

Table 2A. DRAFT Summary and Costs of the 2010 Interagency Ecological Program Monitoring, Special Study and Fish Facility Activities (Elements)

(Element costs are approximate and expressed in thousands of dollars)

2/17/2010

Created from 2010 IEP Program Budget v24 February 17, 2010.xls

I. Monitoring Elements

PROGRAM ELEMENT	ELEMENT DESCRIPTION	COST	FUNDING SOURCE	
A. HYDRODYNAMICS			IEP Core	IEP POD and Coordinated
1. Bay salinity monitoring a. (2010-029) b. Mandates – D1641	Salinity, water temperature, tide and meteorological measurements are collected in San Francisco Bay. Data is used to better understand the hydrodynamics of the estuary and calibration of multi-dimensional flow and transport models. Deliverables: a) Time series of salinity, water temperature wind speed, wind direction, air temperature, atmospheric pressure and visible radiation; b) annual USGS report “Water Resources Data for California” (P. Buchanan and G. Shellenbarger, USGS)	\$236	DWR-\$191 USBR - \$45	\$0
2. Delta flow measurement and database management a. (2010-030) b. Mandates - none c. POD	Channel flow and flow splits at key Delta sites are measured via UVMs and ADCPs. Data is used to evaluate fish transport and migration issues and to validate hydrodynamic models. This element will also maintain the time series database of Bay and Delta hydrographic data (tides, currents salinity, wind, and Delta flows information collected by USGS. Deliverables: a) Time series of measured tidal and daily net-flow for each station in the flow network; b) IEP Newsletter article, IEP Technical Report and peer-reviewed journal contributions made as appropriate. (J. Burau, USGS)	\$1,124	DWR-\$684 USGS-\$382	City of Stockton-\$38 CCWD-\$20
		\$ 1,360		

PROGRAM ELEMENT	ELEMENT DESCRIPTION	COST	FUNDING SOURCE	
B. ENVIRONMENTAL MONITORING			IEP Core	IEP POD and Coordinated
1. Environmental monitoring program a. (2010-072) b. Mandates –D1641 c. POD	This element implements the D-1641 mandate to monitor water quality at 22 sites in San Pablo Bay, Suisun Bay, and the Delta. In addition to basic water quality parameters, chlorophyll, phytoplankton, benthic and zooplankton samples are collected. Deliverables: Annual report to the SWRCB. (K. Gehrts, DWR)	\$3,228	DWR-\$1,004 USBR \$2,225	\$0

PROGRAM ELEMENT	ELEMENT DESCRIPTION	COST	FUNDING SOURCE	
			IEP Core	IEP POD and Coordinated
B. ENVIRONMENTAL MONITORING - Continued				
2. Upper estuary zooplankton sampling a. (2010-077) b. Mandates –D1641 c. POD	Neomysis shrimp and other zooplankton are sampled monthly in San Pablo Bay, Suisun Bay and the Delta. The monthly sampling is coordinated with the Environmental Monitoring Program (2010-072). Deliverables: a) Status and Trends IEP Newsletter article, Spring 2010; b) updated ACCESS database; c) zooplankton chapter in an annual Water Quality report, July 2010. (A. Hennessy, DFG)	\$302	DWR-\$151 USBR-\$151	\$0
3. Operation of thermograph stations a. (2010-104) b. Mandates -none	This element maintains the operation of the thermograph and sediment sampling stations at Vernalis on the San Joaquin River and the Sacramento River below Wilkins Slough. Deliverables: a) Data for water year 2009 will be published in the USGS annual report series “Water Resources Data for California,” Spring 2010. (J. Smithson, USGS).	\$36	DWR-\$22 USGS-\$14	\$0
		\$ 3,566		

PROGRAM ELEMENT	ELEMENT DESCRIPTION	COST	FUNDING SOURCE	
			IEP Core	IEP POD and Coordinated
C. FISH & MACROINVERTEBRATES				
1. Adult striped bass population estimates a. (2010-002) b. Mandates –none c. POD	Annual tagging of adult striped bass for the purpose of making mark-recapture estimates of legal-size striped bass abundance, age distribution, mortality rates and evaluating factors affecting abundance. Deliverables: a) Sportfish Restoration Act report, September 2010; b) updates to the adult striped bass population estimates as data becomes available; c) maintenance of long-term database (J. DuBois, DFG)	\$783	DWR-\$211 DFG-\$572	\$0
2. Fall midwater trawl survey a. (2010-003) b. Mandates –OCAP c. POD	Fall midwater trawl sampling (since 1967) from San Pablo Bay through the Delta to monitor pelagic fish abundance and distribution. Data is used to calculate young-of-the-year indices of several important species including striped bass, delta smelt, longfin smelt, American and threadfin shad. Deliverables: a) Status and Trends IEP Newsletter article, Spring 2010; b) web-based updates of annual indices for six species, September – December 2009; c) maintenance of long-term ACCESS database. (D. Contreras, DFG)	\$341	DWR-\$101 USBR-\$77 DFG-\$141	USBR POD \$22

PROGRAM ELEMENT	ELEMENT DESCRIPTION	COST	FUNDING SOURCE	
C. FISH & MACROINVERTEBRATES- Continued			IEP Core	IEP POD and Coordinated
3. Adult sturgeon population estimates a. (2010-005) b. Mandates –none	Legal-sized green and white sturgeon are tagged to provide estimates of abundance, age distribution and mortality rates that are used to set angling regulations and evaluate factors affecting year-class strength. The frequency of the field work was periodic (every 2-4 years) but is now annual to provide better estimates. Deliverables: a) Sportfish Restoration Act report, September 2010; b) IEP Newsletter articles as appropriate; c) maintenance of long-term database. (M. Gingras, DFG)	\$328	DWR-\$211 DFG-\$117	\$0
4. Summer Townet survey a. (2010-007) b. Mandates –OCAP c. POD	Spring-summer sampling with a towed, small mesh net from San Pablo Bay throughout the Delta to monitor the annual abundance and distribution of juvenile fish in the upper estuary and evaluate factors affecting abundance. Annual delta smelt and striped bass indices are used to track long-trends of relative abundance. Water quality profile and simultaneous zooplankton samples will be collected as well. Deliverables: a) Annual delta smelt and striped bass indices, September 2010; b) IEP Newsletter article, Spring 2010; c) ACCESS database. (V. Afentoulis, DFG)	\$349	DWR-\$88 USBR-\$79 DFG-\$158	USBR POD \$24
5. Estuarine and marine fish abundance and distribution survey a. (2010-011) b. Mandates –D1641	Monthly mid-water and otter trawling survey (since 1980) at 52 channel and shoal stations from South San Francisco Bay to the lower Sacramento and San Joaquin rivers to track abundance and distribution trends of marine and estuarine fishes. Data is used to assess the status of marine and estuarine fishes in the estuary as required by D-1641. Deliverables: a) Status and Trends IEP Newsletter article, Spring 2010; b) maintenance of ACCESS database; c) catch data uploaded monthly and available at http://www.delta.dfg.ca.gov/data/BayStudy/CPUE_Map.asp (M. Fish, DFG)	\$586	DWR-\$330 USBR-\$256	\$0
6. Bay shrimp and crab abundance and distribution surveys a. (2010-012) b. Mandates –D1641	The trawling survey described for 2009-011 also include the collection and processing of Caridean shrimp and <i>Cancer</i> crab species to track abundance and distribution trends of Bay and estuarine shrimp species. Data is used to assess the status of shrimp in the estuary. Deliverables: a) Status and Trends IEP Newsletter article, Spring 2010; b) ACCESS database. (K. Hieb, DFG)	\$152	DWR-\$79 USBR-\$73	\$0
7. Delta juvenile fish monitoring program a. (part of 2010-053) b. Mandates –OCAP	Sampling at key sites in the lower rivers, Delta and estuary targeting all races of juvenile salmon emigrating through and rearing in the Delta. The program provides information on the timing of emigration, extent of rearing in the Delta and annual production. Although this effort focuses on juvenile salmon, information is also collected on other delta fishes. Deliverables: a) The main deliverable is an extensive fisheries database updated daily and dating back to the mid 1970's; b) real-time summaries are provided to the DAT, October – June annually; c) IEP Newsletter articles as appropriate. (J. Netto, USFWS)	\$1,468	DWR-\$736 USBR-\$732	\$0

PROGRAM ELEMENT	ELEMENT DESCRIPTION	COST	FUNDING SOURCE	
C. FISH & MACROINVERTEBRATES - Continued			IEP Core	IEP POD and Coordinated
8. Knight's Landing juvenile salmon monitoring a. (part of 2010-074) b. Mandates –OCAP	Continuous sampling by rotary screw traps of juvenile salmonids emigrating from the Sacramento River. Near real-time reporting of data provides early detection of salmon entering the Delta for management purposes. Deliverables: a) Daily catch of juvenile Chinook transmitted weekly to the DAT during salmon outmigration , October 2010; b) technical reports as appropriate. (R. Vincik, DFG)	\$262	DFG-\$70	DWR ^a -\$192
9. Spring Kodiak trawl a. (2010-088) b. Mandates –OCAP c. POD	Monthly Kodiak trawl sampling between February and April from San Pablo Bay through the Delta to monitor pre-spawning adult delta smelt during late winter and spring. Data collected determines the abundance, distribution and maturity status of adult delta smelt. Deliverables: a) Near real-time data of delta smelt distribution, sexual maturity stage and CPUE are uploaded to http://www.delta.dfg.ca.gov/data/projects/?ProjectID=SKT Jan – April; b) maintenance of ACCESS database; c) IEP workshop presentations and newsletter articles as appropriate. (J. Adib-Samii, DFG).	\$282	DWR-\$170 USBR-\$112	\$0
10. UCD Suisun Marsh fish monitoring a. (2010-093) b. Mandates –none	Monthly monitoring of fish abundance and distribution in Suisun Marsh channels using otter trawls or beach seines. Larval fish sampling using a towed fine-mesh plankton net is done at 5 sites on a monthly basis between February and June. All work is done by UCD personnel. Deliverables: a) Data summarized in annual reports, April 2010; b) long-term Suisun Marsh ACCESS database. (T. Orear, UCD)	\$97	\$0	DWR ^b -\$97
11. Smelt larva survey a. (2010-096) b. Mandates – OCAP c. POD	This survey provides near real-time distribution data for longfin smelt larvae in the Delta, Suisun Bay and Suisun marsh. Data are used by agency managers to assess vulnerability of longfin smelt larvae to entrainment in south Delta export pumps. Sampling occurs within the first two weeks in January and repeats every other week through the second week in March. Deliverables: a) Weekly updates of delta smelt catch to the Smelt Working Group; b) real-time updates of catch data to http://www.delta.dfg.ca.gov/data/projects/?ProjectID=SLS (J. Adib-Samii, DFG)	\$470	DWR-\$121 USBR-\$80	USBR POD \$269
12. Yolo Bypass a. (2010-047) b. Mandates – none	The objectives of this interdisciplinary monitoring effort are to: (1) continue collection of baseline data on lower trophic levels (phytoplankton, zooplankton and aquatic insects), juvenile and adult fishes, hydrology and physical conditions; and (2) analyze Yolo Bypass data collected during 1997 – 2007 to elucidate potential influences on fish community trends. Deliverables: a) Peer reviewed journal article, December 2010; b) upload survey data to IEP data vaults, October 2010. (K. Reece, DWR)	\$236	DWR-\$236	\$0
		\$5,354		

