

Salt Marsh Harvest Mice (*Reithrodontomys raviventris*) Distribution, Abundance, and Population Trends in the East Bay Regional Park District

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Introduction

The Salt Marsh Harvest Mouse (*Reithrodontomys raviventris*) is a state and federally listed endangered rodent endemic to the San Francisco Bay region of California (Figure 1). It was listed as federally endangered in 1970, and is assigned a highly-ranked recovery priority number (2C) by the U.S. Fish and Wildlife Service due to high threats to its survivorship and high potential for recovery. Habitat loss is the primary threat to the Salt Marsh Harvest Mouse. Human activities have resulted in a greater than 80% loss of tidal marsh habitat in the San Francisco Bay area. This remaining habitat is particularly vulnerable to the effects of climate change, sea level rise, and extreme storm and flood events. Due to this species' limited range and loss of suitable habitat, knowledge of its status, distribution, abundance and population trends on lands managed by the East Bay Regional Park District is important for the conservation of the Salt Marsh Harvest Mouse.

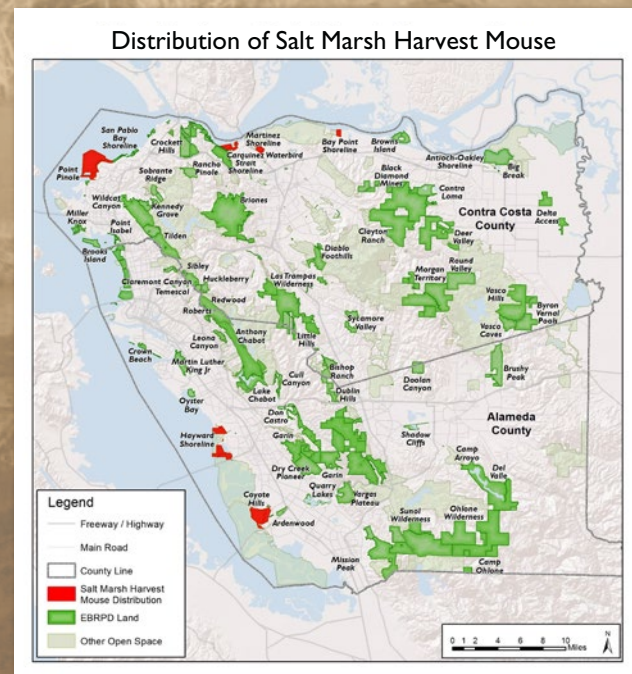


Figure 2. Distribution of Salt Marsh Harvest Mouse (*Reithrodontomys raviventris*) along East Bay Regional Park District's 40 miles of managed San Francisco Bay shoreline.

Methods

During a five year study, from 2012 to 2016, Salt Marsh Harvest Mice were captured, identified, and released at six East Bay Regional Park District sites. Using standard survey protocols, during the months of May through August, the following locations were investigated: Coyote Hills Regional Park (Fremont, Alameda Co.), Hayward Regional Shoreline (Hayward, Alameda Co.), Point Pinole Regional Shoreline (Richmond, Contra Costa Co.), Martinez Regional Shoreline (Martinez, Contra Costa Co.), Waterbird Regional Preserve (Martinez, Contra Costa Co.), and Bay Point Regional Shoreline (Figure 2). The population index value (mice captured/total trap nights x 100) was calculated for each site and year. Canfield's line intercept method (1941) was used to obtain vegetation values. Statistical analyses were performed in JMP Pro 11 (JMP®).

Results

Between 2012 and 2016, 169 Salt Marsh Harvest Mice were caught during a total of 4,450 trap nights. Of the three primary trapping locations surveyed continually over the last five years, Point Pinole Regional Shoreline had the highest mean population index of 4.5, followed by Hayward Regional Shoreline at 3.86, and Coyote Hills Regional Park at 2.57 (Figure 3). A one-way ANOVA revealed significant differences among the Salt Marsh Harvest Mouse captures in each park (F-ratio = 7.7986, df = 119, P = 0.0007) (Figure 4). Tukeys pairwise comparisons showed that Point Pinole Regional Shoreline has statistically significantly higher capture rates than Coyote Hills Regional Park (P = 0.0004) but not for Hayward Regional Shoreline (P = 0.0989). A one-way ANOVA of Salt Marsh Harvest Mouse captures by year indicated a significant decline in Salt Marsh Harvest Mouse captures between 2012 and 2016 (Figure 5) (F-ratio = 4.9540, df = 122, P = 0.0279).

Vegetation: Average vegetation height and estimated pickleweed percent coverage ranged from 31.3-48.5 cm and 50-92%. There were no significant differences among parks (F-ratio = 0.4406, df = 6, P = 0.7408; F-ratio = 0.4433, df = 6, P = 0.7393). The highest Salt Marsh Harvest Mouse population index is associated with a vegetation height of 41.8 cm and 82% pickleweed, at Point Pinole Regional Shoreline.

