National Park Service
U.S. Department of the Interior
San Francisco Bay Area Network
Inventory and Monitoring Program
Research Project Summary March 2009

Small Mammals of Muir Beach

Importance: *Restoration projects in national parks such as Golden Gate National Recreation Area (GOGA) require ecological surveys to identify changes that may take place as a result of the project.*

The western harvest mouse resides in GOGA. From Takekawa et al, 2003.

Muir Beach, a popular destination in GOGA, lies at the mouth of Redwood Creek. Historically the area was part of the Redwood Creek floodplain and included a large freshwater lagoon (Big Lagoon), seasonal freshwater wetlands, an intermittent tidal lagoon, a riparian corridor, and dunes. Development over the years including grazing, roads, and a parking lot has degraded the area and prevented proper flow of water, eliminating the freshwater lagoon completely. The National Park Service (NPS) has been planning a restoration project in the area to establish a more natural ecosystem.

Muir Beach occurs close to the known range for the endangered salt marsh harvest mouse (*Reithrodontomys raviventris*) and the state species of special concern Point Reyes jumping mouse (*Zapus trinotatus orarius*). In preparation for restoration work, NPS requested that the U.S. Geological Survey (USGS) conduct small mammal surveys at the location to determine the distribution and abundance of small mammals and to identify special status mammal species, if any. The presence of endangered species would affect the work done and require protection for the species during restoration activities.

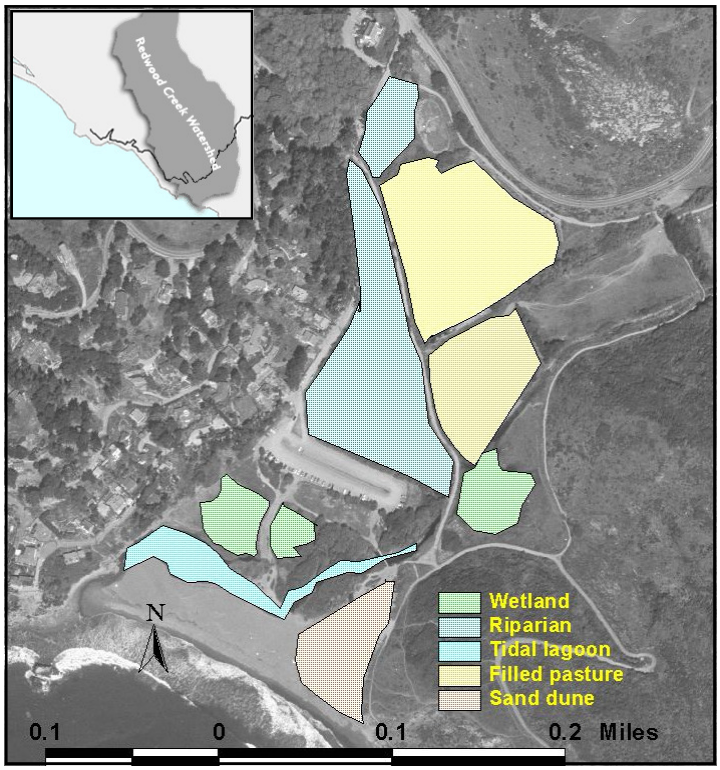

Figure 1. Habitats at Muir Beach that hosted small mammal surveying grids. From Takekawa et al, 2003.

Inventory Methods: *In fall 2002, USGS researchers set out 96 Sherman live traps at 24 locations at Muir Beach over four nights. Captured mammals were identified to species, sexed, weighed, aged, and marked to distinguish recaptures.*

Researchers trapped in five habitat types (Figure 1): pasture, riparian, wetland, dune, and tidal lagoon. USGS conducted surveys in the fall to reduce detection of non-resident individuals and to precede the winter rainy season. Traps included materials to keep the mammals warm and comfortable. Researchers characterized the vegetation at each location; calculated percent cover for plant species, litter, and bare ground; and recorded height for each vegetation species.