PROGRAM ELEMENT	ELEMENT DESCRIPTION	COST	FUNDING SOURCE	
			IEP Core	IEP POD and Coordinated
D. OPERATIONS MONITORING				
1. 20mm delta smelt survey a. (2010-033) b. Mandates –OCAP c. POD	A fine-mesh survey of the estuary and Delta to determine the distribution and abundance of post-larval delta smelt. Zooplankton sampling is conducted simultaneously; data collected is used to calculate density. Sampling is conducted every two weeks from April through July at 35-40 stations from San Pablo Bay through the Delta. The real time processing of the 20mm samples is included in this element. Deliverables: a) ACCESS database, June 2010; b) IEP Newsletter article as appropriate; c) real-time catch data available at http://www.delta.dfg.ca.gov/data/projects/?ProjectID=20mm (J. Adib-Samii, DFG)	\$488	DWR-\$292 USBR-\$196	\$0
2. Delta juvenile fish monitoring program a. (part of 2010-053) b. Mandates -OCAP	Sampling juvenile salmon and other delta fishes with midwater trawls, Kodiak trawls and beach seines in the delta to support or provide information useful to water project operations. Deliverables: a) The main deliverable is an extensive fisheries database updated daily and dating back to the mid 1970's; b) real-time summaries are provided to the DAT, October – June annually; c) IEP Newsletter articles as appropriate. (J. Netto, USFWS)	\$974	DWR-\$489 USBR-\$485	\$0
3. Mossdale spring trawl a. (2010-071) b. Mandates – OCAP	This money supports Region 4 field work, collation and reporting of data from the Mossdale sampling program during April through June. Overall effort is to provide "near-time" information on the relative vulnerability of key fish species to water project operations. Sampling results are made available within 48-hours via the Internet along with data to guide the decision making of the CALFED Ops Group. Deliverables: a) Sampling results are made available within 48-hours via the internet along with data to guide the decision making of the CALFED Ops Group, April – June 2010. (S. Tsao, DFG)	\$140	DWR-\$64 DFG-\$76	\$0
4. Water quality telemetered data collection a. (part of 2010-072) b. Mandates – D1641	Continuous collection of water quality data for multiple parameters including electrical conductivity or salinity, from 7 telemetry sites used for day-to-day CVP and SWP operational decisions. Data is made available on a real-time basis. Deliverables: Annual report to the SWRCB. (S. Batmanghlich, DWR)	\$1,076	DWR-\$538 USBR-\$538	\$0
5. San Joaquin River dissolved oxygen monitoring a. (2010-073) b. Mandates - none	Summer and fall monitoring of dissolved oxygen and temperature levels at several sites in the San Joaquin River near Stockton to evaluate the cause of seasonal dissolved oxygen levels and trigger placement at the Head-of-Old-River Barrier. Data is used to guide water project operations and barrier placement. Deliverables: Annual report. (K. Gehrts, DWR)	\$60	\$0	DWR ^a -\$60

PROGRAM ELEMENT	ELEMENT DESCRIPTION	COST	FUNDING SOURCE	
			IEP Core	IEP POD and Coordinated
D. OPERATIONS MONITORING - Continued				
6. Knights Landing juvenile salmon monitoring a. (part of 2010-074) b. Mandates – OCAP	Continuous sampling by rotary screw traps of juvenile salmonids emigrating from Knights Landing for to determine the distribution and abundance of juvenile salmonids. Deliverables: a) Daily catch of juvenile Chinook transmitted weekly to the DAT, October 2010; b) Technical reports as appropriate. (R. Vincik, DFG).	\$324	DFG-\$70	USBR ^f -\$31 DWR ^a -\$223
7. Mill and Deer creeks juvenile salmonid monitoring a. (2010-075) b. Mandates – OCAP	Continuous sampling by rotary screw traps of juvenile salmonids emigrating from Mill and Deer creeks. Near real-time reporting of data provides early detection of salmon entering the Delta for management purposes. Deliverables: a) Daily catches of Chinook and steelhead summarized twice weekly for the Data Assessment Team (DAT); b) Fish length database, June 2010. (C. Harvey-Arrison, DFG)	\$90	DFG-\$38	USBR ^f -\$26 DWR ^a -\$26
		\$ 3,152		

TOTAL FOR ESTUARY MONITORING:	\$ 13,432,000
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II. Special Study Elements – **DRAFT**

PROGRAM ELEMENT	ELEMENT DESCRIPTION	COST	FUNDING SOURCE	
			IEP Core	IEP POD and Coordinated
A. SALMONID MIGRATION & SURVIVAL				
1. Chinook race identification (DNA) a. (2010-004) b. Mandates – OCAP	Conduct genetic studies to develop unambiguous identifiers of the various races of Central Valley Chinook salmon. Definitive, genetic identification of Chinook salmonid runs is required by NOAA Fisheries OCAP BO for winter-run and spring-run Chinook salmon. Deliverables: None identified. (S. Greene, DWR)	\$291	DWR-\$291	\$0
2. IEP support for DFG Ocean Salmon Project a. (2010-009) b. Mandates - none	Assistance in port sampling for coded-wire tagged (CWT) fish and to collect and process CWTs from Central Valley hatcheries and spawning surveys. This information allows population estimates of salmonids. Deliverables: None identified. (C. Armor, DFG)	\$147	\$0	DWR ^h -\$147
3. Coleman Nat. Fish Hatchery late-fall run production tagging a. (2010-059) b. Mandates - none	Coded-wire tagging of all CNFH late-fall run production to ensure proper race identification during subsequent recovery of fish at Delta export facilities and in juvenile and adult sampling programs. Recovery of tagged late-fall run fish is also part of the spring-run recovery plan. Tags will be purchased by USBR. Deliverables: a) This money supports the tagging of 25% of the annual late-fall production at CNFH. (P. Brandes, USFWS)	\$263	\$0	DWR ^a -\$168 USBR ^f - \$95
		\$701		

PROGRAM ELEMENT	ELEMENT DESCRIPTION	COST	FUNDING SOURCE	
			IEP Core	IEP POD and Coordinated
B. RESIDENT SPECIES				
1. Otoliths analysis of pelagic fish a. (2010-060) b. Mandates – none c. POD	This study will analyze the otoliths of delta smelt to determine daily growth rate and area of origin. Analyses could provide detailed information on fish origin and growth that can be related to histopathology and potentially ambient water toxicity. Deliverables: a) Semi-annual reports to the ERP grant manager; b) presentations at appropriate workshops. (W. Bennett, UCD-BML)	\$350	\$0	DSP ERP ^k \$350
2. Liver histopathology for pelagic fish a. (2010-061) b. Mandates – none c. POD	This element will use histopathology analyses of the liver and glycogen to determine if larval and juvenile delta smelt, striped bass and inland silversides are exposed to toxins and/or food limitations. Samples will be obtained primarily from existing monitoring projects. Deliverables: a) semi-annual reports to the grant manager and b) presentations at appropriate workshops. (S. Teh, UCD)	\$350	\$0	DSP ERP ^k \$350