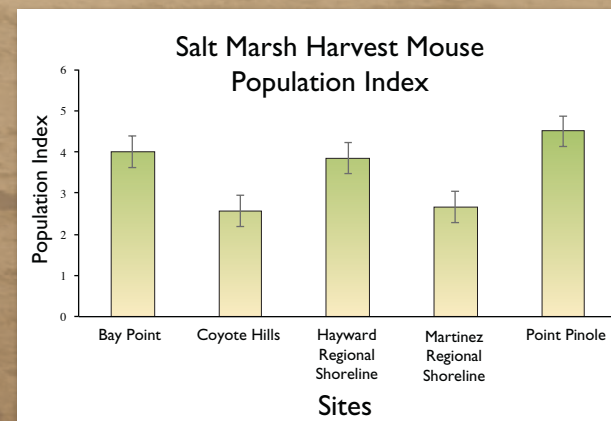


Figure 3. Population index for Salt Marsh Harvest Mouse (*Reithrodontomys raviventris*) locations from 2012 to 2016. The population index was calculated as mice captured/total trap nights x 100.

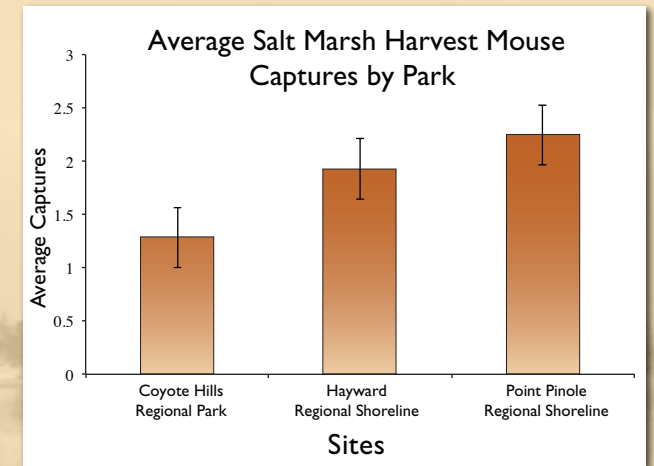


Figure 4. Average nightly captures of Salt Marsh Harvest Mouse (*Reithrodontomys raviventris*) at three sites surveyed continuously from 2012 to 2016. A one-way ANOVA in JMP® showed significant differences among the parks (F-ratio = 7.7986, df = 119, P = 0.0007) (Figure 2). Tukeys pairwise comparisons showed that Point Pinole Regional Shoreline has significantly higher capture rates than Coyote Hills Regional Park (P = 0.0004) but not for Hayward Regional Shoreline (P = 0.0989). Error bars represent standard error.

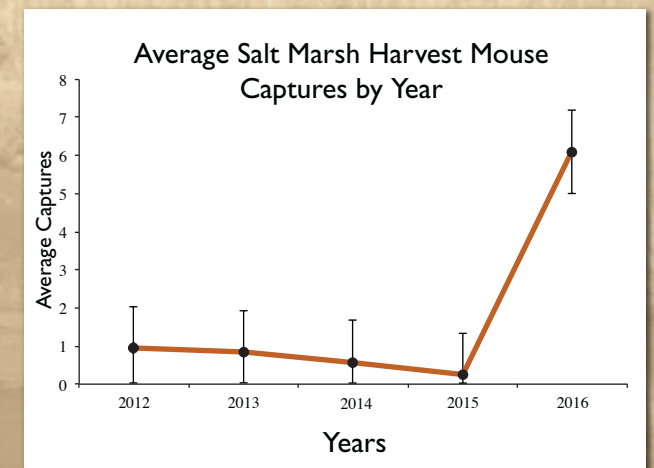


Figure 5. Change in Salt Marsh Harvest Mouse (*Reithrodontomys raviventris*) average nightly captures by year from five study sites. Error bars represent standard error.

Abstract

The Salt Marsh Harvest Mouse (*Reithrodontomys raviventris*) is a state and federally listed endangered species endemic to the salt marshes of the San Francisco Bay Area. As a result of anthropogenic change, its pickleweed-dominated tidal marsh habitat has been greatly reduced. Habitat loss is the primary threat to the Salt Marsh Harvest Mouse. The East Bay Regional Park District manages 40 miles of shoreline, which includes viable Salt Marsh Harvest Mouse habitat. Using standard survey protocols, District staff, interns and volunteers surveyed six sites for Salt Marsh Harvest Mice between 2012 and 2016. During the months of May through August, 169 Salt Marsh Harvest Mice were captured, with a total population index that approximates 3.8 (individuals/trap nights x 100). There was no significant correlation between captures and pickleweed height and coverage; however, populations differed significantly among sites. Continued monitoring is necessary to document their status, distribution, abundance and population trends to help inform conservation efforts for these and other special status species inhabiting tidal wetlands managed by the East Bay Regional Park District.



Figure 1. Salt Marsh Harvest Mouse (*Reithrodontomys raviventris*) on eastern shore of the San Francisco Bay, California (Photographed by Daniel I. Riensche)

Acknowledgments

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