



CALFED Progress Report
California Sea Grant College Program

ConfirmationNumber
 20100430132212

Printed: 4/30/2010 1:26:22 PM ProjectYear_2A 3rd ProjectNo_2C R/SF-20
 TypeQuestionnaire_2B Completion Questionnaire

Preparer Information

PrepName_1A Russell W Perry
 PrepEmail_1B rperry@usgs.gov
 PrepPhone_1C (509) 538-2299 x242

Project Information

ProjectNo_2C R/SF-20 StartDate_3a 11/1/2006 EndDate_3b 10/01/2009
 ProjectTitle_4 Estimating route-specific survival and distribution of juvenile salmonids migrating through the Sacramento-San Joaquin River Delta

CALFed Fellow contact information

FelTitle_5A Mr. FelLast_5B Perry FelFirst_5C Russell FelInit_5D W
 FelInstitution_5E University of Washington
 FelDepartment_5F School of Aquatic and Fishery Sciences
 FelStreetAddr_5G 1122 NE Boat St
 FelCity_5H Seattle FelState_5I WA FelZip_5J 98105
 FelPhone_5K (206) 221-5455 FelFax_5L (206)685-7471
 FelEmail_5M rwperry@u.washington.edu
 FelPositionTitle_5N Predoctoral Graduate Student Fellow

Research Mentor (for additional please see #8)

RMTitle_6A Dr. RMLastName_6B Skalski RMFirstName_6C John RMInit_6D R
 RMIInstitution_6E University of Washington
 RMDepartment_6F School of Aquatic and Fishery Sciences
 RMSStreetAddr_6G 1325 4th Avenue, Ste 1820
 RMCity_6H Seattle RMState_6I WA RMZip_6J 98101-2509
 RMPPhone_6K (206) 616-4851 RMFax_6L _____
 RMEEmail_6M jrs@cbr.washington.edu
 RMPositionTitle_6N Professor

Community Mentor (for additional please see #9)

CMTTitle_7A Ms. CMLastName_7B Brandes CMFirstName_7C Patricia CMInit_7D L
 CMInstitution_7E U.S. Fish and Wildlife Service
 CMDepartment_7F Stockton Office
 CMStreetAddr_7G 4001 N. Wilson Way
 CMCity_7H Stockton CMState_7I CA CMZip_7J 95205
 CMPhone_7K (209) 946-6400 CMFax_7L _____
 CMEmail_7M pat_brandes@fws.gov
 CMPositionTitle_7N Fish Biologist

Additional Research Mentors and Community Mentors

Additional Research Mentors_8

Dr. Jon Burau, Engineer
U.S. Geological Survey
6000 J Street - Placer Hall
Sacramento, CA 95819-6129

Additional Community Mentors_9

Dr. Steven T. Lindley, Ecologist
8604 La Jolla Shores Drive
La Jolla, CA 92037-1508
(831) 420-3921

(916) 278-3127
jrbureau@usgs.gov

Steve.Lindley@noaa.gov

Project Objectives: Please type your responses, and answer the questions in a style appropriate for laymen.

ProjectObjectives_10

My primary objective is to develop a mark-recapture model that will estimate parameters of population distribution through the Delta, survival probabilities of juvenile salmonids traversing different migratory pathways, and overall survival probabilities of the population migrating through the Delta.

Additional objectives include

- 1) Collaborating with community mentors to design the telemetry system needed to implement the mark-recapture model.
- 2) Estimating survival, detection, and migration distribution of juvenile salmonids through the Delta.
- 3) Assessing assumptions of survival models for valid interpretation of survival estimates.
- 4) Performing sample size and power analysis to aid in design of studies with the necessary precision required for sound management decisions.
- 5) Conducting simulation experiments to aid in understanding the complex physical and biological processes that govern population distribution and survival through the Delta in response to water management actions.

Summary of progress in meeting each of these goals and objectives

ProgressSummary_11

During the first year of this project, I worked directly with Jon Bureau and Pat Brandes to design mark-recapture models for telemetry studies they conducted during the winter of 2006/2007. First, I worked with these researchers to design and implement a telemetry system necessary for estimating survival and movement of fish through the Delta. Then based on this design, I developed mark-recapture models to estimate 1) survival through specific reaches of the Delta, 2) the proportion of fish using specific migration routes such as Steamboat/Sutter Slough, the Delta Cross Channel, and Georgiana Slough, and 3) survival through the entire Delta. I then conducted simulations based on true parameter values and tested the mark-recapture model to ensure the model produced unbiased parameter estimates. Last, I then ran these models with the telemetry data of each study and produced survival route entrainment estimates. Although sample sizes were small, the estimates produced from this study represent a first glance at understanding the movement and survival of juvenile salmon at fine spatial scales in the Delta. For 2007-2008, the next step is to expand the scope of the model to the southern Delta, and apply the model to full-scale field studies.

