

# DELTA SCIENCE FELLOW 2013



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## WHY THIS RESEARCH MATTERS

The Delta's salt marsh harvest mouse (SMHM) (*Reithrodontomys raviventris*) has been federally listed for over 40 years, yet detailed demographic data has never been collected. A basic understanding of demographics is necessary for a complete management plan.

The historic range of the SMHM has been reduced by almost 95% to 12,555 hectares. A large proportion of remaining habitat exists as diked wetlands managed for waterfowl, and the value of this habitat type relative to their historical tidal wetlands is largely unknown. Tidal habitat restoration is one of the primary conservation strategies for SMHM, but the immediate effects of restoration activities, and habitat shifts on SMHM populations are uncertain.

Image: NMSU

## *Optimizing salt marsh harvest mouse conservation through an investigation of demography, habitat use and multi-species management*



LEFT: The research crew tags and collars the mice, then tracks their movement with radio telemetry receivers. BELOW: A salt marsh harvest mouse. K. Smith/UC Davis



## PROJECT

This project characterized the demographic and life history attributes of the salt marsh harvest mouse and the effects of tidal restoration. The Fellow used monthly live-trapping, mark and recapture techniques over a period of three years, and existing datasets to evaluate demographic characteristics and population sizes for the SMHM, as well as estimate the relative value of various habitat types for this endangered species. To develop recommendations for improved multispecies management, the Fellow also studied the relationship between SMHM and common waterfowl species.

The Fellow used radiotelemetry to evaluate habitat use of SMHM, and made important observations of behaviors such as feeding and nesting. The fellow also used a cafeteria trial to examine the diet preferences of SMHM. The Fellow alone spent ~2,900 hours over 500+ days in the field collecting this data and managed a field crew consisting of 5+ state employees, a total of 10 undergraduate assistants from UC Davis, and more than 100 volunteers, mostly UC Davis undergraduates.



Katherine Smith and Lauren Barthman-Thompson (CA Department of Fish and Wildlife) fit a radiotelemetry collar on a salt marsh harvest mouse. *Courtesy photo*

## RESULTS

Preliminary analysis of data indicates that the value of diked and tidal wetlands for supporting SMHM is similar. Radiotelemetry data and visual observations made in the field have revised our understanding of “good” SMHM habitat, showing that mice use habitat and vegetation types that the established literature states they will not use. Finally in the cafeteria trials, SMHM prefer to feed on rabbits foot grass (*Polypogon monspeliensis*) and fat hen (*Atriplex prostrata*) over pickleweed; both of these plants are actively promoted by waterfowl managers in diked wetlands. Overall, these results suggest that management for ducks can also provide habitat and forage for SMHM. This research took place in conjunction with long term monitoring efforts with guidance from the ad hoc salt marsh harvest mouse working group, with the goal of improving management of SMHM to ultimately down- or de-list this species.

## RESEARCH MENTOR

Douglas Kelt, Wildlife, Fish and Conservation Biology Department,  
University of California, Davis

## COMMUNITY MENTORS

Steve Culberson and Michael Chotkowski, U.S. Fish and Wildlife Service

Lauren Barthman-Thompson, CA Department of Fish and Wildlife

## SELECT PUBLICATIONS

Smith, K.R. (2012). Refuge use and movement of the salt marsh harvest mouse (*Reithrodontomys raviventris halicoetes*) in response to environmental heterogeneity. New Mexico State University, Las Cruces, New Mexico, 62 pp.

Smith, K. R., Barthman-Thompson, L., Gould, W. R., & Mabry, K. E. (2014). Effects of natural and anthropogenic change on habitat use and movement of endangered salt marsh harvest mice. *PLoS one*, 9(10), e108739.

Trombley, S., and Smith, K.R. (2017) Potential evidence of biparental care or mate guarding in the salt marsh harvest mouse. *California Fish and Game*. (Submitted).

## MANAGEMENT APPLICATIONS

The Fellow’s observations of daily behavioral patterns have been used by the U.S. Fish and Wildlife service to make recommendations to groups performing work in the San Francisco Estuary. The Fellow has presented preliminary findings to the USFWS, local advisory committees, and private companies. As a direct result of this research, managers now recommend that habitats other than tidal wetlands dominated by pickleweed are evaluated for SMHM presence, and the inventory of habitat available for SMHM has increased greatly.

## CONTACT

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