

Calfed Fellowship Progress Report 2008

Project title:

Measuring and predicting the success of riparian restoration for wildlife populations:
Accommodating uncertainty and complexity

CALFED Fellow:

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Project Objectives:

The goal of this project is to integrate population modeling of passerine bird populations with information on habitat quality and conservation strategies to develop a better understanding of how restoration can be designed to promote healthy and functional riparian bird habitat in the CALFED region.

1. Develop performance measures of restoration success. This project capitalizes on the rich data sets that are already available for riparian habitats in the Central Valley. PRBO Conservation Science, in partnership with federal, state, and non-profit agencies, has been conducting intensive monitoring of riparian bird systems in the CALFED region

since 1991 including the Sacramento Valley; the Delta; and the San Joaquin River. This project will integrate information on avian demography with larger scale patterns of riparian restoration, hydrology, and climate to estimate the population trajectories of these species and the degree to which restoration is influencing these trajectories.

2. Enhance information transfer and develop decision support. Performance measures of restoration success are of little utility if they are not useful to decision makers. To develop a better understanding of what types of information about riparian bird habitat conservation, the CALFED fellow will engage in discussions with decision makers about the type of information that is needed to guide the management and restoration of riparian habitats.

3. Incorporate uncertainty into restoration planning. Today, more than ever before, the future of riparian ecosystems is difficult to predict because we lack information about how patterns of land-use and climatic conditions will change in the future. This uncertainty means that we need to develop conservation and restoration strategies that will be successful, even when we lack detailed knowledge about future conditions. Such strategies may include explicitly incorporating uncertainty into quantitative models, but also simply incorporating an explicit discussion of uncertainty in the qualitative development of restoration and conservation strategies. This project will address the ramifications of uncertainty for riparian restoration and conservation from a quantitative and qualitative perspective.

Summary of progress in meeting each of these goals and objectives:

1. Developing performance measures of restoration success. Fellow has begun work on synthesizing data on reproductive success and survival to evaluate the demographic response of riparian birds to restoration. Results of preliminary analyses were presented at the joint meeting of the *Ecological Society of America* and *Society for Ecological Restoration* in 2007. This work has resulted in an unpublished manuscript on the application of seasonal fecundity models to riparian restoration. In collaboration with PRBO biologists, Fellow is organizing a symposium on measuring the success of avian habitat restoration at the joint meeting of the *Cooper Ornithological Society*, *American Ornithologists Union*, and *Society of Canadian Ornithologists* that will be held in August 2008. In collaboration with PRBO biologists, Fellow is guest-editing a special section on evaluating the restoration of riparian wildlife habitat to be published in *Restoration Ecology*. Fellow has been invited to participate in the Bank Swallow Working Group, to develop conservation and restoration strategies for this special status species that nests in river banks of the Sacramento Valley.

2. Enhancing information transfer and developing decision support. Fellow has gathered information about decision support tools for riparian habitat restoration and conservation by distributing a questionnaire to land managers and from one-on-one interactions with restoration practitioners. Preliminary results of the questionnaire are posted on-line (http://nseavy.googlepages.com/riparian_dst), and were presented at the *National Partners in Flight* meeting and the *Bay Area Conservation Biology Society* meeting in 2008. This work has resulted in one manuscript that is in review at *Conservation Letters*, and a second manuscript that is in preparation.

3. Incorporate uncertainty into restoration planning. Fellow has developed collaborations with climate modelers and restoration practitioners to learn more about the

uncertainty associated with future climatic conditions and how it impacts the practice of restoration. This work has resulted in one manuscript published in the *Auk*, and a second manuscript that has been submitted to *Ecological Restoration*.

Project modifications: Please explain any substantial modifications in directions pursued.

1. Riparian bird response to vegetation structure: A multiscale analysis using LiDAR measurements of canopy height. Fellow has collaborated with UC Davis and PRBO biologists to investigate the utility of LiDAR measurements of canopy height to understand the response of riparian birds to vegetation structure. Research results will be presented at this summer's joint meeting of the *Cooper Ornithological Society*, *American Ornithologists Union*, and *Society of Canadian Ornithologists*. This work has resulted in an unpublished manuscript on the application of LiDAR technology to describing habitat associations of riparian birds and understanding the spatial scale at which birds respond to riparian vegetation.

2. Experimentally testing restoration recommendations. Fellow is collaborating with ecologists from The Nature Conservancy, PRBO, and UC Davis to develop a proposal to conduct a large scale experiment that will compare four different riparian restoration strategies on the Cosumnes River Preserve. The Fellow's contribution to this multi-disciplinary project is focused on measuring the response of the bird community to the restoration treatments.

3. Identifying Bird Species of Climate Concern. Fellow is collaborating with PRBO biologists to produce a companion manuscript to the recently published Bird Species of Special Concern. This manuscript will identify bird species in California that are most at risk from the projected effects of climate change over the next century.

Benefits and applications: Suggest the relevance of these new findings to management.

To date, there are two results from this project that have the potential to make major contributions to management.