The western harvest mouse and the endangered salt marsh harvest mouse can be difficult to distinguish, so the researchers measured tail characteristics according to the Shellhammer tail score. In this method, tail traits have been assigned numeric scores,

and the total score for all tail characteristics of a single mouse can be used to differentiate between species. Scores of captured mice in this study ranged from three to seven, while the salt marsh harvest mouse usually scores between zero and two. The researchers also verified captured mice were harvest mice by their characteristic grooved upper incisors with no external cheek pouches.

Inventory Findings: *Researchers detected four small mammal species – western harvest mouse, deer mouse (Peromyscus maniculatus), California vole (Microtis californicus), and non-native roof rat (Rattus rattus).*

The western harvest mouse was the most abundant species. Researchers did not detect the salt marsh harvest mouse or the Point Reyes jumping mouse. The greatest number of small mammals was found in the pasture where dense cover provided abundant habitat for western harvest mice. Although dunes had low vegetative cover, deer mice and western harvest mice used this habitat along with adjacent edge habitats. The habitat distribution of small mammals differed by species (Figure 2). Pasture and wetland areas were similar in vegetation type, vegetative height structure, and small mammal capture. Abundance of western harvest mice was significantly related to habitat and vegetation– primarily vegetative cover, but not height.

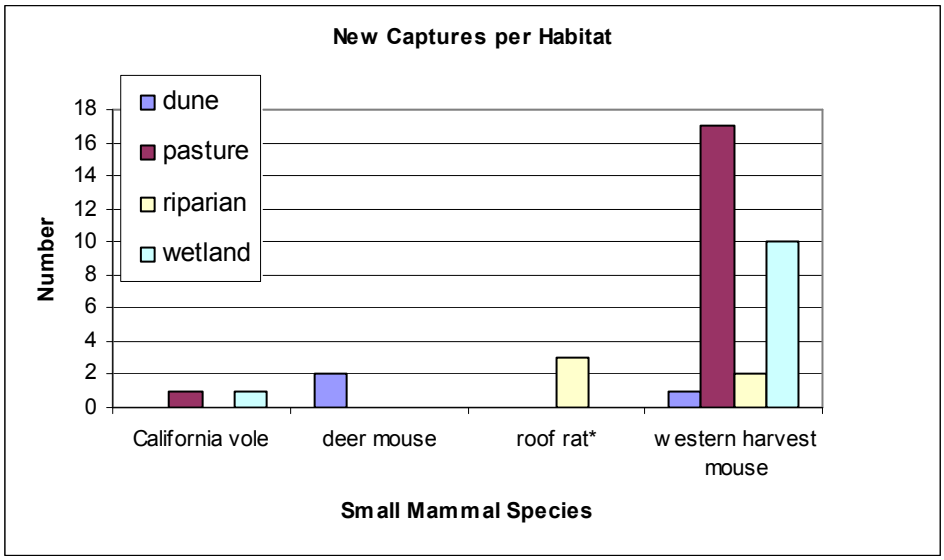

Figure 2. Number of new captures of each small mammals species by habitat. *Roof rats were not marked to distinguish recaptures, so the number of new

Tidal marsh plants associated with the salt marsh harvest mice – pickleweed, fat hen, gumplant, and coyote bush – were not present. However, the researchers noted that increased tidal flows from restoration efforts may establish tidal marsh plants and their associated small mammal community. Healthy riparian corridors from floodplain restoration would support greater numbers and diversity of small mammals.

Additional Resources:

Takekawa, J. Y., M. A. Bias, I. Woo, S. A. Demers, and E. E. Boydston. 2003. Small mammal survey at Big Lagoon, Muir Beach, Marin County, CA. Unpubl. Progr. Rep., U. S. Geological Survey, Vallejo, CA. 25pp. Online: http://science.nature.nps.gov/im/units/sfan/Inventory/FinalInventoryReports/MBch_Smammal_final%2002.pdf.

Summary written by Alison Williams. For more information contact Marcus Koenen, Inventory and Monitoring Coordinator, National Park Service, San Francisco Bay Area Network, 415-331-5734.