CALFed Progress Questionnaire
California Sea Grant College Program

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ProjectYear_2A 3rd Year **ProjectNo_2C** R/SF-9

TypeQuestionnaire_2B Final

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Project Information

ProjectNo_2C R/SF-9 **StartDate_3a** 9/01/2005 **EndDate_3b** 8/31/2008
ProjectTitle_4 Looking Back to Go Forward: The application of otolith growth and micro-chemistry to determine spatio-temporal variability in recruitment success for

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Additional Research Mentors and Community Mentors

Additional Research Mentors_8

Additional Community Mentors_9

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

ProjectObjectives_10

Recent technological advancements in micro-chemical analysis has provided fisheries managers a unique opportunity to learn about elusive patterns and processes in population structure and recruitment dynamics. In this study we look back on the life history of the delta smelt by employing the laser ablation technique to resolve recruitment patterns for the threatened delta smelt, a key species in the pelagic organism decline in the upper San Francisco Estuary. We examined smelt collected during the juvenile and adult CDFG surveys (1999 to 2007) for natal and juvenile habitats using otolith strontium isotope ratios at the core and corresponding mid-points for adults and edge points for juveniles. Water 87Sr:86Sr values varied inter-annually at sites within the delta reflecting water transport operations. Therefore water strontium isotope ratios were modeled with a linear mixing model for mixtures of Sacramento and San Joaquin River waters and low-salinity waters to identify habitats.

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Summary of progress in meeting each of these goals and objectives

ProgressSummary_11

Our strontium isotope geochemistry results clearly demonstrate the value of retrospective determination of natal and juvenile rearing habitats for populations undergoing selective mortality. Delta smelt originated in the freshwaters of the Sacramento River, however few individuals utilized the low- salinity zone during early life. During extreme wet years, the low-salinity zone can be the primary habitat for larval rearing. While the natal origins of delta smelt varied inter-annually, the habitats where juveniles reared appeared to be less variable, with a majority of fish utilizing the low-salinty zone. In 6 out of the 7 years of this study, individuals reared in San Joaquin River water during the juvenile period had very poor recruitment to the adult survey. Meanwhile juveniles reared in low-salinity waters appeared to exhibit the highest recruitment success. The outlying year, 2005 was an unusual water year, with high late season outflow resulting in poor recruitment of fish rearing as juveniles in the low-salinity zone. These observations highlight the movement patterns of delta smelt form their natal habitats in tidal freshwater habitats to the low salinity zone. However it is apparent that few individuals remain in upstream tidal habitats and have varying success.

PROJECT MODIFICATIONS: Please explain any substantial modifications in research plans, including new directions pursued. Describe major problems encountered, especially problems with experimental protocols and how they were resolved. Describe any ancillary research topics developed.

Modifications_12

BENEFITS AND APPLICATIONS: Suggest the relevance of these new findings to management. Describe any accomplishment, that is significant effects your project has had on resource management or user group behavior. CALFED is looking for "management cue" (see http://science.calwater.ca.gov/pdf/soemgmtcues.pdf).

BenefitsApplic_13

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

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

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

Otolith, Strontium Isotopes, Delta Smelt, POD, ICP-MS

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PATENTS: List any patents associated with your project.

Patents_18

Additions: Additional information can be added here. Please begin the text with the number of the question you are adding to.

Additions_19