



CALFed Progress Questionnaire
California Sea Grant College Program

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ProjectNo_2C R/SF-2

Preparer Information

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Project Information

ProjectNo_2C R/SF-2 StartDate_3a 4/1/03 EndDate_3b 3/31/05
ProjectTitle_4 A Mechanistic Model to Evaluate and Improve Riparian Restoration Success

CALFed Fellow contact information

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Additional Research Mentors and Community Mentors

Additional Research Mentors_8

Form with 6 horizontal lines for entering additional research mentor information.

Additional Community Mentors_9

Form with 6 horizontal lines for entering additional community mentor information.

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

ProjectObjectives_10

The goal of this research is to develop a predictive understanding of recruitment and survival of the pioneer riparian tree species cottonwoods and willows that dominate the crucial initial phase of riparian community recovery.

As part of this effort, I am drawing on existing sources of hydrologic, topographic and vegetation data, and integrating new research with those data. Anticipated products from this project include:

- (1) Completion of field-based, regionally- and species-specific numerical model calibrating a general conceptual framework of pioneer tree recruitment to field sites on the Tuolumne River.
- (2) Outreach to resource managers and restoration practitioners to disseminate the findings of this research for use in designing and refining flow schedules and on-the-ground restoration projects;
- (3) A doctoral dissertation detailing results of this research;
- (4) Several manuscripts for submission to peer review journals.

Summary of progress in meeting each of these goals and objectives

ProgressSummary_11

FIELD-CALIBRATED MODEL: Field work was conducted and completed in 2003 for the seed release phenology and reach-wide seedling demography studies. The phenology study involved 16 field visits to each of the 6 San Joaquin Basin sites. The seedling study consisted of a 3-day canoe survey in September 2003 to document seedling recruitment patterns on 14 sandbars on the lower Tuolumne River. Data from the 2003 field studies were entered and thoroughly quality-checked and corrected. Temperature and humidity sensors used in the field studies were calibrated against each other in the office and correction factors computed.

DATA ANALYSIS AND MANUSCRIPT DEVELOPMENT:

We began analyses of the seed release phenology data, plotting average values of seed release intensity at a variety of spatial scales (e.g., tree, site, river), as well as temporal initiation of seed release and daily temperature and relative humidity patterns. We also secured historical flow and climate data for the Tuolumne and San Joaquin basins covering a 100-year period of record; these data were quality checked and integrated with the phenology data for analysis of historical snowmelt initiation and climate patterns. A manuscript article is in preparation on this component of the research.

A preliminary analysis of the tank study data was completed in Spring 2003. In early June, John Stella and John Battles gave an oral presentation on this analysis at the North American Forest Ecology Workshop in Corvallis, Oregon. The talk highlighted differences in seedling mortality and growth across species and drawdown treatments, and summarized the ecological and restoration applications of the study. Further analyses of these data are planned for Year 2 of the CALFED Science Fellowship.

OUTREACH:

Throughout 2003 John Stella volunteered as a peer reviewer for a floodplain revegetation plan and monitoring plan for the California Department of Water Resources Merced River Salmon Enhancement Project, Robinson Reach. Results of this effort include two extensive reviews of the plans, including written comments and suggestions to improve the experimental design and enhance the scientific knowledge gained by the restoration effort.

In June 2003, John Stella was interviewed for an article in the CALFED Science-In-Action newsletter about the relevance of this research project to riparian restoration efforts on the Sacramento River. The resulting article quoted extensively from the interview and integrated this research with other site-scale and reach-wide approaches.

John Stella is collaborating with other researchers and agency staff to present a special session at the 2004 CALFED Science Conference. The session is titled *Managing Big Rivers below Big Dams - the challenge to restore native riparian and aquatic species.*

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

The original fellowship application proposed to test the research model on an existing restoration project on the Merced River. After discussions with the restoration team from the Department of Water Resources, it was determined that the most helpful outreach would be to provide scientific review of the restoration and monitoring plans for that project. The outreach provided during the first year of the grant is described in the Project Progress section.