1. The development of decision support tools needs to prioritize one-on-one interactions between ecologists and decision makers. In the questionnaire that was distributed to managers that are engaged in the conservation and restoration of riparian bird habitat, there was a strong consensus that one-on-one interactions are important, but generally not available in the decision making process. Thus, although the development of quantitative tools is important, it must be done in conjunction with mechanisms that will ensure one-on-one interactions to support these tools are also available. In the manuscript "How can we improve delivery of decision support tools for conservation and restoration?", submitted to *Conservation Letters*, the implications of the responses to the questionnaire for developing decision support tool are developed.

2. The role of riparian restoration in climate change adaptation. A growing awareness of the projected effects of climate change has made it clear that ecosystems in the future will be very different from historical conditions. As a result, success of ecological restoration may no longer be defined simply by the ability to recreate historical conditions. In the manuscript "Why climate change makes riparian restoration more important than ever", submitted to *Ecological Restoration*, a diverse group of

authors has considered the role that riparian restoration can play in protecting ecosystem from the negative effects of climate change. Specifically, the potential that riparian restoration has to enhance natural ecosystem resilience, habitat connectivity, thermal refugia, and critical hydrological functions will enhance ecosystem resilience, resistance, and response to climate change. This work provides decision makers with a rationale for investing in riparian restoration as a strategy for preparing ecosystems for climate change. It also makes recommendations for modifying on-the-ground practices and developing research questions that will make restoration more successful under a changing climate.

Publications: List any publications, presentations, or posters that have resulted from this funded research.

Publications

- Seavy, N. E., J. H. Viers, and J. K. Wood. In prep. Riparian bird response to vegetation structure: A multiscale analysis using LiDAR measurements of canopy height. Intended for submission to *Ecological Applications*.
- Seavy, N. E. In prep. Modeling predation and parasitism effects on seasonal fecundity of riparian birds. Intended for submission to *Avian Ecology and Conservation*.
- Seavy, N. E., T. Gardali, G. H. Golet, F. T. Griggs, C. A. Howell, T. R. Kelsey, S. Small, J. H. Viers, J. F. Weigand. In review. Why climate change makes riparian restoration more important than ever. Submitted to *Ecological Restoration* in May 2008.
- Seavy, N. E. and C. A. Howell. In review. How can we improve delivery of decision support tools for conservation and restoration? Submitted to *Conservation Letters* in April 2008.
- Seavy, N.E., K. E. Dybala, and M. A. Snyder. 2008. Climate models and ornithology. *Auk* 125:1-10.

Presentations

- Seavy, N.E. Evaluating decision support tools for riparian habitat conservation: What is important and what is needed? *National Partners in Flight* meeting, McAllen, Texas, 2008.
- Seavy, N.E. and C.A. Howell. Evaluating decision support tools for riparian habitat conservation: What is important and what is needed? *Bay Area Conservation Biology Society* meeting, Davis, California, 2008.
- Seavy, N.E. , M. Gould, and T. Gardali. Birds per 100 net hours: are we correcting correctly? *Western Bird Banding Association* meeting, Petaluma, California, 2007.
- Jennings, S, T. Gardali, and N.E. Seavy. The effect of constant effort mist-netting on Song Sparrow and Wrentit breeding success. *Western Bird Banding Association* meeting, Petaluma, California, 2007.
- Seavy, N.E. Using demographic models to guide and evaluate restoration of riparian bird habitat: Implications for monitoring. *Ecological Society of America* and *Society for Ecological Restoration* meeting, San Jose, California, 2007.

Posters

- Seavy, N.E. Riparian restoration and bird monitoring: What are the tools and how can they be improved? *Riparian Habitat Joint Venture* meeting, Sacramento, California, 2007.
- Seavy, N.E., G. Ballard, T. Gardali, G. Geupel, C. Howell, and N. Nur. Riparian restoration, bird population dynamics, and ecosystem function. *State of the Estuary* meeting, Oakland, California, 2007.

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

PRBO Conservation Science--Fellow is collaborating with multiple biologists, including Christine Howell, Tom Gardali, Geoff Geupel, and Julian Wood. This includes collaboration on manuscripts, organizing a symposium and special section on measuring the success of riparian restoration, and collaborations on designing new projects to measure the response of bird populations to restoration.

UC Davis--Fellow is collaborating with Dr. Joshua Viers on two manuscripts, and graduate student Kristy Dybala on one manuscript.

UC Santa Cruz--Fellow collaborated on one manuscript with climatologist Dr. Mark Snyder.

California Department of Fish and Game--Fellow is participating as a member of the Bank Swallow working group, organized by Kent Smith.

The Nature Conservancy--Fellow is collaborating with Dr. Greg Golet on one manuscript, and with Dr. Jaymee Marty on a proposal to experimentally compare alternative restoration techniques.

River Partners--Fellow is collaborating with Dr. Stacy Small and Thomas Griggs on one manuscript.

California Audubon--Fellow is collaborating with Rodd Kelsey on one manuscript.

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.

None at this time.