility. In 2004, a new predator removal method using carbon dioxide (CO2) was approved for study. This method would not reduce daily salvage due to secondary channel downtime and could prove to be more efficient, and safer for employees and fish than the current predator removal method. This project was divided into five phases and summaries of Phases 1–4 (completed in Sept. 2007) are included below. Portions of Phase 5 that have been preliminarily investigated have also been summarized below. Predation may be significant within the primary bypass tubes and secondary channel because striped bass continue to reside within them.

The goals of this study are to determine means and methods to reduce the number and average size of striped bass in the secondary system by removing large resident fish; increase survival of fish collected during the predator removal process; decrease the amount of time necessary to perform the predator removal process and minimize, or eliminate, facility downtime during predator removals, and to develop a predator removal technique that is safer for employees.

Tag Studies

Data are needed on the rate at which striped bass digestively pass acoustic tags that were inside predated salmon. This information will assist researchers with evaluation and interpretation of data on survival and movement of salmon and steelhead throughout the Central Valley of California, with probable application to other systems.

The overall goal of this study is to collect data that will assist with evaluation and interpretation of data on survival and movement of Chinook salmon and steelhead throughout the Central Valley of California. We also want to quantify the rate at

which striped bass digestively pass acoustic tags that were inside predated Chinook salmon and steelhead, and to evaluate the role of fish size and water temperature with respect to the rate at which striped bass digestively pass acoustic tags that were inside predated Chinook salmon and steelhead.

It is unknown if acoustic-tagged Chinook salmon in our study will assist researchers with evaluation and interpretation of data on survival and movement of Chinook salmon throughout the Central Valley of California, with probable application to other systems.

Suspended For Insufficient Funding

Evaluation of Chinook Salmon and Central Valley Steelhead Facility Losses at the Tracy Fish Collection Facility

Recently, NMFS completed a Biological Opinion stating TFCF operations are likely to jeopardize the continued existence of the endangered Sacramento River winter-run Chinook salmon and threatened Central Valley spring-run Chinook salmon and Central Valley steelhead (NMFS 2009). Our objective is to determine whole facility survival (from the trash boom to the holding tank) for juvenile Chinook salmon and steelhead.

Chinook salmon may be entrained at the TFCF from December through July, but the majority are entrained April and May (TFCF salvage data). Juvenile steelhead are uncommon at the TFCF, but the majority of those salvaged also appear in the spring. Recently, NMFS determined operations of Jones Pumping Plant (JPP) may adversely affect the existence of the endangered winter-run and threatened Central Valley spring-run Chinook salmon, and the Central Valley steelhead (NMFS 2009). This study will estimate TFCF survival for fall-run Chinook salmon as a surrogate for winter-run and spring run races and steelhead. Key areas of interest include a determination of non-participation (or swim-out), predation in front of and within the facility, and louver related losses.

The goal of this evaluation is to determine the baseline facility survival for juvenile Chinook salmon (<175mm fork length) and steelhead (about 200-225 mm fork length) under normal operating and hydraulic conditions.

Reports due this Year from Previous Studies

- Evaluation of the TFCF Holding Tank Screen Entrainment Efficiency for Juvenile Delta Smelt
- Scoping Report of Incorporating Barging into Salvaged Fish Release Procedures
- Influence of Acoustic Tags on Susceptibility of Chinook Salmon to Predation
- Evaluation of Chinook Salmon and Central Valley Steelhead Facility Losses at the Tracy Fish Collection Facility
- Effect of Negative Pressure on Selected Fishes Salvaged at Tracy Fish

Collection Facility
- Evaluating the Use of Carbon Dioxide as an Alternative Predator Removal Technique to Decrease TFCF Predator Numbers and Improve Facility Operations
- Evaluating Debris Removal from Circular Holding Tanks by Lifting the Holding Tank Screen at the Tracy Fish Collection Facility
- Evacuation Rates of Acoustic Tags in Striped Bass
- Low Cost Solution to Retain More Larval Fish: Effectiveness of Using a Fine Mesh Screening on the Holding Tanks
- Tracy Series Reports
- Release Site Design

Adaptive Management:

The research activities that we undertake at the TFCF are in response to legal requirements of CVPIA (the 23 actions) and/ or Reasonable and Prudent Alternative (RPA), 2009 Biological Opinion in pursuit of improvements to reduce pre-screen loss and improve fish handling and screening efficiency. We use an adaptive management approach to take advantage of opportunities to learn from actions by explicitly identifying assumptions and data gaps, and then design and implement research activities that deliver meaningful feedback to project planners. This feedback comes from and stakeholder TIFTIF meetings. Another key feedback source is the TFFIP peer review process resulting in the publication of the Tracy Volume Series.

For this year continuing studies in particular rely on an adaptive management approach to improve study design and implementation. One multi-year study, the Evaluation of Chinook Salmon and Central Valley Steelhead Facility Losses at the Tracy Fish Collection Facility is an example. Our objective is to determine whole facility survival (from the trash boom to the holding tank) for juvenile Chinook salmon and steelhead. The study design is the result of many years of investigations and trials, starting with the first evaluations of louver efficiencies in 1960 and takes in the latest developments in acoustic listening systems.

Continuing predator removal studies and development of alternate methods to remove predators is a completely iterative process. The Evaluation of the Use of Electricity for Predator Removal in the primary channel, using physical and non-physical removal methods (e.g., electricity, sound, light, CO_2) started with laboratory trials at the Denver Technical Service Center. This has led to a discussion of human safety concerns relating to a field test in the secondary channel. This year a safety plan and permitting requirements for a field evaluation will be will be drafted. Evaluating the Use of Carbon Dioxide for Predator Removal began in 2004 as a new predator removal method. At that time we recognized the problems with current methods. They can be dangerous for employees, decreases daily salvage, and causes damage to the fish and/or fish

mortality. The goals of CO_2 study are to determine means and methods to reduce the number and average size of striped bass in the secondary system by removing large resident fish; increase survival of fish collected during the predator.

Altering fish handling techniques is another opportunity for continual adaptation and improvement. As part of our performance criteria development we completed design, acquisition, and implementation of the negative pressure test chamber. In our trials last year of negative pressure on selected fishes salvaged, our preliminary analyses we found no effect of negative pressure on fishes. This year we will seek to fill information gaps on the effect negative pressure has on health and survival of various fish species and size classes salvaged at the TFCF. This information will assist in evaluating the use of vacuum systems as a fish-safe transfer method. Also since we now have a new haul-out bucket and new fish-haul trucks in use at the TFCF, we must evaluate their performance to determine the effects of fish density on important water quality parameters at the onset, throughout, and at the end transport. Evaluation of this new equipment, paired with the development of updated fish transport tables, will increase the likelihood that the millions of fish that are salvaged.

Among the new studies this year are two studies involving Acoustic Tags. These studies, one to investigate evacuation rates in Striped Bass the other to study the influence of Acoustic Tags on susceptibility of Chinook salmon to predation are designed to fill-in data gaps. Acoustic-tagged salmon consumed by untagged predators may lead to false positive detections by acoustic receivers and confounds researchers' abilities to adequately assess acoustic data. Data are needed on the rate at which striped bass digestively pass acoustic tags that were inside predated salmon. The other area lacking data is the suspected high level of predation upon tagged salmon.
Our study will assist researchers with evaluation and interpretation of data on survival and movement of Chinook salmon throughout the Central Valley of California, with probable application to other systems.

With the data collected this year we can continue to integrate experimental and pilot studies, to continually improve project outcomes, meeting our legal requirements and demands to make effective improvements to reduce pre-screen loss and improve fish handling and screening efficiency.