PROGRAM ELEMENT	ELEMENT DESCRIPTION	COST	FUNDING SOURCE	
B. RESIDENT SPECIES - Continued			IEP Core	IEP POD and Coordinated
3. Fish Diet and Condition a. (2010-062) b. Mandates – none c. POD	This study will examine the stomach contents of many fish and zooplankton for changes in diet composition, feeding success and parasite load. Weights of fishes will be examined in relation to regions of the estuary, as well as environmental conditions such as conductivity, temperature, and water clarity. Changes to stomach contents or parasite load may be associated to growth rate, relative weight or liver condition. Deliverables: a) draft delta smelt diet and condition manuscript, July 2009; b) ACCESS database; c) newsletter articles or presentations where appropriate. (S. Slater, DFG)	\$40	\$0	USBR POD \$40
4. Striped bass life cycle modeling a. (2010-038) b. Mandates – none c. POD	A life cycle model that integrates the effects of multiple stressors has been developed for striped bass. This next step will generalize the model and make it applicable to longfin smelt. These models will provide a better understanding of what factors drive the population dynamics and what management strategies should be implemented for these species. Deliverables: a) Progress reports and workshop presentations as appropriate; b) submission of 3 peer-reviewed manuscripts; c) computer codes for each model and supporting documentation explaining use, inputs and outputs. (F. Loge and E. Loboshefsky, UCD)	\$125	\$0	DWR POD \$125
5. Modeling delta smelt populations a. (2010-041) b. Mandates – none c. POD d. Delta Science	A delta smelt life cycle model will be developed in this study. The models will integrate the effects of multiple stressors on delta smelt population so a better understanding of what factors drive the population dynamics and what management strategies could be implemented. Deliverables: a) Final project reports and manuscripts ideally submitted to journals by January 2009 but this has been postponed to a later date. (W. Kimmerer, SFSU-RTC; B. Bennett, UCD-BML; K. Rose, LSU) <i>THIS HAS NOT RESTARTED</i>	\$332	\$0	DSP ^k \$332
6. Estimation of pelagic fish population sizes a. (2010-043) b. Mandates – none c. POD	Development of methods to calculate population estimates of many pelagic species will be investigated based on previous efforts. This effort will include particle tracking models to define boundaries of sampling regions and volumes represented by fixed stations in existing monitoring surveys and test the assumption of randomness in the data. Deliverables: This work is expected to result in several additional publications over the next three years. (Ken Newman, USFWS.)	\$188	\$0	DWR POD \$94 USBR POD \$94
7. Longfin smelt habitat requirements a. (2010-098) b. Mandates – none c. POD	This analysis will investigate what the habitat requirements are for longfin smelt are and if suitable habitat has shifted spatially and/or temporally. Preexisting data from the FMWT and Towntnet survey will be used to help answer this question. This work will be conducted with redirected staff effort. Deliverables: none identified. (R. Baxter, DFG)	\$0	\$0	\$0
8. Estimates of fish and zooplankton biomass a. (2010-106) b. Mandates – none c. POD	This analysis will utilize existing IEP long-term monitoring data from the Fall Midwater Trawl Survey, Towntnet Survey, and Bay Study to estimate fish biomass and the 20mm and Towntnet survey to estimate zooplankton biomass based on length-weight relationships. Biomass trends will be investigated for spatial and temporal patterns. This work will be conducted with redirected staff effort. (R. Baxter, DFG)	\$0	\$0	\$0

B. RESIDENT SPECIES - Continued			IEP Core	IEP POD and Coordinated
9. Striped bass bioenergetics a. (2010-115) b. Mandates – none c. POD	This element is a collaborative effort with 2010-038 that focuses on bioenergetics analyses of the striped bass adult population to track the long- and short-term (i.e., POD years) trends in consumption demand of piscivorous striped bass. This analysis will investigate the trends in estimated population consumption demand of age 1 and older striped bass and determine if consumption demand has decreased more slowly than prey relative abundance/relative biomass. Deliverables: Draft manuscript for publication, spring 2010. (G. Bengino DWR)	\$30	\$0	DWR POD \$30
10. Delta smelt culture facility a. (2010-108) b. Mandates – none c. POD	Funding for this element will cover the costs of producing larval, juvenile, and adult delta smelt for research projects funded or conducted by various agencies and academia. Funding will also cover the establishment and maintenance of a refugial population of delta smelt. Deliverables: 24,000 larvae, 13,000 juvenile and 8,000 adult delta smelt for research conducted in 2010; b) annual production report. (J. Lindberg, UCD)	\$1,791	\$0	USBR POD \$592 USBR ^c \$288 USBR ^j \$911
11. Impacts of largemouth bass on the Delta ecosystem a. (2010-133) b. Mandates – none c. POD	“Top-down” effects are a key part of the POD conceptual model, however predation from inshore piscivores is a relatively poorly understood source of mortality. There is strong evidence that centrarchid populations have thrived as a result of the expansion of <i>Egeria</i> beds, but it is unclear whether this may have contributed to the POD. Specifically, we need estimates of inshore predator abundance, and information about their effects on pelagic habitat Deliverables: a) Semi-annual progress reports, December 2009 and June 2010; b) oral progress reports to POD MT as requested; c) presentation at IEP workshop, May 2010, d) manuscript to IEP newsletter or professional journal, June 2010. (A. Sih and L. Conrad, UCD)	\$178	\$0	USBR POD \$178
12. Delta smelt genetics a. (2010-135) b. Mandates – none c. POD	This study will examine (1) the current genetic structure (microsatellite markers) of the Delta smelt population, (2) to what extent hybridization between Delta smelt and Wakasagi smelt or longfin smelt occur, (3) spawning strategies using breeding experiments and microsatellite markers to understand Delta smelt population dynamics and (4) will develop a breeding plan to maintain natural genetic variation and population structure in closed populations using information obtained from population structure, population dynamics, and spawning strategies of Delta smelt. Deliverables: a) progress reports to USFWS; b) year-end final contract reports; c) determine population structure, 2010; d) assessment of hybridization between delta smelt, longfin smelt and wakasagi, 2010. (B. May, UCD)	\$0	\$0	\$0
13. Bioenergetics of zooplankton species a. (2010-136) b. Mandates – none c. POD	Videographic techniques will be used to record observations of predator-prey interactions and specific patterns of prey selection to develop quantitative models of prey selection. Growth rates of larval delta smelt will be measured in laboratory experiments.. Data on respiration, ingestion, growth and excretion will be used to create an energy budget for larval delta smelt, allowing for the possibility of more accurate models of population dynamic. Deliverables: a) Presentation at State of the Estuary Conference, October 2009; b) journal article submissions, spring 2010. (L. Sullivan, SFSU)	\$17	\$0	DWR POD \$17

PROGRAM ELEMENT	ELEMENT DESCRIPTION	COST	FUNDING SOURCE	
B. RESIDENT SPECIES - Continued			IEP Core	IEP POD and Coordinated
14. Population genetics and otolith geochemistry of longfin a. (2010-137) b. Mandates – none c. POD	This study seeks to address some of the data gaps in longfin smelt life history by (1) identifying population structuring among tissue collections from the San Francisco Bay/Delta, Klamath River, coastal Oregon, and Columbia River, (2) comparing the life-history variability from pre-POD to POD era using strontium isotope 87Sr:86Sr ratios to reflect salinity history, and (3) evaluate multiple annual collections of longfin smelt collected pre and post POD decline to compare genetic variation in the population during these periods which can assess demographics, effective population size, and population bottlenecks. Deliverables: a) Semi-annual progress reports, December 2009 and June 2010; b) oral progress report to POD MT, as requested; c) presentation at IEP workshop, May 2010; d) manuscript to IEP newsletter or professional journal, June 2010. (J. Israel, B. May and J. Hobbs, UCD)	\$113	\$0	USBR POD \$113
15. Lower trophic levels of Suisun Bay food web a. (2010-142) b. Mandates – none c. POD d. Delta Science	This project is designed to obtain a coarse “time-series” of food sources being utilized by the dominant zooplankton inhabiting the central portion of the upper SFB estuary (Suisun Bay) with biomarker-specific, multiple isotopes. This project focuses on Suisun Bay because it a critical habitat for the threatened Delta Smelt, has been an area of particular concern for the pelagic organism decline investigations, and is likely to be strongly affected by changes to water project operations. Deliverables: Completion of four sampling cruises, sample and data analysis, full synthesis of all data, and first paper submission, August 2009. (S. Lang, UCSD)	\$76	\$0	DSP ^k \$76
16. Potential loss of life history variation and the decline of delta smelt a. (2010-162) b. Mandates – none c. POD	This project will investigate the “Big Mama Hypothesis” which posits that larger, more robust, delta smelt tend to reproduce earlier in spring, spawning larger numbers of better provisioned larvae that are more likely to survive and reproduce than those hatching from smaller parents later in the spawning season. Questions include: 1) Has selective entrainment of early-spawned larvae been of sufficient magnitude and duration to cause undesirable evolutionary change in delta smelt, and 2) If such changes have occurred, how can management reverse the process and contribute to restoration of the species? Deliverables: The primary product of this work will be a completed manuscript for submission to a peer-reviewed scientific journal, July 2010. (B. Bennett, UCD)	\$32	\$0	SWRCB POD \$32
17. Use of PCR to detect silverside predation on larval delta smelt a. (2010-166) b. Mandates – none c. POD	This study will determine if PCR genetic techniques are sensitive enough to detect the presence of delta smelt DNA in Mississippi silversides gut contents. DNA assays for delta smelt (and 13 other fish species) will be developed at UCD. Laboratory feeding studies will be used to test assay sensitivity and DNA gut survival; then the assay will be tested with wild caught silversides in the lower Sacramento River. Deliverables: Specific assay details presented t the 2010 Delta Science Conference and published in an appropriate peer-reviewed journal. (B. Schreier, DWR; B. May and M. Baerwald, UCD)	\$68	\$0	DWR POD \$68

PROGRAM ELEMENT	ELEMENT DESCRIPTION	COST	FUNDING SOURCE	
B. RESIDENT SPECIES – Continued			IEP Core	IEP POD and Coordinated
18. Investigation of presence, migration patterns and site fidelity of sub-adult striped bass a. (2010-167) b. Mandates – none c. POD	Sub-adult striped bass will be tagged with VEMCO sonic tags in conjunction with DFG tagging efforts. Observations will determine movement and/or site fidelity and attempt to associate these with water quality data to determine water quality effects. Deliverables: Presentations at Delta Science Conference or IEP Workshop, IEP Newsletter article and a journal publication, if appropriate. (C. LeDoux-Bloom, DWR)	\$75	\$0	DWR POD \$75
19. Monitoring inter-annual variability of delta smelt population contingents and growth a. (2010-168) b. Mandates – none c. POD	This study will use archived and 2010 delta smelt otoliths from IEP monitoring surveys to determine the mechanisms (e.g. climate variability, hydrology) responsible for different life history contingents. This study will also ask how flow variations and CVP and SWP entrainment affect contingents. Deliverables: Oral presentations to the IEP and at national scientific conferences, reports as required, two peer-reviewed publications and a results database. (J. Hobbs, UCD)	\$98	\$0	USBR POD \$98
20. Delta smelt feeding and food web interactions a. (2010-169) b. Mandates – none c. POD	This is a large, integrated study with many tasks. The overarching focus is to determine what the food supply of delta smelt is in the LSZ during late summer to fall. Specific tasks include 1) incubation experiments with different species of copepods and with cultured delta smelt and their prey organisms (copepods) or predators (striped bass, jellyfish) to determine food limitation, predation, and species interactions; 2) field sampling of phytoplankton, zooplankton, and jellyfish combined with modeling to determine population dynamics and production; 3) gut content & gut evacuation analyses in field-caught jellyfish to determine diets; and 4) 3D modeling to determine plankton transport rates. Deliverables: Newsletter articles and reports to the IEP from all tasks in Year 1. If the project is funded in year 2 and/or 3, peer-reviewed articles on 1) feeding by delta smelt; 2) feeding interactions among copepods; 3) population dynamics of Pseudodiaptomus; and 4) abundance, distribution and predation impact of jellies. (W. Kimmerer, SFSU)	\$400	\$0	USBR POD \$400

PROGRAM ELEMENT	ELEMENT DESCRIPTION	COST	FUNDING SOURCE	
			IEP Core	IEP POD and Coordinated
B. RESIDENT SPECIES - Continued				
21. Experimentally determining early life-stage sensitivity to salinity for longfin a. (2010-170) b. Mandates – none c. POD	This study will determine a) the range of suitable habitat for longfin smelt reproduction and early development; and b) how the position of X2 in the fall affects the spawning and early development habitats of longfin smelt. Task 1 will include the culturing and direct observation of egg and larval development in a range of lab salinities. Task 2 will analyze otoliths of archived DFG samples of longfin smelt adults and juveniles to validate whether the otolith strontium isotope ratios represent a reliable record of exposure during early development. Deliverables: Preserved series of larvae reared in 2 and 4 ppt salt water, report on development of longfin smelt culture methodologies, presentation at IEP Workshop or Delta Science Conference and a peer-reviewed publication. (J. Lindberg and J. Hobbs, UCD)	\$70	\$0	USBR POD \$70
22. Metabolic responses to variable salinity environments in field-acclimatized Corbula a. (2010-177) b. Mandates – none c. POD	Task 1: Filtration rates and tissue metabolic rates from Corbula clams collected monthly from spring to fall at river transect sites will measure metabolic variation in Corbula acclimatized to different salinities and seasons. Task 2: Growth and condition measurements (RNA:DNA, fat content, protein, GSI, etc.) will determine how Corbula acclimatized to varying salinity, partitions energy in physiological categories. Task 3: Basic water chemistry variables (nutrients, chlorophyll, etc.) will be examined to investigate how planktonic assemblages alter the metabolic physiology of Corbula. Deliverables: IEP report, manuscript for peer-reviewed journal (target is MEPS or Estuaries and Coasts), and presentations at local and national meetings such as CERF, CAERS and EET. (J. Stillman and N. Miller, SFSU)	\$137	\$0	USBR POD \$137
23. Bivalve effects on the food web supporting delta smelt a. (2010-178) b. Mandates – none c. POD	Clam sampling (Corbula and Corbicula) in the spring will occur at a combination of ongoing DWR benthic “GRTS” sampling at 175 sites and an additional 22 shallow water stations in the northern Delta and bays. Samples will be processed for clam size, biomass and grazing rates based on established relationships to determine if grazing rates vary with longitudinal location, water quality or depth, or flow variability. Deliverables: Progress reports and oral presentation at EET, IEP Workshop or Delta Science Conference, IEP Newsletter article and peer-reviewed journal articles. (J. Thompson, USGS and K. Gehtrs, DWR)	\$89	\$0	USBR POD \$89
24. Longfin smelt bioenergetics a. (2010-181) b. Mandates – none c. POD	Lab experiments using cultured juvenile (year 1) and sub-adult (year 2) longfin smelt will determine the maximum consumption, resting and active metabolic rates (respirometry). These results will then be used to develop a longfin smelt bioenergetics model, which will be used as the input for the growth of longfin smelt in an Individual Based life cycle model for longfin smelt (see element 2010-038). Deliverables: A report submitted to the IEP and a peer-reviewed publication on longfin smelt bioenergetics at the end of year 2. (F. Loge, J. Cech and J. Lindberg, UCD)	\$128	\$0	USBR POD \$128

PROGRAM ELEMENT	ELEMENT DESCRIPTION	COST	FUNDING SOURCE	
B. RESIDENT SPECIES - Continued			IEP Core	IEP POD and Coordinated
25. Natal origins of delta smelt with new isotope tracers a. (2010-182) b. Mandates – none c. POD	This study will explore new tracers of habitats in the Bay-Delta using isotopes of mercury. Otoliths from the FCCL and water samples from the Delta will be examined to determine the efficacy of mercury isotopes to discriminate among different source waters entering the Delta. Archived delta smelt from 1999, 2001 and other selected years (to be determined) will then be assayed for mercury isotopes near the core with laser ablation. Data from the new tracer will be compared to existing strontium isotope data to evaluate the usefulness of mercury isotopes relative to strontium. Deliverables: Presentations at IEP meetings and the Delta Science Conference and a peer-reviewed journal article that demonstrates a novel approach for analyzing otoliths for natal origins. (J. Hobbs, UCD)	\$40	\$0	USBR POD \$40
26. Disease and physiology monitoring in wild delta smelt adults a. (2010-184) b. Mandates – none c. POD	This study will analyze subadult and adult delta smelt captured from the Spring Kodiak Trawl in the lower Sacramento River for fish pathogens, tissue abnormalities (histology), energy reserves (muscle triglycerides) and osmoregulatory status (gill Na-K-ATPase). The influence of pathogens, contaminants and adverse water quality on delta smelt survival is an unresolved biological question. Deliverables: Laboratory analysis of samples and production of technical report, August 2010. (S. Foott, USFWS)	\$0	\$0	\$0
		\$4,727		

PROGRAM ELEMENT	ELEMENT DESCRIPTION	Cost	FUNDING SOURCE	
			IEP Core	IEP POD and Coordinated
C. ECOLOGICAL PROCESSES				
1. Hydrodynamic studies in the Delta a. (2010-027) b. Mandates – none	Funds for this element will support A) developing the capability to map spatial structure of salinity and temperature throughout the Delta (“slack water plots”), B) investigation of transport mechanisms in Suisun Marsh, C) circulation and mixing in Cache Slough/Liberty Island Complex, and D) documentation of spatial and temporal variation in hydrodynamic and salt transport processes. Deliverables: a) Analyze existing historical and current hydrodynamic and salinity data to document the spatial and temporal variations in hydrodynamics and salt transport processes; b) deploy hydrodynamic and water quality instrumentation to understand circulation and mixing in the Cache Slough/Liberty Island complex and fluxes of constituents (e.g. Chl-a, turbidity, etc.) in collaboration with DWR; c) use hydrodynamic field investigations and numerical modeling in collaboration with DWR’s Suisun Marsh Branch to understand how geometric complexity affects ecosystems. (J. Burau, USGS)	\$254	DWR-\$74 USGS-\$94	DWR ^b -\$86
2. Field survey of <i>Microcystis aeruginosa</i> bloom biomass and toxicity a. (2010-079) b. Mandates – none c. POD d. Delta Science	This survey will measure the bloom biomass and toxicity of <i>Microcystis aeruginosa</i> . Sampling will be closely connected to fish surveys to examine if there is a link between <i>Microcystis</i> biomass and toxicity and its direct effects on zooplankton and fish. This work was started with POD funding and is now funded by a two-year Delta Science (formerly CALFED Science) grant. If it is determined that spatial and temporal coverage of <i>Microcystis</i> sampling needs to be increased, the POD will supplement the above program with additional field collections. Deliverables: a) Semi-annual reports, December 2009 and June 2010; b) oral or poster presentation, March 2010; c) peer reviewed journal submission or IEP newsletter, June 2010. (P. Lehman and D. Riordan, DWR)	\$250	\$0	DSP ^k \$250
3. Zooplankton fecundity and population structure a. (2010-044) b. Mandates – none c. POD	Effort will examine archived samples from the IEP zooplankton monitoring survey to determine some population dynamics parameters of both <i>Pseudodiaptomus forbesi</i> and <i>Eurytemora affinis</i> . This information is needed to examine what factors could be limiting zooplankton in Suisun Bay. Deliverables: a) IEP workshop or DELTA Science workshop presentation. (W. Kimmerer, SFSU-RTC)	\$41	\$0	DWR POD \$41

PROGRAM ELEMENT	ELEMENT DESCRIPTION	COST	FUNDING SOURCE	
			IEP Core	IEP POD and Coordinated
C. ECOLOGICAL PROCESSES - Continued				
4. Synthetic analysis a. (2010-046) b. Mandates – none c. POD	This is a collaborative effort between the POD and UCSB National Center for Ecological Analyses and Synthesis (NCEAS), which provides the setting, tools and staff support for individual scientist and working groups to conduct analysis and synthesis of complex ecological data. The focus will be the identification and testing of hypotheses about individual and interacting stressor(s) associated with the observed POD trends. Deliverables: Three different working groups facilitated by NCEAS are targeting submission of at least nine journal articles before completion of this agreement. Two manuscripts have already been published and one is in review. (G. Castillo, USFWS; L. Brown, USGS; T. Sommer and F. Mejia, DWR; L. Grimaldo and F. Feyrer, USBR). Note: POD funding supports UCSB NCEAS project leadership and facilitation and IEP agency support staff. The work by external working group members is entirely voluntary.	\$751	\$0	USBR POD \$449 DWR POD \$302
5. Effects of Cache Sl. On N. Delta pelagic habitat a. (2010-132) b. Mandates – none c. POD	The proposed study will examine the hydrodynamic “footprint” of Liberty Island, the major body of water in the Cache Slough Complex. Flux of phytoplankton out of Liberty Island will be studied as part of the Breach III study, providing a good opportunity to examine the fate of the exported material. We suspect that transport of biological and physical constituents from Liberty Island has a dominant effect on the channels of the Cache Slough Complex and perhaps a large area of the north Delta. The study approach will include both continuous monitoring and 24-hour flux studies. Deliverables Presentations at IEP meetings and peer-reviewed journal articles as appropriate (P. Lehman, T. Sommer, G. Benigno, DWR; J. Burau, USGS)	\$419	USGS-\$95	USBR POD \$218 DWR POD \$106
6. Effects of wastewater treatment a. (2010-138) b. Mandates – none c. POD	1) Do WWTP effluents affect phytoplankton primary production and community composition in the Delta? 2) Do different wastewater treatment levels (secondary vs. tertiary) result in different phytoplankton responses? Field studies will include transect surveys of nutrients and phytoplankton as well as phytoplankton "grow-out" enclosures experiments at or near the Sacramento and San Joaquin WWTPs. Laboratory experiments with added effluent, ammonium, and nitrate will complement the field study. Deliverables: Annual reports to the SWRCB, DSP, POD MT, IEP Newsletter articles, presentations as appropriate, and a journal article. (R. Dugdale, A. Parker, F. Wilkerson, SFSU,RTC) WHY IS THIS IN ESTUARINE MONITORING, NOT PROCESSES?	\$92	\$0	DSP ^k \$92
7. 3-D modeling of the Delta a. (2010-141) b. Mandates – none c. POD	This study will address the entrainment of delta smelt in the export facilities and the exposure of delta smelt to toxins and available food items given that location controls the exposure of delta smelt to these items. The UnTRIM Bay-Delta model will be extended throughout portions of the Delta not included in the present UnTRIM model. The resulting tool will predict a large range of processes including hydrodynamics, salt intrusion, movement of organisms and sediment transport. Deliverables: a) IEP Workshop presentation, February 2010; b) final technical report, May 2010. (E. Gross)	\$0	\$0	\$0

PROGRAM ELEMENT	ELEMENT DESCRIPTION	COST	FUNDING SOURCE	
			IEP Core	IEP POD and Coordinated
C. ECOLOGICAL PROCESSES - Continued				
8. BREACH III a. (2010-147) b. Mandates – none	The purpose of this study is to provide a predictive level of understanding about (1) how abiotic and biotic factors in a restoring wetland (levee breach), Liberty Island and Little Holland Tract, control vegetation colonization and expansion and subsequent responses by native fish and wildlife, and (2) how restoration processes influence local flooding and levee erosion over the course of the restoration. Models being developed will be valuable in interpreting flood conveyance scenarios as the island evolves. Deliverables: a) Quarterly progress reports; b) Restoration Practitioners and Resource Managers Modeling Workshop; c) final task report; d) Liberty Island Basin Model; e) several peer-reviewed journal articles. (P. Hrodey, USFWS and C. Simenstad, UW)	\$1,900	\$0	DSP ^k ERP \$1,900
9. Declines in the California Delta, the book a. (2010-149) b. Mandates – none c. POD	This work is intended to produce a book that would accompany and complement the comprehensive 2010 POD synthesis report and the specialized project reports and journal publications by individual POD principal investigators. This book will follow and update previous books bringing together results from studies in the San Francisco estuary (Conomos 1979, Hollibaugh 1996). It will be intended for a scientific audience but will also effectively communicate important conclusions to non-scientist readers. In contrast to reports, the book would consist of contributed chapters authored by individuals or groups of POD PI's. This will allow for an in depth presentation and discussion of results than can be summarized in reports. (L. Brown, A. Mueller-Solger, many others)	\$0	\$0	\$0
10. Plankton dynamics in the Delta, trends and interactions a. (2010-150) b. Mandates – none c. POD	This project seeks to identify: (1) long-term spatial and temporal patterns in zooplankton; (2) long-term interactions between primary producers and zooplankton; and (3) biotic interactions in the plankton community. Analyses of historical data, trends, seasonal variability, and food webs will be conducted using a variety of techniques appropriate to each analysis area. Deliverables: Annual progress report, presentations at local and national meetings, final research report summarizing results and accomplishments and a peer-reviewed journal publication. (M. Winder, UCD)	\$83	\$0	DSP ^k \$83
11. Environmental controls of the distribution of harmful algae and their toxins a. (2010-152) b. Mandates – none c. POD	This project will determine the distribution of harmful algae and their toxins in San Francisco Bay and characterize the environmental parameters that control toxin production by harmful algae in the Bay. It will combine monitoring and mapping of biological, chemical, and physical components throughout the Bay and Delta along with controlled manipulations to examine specific parameters likely to control growth and toxicity in the natural population of these species. Deliverables: Monthly monitoring and data collection of harmful algae and toxins in the SF Bay and Delta, In-situ incubation experiments conducted seasonally, presentations, publications, monthly report cards describing the health of the Bay and monthly reports of elevated levels of toxins. (C. Mioni, UCSC)	\$82	\$0	DSP ^k \$82

PROGRAM ELEMENT	ELEMENT DESCRIPTION	COST	FUNDING SOURCE	
C. ECOLOGICAL PROCESSES - Continued			IEP Core	IEP POD and Coordinated
12. Comparison of nutrient sources, phytoplankton growth and species composition a. (2010-153) b. Mandates – none c. POD	This study focuses on the effects of the two main wastewater treatment plants (WWTPs) in the Delta: the Sacramento Regional WWTP and the Stockton WWTP. Field studies will include transect surveys of nutrients and phytoplankton along the Sacramento and San Joaquin rivers and as well as phytoplankton "grow-out" enclosures experiments. Questions include: 1) How do differences in nutrient and phytoplankton community composition between the San Joaquin and Sacramento rivers influence conditions downstream? 2) How do phytoplankton growth rates and community structure respond to the differences in nutrient concentrations in the SJ River vs. the Sac River, resulting from differences in wastewater treatment? Deliverables: Data and technical reports, presentations at IEP meetings or the Delta Science Conference, publications in peer-reviewed journals. (R. Dugdale, A. Parker and F. Wilkerson, SFSU; Anke Mueller-Solger, DSP)	\$338	\$0	DSP ^k \$338
13. Distribution of green and white sturgeon in the Delta a. (2010-156) b. Mandates – none		\$525	USACE \$525	\$0
14. Comparison of 1 and 2-D hydrodynamic and water quality models of the Delta a. (2010-163) b. Mandates – none	The purpose of this study is to compare the performance of diverse modeling approaches in 1- and 2-D to simulate the flow and transport in the Sacramento-San Joaquin Delta, to identify model improvement needs, and Delta locations with poorer flow representation. The project will define <i>seven</i> flow scenarios (<i>four</i> corresponding to low and high flows for which field data are available) to compare model performance, for a common set of boundary conditions. <i>Two</i> more scenarios will correspond to events of low and high pumping, to be defined. All models will be run with the same boundary conditions, the same domain and with the same flow forcing mechanisms. An additional scenario of sea level rise will be included in the analysis. Models to be compared will include: RMA 1- and 2-D models, RMA-TAM, and DSM2. Deliverables: Final report results, June 2010 and a presentation to CWEMF and DSM2 users' group meetings. (F. Bombardelli, UCD)	\$59	\$0	SWRCB POD \$59
15. Remote sensing mapping and monitoring of Microcystis and turbidity in the upper SFE a. (2010-171) b. Mandates – none c. POD	This study will 1) collect sensor data and water samples along gradients of turbidity and Microcystis concentrations for remote sensing model parameterization; 2) use EMP cruises to collect low frequency water quality samples for model implementation and map validation; and 3) map total suspended solids and Microcystis biomass using Landsat images. Deliverables: Data, map and image files. Quarterly progress reports and a final report. One peer-reviewed manuscript describing the spatial and temporal variation of Microcystis in relation to turbidity. A how-to training manual to the procedures developed for future Landsat data analysis. (S. Ustin and E. Hestir, UCD; P. Lehman, DWR and B. Downing, USGS)	\$134	\$0	USBR POD \$134

PROGRAM ELEMENT	ELEMENT DESCRIPTION	COST	FUNDING SOURCE	
			IEP Core	IEP POD and Coordinated
C. ECOLOGICAL PROCESSES - Continued				
16. Effect of seasonal variations in flow on nutrients, organic matter and phytoplankton a. (2010-175) b. Mandates – none c. POD	Existing chemical and isotopic data from USGS, SFSU, CVRWQCB, and hydrodynamic information from DSM2-Qual and RMA-2D modeling will be used to determine nitrification rates and how changes in flows and relative amounts of water from different sources, and the location of X2 in the fall, relate to sources, fate and transport of constituents important to the base of smelt and other food webs (nutrients, chlorophyll and organic matter) in the northern San Francisco Bay, Delta, Cache Slough and lower Sacramento River. Deliverables: Quarterly progress reports, a presentation at an IEP forum (e.g. EET or the annual workshop), a talk or poster presentation at Delta Science Conference, AGU or other national conference, electronic copy of the results database and one or more USGS-approved journal article. (C. Kendall, USGS)	\$42	\$0	USBR POD \$42
17. Influence of water quality and SAV on LMB distribution, diet composition and predation a. (2010-176) b. Mandates – none c. POD	This electrofishing study builds on a previously funded IEP study to determine how abiotic and biotic factors influence largemouth bass distribution and abundance and their impacts on delta smelt and other pelagic fishes. The extension will add 3 – 5 additional Sacramento River channel locations to see if LMB predation on delta smelt can be detected and what the relationship between SAV species composition and biomass is with invertebrate and fish species biomass and composition. Deliverables: Oral presentations, IEP Newsletter articles, final project report and three peer-reviewed journal articles by June 2011. (L. Conrad and P. Crain, UCD)	\$173	\$0	USBR POD \$173
18. Causes of variation in NH4 sources, sinks and contributions to algal productivity using a multi-isotopic approach a. (2010-179) b. Mandates – none c. POD	This study will use a sophisticated and innovative multiple stable isotope approach to analyze existing and new samples collected along lower Sacramento and San Joaquin River transects, combined with hydrodynamic modeling and application of novel phytoplankton enumeration (FlowCam) to determine what the seasonal contributions and effects of NH4 from SRWTP, tributary, and other sources are to critical habitats and the Bay-Delta food web. Other aspects will address variation in nitrification rates, identification of sources and sinks, and quantification of NH4 from WWTP's versus agricultural drains. Deliverables: (C. Kendall, M. Young, S. Silva, USGS; P. Lehman, DWR)	\$242	\$0	USBR POD \$242
19. Hydrodynamic and particle tracking modeling of delta smelt habitat and prey a. (2010-180) b. Mandates – none c. POD	This project will use existing 3D hydrodynamic modeling tools (UnTRIM) and laboratory data to better understand the variability of physical fish habitat with X2 and the population dynamics of calanoid copepods. Does habitat area and volume vary with freshwater flow? What patterns of vertical swimming by planktonic organisms in the LSZ result in tidal patterns of vertical distributions similar to those observed? Deliverables: Two peer-reviewed journal articles, presentations at IEP EET, CWEMF, State of the Estuary and/or Delta Science Conference. (E. Gross and M. MacWilliams, URM)	\$339	\$0	USBR POD \$339
		5,724		

PROGRAM ELEMENT	ELEMENT DESCRIPTION	COST	FUNDING SOURCE	
			IEP Core	IEP POD and Coordinated
D. ESTUARINE MONITORING				
1. Mitten crab monitoring and reporting a. (2010-026) b. Mandates – none	This element contributes to the Aquatic Nuisance Species hotline reporting system for mitten crab collections and observations and implements summer surveys of mitten crab distribution and abundance. The main part of this element will be funded and staffed by USFWS exotic species personnel with some sharing of resources from IEP. Deliverables: Quarterly reports are submitted to the FWS. (R. Smith, USFWS)	\$28	USFWS \$28	\$0
2. Benthic macrofauna biomass trends a. (2010-065) b. Mandates – none c. POD	This study will measure and examine the biomass of benthic organisms collected quarterly from 1975-2004. The information will improve our understanding of benthos roles in the estuary, including feeding potential of various functional groups, availability and transmission of contaminants bioaccumulated in benthos, and trends in production. The cost to do this work will be absorbed in the Environmental Monitoring Program. Deliverables: a) DSP final report, October 2010; b) Delta Science Conference presentation, October 2010. (K. Gehrts, DWR)	\$40	\$0	DSP ^k \$40
3. Investigation of power plant impacts a. (2010-087) b. Mandates – none c. POD	Analyses will be conducted for trends in fish entrainment and impingement at power plants. This effort will analyze whether or not pelagic fishes are vulnerable to entrainment and thermal effects and the scale of impact these power plants have on pelagic fish populations. Deliverables: a) Monthly entrainment reports; b) Final report, May 2010. (C. Raifsnider, Tenera and B. Schreier, DWR).	\$25	\$0	DWR POD \$25
4. Field support of all POD activities a. (2010-089) b. Mandates – none c. POD	This element provides the funding for the supplemental collections and sampling of water, fish and zooplankton needed for various POD activities. Deliverables: Field sample collection for water toxicity. (Various Mates and Technicians, DFG).	\$68	\$0	USBR POD \$68
5. Corbula salinity tolerance, distribution and grazing rates a. (2010-076) b. Mandates – none c. POD	Salinity tolerance of Corbula clam will be measured in a controlled laboratory setting to evaluate if increases in salinity level in Suisun Bay influenced the change in distribution of Corbula. Two surveys will also be conducted to assess distribution, abundance and size (and therefore grazing rates) of benthic bivalves. Deliverables: Presentation at IEP Workshop, spring 2010. (J. Stillman, SFSU-RTC)	\$0	\$0	\$0
6. Fish Community Monitoring a. (2010-113) b. Mandates – NMFS BO (2006)	Bottom trawling and entrainment sampling are conducted in association with dredge operations conducted by the USACE in the Sacramento and San Joaquin Deepwater Ship Channels. This fish community monitoring is designed to determine a) that maintenance dredging will result in take of listed and other fishes through direct dredge entrainment; b) if there is a correlation between presence of fish in the dredging areas and entrainment by the dredge; and c) if differential use of the water column results in different entrainment levels among fishes present in the project areas. Deliverables: An annual report produced by SWCA is provided to the USACE. (T. Toland)	\$125	USACE \$125	\$0

PROGRAM ELEMENT	ELEMENT DESCRIPTION	COST	FUNDING SOURCE	
			IEP Core	IEP POD and Coordinated
D. ESTUARINE MONITORING - Continued				
7. Feasibility of using towed imaging systems a. (2010-130) b. Mandates – none c. POD	This study will examine limitations of the gear including turbidity, velocity, and variation in fish size. If technical issues can be overcome, a more detailed study in 2010 will address questions such as 1) Are towed video imaging systems a feasible technique for measuring the abundance and distribution of pelagic fishes in the Delta and Estuary? 2) If so, what species, life stages, and regions would be most suitable for this technique? Deliverables: a) Progress reports; b) presentation at IEP Workshop Series, Tools for the 21 st Century, October 2009 and future IEP meetings. (G. Benigno, DWR and D. Portz, USBR)	\$201	\$0	DWR POD \$41 USBR POD \$160
8. Use of acoustics to estimate trawl dimensions a. (2010-131) b. Mandates – none c. POD	This study will employ the use of a commercially-available transmitter, transponder, computer system to calculate dimensions of a net while the net is being towed during routine monitoring surveys and special deployments. What are the dimensions – particularly the opening – of a midwater trawl? The information should improve the accuracy of abundance indices and abundance estimates for Delta smelt and other fishes susceptible to the trawl and may suggest appropriate alternative configurations and/or deployment of trawls. Deliverables: a) memos following deployment and a final report with tables of pertinent trawl dimensions and recommendations; b) IEP Newsletter articles and poster presentations as appropriate; c) IEP Workshop oral presentation, May 2010. (J. Messineo, DFG)	\$11	\$0	USBR POD \$11
9. Effects of <i>Microcystis</i> on threadfin shad a. (2010-139) b. Mandates – none c. POD	The elements of this task will evaluate: 1) Acute toxicity of microcystins on larval and juvenile fish; 2) Water exposure of larval and juvenile threadfin to environmentally-relevant concentrations of microcystins and dietary exposure of larval and juvenile threadfin to single-celled and colonial forms of microcystins; 3) examine sublethal <i>Microcystis</i> studies on TFS including growth, histopathological, and reproductive effects, 4) determine bioaccumulation and fate of microcystins in threadfin. Deliverables: a) Semi-annual progress reports, December 2009 and June 2010; b) oral progress report to POD MT, as requested; c) presentation at IEP workshop, May 2010; d) IEP newsletter or professional journal, June 2010. (S.Teh, UCD and P. Lehman, DWR)	\$178	\$0	DWR POD \$178
		\$676		

PROGRAM ELEMENT	ELEMENT DESCRIPTION	COST	FUNDING SOURCE	
			IEP Core	IEP POD and Coordinated
E. FISH FACILITIES				
1. TFCF efficiency evaluation for delta smelt a. (2010-TF1) b. Mandates – CVPIA, OCAP (ESA)	This element will continue assessment of the existing TFCF for delta smelt salvage efficiency. No assessment for delta smelt has ever been conducted at the TFCF. This information will be helpful towards establishing baseline conditions for present TFCF operation. (M. Bowen, USBR)	\$92	\$0	USBR ^c \$92
2. Evaluation of an above ground holding tank and pumped bypass system a. (2010-TF14) b. Mandates – CVPIA, DSP	This study element evaluates and assesses an above ground holding tank as an alternative to the presently used recessed collection tanks at the south delta fish facilities. An above ground holding tank could allow for better separation of fish and debris while awaiting transport to the release sites by reducing stress and predation. (C. Demoyer)	\$130	\$0	USBR ^c \$130
3. Evaluation of holding tank influences delta smelt - Report a. (2010-TF10) b. Mandates – CVPIA, OCAP (ESA)	This study element will complete recessed holding tank swirl tests to assess stress associated with the existing recessed holding tanks located at the south delta fish facilities. This information is useful in conjunction with CHTR study efforts. (C. Karp, USBR)	\$15	\$0	USBR ^c \$15
4. TFCF efficiency for white sturgeon a. (2010-TF3) b. Mandates – CVPIA, OCAP (ESA)	This study element will allow for continued assessment of the existing TFCF for white sturgeon salvage efficiency. No assessment for salmon has been conducted since the facility was first built in the 1950s. This information will be helpful towards establishing baseline conditions for present TFCF operation. (C. Karp, USBR)	\$83	\$0	USBR ^c \$83
5. TFCF efficiency for Chinook salmon a. (2010-TF2) b. Mandates – CVPIA, OCAP (ESA)	The salmon efficiency evaluation work involves running a series of trials to determine present day salvage efficiency for Chinook salmon at the federal TFCF. Tests will be run under varying different pumping (export) scenarios. (C. Karp, USBR)	\$89	\$0	USBR ^c \$89

PROGRAM ELEMENT	ELEMENT DESCRIPTION	COST	FUNDING SOURCE	
			IEP Core	IEP POD and Coordinated
E. FISH FACILITIES - Continued				
6. Evaluation of the use of CO2 to remove predators a. (2010-TF6) b. Mandates – CVPIA, OCAP (ESA)	This study element will evaluate the use of CO2 as an aid in the removal of predators from the bypass system at the TFCF. (B. Wu, USBR)	\$70	\$0	USBR ^c \$70
7. Predator impacts on salvage rates a. (2010-TF8) b. Mandates – CVPIA, OCAP (ESA)	This study will help determine whether the existing predator load in the primary channel of the TFCF is significantly reducing the number of fish reaching the recessed holding tanks. Paired whole facility efficiency trails will be performed with high and low predator loads. (B. Bridges, USBR)	\$72	\$0	USBR ^c \$72
8. Fish behavior at the mitten crab traveling screen a. (2010-TF13) b. Mandates – CVPIA	This study element will allow for completion of fish passage assessment associated with operation of the mitten crab traveling screen located at the TFCF. This is a requirement placed on Reclamation for continued use of the traveling screen as part of the TFCF operations. The screen is also being assessed for debris removal in addition to mitten crab removal. (C. Karp, USBR)	\$48	\$0	USBR ^c \$48
9. TFFIP website a. (2010-TF24) b. Mandates – CVPIA	This activity allows for continued maintenance of Reclamation’s Tracy Research Program web site. The website contains all previously released Tracy Volume Series Reports as well as water chemistry data and current year program information. It also provides links to other relevant sites. (D. Portz, USBR)	\$63	0	USBR ^c \$63
10. Tracy Series Reporting a. (2010-TF23) b. Mandates – CVPIA	This activity provides for publishing of Reclamation’s Tracy Research Volume Series Reports. To date, over 27 volumes have been published. (D. Portz, USBR)	\$138	0	USBR ^c \$138
11. Evaluation of debris removal at the from circular holding tanks a. (2010-TF11) b. Mandates – CVPIA	This study will evaluate mechanical debris removal from the circular holding tanks. (C. Demoyer, USBR)	\$93	0	USBR ^c \$93

PROGRAM ELEMENT	ELEMENT DESCRIPTION	COST	FUNDING SOURCE	
			IEP Core	IEP POD and Coordinated
E. FISH FACILITIES - Continued				
12. Evaluation of holding tank screen entrainment at TFCF a. (2010-TF9) b. Mandates – CVPIA	The primary purpose of this study is to determine the TFCF holding tank screen entrainment efficiency for four size classes of juvenile delta smelt. The results will help determine how many delta smelt are being lost through the screens and how this effects fish salvage numbers and fish loading densities. (R. Reyes, USBR)	\$65	0	USBR ^c \$65
13. Evaluation of striped bass predators at TFCF a. (2010-TF7) b. Mandates – CVPIA	This study will help attempt to quantify the number of predator fish that are located between the trashrack structure and the primary louvers. This information will be helpful in determining their impact to salvage of fish at the TFCF. Predators will be released into the primary channel and captured using the Peterson mark-recapture technique. (R. Bark, USBR)	\$85	0	USBR ^c \$85
14. Bates Table Evaluation a. (2010-TF5) b. Mandates – CVPIA, OCAP	Evaluation of the current Bates Table used for guidance when holding and transporting fish to release sites. The Bates Table was originally produced in the 1960s and is in need of reassessment due to changing conditions. The information can be used by both south delta fish facilities for improved guidance and is linked to CHTR studies. (Z. Sutphin, USBR)	\$87	0	USBR ^c \$87
15. TFCF fish salvage efficiency for splittail a. (2010-TF4) b. Mandates – CVPIA, CALFED ROD	This study will assess present day TFCF for overall splittail salvage efficiency. (C. Karp, USBR).	\$86	0	USBR ^c \$86
16. Biology building furniture a. (2010-TF25) b. Mandates – CVPIA	The purchase of furniture is needed for occupancy of the newly constructed biology building. (R. Silva, USBR)	\$119	0	USBR ^c \$119
17. Evaluation of debris removal from circular holding tanks a. (2010-TF12) b. Mandates – ESA, CVPIA, CALFED ROD	This study will assess how well debris can be removed from the holding tanks via lifting of the holding tank screens. (B. Wu, USBR)	\$60	0	USBR ^c \$60

E. FISH FACILITIES - Continued			IEP Core	IEP POD and Coordinated
18. Evaluation/Design of electric pulse fish crowders with TFTF development a. (2010-TF15) b. Mandates – CVPIA	This study will provide valuable information related to use of electric fish crowders (pulsed electric fields) as a means of moving fish along or preventing fish residency. (C. Demoyer, USBR)	\$73	0	USBR ^c \$73
19. Design and evaluation of strobe lights as a predator deterrent a. (2010-TF16) b. Mandates – ESA, CVPIA, CALFED ROD	This study will assess how strobe lights can keep larger predatory fish away from smaller fish. (D. Portz, USBR).	\$73	0	USBR ^c \$73
20. Fish Facility history of maintenance and operational changes a. (2010-107) b. Mandates – none c. POD	This project will identify changes that have occurred at the state and federal fish facilities from 1956 to 2006 that may have impacted the reported number of salvaged fish. Changes will be documented in the form of metadata. (B. Bridges, USBR and J. Morinaka, DFG)	\$50	0	USBR ^c \$50
21. Evaluation of new fish transfer bucket a. (2010-TF17) b. Mandates – ESA, CVPIA, CALFED ROD	This study will assess how effective the new fish transfer bucket is for transferring fish from the bucket to the fish haul trucks. (C. Karp, USBR).	\$73	0	USBR ^c \$73
22. Evaluation of DIDSON for underwater observation a. (2010-TF18) b. Mandates – ESA, CVPIA, CALFED ROD	This activity will utilize the DIDSON underwater camera as a tool for assisting with collection of fishes from other studies. (S. Hiebert, USBR).	\$66	0	USBR ^c \$66

E. FISH FACILITIES - Continued			IEP Core	IEP POD and Coordinated
23. Assessment of modifications to the bypass system a. (2010-TF19) b. Mandates	This effort will focus on closing bypasses to improve hydraulic control to help maintain bypass criteria. (C. Demoyer, USBR).	\$72	0	USBR ^c \$72
24. Evaluation of secondary channel screened water system a. (2010-TF20) b. Mandates – Regulatory Agency Request	This study will evaluate the screened water system to see how well the system alleviates debris collection in the secondary system and what types of impacts related to fish passage would arise. (K. Zehfuss, USBR)	\$45	0	USBR ^c \$45
25. Water quality monitoring of incoming flows a. (2010-TF21) b. Mandates – CVPIA	This activity will continue the collection of water quality data at the entrance to the TFCF for use as baseline data for studies and operations within the TFCF. (B. Bridges, USBR)	\$40	0	USBR ^c \$40
26. TFCF fish taxonomy a. (2010-TF22) b. Mandates – CVPIA	This activity will continue the collection and publishing of delta fish identification. (R. Reyes, USBR)	\$55	0	USBR ^c 55
27. Pilot mark-recapture to estimate prescreen fish loss a. (2010-140) b. Mandates – none	This activity will complete the report writing needed to communicate the results of the adult delta smelt mark-recapture experiments that were conducted at the Skinner fish Facility and Clifton Court Forebay. (G. Castillo, FWS)	\$15	0	DSP ^k \$15
		\$1,957		

F. CONTAMINANT EFFECTS			IEP Core	IEP POD and Coordinated
1. Contaminants and biomarkers work a. (2010-127) b. Mandates – none c. POD	The overall goal is to assess the potential for contaminated water to contribute to the observed declines of pelagic species in the Delta. The study will build on the results of the the Delta-wide POD contaminants monitoring project that was initiated in 2006 to investigate toxicity of Delta water samples to invertebrates and early life stages of fish species of concern. Deliverables: a) Semi-annual progress reports; b) oral progress reports to POD MT, September 2009; b) manuscript submitted to peer-reviewed journal, and/or summer 2009 IEP Newsletter. (I. Werner, UCD)	\$453	\$0	DWR POD \$453
2. Selenium analysis a. (2010-145) b. Mandates – none c. POD	The primary objective is to establish background selenium levels in the freshwater delta. Previously collected fish will be analyzed and contaminant levels will be compared with concentrations believe to harm wildlife and people. The data may also be helpful should the hydrology of the estuary change as a result of Delta Vision and the amount and residence time of San Joaquin River water increased in the Delta. Deliverables: Analysis results due in 2008, final report due in summer 2009. (DFG, Moss Landing)	\$0	\$0	\$0
3. Contaminant synthesis 2 – impacts of contaminants and discharges a. (2010-146) b. Mandates – none c. POD	This study will answer the following questions: 1) What are the potential impacts of discharges from Delta islands on beneficial uses in the Delta? 2) Are there data gaps with respect to ammonia concentrations and potential effects to species residing in the Delta? Deliverables: a) Review and synthesis of existing ambient monitoring programs; b) review and synthesis of data and studies on the effects of ammonia on aquatic species. (M. Johnson, UCD).	\$200	\$0	SWRCB POD \$150 DWR POD \$50
4. Spatial and temporal quantification of pesticide loadings a. (2010-154) b. Mandates – none c. POD	This project uses a weight-of-evidence approach to identify major sources of pesticide loadings to the Sacramento River, San Joaquin River, and Bay-Delta estuary. The study employs a combination of tools, including geographical information system (GIS) analysis, simulation modeling, and an evaluation of existing in-stream monitoring. Study results are intended to: 1) provide further knowledge of the fate and transport of agricultural chemicals (e.g., copper, organophosphates) and emerging pesticides (e.g., pyrethroids); 2) match results to the location of sensitive species critical habitats; 3) identify and rank pesticide source areas; 4) evaluate implications of future pesticide use; 5) aid in developing management plans; 6) support future monitoring programs; 7) link results to fish life cycle models; and 8) provide a data-link to support other water quality models and population models.	\$235	\$0	DSP \$235

F. CONTAMINANT EFFECTS - Continued			IEP Core	IEP POD and Coordinated
5. Acute and chronic toxicity of contaminant mixtures and multiple stressors a. (2010-157) b. Mandates – none c. POD	This study will address the mixture toxicity of several contaminants of concern in the Delta in the presence and absence of other environmental stressors (temperature, food deprivation). A sensitive resident invertebrate species, the amphipod <i>Hyalella azteca</i> , will be used as test organism, and toxicity will be quantified by means of acute (10-d survival) and chronic (growth, swimming ability) endpoints. Deliverables: Peer-reviewed study plan, progress report and/or participation in POD CWT and a final report by February 2011. (I. Werner, UCD)	\$40	\$0	SWRCB POD \$40
6. Advancing procedures for extracting and recovering chemicals of concern a. (2010-158) b. Mandates – none c. POD	This study will address a critical need to develop better techniques to extract and recover organic chemicals in sediment interstitial water, as part of the TIE Phase II toxicant identification process. The study will implement a set of tests to evaluate better extraction and elution techniques, and is designed to complement other ongoing efforts. Deliverables: Peer-reviewed study plan, progress report and/or participation in POD CWT and a final report by February 2011. (R. Tjeerdema, UCD)	\$40	\$0	SWRCB POD \$40
7. Investigation of pyrethroid pesticides in the American River a. (2010-159) b. Mandates – none c. POD	This study will explore if storm water runoff to the American River is toxic to <i>H. azteca</i> . Samples will be collected during three separate rain events at a minimum of four sites on the American River below Folsom Dam. Each river site will be sampled between two and four times during each rain event. Samples will be collected at up to five of the largest discharges of runoff to the American River below Folsom Dam. Each discharge site shall be sampled two times during three separate rain events, yielding up to 30 samples. All samples will undergo chemical analysis for pyrethroids. River samples (not discharge samples) will be tested with <i>H. azteca</i> , and toxic samples will undergo toxicity identification evaluations and follow-up sampling. Deliverables: QAPP and monitoring plan, sample collection, electronic data (July 2010), progress reports and/or participation in the POD CWT, final report (Feb 2011) and a peer-reviewed journal article if appropriate. (D. Weston)	\$100	\$0	SWRCB POD \$100
8. Full life-cycle bioassay assessment of chronic exposure of Pseudodiaptomus to NH4 a. (2010-160) b. Mandates – none c. POD	The study will use full life-cycle tests to assess the effects of chronic exposure to ammonia for the estuarine copepod <i>P. forbesi</i> . By performing a 30 day bioassay at 25°C, eggs will hatch and grow up to all life stages, therefore facilitating counting at test termination. Copepods have an easily distinguishable sexual morphology and their egg sacs are external, making clutch sizes easy to count. Such characteristics will allow for the assessment of life table parameters and sublethal ammonia effects on the reproduction of this copepod in a period of 30 days. Deliverables: Draft final report (March 2010), presentation of results at the POD CWT and a final summary report (April 2010). (S. Teh, UCD)	\$77	\$0	SWRCB POD \$77

F. CONTAMINANT EFFECTS - Continued			IEP Core	IEP POD and Coordinated
9. SRWTP effluent toxicity testing with delta smelt and rainbow trout a. (2010-161) b. Mandates – none c. POD	This study will conduct toxicity testing (including reference toxicants) with delta smelt to determine the range of SRWTP effluent toxicity. In addition, larval rainbow trout will be used in concurrent toxicity tests to evaluate if they could be used as a surrogate species for delta smelt in toxicity testing and enable the application of TIE's when needed. Deliverables: Final draft report (October 2010). (I. Werner, UCD)	\$65	\$0	SWRCB POD \$65
10. Variability of nutrients in Suisun Bay in relation to spring phytoplankton blooms a. (2010-164) b. Mandates – none c. POD	This study would be an extension of earlier work on the effect of ammonia on phytoplankton blooms in the estuary. The purpose of this project is to better understand the variability of nutrients in Suisun Bay, their relation to spring phytoplankton blooms and sources of ammonium. Questions include: 1) How do nutrients vary in Suisun Bay temporally and spatially and how does this relate to spring phytoplankton blooms? What are the major sources of ammonium in Suisun Bay? Deliverables: Data delivered to SWAMP DMT at Moss Landing Marine Labs in SWAMP format, August, 2010. (R. Dugdale, SFSU)	\$25	\$0	SWRCB POD \$25
11. Ammonia sampling program for the San Joaquin Delta a. (2010-165) b. Mandates – none c. POD	The purpose of this study is to collect water quality data, including total and unionized ammonia, primarily in the lower Sacramento River and northern Delta to determine whether ambient concentrations are potentially toxic to sensitive resident aquatic organisms and to support development of an ammonia fate and transport model. A spatial emphasis is placed on the lower Sacramento River and northern Delta as the biological risk from elevated ammonia is likely to be greatest here. However, other areas of the Estuary are also proposed for monitoring as it is likely that the Sacramento Regional Wastewater Treatment Plant is not the only source of ammonia. Deliverables: Regional Board staff draft interpretive report (May 2010) and a final report 30 days after receiving comments from the POD CWT. (R. Dahlgren, UCD and C. Foe, CVRWQCB)	\$68	\$0	SWRCB POD \$68
12. Role of pyrethroid pesticides in limiting prey availability for delta smelt a. (2010-172) b. Mandates – none c. POD	This study will conduct field sampling, chemical analyses, toxicity tests of field samples at ambient temperatures (Hyaella, Pseudodiaptomus and Eurytemora) and zooplankton monitoring to determine if pyrethroid pesticides reduce populations of copepod prey in the Cache Sough region during February through June. Deliverables: quarterly reports, final report in the form of one or more publishable manuscripts, an IEP newsletter article, and at least two oral presentations at an IEP Workshop, regional or national toxicity conference, or to other state agencies or stakeholders. (D. Weston, UCB)	\$158	\$0	POD \$158

F. CONTAMINANT EFFECTS - Continued			IEP Core	IEP POD and Coordinated
13. Distribution, concentration and fate of NH4 in the Sac R. and LSZ a. (2010-173) b. Mandates – none c. POD	Water samples collected along river transects from spring through fall will be incubated with 15N labeled ammonium to determine nitrification rates, in concert with measurements of NH4+ concentration and phytoplankton NH4+ uptake to determine the distribution, fate, concentration and effects of contaminants, including ammonium, that may have lethal or sublethal effects on delta smelt and their food items. How are these affected by flow variability? Deliverables: Progress report at the end of year 1, presentations, IEP Newsletter articles. (R. Dugdale and A. Parker, SFSU; C. Kendall, USGS)	\$77	\$0	POD \$77
14. Influence of elevated NH4 on phytoplankton physiology in the SFE during fall a. (2010-173) b. Mandates – none c. POD	This study will explore the differences in nutrients and phytoplankton dynamics in the Sacramento and San Joaquin rivers and how variation in irradiance via changing river flow modulates NH4 effects. Measurements of phytoplankton primary production (C-13 incubations) and NO3 and NH4 uptake (N-15 incubations) along river transects will determine if NH4 plays a bottom-up role in the delta smelt food web by modulating phytoplankton growth and if this interacts with light effects. Deliverables: Presentation at IEP EET (or equivalent) meeting and IEP workshop, IEP Newsletter article and one peer-reviewed journal article. (A. Parker, R. Dugdale and F. Wilkerson, SFSU).	\$114	\$0	POD \$114
15. Novel molecular and biochemical biomarker work a. (2010-183) b. Mandates – none c. POD	This study will apply, test and refine newly developed biomarker tools using archived delta smelt from previous toxicity tests. This will add new sublethal endpoints to toxicity tests with delta smelt and help pinpoint locations and contaminants of concern. It will also produce and test novel, cutting-edge tools for exploring and monitoring the links between contaminants and life history parameters such as metabolism, growth and reproduction. This will provide important insights into the role of contaminants in the decline of delta smelt and information needed for delta smelt life history models. Deliverables: Progress reports and/or participation in the POD CWT, final report by September 2011, one or more IEP Newsletter articles(s) and one or more peer-reviewed publication. (I. Werner)	\$220	\$0	USBR POD \$220
		\$1,872		

TOTAL FOR SPECIAL STUDIES:	\$ 15,657,000
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III. Program Management Activities

PROGRAM ELEMENT	ELEMENT DESCRIPTION	COST	FUNDING SOURCE	
			IEP Core	IEP POD and Coordinated
J. IEP FUNCTIONS				
1. Data Management and Utilization a. (2010-019) b. Mandates - none	Management and dissemination of data and information generated by IEP monitoring and special study activities. (S. Brubaker, DWR)	\$805	DWR-\$166 USBR-\$389	DWR ^a \$250
2. Science Advisory Group (SAG) a. (2010-020) b. Mandates – none	Funding to support travel and meeting costs for the Science Advisory Group. (E. Van Nieuwenhuyse, USBR)	\$20	USBR- \$20	\$0
		\$ 825		

K. IEP OVERSIGHT AND COORDINATION – For all agencies, Program Management refers primarily to management and oversight activities, such as performance of Coordinator and Management Team responsibilities. All funding from IEP Core except DELTA Science which is from IEP Coordinated.		
Dept. of Fish and Game		\$1,124
Dept. of Water Resources		\$405
Water Resources Control Board		\$167
U.S. Bureau of Reclamation		\$625
U.S. Fish and Wildlife Service		\$0
U.S. Geological Survey		\$100
U.S. Environmental Agency		\$40
National Marine Fisheries Service		\$5
U.S. Army Corps of Engineers		\$166
Delta Science Program		\$150
		\$ 2,782

TOTAL FOR PROGRAM MANAGEMENT ACTIVITIES	\$ 3,607,000
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TOTAL MONITORING	\$ 13,432,000
TOTAL SPECIAL STUDIES (UNDER DEVELOPMENT)	\$ 15,657,000
TOTAL PROGRAM MANAGEMENT ACTIVITIES	\$3,607,000
DRAFT 2010 OVERALL PROGRAM TOTAL	\$32,696,000

Notes:

^a = funding from DWR Operations

^b = funding from Suisun Marsh group (60% DWR and 40% USBR)

^c = funding from USBR Tracy Operations

^d = funding from DWR Prop 13 funds

^e = funding from DWR Planning

^f = funding from USBR Operations

^h = funding from DWR FERC

ⁱ = funding from DWR Fish facilities

^j = funding from USBR DSP

^k = DSP funded projects were affected by a stop work order issued in December 2008. In some cases, bridge funding was obtained and work was restarted by winter 2009. The only project that has not yet been restarted is project 2010-041.