In years 2 and 3, I analyzed telemetry data from 2008 and 2009 to estimate survival and migration route probabilities. I then used the three years of data to focus on factors affecting survival and entrainment probabilities. For entrainment probabilities, I found that river flow, tidal fluctuations, and Delta Cross Channel gate operations affected the probability of fish entering the interior Delta, where pumping stations are located. The highest probabilities of fish entering the interior Delta occurred during flood tides when the river reversed direction and flowed upstream. As mean river flow declines, tidal forces increasing, thereby increasing the probability of fish entering the interior Delta. Closing the Delta Cross Channel decreased the probability of fish entering the Interior Delta, but by much less than expected given the fraction of flow entering the interior Delta.

I found the survival for fish migrating in the Sacramento River and Sutter and Steamboat Sloughs increased with river flow in the Sacramento River, but survival of fish entering the interior Delta was not significantly related flow variables for the interior Delta. However, sample size was small for the interior Delta, which may have decreased statistical power to detect an effect. Although I found an effect of river flow, there was substantial variability among release groups that could not be explained environmental covariates used in my analysis.

PUBLICATIONS: List any publications, presentations, or posters that have resulted from this funded research. Give as many details as possible, including status of paper (e.g., in review; in press), journal name, conference location and date of presentation. Please note (as outlined in the conditions of the award) that each fellow is required to submit an abstract for an oral or poster presentation at each State of the Estuary conference and CALFED Science Conference during the duration of the fellowship.

Publications_14

Oral Presentation
Survival and Distribution of Juvenile Chinook Salmon Migrating through the San Joaquin-Sacramento River Delta
American Fisheries Society National Conference
San Francisco, CA
September 3, 2007

Oral Presentation
Survival and Distribution of Juvenile Chinook Salmon Migrating through the San Joaquin-Sacramento River Delta
DWR and CALFED Meeting
Ryde, CA
September 6, 2007

Poster Presentation
Estimating Survival and Distribution of Juvenile Chinook Salmon Migrating through the Sacramento to San Joaquin River Delta
State of the Estuary Conference
Oakland, CA
October 15-17, 2007

Oral Presentation
Survival of Juvenile Salmon in the Sacramento-San Joaquin River Delta
CALFED Brown Bag Seminar
Sacramento, CA
August 20, 2009

Feature Article
Delta Pathways and Outmigrating Salmon Survival Spotlighted
CALFED Science News
October, 2009
http://www.science.calwater.ca.gov/publications/sci_news_1009.html

Peer-Reviewed Article
Perry, R. W., P. L. Brandes, P. T. Sandstrom, A. Ammann, B. MacFarlane, A. P. Klimley, and J. R. Skalski. 2010. Estimating

survival and migration route probabilities of juvenile Chinook salmon in the Sacramento–San Joaquin River Delta. North American Journal of Fisheries Management. 30:142–156.

Report
Perry R. W. and J. R. Skalski. 2008. Migration and survival of juvenile Chinook salmon through the Sacramento–San Joaquin River Delta during the winter of 2006-2007. Report to U.S. Fish and Wildlife Services, Stockton, California.
<http://www.fws.gov/stockton/jfmp/datareports.asp>

Report
Perry R. W. and J. R. Skalski. 2009. Migration and survival of juvenile Chinook salmon through the Sacramento–San Joaquin River Delta during the winter of 2007-2008. Report to U.S. Fish and Wildlife Services, Stockton, California.
<http://www.fws.gov/stockton/jfmp/datareports.asp>

COOPERATING ORGANIZATIONS: List those agencies and/or persons who provided financial, technical or other assistance to your project since inception. Describe the nature of their collaboration.

CoopOrganiz_15
Steve Lindley, NOAA Fisheries, telemetry database support
Bruce McFarlane, NOAA Fisheries, telemetry study design
Dave Vogel, Natural Resource Scientists, telemetry database support

AWARDS: List any special awards or honors that you, or mentor or members of the research team, have received during the duration of this project.

Awards_16

KEYWORDS: List keywords that will be useful in indexing your project.

Keywords_17