The original fellowship application proposed to develop a database of Central Valley riparian source data, as well as reference (non-local) and regional values for parameters influencing riparian recruitment. Extensive research of existing data indicates that a more useful format for these data would be as summary information within scientific articles submitted to peer-review journals.

Several deliverables were added to the original project objectives. These deliverables include articles submitted to peer-review journals and a doctoral dissertation.

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

Many of CALFED's priority at-risk species rely on riparian ecosystems to maintain fundamental habitats and processes. This project will directly benefit CALFED and its public constituents by the development of field-tested, regionally applicable tools for designing and evaluating restoration approaches. The component field studies are designed to provide crucial life-history data on keystone native floodplain tree species. These data and analyses will allow water managers to target flow timing, magnitude, and ramping rates that will maximize natural recruitment. Field tests of model predictions will provide key information about the effects of existing spring flow releases and help prioritize potential future releases based on water year characteristics. This research is also relevant to the potential effects of climate change on water supplies and spring restoration flows; potential impacts to floodplain tree populations can be better assessed. Restoration project managers will also benefit from the field studies in setting floodplain design elevations and physical characteristics to optimize conditions for a sustainable, native vegetation community.

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

Stella, John C., Bruce K. Orr, John J. Battles, and Joe R. McBride. 2002. Calibrating a model of seedling recruitment for riparian pioneer tree species on the lower Tuolumne River, CA. Poster presentation. Meeting of the Ecological Society of America. Tucson, AZ.

Stella, John C., Bruce K. Orr, John J. Battles, and Joe R. McBride. 2003. Reproductive phenology and groundwater requirements for seedlings of three pioneer riparian species on the lower Tuolumne River, CA. Oral presentation. CALFED Science Conference. Sacramento, CA.

Stella, John C., Bruce K. Orr, John J. Battles, and Joe R. McBride. 2003. Riparian forest sustainability: calibrating a physical and biological recruitment model for the lower Tuolumne River, CA. Oral presentation. North American Forest Ecology Workshop. Corvallis, OR.

Forests Round the Bend. 2003. CALFED Science In Action. CALFED Bay-Delta Program. Sacramento, CA. Research featured in an article about riparian forest restoration on the Sacramento River.

Stella, John C., John J. Battles, Bruce K. Orr, and Joe R. McBride. 2004. Correspondence of riparian tree seed release patterns with river hydrology and local climate on the Tuolumne and San Joaquin rivers, CA. Oral presentation. Meeting of the Ecological Society of America. Portland, OR. (accepted)

Stella, John C., John J. Battles, Bruce K. Orr, and Joe R. McBride. 2004. Model calibration results for restoration of riparian trees through natural recruitment. Oral presentation. CALFED Science Conference. Sacramento, CA. (proposed)

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

Department of Environmental Science, Policy and Management (ESPM), UC Berkeley. Laboratory space, library and administrative resources.
Center for Forestry, UC Berkeley. Field station facilities for ecological experiments, staff help, administrative resources.
Stillwater Sciences. Scientific expertise, in-kind support and administrative resources.
Tuolumne Irrigation District. District staff have been helpful in provided flow and climate data for the Tuolumne River watershed.

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

NSF Doctoral Dissertation Improvement Grant. Awarded to John Stella, 2003.
Edward A. Colman Fellowship in Watershed Management, Department of ESPM, UC Berkeley. Awarded to John Stella, 2000-2001 and Fall 2003.
Departmental Fellowships, Department of ESPM, UC Berkeley. Awarded to John Stella, 1996-1998, 2000-2003.

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

Keywords_17

riparian ecology, seed release phenology, Salicaceae, Populus fremontii, Salix gooddingii, Salix exigua, seedling recruitment, restoration

PATENTS: List any patents associated with your project.

Patents_18

does not apply

