

ECTOPARASITES FOUND ON SALT MARSH HARVEST MICE IN THE NORTHERN SALT MARSHES OF GRIZZLY BAY, CALIFORNIA

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The salt marsh harvest mouse, *Reithrodontomys raviventris* Dixon (Rodentia: Muridae), is listed as an endangered species by both the federal government and the State of California. There are two subspecies - *R. r. halicoetes* in the northern marshes of San Pablo, Grizzly, and Suisun bays, and *R. r. raviventris* in the southern arm of San Francisco Bay (Shellhammer 1982). The salt marsh harvest mouse is a keystone species in tidal and brackish marsh habitats; their populations thrive best in complete, healthy marsh ecosystems and decrease in numbers or experience extirpation in human-altered marshes. Salt marsh harvest mouse populations are negatively affected by the elimination of high marsh and upland habitats that provide refugia during high tides (Shellhammer 1989).

Little is known about ectoparasites on the salt marsh harvest mouse and no flea records are known, although numerous fleas have been recorded from other species of *Reithrodontomys*, particularly *R. megalotis* (e.g., Ford et al. 2004¹). To address this question, fleas were opportunistically collected from individuals during several trapping sessions in the northern tidal region of Grizzly Bay, Solano County, California (38.16°N, 122.08°W), conducted in July 2004 by the California Department of Fish and Game to monitor mouse populations in salt marsh harvest mouse reserves in the Suisun Marsh.

Mammals were trapped using small (7.6 x 7.6 x 22.8 cm) folding and non-folding Sherman traps (Tallahassee, Florida) set in standard grid formation with 10-m centers.

¹Ford, P. L., R. A. Fagerlund, D. W. Duszynski, and P. J. Polechla. 2004. Fleas and lice of mammals in New Mexico. United States Department of Agriculture, Forest Service. Rocky Mountain Research Station. General Technical Report RMRS-GTR-123, 58 pp.

Traps were placed above the highest high tide line. Harvest mice were identified to species using the identification method described by Fislser (1965) and Shellhammer (1984). Harvest mice were inspected for fleas, which were removed by hand or forceps and stored in screw-thread vials (17 x 60 mm) filled with 70% ethyl alcohol.

Flea specimens were identified as *Orchopeas leucopus* (Baker) (Ceratophyllidae: Ceratophyllinae) at the Plant Pest Diagnostics Laboratory, California Department of Food and Agriculture, Sacramento, California. Voucher specimens (1 male, 1 female) are slide mounted together in Canada balsam, and are housed in the California State Collection of Arthropods, with the following labels: left, “*Orchopeas / leucopus /* (Baker, 1904) / det. S.D. Gaimari, 2005 / Vouchers: Clark et al. 2005”; and right, “*Reithrodontomys raviventris /* California: Solano Co. / Grizzly Bay (N tidal region) / 38.16°N, 122.08°W / VII-2004, H. Clark coll. / CDFAPDR# 1333288.”

The genus *Orchopeas* has been previously reported from species of *Reithrodontomys*, but not *R. raviventris*. Species of *Orchopeas* seem to be most closely associated with woodrats of the genus *Neotoma* (Cricetidae), but many other hosts, including Muridae, as well as species of Sciuridae and Heteromyidae, are known. *Orchopeas leucopus* is widespread throughout the United States, and is known from all four of these families. In reviewing the literature, Lewis (2000) found references for 76 host species, although the vast majority consisted of only a few species in the genera *Onychomys*, *Neotoma*, *Peromyscus*, and *Reithrodontomys*.

The salt marsh harvest mouse has become endangered primarily from destruction and modification of its habitat (Shellhammer 1982, 1989). However, further threats to this species may include parasitic loads present within isolated populations. Threats are twofold. First, the very presence of fleas and other ectoparasites on the salt marsh harvest mouse may compromise their ability to survive due to the nature of parasites, i.e., consuming energy resources from the host, at the disadvantage of the host. