20-mm Survey

Project Description

The 20-mm Survey monitors juvenile Delta and Longfin Smelt distribution and abundance throughout their historic spring range in the Sacramento-San Joaquin Delta and upper Estuary.

Fact Sheet Number

2019-033

Project Need

This survey provides up-to-date information specified in the 1995 Delta Smelt Biological Opinion (BO) for the operation of the SWP and the CVP. This survey monitors Delta Smelt around 20 mm TL in size which it is the size that "take" is counted against the SWP and CVP. This information allows managers to vary water operations and provide sufficient flows to maintain Delta Smelt rearing habitat away from the south and central Delta and minimize entrainment. This survey is also a requirement of Section 5.2 of Incidental Take Permit No. 2081-2009-001-03 for the State Water Project, issued by CDFW under the authority of the California Endangered Species Act and pursuant to Fish and Game Code sections 2081(b) and 2081(c), and California Code of Regulations, Title 14. Similar to Delta Smelt, the distribution and catch information of Longfin Smelt are used to determine entrainment risks and ensure that adequate flows are maintained for the protection of young Longfin Smelt.

Project Objectives

- Determines the distribution of juvenile Delta and Longfin Smelt in relation to the major water diversions
- Compares current relative abundance to historical annual abundances
- Provides concurrent zooplankton density information to monitor the suitability of their food supply

Schedule of Milestones

Every two weeks between March through June field surveys will be conducted and field and laboratory results will be reported weekly to the Smelt Working Group and the WOMT team starting 5 days after the field sampling are concluded. Shortly afterwards, raw and calculated data will be uploaded to the Region 3's 20-mm Survey web page. A memo describing the annual abundance index will be prepared and distributed in June. By the end of the calendar year a draft survey summary article will be submitted to the Editor of the IEP newsletter for publication.

Project Cost

$0.67 Million, DWR & USBR

Project Manager

Marty Gingras
CDFW

Principal Investigator

Robert Fujimura
CDFW

Environmental Sampling in the Sacramento-San Joaquin River Delta

Red Bluff Diversion Dam Rotary Trap Juvenile Monitoring Project

This is Activity #1 of contract “Fisheries Monitoring Activities in Sacramento River, Clear Creek, and Battle Creek required by NMFS OCAP Biological Opinion.

Fact Sheet Number

2019_040

Project Description

Quantification of passage and production of juvenile salmonids produced in the upper Sacramento River, CA.

Project Need

This project will allow evaluation and adaptive management of water releases from Shasta/Keswick reservoirs and provide real-time information to Delta Operations for Salmon and Sturgeon (DOSS) group for fishery and water operations management.

Data on the status and production trends of endangered winter-run Chinook Salmon, Threatened spring- run Chinook, the Central Valley ESU of Steelhead as well as the Southern Distinct Population Segment of the North American Green Sturgeon will be derived. This project is required to fulfill Monitoring and Reporting requirements under NMFS (2009, 2011) Biological Opinion RPA 11.2.1.3 (8) b.

Project Objectives

The primary objective is to estimate total annual production of juvenile winter-run Chinook Salmon produced in the mainstem Sacramento River, CA and compare these data to adult escapement estimates. Secondary objectives are to estimates juvenile production of fall, late-fall, and spring-run Chinook Salmon and to measure relative abundance of Lamprey and Green Sturgeon passing Red Bluff Diversion Dam.

Schedule of Project Milestones (When will data collection, analyses, and reporting elements be completed?)

Date	Milestone
10/01/2018	Field work initiated
10/14/2018	Preliminary bi-weekly data posted to FWS website (recurring reporting every 2 weeks)
12/31/2019	Annual Report due

Expected FY 2019 Project Cost

$0 – FY19 agreement amount = $1,017,066.55 (but funding received in previous years, and cost savings, will be sufficient to complete the work)

Is this Project for a CVP/SWP Biological Opinion or Water Right Decision Compliance? If so, Which Specific Requirement?

RPA 11.2.1.3 (Monitoring and reporting) related to the Long Term Operations of the Central Valley Project and the State Water Project Biological Opinion (NMFS 2009).

Investigator

Bill Poytress & James G. Smith
U.S. Fish and Wildlife Service
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Upper Sacramento River Winter Chinook Salmon Carcass Survey

This is Activity #2 of contract "Fisheries Monitoring Activities in Sacramento River, Clear Creek, and Battle Creek required by NMFS OCAP Biological Opinion.

Fact Sheet Number

2019_041

Project Description

This project monitors the annual abundance, timing, distribution, and several life history characteristics of naturally spawning winter Chinook salmon. This project is conducted in cooperation with the California Dept. of Fish and Wildlife and the Pacific States Marine Fisheries Commission.

Project Need

Estimates of abundance of Sacramento River Winter Chinook Salmon provide the basis for monitoring the population status and trends of this endangered species. Information generated from this project also provides the basis for evaluating the supplementation program at the winter Chinook Conservation Hatchery. Recoveries of coded-wire tags from this project feed into cohort reconstructions, which provide the basis for estimating survival rates and evaluating the effects of ocean harvest upon this endangered species.

Project Objectives

An estimate of winter Chinook spawner abundance will be generated based on carcass mark-recapture estimation methods. This project will estimate escapement and contribution to natural spawning by natural and hatchery origin winter Chinook. Recoveries of coded-wire tags will be reported to the Regional Mark Information System for use in a cohort reconstruction analysis.

Schedule of Project Milestones

Date	Milestone
05/01/2019	Daily field surveys initiated
06/30/2019	Complete Annual Project Report for 2016 survey season – will be posted on website of the USFWS-RBFWO
08/31/2019	Daily field surveys concluded

Expected FY 2019 Project Cost

$0 – FY19 agreement amount = $153,571 (but funding received in previous years, and cost savings, will be sufficient to complete the work)

Is This Project for a CVP/SWP Biological Opinion or Water Right Decision Compliance? If so, Which Specific Requirement?

Estimating adult escapement of winter Chinook is a requirement of RPA 11.2.1.3.8.a of the CVP/SWP Biological Opinion.

Investigator

Kevin Niemela & James G. Smith
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Adult Spring Chinook Escapement Monitoring in Clear Creek

This is Activity 4 of contract “Fisheries Monitoring Activities in Sacramento River, Clear Creek and Battle Creek required by NMFS OCAP Biological Opinion.”

Fact Sheet Number

2019_042

Project Description

Estimate population size and distribution of adult spring Chinook holding and spawning in Clear Creek.

Project Need

The Clear Creek spring Chinook population is dependent on the operation of Whiskeytown Dam to survive. The BiOp requires six actions in Clear Creek. This monitoring activity is used to guide and evaluate the effectiveness of these RPA actions and to evaluate the impacts of the operation of the CVP. This monitoring activity estimates annual adult escapement of spring Chinook into Clear Creek using two methods: video counts and snorkel based estimates.

Increasing the population of spring Chinook in Clear Creek so that it can survive independently of other populations is required for recovery and de-listing of spring Chinook in the Central Valley ESU. This monitoring tracks progress towards recovery.

Project Objectives

Operate a video weir station to count and identify fish entering and leaving the watershed. Index adult holding population size by visual counts made during snorkel surveys.

Estimate the spatial and temporal distribution of holding and spawning through snorkel surveys;

Estimate spawning population size using redd counts produced during snorkel surveys. Spawning success is an indicator of the effectiveness of water and temperature management especially during the summer holding period when reservoir management is particularly important.

Obtain genetic samples, scales, and otoliths to determine run, age, natal origin, and juvenile life history of Chinook spawning in Clear Creek. This information is used to evaluate the effectiveness of water management and habitat restoration.

Schedule of Project Milestones

Date	Milestone
10/01/2018	Snorkel survey field work continues from previous FY
11/15/2018	Snorkel survey field work complete
04/15/2019	Video count and snorkel survey field work begins
08/23/2019	Video count field work ends
09/30/2019	Annual Report

Expected FY 2019 Project Cost

$0 – FY19 agreement amount = $ 255,387 (but funding received in previous years, and cost savings, will be sufficient to complete the work)

Is This Project for a CVP/SWP Biological Opinion or Water Right Decision Compliance? If so, Which Specific Requirement?

This project is used to develop adult escapement estimates required in Sections 11.2.1.3.7 and 11.2.1.3.8.a of the CVP/SWP BiOp. This monitoring data guides the pulse flows provided in Action I.1.1. Spring Attraction Flows. The project provides spawning gravel evaluations required in Action I.1.3 Spawning Gravel Augmentation. The project provides water temperature data and spring Chinook locations to evaluate Action I.1.5 Thermal Stress Reduction.

Investigator

Charlie Chamberlain & James G. Smith
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Juvenile Spring-Run and Steelhead Production Monitoring in Clear Creek

This is Activity 5 of contract "Fisheries Monitoring Activities in Sacramento River, Clear Creek and Battle Creek required by NMFS OCAP Biological Opinion."

Fact Sheet Number

2019_043

Project Description

Estimate production of juvenile salmonids in Clear Creek.

Project Need

The BiOp requires six actions in Clear Creek in addition to required monitoring. Clear Creek juvenile salmon and steelhead production estimates are used to guide and evaluate the effectiveness of the RPA actions. The information is also needed to evaluate the impacts of CVP operations and to track progress towards recovery.

Project Objectives

Operate a rotary screw trap to catch, identify, and count juvenile fish leaving Clear Creek.

Use rotary screw trap capture-efficiency trials to transform juvenile counts into total production estimates for salmon and steelhead.

Estimate spawning success by combining juvenile production estimates with adult population estimates. Spawning success can be an indicator of the effectiveness of water management, habitat restoration and environmental variables.

Schedule of Project Milestones

Date	Milestone
11/01/2018	Rotary screw trap operation begins
06/30/2019	Rotary screw trap operation ends
09/30/2019	Annual Report

Expected FY 2019 Project Cost

$264,910 – FY19 agreement amount = $341,455 (but funding received in previous years, and cost savings, will be sufficient to complete the work)

Is This Project for a CVP/SWP Biological Opinion or Water Right Decision Compliance? If so, Which Specific Requirement?

This project is used to develop juvenile population estimates required in Sections 11.2.1.3.7 and 11.2.1.3.8.a of the CVP/SWP BiOp.

Investigator

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Adult Steelhead and Late-fall Chinook Escapement Monitoring in Clear Creek

This is Activity 6 of contract “Fisheries Monitoring Activities in Sacramento River, Clear Creek and Battle Creek required by NMFS OCAP Biological Opinion.”

Fact Sheet Number

2019_044

Project Description

Estimate population size and distribution of adult steelhead and late-fall Chinook spawning in Clear Creek.

Project Need

The BiOp requires six actions in Clear Creek in addition to required monitoring. This monitoring activity is used to guide and evaluate the effectiveness of the RPA actions. The information is also needed to evaluate the impacts of CVP operations and to track progress towards recovery. The activity estimates annual adult populations of steelhead and late-fall Chinook in Clear Creek using two methods: video counts and kayak-based redd counts.

Project Objectives

Operate a video weir station to count and identify fish entering and leaving the watershed.

Estimate spawning population size using redd counts produced during kayak surveys.

Estimate spawning success by combining redds counts with estimates of the number of juvenile fish produced. Spawning success can be an indicator of the effectiveness of water management and habitat restoration.

Collect spawning habitat data for use as an indicator of the effectiveness of habitat restoration.

Estimate the spatial and temporal distribution of spawning through kayak-based surveys.

Schedule of Project Milestones

Date	Milestone
12/01/2018	Kayak surveys and video weir counts begin
04/15/2019	Kayak surveys and video weir counts complete
09/30/2019	Annual Report

Expected FY 2019 Project Cost

$0 - FY19 agreement amount = $169,042 (but funding received in previous years, and cost savings, will be sufficient to complete the work)

Is This Project for a CVP/SWP Biological Opinion or Water Right Decision Compliance? If so, Which Specific Requirement?

This project is used to develop adult population estimates required in Sections 11.2.1.3.7 and 11.2.1.3.8.a of the CVP/SWP BiOp. The project provides spawning gravel evaluations required in Action I.1.3 Spawning Gravel Augmentation.

Investigator

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Adult Salmonid Escapement Monitoring in Battle Creek

This is Activity 8 of contract “Fisheries Monitoring Activities in Sacramento River, Clear Creek and Battle Creek required by NMFS OCAP Biological Opinion.”

Fact Sheet Number

2019_045

Project Description

Estimate annual adult escapement of naturally-produced spring Chinook salmon and steelhead upstream of the Coleman National Fish Hatchery (CNFH) barrier weir in Battle Creek.

Project Need

The BiOp requires monitoring of juvenile salmon and steelhead production in Battle Creek. The BiOp also requires implementation of the Battle Creek Salmon and Steelhead Restoration Project which is intended to restore populations of endangered winter Chinook, and threatened spring Chinook and steelhead. This monitoring project is an essential element of the Restoration Project’s Adaptive Management Plan. Production estimates are used to guide and evaluate the effectiveness of the Restoration Project. The Restoration Project and its Adaptive Management Plan are high priorities in the NMFS Recovery Plan.

Project Objectives

Enumerate adult Chinook and steelhead returning to Battle Creek and passing above CNFH barrier weir fish ladder using two methods, fish sorting and video monitoring. Natural-origin fish are sorted from hatchery-origin fish and passed upstream using the CNFH spawning Building in March. Collect biological information and tissue samples from natural-origin fish. Analyze tissue samples to genetically determine the run of Chinook. Record fish passage using video cameras from April through July when average water temperatures are generally above 60°F. Compare escapement estimates to spawning population estimates based on redd counts to evaluate over-summer survival which can be an indicator of the effectiveness of water management, habitat restoration and environmental variables.

Schedule of Project Milestones

Date	Milestone
03/01/2019	Fish counting operation begins
07/30/2019	Fish counting operation ends.
09/30/2020	Annual Report

Expected FY 2019 Project Cost

$0 – FY19 agreement amount = $226,782 (but funding received in previous years, and cost savings, will be sufficient to complete the work)

Is This Project for a CVP/SWP Biological Opinion or Water Right Decision Compliance? If so, Which Specific Requirement?

This project is required in Section 11.2.1.3.8.a of the CVP/SWP BiOp. The project is an element of the RPA Action I.2.6 Restore Battle Creek for Winter-Run, Spring-Run, and CV Steelhead.

Investigator

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Reclamation Point of Contact: John Hannon

Sacramento River Basin Salmonid Monitoring (R16AC00149)

Fact Sheet Number

2019_046

Project Description

Conduct annual Chinook salmon spawning escapement surveys in the Sacramento River Basin (mainstem, Deer Creek, Antelope Creek, Mill Creek, Clear Creek, Battle Creek, Cottonwood Creek, Cow Creek, Bear Creek, and American River) to estimate the abundance and distribution of Chinook salmon spawners.

Project Need

The monitoring activities of this agreement are part of the Reasonable and Prudent Actions (RPA) described by National Marine Fisheries Service in the biological opinion (BiOp) on long-term operations of the CVP and California State Water Project (SWP). To maintain CVP operations, Reclamation must ensure these activities occur in order to comply with the Endangered Species Act.

Project Objectives

The primary objective of this project is to continue to determine the annual abundance and distribution of adult Chinook salmon returning to spawn in the Sacramento River Basin and to assess effectiveness of restoration actions.

Schedule of Project Milestones (When Will Data Collection, Analyses, and Reporting Elements be Completed?)

Date	Milestone
10/01/2018 – 09/30/2019	Adult Chinook Salmon escapement monitoring in the Upper Sacramento River Basin
10/01/2018 – 09/30/2019	Tributary Adult Chinook escapement surveys
10/01/2018 – 09/30/2019	Sacramento River spawning and rearing habitat restoration monitoring program
09/01/2018 – 06/30/2019	American River Chinook Salmon escapement estimation and monitoring
09/30/2019	Annual Survey Reports

Date	Milestone
03/31/2019	Semi-Annual Performance Report and Financial Report
09/30/2019	Semi-Annual Performance Report and Financial Report

Expected FY 2019 Project Cost

$1,132,996. This is a cooperative/partnered project with the California Department of Fish and Wildlife

Is This Project for a CVP/SWP Biological Opinion or Water Right Decision Compliance? If so, Which Specific Requirement?

The escapement surveys for winter-run and spring-run Chinook in the Sacramento River, Clear Creek, Mill Creek, Deer Creek, and Battle Creek is a requirement in the 2009 water ops biological opinion, Section 11.2.1.3 Monitoring and Reporting item 8.a. on page 585. The restoration effectiveness monitoring task is a CVPIA funded activity.

Investigator

Stan Allen
PSMFC

Reclamation Point of Contact: Joshua Israel, Bay Delta Office, Sacramento CA and Elissa Buttermore, Bay Delta Office, Sacramento CA

Genetic Identification of Salmonids and Smelt to Inform Central Valley Project Operations and Bay-Delta Monitoring

Fact Sheet Number

2019_23

Project Need

Average yearly false positive rate for winter run (i.e. calling a fish winter run when it wasn't) at salvage during 1996-2010 was 56%, although error rates varied considerably within a season. For 2011-2014, average yearly false positive rates at the CVP have been 58% - 80%, with rate >85% during recent years of drought. There is reason to believe that observations from salvage may reflect general inaccuracy that would apply to IEP monitoring programs, which collect upwards of 100,000 Chinook Salmon juveniles annually. Furthermore, there is indication that identification of spring run in IEP surveys is also problematic (i.e. ~2/3 false positive rate) using length-at-date criteria. These error rates compromise interpretations from compliance monitoring activities regarding listed Chinook Salmon populations.

Project Objectives

The primary objectives of this work is the genetic classification (to race; ESU) of Chinook Salmon captured from SWP and CVP fish protection facilities and IEP monitoring programs. The population-of-origin is determined for juveniles by comparing their genotypes to reference genetic baselines in order to quantify the number and distribution of true ESA-listed (genetic) winter and spring runs categorized by length-at-date criteria models. The overarching goal of this work is to directly target (and reduce) one source of uncertainty in the estimation of loss for listed Chinook Salmon (but primarily winter run) at South Delta fish salvage facilities and from IEP compliance monitoring. Additionally, this project intends to develop the means to scale (increase) genotyping capacity without dramatically altering current cost projections.

Another project objective is to assist USBR staff with determining the species of larvae collected as part of USBR activities and deemed ambiguous by USBR staff. Species identification information is relied upon to estimate the effects of project operations, especially in the spring as specified in the USFWS BiOp. Genetic approaches to species identification are intended to reduced labor costs and increase accuracy of USBR species enumeration activities.

Annual report that includes the following:

Schedule of Project Milestones

Date	Milestone
December 2018	CVPIA/IEP Genetic Monitoring Methodology
December 2018 – April 2019	Execution of Rapid ID protocol
September 2019	Completion of CVP/SWP salvage and IEP monitoring programs genetic stock identification results
September 2019	Annual Reporting

Expected FY 2019 Project Cost

$270,385 Cramer fish sciences/USBR and $30,000 USBR . The additional $30,000 is for TFCF to collect samples that will be processed by Cramer Fish Sciences

Is This Project for a CVP/SWP Biological Opinion or Water Right Decision Compliance? If so, Which Specific Requirement?

It is related to Action IV.2.3.

Investigator

Scott Blankenship
Cramer Fish Sciences
Sacramento CA

Coleman Hatchery Late Fall Chinook Tagging

Fact Sheet Number

2019-59

Project Description

Hatchery produced juvenile late fall-run Chinook Salmon and naturally produced endangered winter-run Chinook salmon overlap in size. Juvenile salmon of both races are encountered at Delta export facilities. To prevent Federal and State water pumping facilities from being erroneously encumbered for taking winter-run Chinook salmon, the facilities must able to differentiate between the two races. To accomplish this, approximately 1,100,000 late fall-run Chinook salmon are marked and tagged at the Coleman National Fish Hatchery each year.

The coded wire tags are purchased directly by the USBR. Tagging and marking operations are conducted by USFWS personnel or sub-contractors. Contract costs are for the actual tagging of the fish, operational oversight, and recovery of tags from adults at the hatchery.

Project Need

Tagging is mandated under the National Marine Fisheries Service (NMFS) 2009 RPA with 2011 amendments (Action IV.3). Recovery of tagged late fall-run Chinook Salmon is also part of the spring-run recovery plan.

Project Objectives

- Use hatchery origin late fall chinook salmon as surrogates to determine take of winter-run Chinook Salmon at Delta pumping plants
- Provide pumping facilities and monitoring programs a way to differentiate between natural produced winter run and hatchery produced late-fall run Chinook Salmon
- Inform biological opinions and management action assessments.

Schedule of Milestones

N/A

Project Cost

USBR: 1.1 Million
Tags: $101,200 (purchased directly)
DWR: Tag Application: $58,300
DWR: Tag Recovery: $69,377
Total: $228,877

Project Manager

Julie Day
USFWS
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Principal Investigator

Kevin Niemela
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Reclamation Point of Contact: Nicolas Sakata, Bay-Delta Office

Compliance

Fact Sheet Number

2019_47

Project Description

Compliance is a 40-foot, 1985 Munson Hammerhead 30 that has been stretched. The Compliance is an aluminum work boat that is powered by twin diesel sterndrives, which provide a cruising speed of about 22 knots and a top speed of about 30 knots. In 2016, the vessel was retrofitted with a gantry frame, wing davits and deck winches to conduct trawling operations. The interior contains dual counters which currently serve as a small wet lab. The aft deck is elevated above the cockpit and extends beyond the transom and over the sterndrives. There is a flying bridge above the pilothouse that provides greater visibility to the operator. An inverter provides 110V AC power for small computers and sampling equipment.

Project Need

Compliance monitoring is a responsibility shared by Department of Water Resources (DWR) and Reclamation. To ensure resiliency of boat-based monitoring, Reclamation operates and maintains its own monitoring vessels. Compliance is a smaller, faster and more nimble vessel compared to Reclamation's other vessel (R/V Endeavor). This allows work to be performed in smaller bodies of water and more efficiently.

Project Objectives

The primary objective of Compliance is to provide a complimentary platform to carry out compliance monitoring that is mandated by the State Water Resources Control Board as part of Reclamation's water rights permit.

Project Schedule for FY19

Sacramento Ship Channel Monitoring– Monthly (1 day)
Ship Channel Nutrient Experiment – TBD

Project Costs for FY19

$90,000

For Fiscal Year 2019 (FY19), in addition to normal O&M costs, Reclamation is anticipating a renewal of some of the vessel's systems, including hydraulics, fuel, hull, and steering. For the most part, these are just normal life cycle maintenance requirements. The hydraulics component is to accommodate a change in mission requirements.

Project Point of Contact

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Reclamation Point of Contact: Nicolas Sakata, Bay-Delta Office

R/V Endeavor

Fact Sheet Number

2019_48

Project Description

R/V Endeavor is a 50-foot, 1973 Delta Marine charter boat. The vessel was acquired by the federal government in 2003 and retrofitted to conduct environmental monitoring in the San Francisco Bay and Delta. Endeavor is primarily used to conduct compliance monitoring under the Interagency Ecological Program's (IEP) Environmental Monitoring Program (EMP). Powered by twin diesel inboards, Endeavor has a cruising speed of 17 knots and a top speed of 25 knots. Endeavor is equipped with a diesel generator, which provides 110V AC power for pumps, climate control, computer systems and sample processing equipment. An onboard hydraulic system provides hydraulic power to an anchor winch, deck crane, and scientific winch.

Project Need

Compliance monitoring is a responsibility shared by Department of Water Resources (DWR) and Reclamation. To ensure resiliency of boat based monitoring, Reclamation operates and maintains its own monitoring vessels. Both agencies have benefitted from the ability to perform scheduled and unscheduled maintenance, while the other agency performs the required monitoring.

Project Objectives

The primary objective of R/V Endeavor is to provide a platform to carry out compliance monitoring that is mandated by the State Water Resources Control Board as part of Reclamation's water rights permit.

Project Schedule

Benthic – Monthly (2 days, except 5 days for May and October)
Stockton Dissolved Oxygen – Twice per month (June through November)
Water Quality – Backup Vessel (Monthly, 6 days)
Maintenance – Fall 2019 (4 months)

Project Costs for FY19

$200,000

For Fiscal Year 2019 (FY19), in addition to normal O&M costs, Reclamation is anticipating a retrofit of the vessel's interior. Last updated in 2003, the interior and related systems are in need of general renewal and updating.

Project Point of Contact

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Reclamation Point of Contact: Towns Burgess, oburgess@usbr.gov

Enhanced Acoustic Tagging, Analysis, and Real-Time Monitoring of Wild and Hatchery Salmonids in the Sacramento River Valley

Fact Sheet Number

2019_303

Project Description

NOAA-Fisheries Southwest Fisheries Science Center will support a collaborative telemetry effort in the Central Valley that will provide reach-specific and route-specific survival estimates, abundance estimates of salmonids entering and exiting the Delta, and support for Green Sturgeon Sail objectives.

Project Need

There is a well-documented need for improved detection and associated modeling of salmon migration and survival in the Central Valley. These monitoring efforts can provide critical information on juvenile salmonid distribution and survival, which inform biologists and managers interpretations of the exposure and intensity of CVP and SWP water operation risks on tagged populations in Central Valley rivers and the Bay-Delta. Understanding salmon survival and migration dynamics in the Delta and its tributaries is critical to the operation of state and federal water projects, recovery of ESA-listed species, and sport and commercial fisheries management. Tracking the fate of individual tagged fish can be accomplished with acoustic telemetry, tracking groups of acoustic telemetered fish can be used to develop estimates of survival and movement for other non-tagged fish also part of that group, and population level sampling programs can use survival estimates generated by acoustic tagged fish and applied to other mass marked (e.g. coded wire tagging) groups to develop improved capture efficiency for these sampling programs. These capture efficiency estimates can then be used to estimate abundance of non-tagged populations.

Project Objectives

The key objectives of this study are as follows:

- Compile data from autonomous and real-time JSATS receivers
- Sharing of JSATS receiver inventory to facilitate regionalization of array

- Coordinate allocation of unique tag codes for new tag purchases
- Compile data from newly tagged fish with JSATS tags
- Perform the analyses, report creation, publication writing and presentations primarily related to juvenile salmonid survival

Schedule of Project Milestones

Date	Milestone
November	Task 1 and 2: Data Management Plan (IEP format)
December (Annually)	Task 1: Web-accessible summary of deployment locations of receivers.
Ongoing	Task 1: Data quality assurance of no more than 2 days of downtime before site visit to re-establish real time operations.
August (Annually)	Task 1: Post-recovery inventory of receivers and equipment submitted annually within 1 month of recovery.
March 31, June 30, September 30, December 31(Annually)	Task 2: Quarterly log of deployment and download activity including what sites were visited and operational coverage for each receiver.
December (Annually)	(Task 3 and 4) Final Pre-season tagging plan.
December-June (Annually)	(Task 3 and 4) Telemetry Study Summary within 48 hours of release of fish.
January-June (Annually)	Fish handling, tagging, transport, and release databased within 30 days of release of fish.
August (Annually)	Final memo/report on tag life test results within 90 days of end of test.
August (Annually)	Final memo/report on tag effects results within 90 days of end of test.
January (Annually)	Study Plans
June 2020	Acoustic Telemetry Technical Report
October 2018	Green sturgeon population estimate

Expected FY 2019 Project Cost

This is a three-year interagency agreement lasting from Fiscal Year 2018 through Fiscal Year 2020 (Agreement number R18PG00009). Fiscal Year 2019 cost $368,678 and total agreement cost approximately $1,163,000.

Is This Project for a CVP/SWP Biological Opinion or Water Right Decision Compliance? If so, Which Specific Requirement?

N/A

Investigator

Arnold Ammann, ammann@noaa.gov, NOAA-Fisheries Southwest Fisheries Science Center

Reclamation Point of Contact: Towns Burgess, oburgess@usbr.gov

Enhanced Acoustic Tagging, Analysis, and Real-Time Monitoring of Wild and Hatchery Salmonids in the Sacramento River Valley

Fact Sheet Number

2019_304

Project Description

University of California, Santa Cruz will support a collaborative telemetry effort in the Central Valley that will provide reach-specific and route-specific survival estimates, abundance estimates of salmonids entering and exiting the Delta, and support for Green Sturgeon Sail objectives.

Project Need

There is a well-documented need for improved detection and associated modeling of salmon migration and survival in the Central Valley. These monitoring efforts can provide critical information on juvenile salmonid distribution and survival, which inform biologists and managers interpretations of the exposure and intensity of CVP and SWP water operation risks on tagged populations in Central Valley rivers and the Bay-Delta. Understanding salmon survival and migration dynamics in the Delta and its tributaries is critical to the operation of state and federal water projects, recovery of ESA-listed species, and sport and commercial fisheries management. Tracking the fate of individual tagged fish can be accomplished with acoustic telemetry, tracking groups of acoustic telemetered fish can be used to develop estimates of survival and movement for other non-tagged fish also part of that group, and population level sampling programs can use survival estimates generated by acoustic tagged fish and applied to other mass marked (e.g. coded wire tagging) groups to develop improved capture efficiency for these sampling programs. These capture efficiency estimates can then be used to estimate abundance of non-tagged populations.

Project Objectives

The key objectives of this study are as follows:

- Compile data from autonomous and real-time JSATS receivers
- Sharing of JSATS receiver inventory to facilitate regionalization of array
- Coordinate allocation of unique tag codes for new tag purchases
- Compile data from newly tagged fish with JSATS tags
- Perform the analyses, report creation, publication writing and presentations primarily related to juvenile salmonid survival

Schedule of Project Milestones

Date	Milestone
November	Task 1 and 2: Data Management Plan (IEP format)
December (Annually)	Task 1: Web-accessible summary of deployment locations of receivers.
Ongoing	Task 1: Data quality assurance of no more than 2 days of downtime before site visit to re-establish real time operations.
August (Annually)	Task 1: Post-recovery inventory of receivers and equipment submitted annually within 1 month of recovery.
March 31, June 30, September 30, December 31(Annually)	Task 2: Quarterly log of deployment and download activity including what sites were visited and operational coverage for each receiver.
December (Annually)	(Task 3 and 4) Final Pre-season tagging plan.
December-June (Annually)	(Task 3 and 4) Telemetry Study Summary within 48 hours of release of fish.
January-June (Annually)	Fish handling, tagging, transport, and release databased within 30 days of release of fish.
August (Annually)	Final memo/report on tag life test results within 90 days of end of test.
August (Annually)	Final memo/report on tag effects results within 90 days of end of test.
January (Annually)	Study Plans
June 2020	Acoustic Telemetry Technical Report
October 2018	Green sturgeon population estimate

Expected FY 2019 Project Cost

This is a three-year cooperative agreement lasting from Fiscal Year 2018 through Fiscal Year 2020 (Agreement number R18AC00039). Fiscal Year 2019 cost $939,868 and total agreement cost approximately $2,953,000.

Is This Project for a CVP/SWP Biological Opinion or Water Right Decision Compliance? If so, Which Specific Requirement?

N/A

Investigator

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Environmental Monitoring Program

Fact Sheet Number

2019-072

Project Description

The Environmental Monitoring Program (EMP) was established in 1971 to: (1) collect environmental data for resource management, (2) better understand estuarine processes, and (3) document compliance with water right decisions. The EMP is comprised of staff from the Department of Water Resources, United States Bureau of Reclamation, and the California Department of Fish and Wildlife. EMP staff are responsible for collecting water quality, chlorophyll, phytoplankton, benthic, and zooplankton samples at fixed locations in the Sacramento-San Joaquin Delta, Suisun Bay, and San Pablo Bay.

Two of the program's strengths are continuity and data integration. The EMP is one of the nation's oldest environmental monitoring programs and has compiled over four decades of consistent and comprehensive water quality and biological data.

Project Need

The data collected by the EMP is currently mandated by State Water Resources Control Board's Water Right Decision 1641 (D-1641) for the operation of the State Water Project (SWP) and Central Valley Project (CVP). D-1641 stipulates that DWR and USBR implement a comprehensive monitoring program to ensure compliance with water quality objectives and standards, which were established to protect the beneficial uses of water in Sacramento-San Joaquin Delta and Suisun Marsh.

Project Objectives

- Ensure compliance with State Water Resources Control Board Water Right Decision 1641
- Provide accurate and validated water quality and biological information to managers for real time and adaptive management of the SWP and CVP
- Document and evaluate long term water quality and ecological trends in the San Francisco EstuaryDetect and document invasive species, such as Microcystis aeruginosa and Potamocorbula amurensis, and conduct specials studies to discern their impact on native species, the food web, and human health

Project Cost

USBR: $2.18 Million
DWR: $2.27 Million
Total: $4.45 Million

Project Manager

J. Newcomb
DWR

Principal Investigator

S. Lesmeister
DWR

Fall Midwater Trawl

Fact Sheet Number

2019-049

Project Description

Fall Midwater Trawl Survey (FMWT) sampling began in 1967 to measure the abundance and distribution of age-0 Striped Bass and has since collected similar information on a suite of pelagic fishes including Delta Smelt and Longfin Smelt. Survey staff calculates annual abundance indices based on September through December monthly sampling data collected from San Pablo Bay through the Delta. POD and subsequently FLaSH funding allowed survey sampling to expand into Cache Slough and the Sacramento Deepwater Ship Channel and to add zooplankton sampling and processing (see element # 062). The abundance and distribution data acquired along with other survey data provide means to determine species status and to evaluate the success of various mitigation and restoration projects for benefitting fishes in the estuary. Fish collected are also used to support various research activities (see element #s 062, 296).

Project Need

The FMWT survey is mandated by the Delta Smelt Biological Opinion for the combined operations of the Central Valley Project and the State Water Project (USFWS 2008). The survey's catch data provides means to calculate adult Delta Smelt incidental take at the export facilities. The State Water Project Incidental Take Permit for Longfin Smelt requires the FMWT Longfin Smelt abundance index to calculate the incidental take limit for the salvage facilities.

Project Objectives:

- To annually measure the abundance and distribution of selected species of pelagic fishes in the estuary.
- To gain understanding of the factors affecting abundance, distribution and survival of pelagic fishes in the estuary.
- To detect introductions of new exotic fish and invertebrates.
- Provide baseline data to evaluate management plans and habitat restoration projects.
- To measure availability of fall planktonic food resources (since 2010).

List major milestones using this format so people will understand when it will start, when key activities will occur and when results will be available.

Date	Milestone
September	Monthly surveys start and continue through December
Late December	Wrap up data entry and database corrections
Late December to Early January	Calculate and report annual abundance indices
March/April	Submit status and trends article to IEP Newsletter

Project Cost

$325,500, DWR
$319,500, USBR
(values include funding for boat operations and for north Delta and zooplankton sampling)

Project Manager

Randall Baxter
CDFW

Principal Investigator

James White
CDFW

Juvenile Salmon Emigration Real Time Monitoring

Fact Sheet Number

2019-50

Project Description

Beach seining and surface trawling 3 days/week from October 1st to January 31st near Sacramento to detect the arrival of older juvenile Chinook Salmon entering the Delta.

Project Need

This monitoring is mandated by (1) the State Water Resources Control Board Water Quality Control Plan and (2) the National Marine Fisheries Service's RPA proposed by the 2009 biological opinion and conference opinion on the long-term operations of the Central Valley Project and State Water Project. Monitoring data are used to inform Delta Cross Channel Gate closure decisions from October 1st to December 15th to minimize the diversion and mortality of emigrating juvenile winter-run sized Chinook Salmon. These data also were and will continue to be used to inform biological opinions, and drought operations planning decisions.

Project Objectives

- Provide data for Delta Cross-channel Gate operational triggers.
- Inform the Real-Time Drought Operations Management Team.

Schedule of Milestones

Date	Milestone
January 2016	Completed real time monitoring

Project Cost

DWR: $111,187
USBR: $88,472
Total: $199,659

Project Manager

Julie Day
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Juvenile Salmon Monitoring

Fact Sheet Number

2019-053

Project Description

Year-round beach seining throughout the San Francisco Estuary and surface trawling at Chipps Island, Sacramento, and Mossdale to monitor the relative abundance and distribution (spatial and temporal) of juvenile Chinook Salmon and other native species in the Central Valley of California.

Project Need

This monitoring is mandated by the National Marine Fisheries Service's 2009 biological opinion and conference opinion on the long-term operations of the Central Valley Project and State Water Project.

Project Objectives

- Determine the status and trends of juvenile Chinook Salmon in the San Francisco Estuary.
- Examine factors influencing the status and trends of juvenile Chinook Salmon.
- Inform biological opinions, drought operations, and management action assessments.

Schedule of Milestones

Date	Milestone
May 2016	Beach Seine Efficiency Study Report Completed
September 2016	FY16 Field year completed
June 2017	2014-2015 Draft Annual Report Completed

Project Cost

DWR: $1,816,971
USBR: $1,445,602
Total: $3,262,573

Project Manager

Julie Day
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Middle Sacramento River Juvenile Salmon and Steelhead Monitoring Project

Fact Sheet Number

2019-074

Project Description

Monitoring of out-migrant juvenile Sacramento River Chinook salmon and steelhead utilizing rotary screw traps located near Knights Landing, CA on the Sacramento River.

Project Need

Mandates created by the NMFS OCAP BiOp dictate the need for juvenile salmonid monitoring in the upper Sacramento River between Red Bluff Diversion Dam and confluence with the Feather to provide an early warning of increases in emigration rates of listed salmonids out of the upper Sacramento River toward the Sacramento- San Joaquin Delta. This near real-time data and early warning information provided by the program allows for data related triggers for the operation of the DCC. Daily catch data are reported to the Delta Operations for Salmonids and Sturgeon Technical Work Group (DOSS), as well as posted on the publicly accessible CalFISH website for interested parties. DOSS utilized catch data to advise NMFS, through the Water Operations Management Team (WOMT), of entrainment risk in CVP/SWP export facilities and the data **driven management tools/triggers: 1) from October 1 to November 30, if the Knights Landing** Catch Index (KLCI) is greater than three juvenile winter-run Chinook salmon per day, within 24 hours the DCC gates will be closed and 2) DCC gates are to be closed from December 1 to December 14, unless the KLCI is less than three juvenile winter-run Chinook salmon per day.

Project Objectives

- Monitor and report the outmigration of juvenile salmonids from the Sacramento River as they move toward the Sacramento-San Joaquin Delta on a real-time basis
- Monitor, record and compare movements of emigrating salmonids during specific environmental conditions.
- Estimate emigrating salmonid numbers and composition in the lower Sacramento River above the Delta.
- Examine the influences of Sacramento River flood relief structures on emigrating juvenile salmonids.

Schedule of Milestones

Date	Milestone
6/30/2018	Traps removed from river for maintenance
8/1/2018	Traps positioned on river, monitoring begins
Daily	Catch updates are reported
Bi-weekly	Report summarizing trends in catch and trap operation

Project Cost

$545,122, CDWR and USBR

Project Manager

Colin Purdy
CDFW

Principal Investigator

Jason Julienne
CDFW

Mossdale Spring Trawl

Fact Sheet Number

2019-071

Project Description

This project is a long term San Joaquin River basin juvenile Chinook salmon monitoring using a trawl net. The project samples on San Joaquin River near Mossdale County Park.

Project Need

This project needs to identify annual juvenile Chinook salmon production in the San Joaquin River Basin. This project is mandated by National Marine Fisheries Service Biological Opinion and Conference Opinion on the Long-Term Operations of the Central Valley Project and State Water Project RPA 11.2.1.3. This project also provides data to the San Joaquin River Basin salmon life model refinement.

Project Objectives

- What is the annual juvenile Chinook salmon production in the San Joaquin River Basin?
- How do water quantity and quality conditions affect smolt production trends?
- To determine *Oncorhynchus mykiss* passage at Mossdale trawl.

Schedule of Milestones

- List major milestones using this format so people will understand when it will start, when key activities will occur and when results will be available.
- Project starts the first week of April and ends the last week of June every year.
- Draft technical report is generated within 18 months

Kodiak trawl sampling at Mossdale

Project Cost

$360,000

Project Manager

Dean Marston
CDFW

Principal Investigator

Steve Tsao
CDFW

Spring Kodiak Trawl

Fact Sheet Number

2019-088

Project Description

The Spring Kodiak Trawl (SKT) began in 2002 and is designed to provide information on the distribution of pre-spawning and spawning Delta Smelt to improve our ability to detect adult Delta Smelt, obtain maturity status data, and provide results on a near "real-time" basis to assist in water management and export decisions.

Project Need

The survey is designed to determine pre-spawning and spawning distribution of adult Delta Smelt in relation to the CVP and SWP water export facilities. As specified in the 2008 Delta Smelt Biological Opinion (BO) for the operation of the SWP and the CVP real-time distributional information is used to implement RPA Component 1 Actions 1 and 2 to protect pre-spawning adult Delta Smelt from entrainment and loss related to water operations. This data is then used to adaptively water exports and flows to protect these fish and their rearing habitat. Due to its superiority in sampling efficiency to the earlier Fall Midwater Survey, the early results of the SKT are also been used by USFWS to help estimate the absolute abundance of adult Delta Smelt at extremely low population levels.

Project Objectives

- Determines the distribution of maturing Delta Smelt during the period of December through May
- Evaluates the sexual maturation of Delta Smelt during this period and detects the start of spawning migration
- Reports current relative abundance compared to historical annual abundances

Employee taking a survey for the Spring Kodiak Trawl

Schedule of Milestones

Every month between December through May field surveys will be conducted and field results will be reported during that same week to the Smelt Working Group after the field sampling are concluded. Shortly afterwards, raw and calculated data will be uploaded to the CDFW Region 3's SKT Survey web page. A memo describing the annual abundance index will be prepared and distributed by early June. By the end of the calendar year a draft survey summary article will be submitted to the Editor of the IEP newsletter for publication.

Project Cost

$0.42 Million, DWR & USBR

Project Manager

Marty Gingras; CDFW

Principal Investigator

Robert Fujimura; CDFW

Summer Townet Survey

Fact Sheet Number

2019-007

Project Description

Summer Townet Survey (STN) is a long-term effort to monitor young pelagic fishes in the upper San Francisco Estuary. Since 1959, STN has sampled fixed locations from eastern San Pablo Bay to Rio Vista on the Sacramento River, and to Stockton on the San Joaquin River; and a single station in the lower Napa River. The study area was expanded in 2011 to include the Sacramento Deep Water Ship Chanel and Cache Slough. Currently, 40 stations are sampled every other week June through August using a conical, fixed-frame net, which is pulled obliquely through the water column 2 to 3 times at each station. Data collected at 31 stations are used to calculate annual relative abundance indices for age-0 Striped Bass (*Morone* saxatilis) and Delta Smelt (*Hypomesus transpacificus*). The remaining 8 stations are sampled to increase our understanding of juvenile fish abundance and distribution in the lower Napa River and the north Delta. In 2005, STN added a zooplankton net to assess fish food resources at each station. A subset of the fish collected are retained for diet analysis by CDFW researchers. The STN also measures water temperature, water clarity and specific conductivity. Managers and researchers use the data collected by STN to inform decisions and improve our understanding of the health of the upper San Francisco Estuary.

Project Need

This project is mandated by the 2008 Delta Smelt biological opinion for the combined operation of the Central Valley Project and State Water Project. While the original intent was to monitor the population of age-0 Striped Bass throughout the upper San Francisco Estuary, its scope has broadened to include other species of fish such as Delta Smelt (which is listed as threatened under the federal and state endangered species acts) and the food resources they rely upon.

Project Objectives

- Measure annual abundance of selected age-0 fish
- Measure factors affecting abundance and distribution of age-0 Striped Bass, Delta Smelt and other fish in the estuary
- Measure availability of summer planktonic food resources
- Examine summer diets of young Striped Bass, Delta Smelt, and other pelagic fishes

Schedule of Milestones

List major milestones using this format so people will understand when it will start, when key activities will occur and when results will be available.

Date	Milestone
June	Sampling begins and is conducted every other week through August
July	Annual index of relative abundance is calculated for Delta Smelt and released to the public
August	Annual index of relative abundance is calculated for age-0 Striped Bass and released to the public
September	Data is made available on the STN webpage

Project Cost

$325,500 California Department of Water Resources
$319,500 United States Bureau of Reclamation

Project Manager

Gregg Erickson
California Department of Fish and Wildlife

Principal Investigator

Felipe La Luz and Randy Baxter
California Department of Fish and Wildlife

Operation of Thermograph Stations

Fact Sheet Number

2019-104

Project Description

The purpose of this portion of the project is to provide continuous information on the temperature and sediment regimes in the rivers in order to evaluate effects on the restoration of native species fisheries, amphibians and other aspects of the aquatic ecosystem. And better understand the transition from cold water to warm water regimes and how flow magnitude interacts to control the transition.

Project Need

This portion of the I.E.P. is to help evaluate effects of temperature and sediment on fisheries, amphibians and other aspects of the aquatic ecosystem and better understand the transition from cold water to warm water regimes and how flow and changes in sediment interact to control the transition.

Project Objectives

- Provide accurate continuous temperature readings.
- Provide data regarding sediment loading.

Schedule of Milestones

List major milestones using this format so people will understand when it will start, when key activities will occur and when results will be available.

Date	Milestone
October 1, 2016	Start of 2017 Water Year data collection
April 1, 2018	Approval of 2017 Water Year Data

Project Cost

$54,800 USGS, DWR

Project Manager

Paul A. Work, Ph.D., P.E.
USGS

Principal Investigator

Armando R. Robledo
USGS

Tidal Wetland Monitoring Study

Fact Sheet Number

2019-311

Project Description

The CDFW Fish Restoration Program will collect fish and invertebrate data near existing and planned tidal wetlands. These data will provide information on how fish and invertebrate communities change pre-/post-restoration. While collecting these data, the variability of invertebrate catches will be assessed for each gear type to determine the optimal number of samples per sampling site. Additionally, methods of assessing the efficiency of fish sampling gears will be compared in 2019.

Project Need

Under the 2008 State Water Project/Central Valley Project Joint Operations Biological Opinion from United States Fish and Wildlife Service, 2009 National Marine Fisheries Service, and 2009 State Water Project Incidental Take Permit, Department of Water Resources (DWR) is required to restore 8,000 acres of tidal wetlands in the Sacramento-San Joaquin Delta (Delta) and Suisun Marsh to improve habitat and food web resources for threatened fishes. The Fish Restoration Program is responsible for biological monitoring in these restored tidal habitats to assess their success for providing benefits for at-risk native fishes. Pre-project monitoring data allows project managers to evaluate the effectiveness of tidal wetland restoration projects.

Project Objectives

1. Continue developing a baseline of biomass, community composition, and fish condition for fish and invertebrates near planned tidal restoration and comparison sites.

2. Determine the extent to which long-term IEP sampling reflects conditions in nearby shallow- water and wetland habitats.

3. Use new sampling technology to determine whether gear efficiency evaluations are feasible.

4. Determine the level of spatial and temporal replication necessary to make sampling design recommendations for long-term monitoring.

5. Determine if the lampara can sample in submerged aquatic vegetation.

6. Sample SAV at tidal restoration sites to estimate biomass for each species.

Schedule of Milestones

Date	Milestone
January, 2019	Project sampling begins
December, 2019	Project sampling ends
July, 2019	Report finalized

Project Cost

$1,091,997 Funding Source: DWR

Project Manager

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Principle Investigator

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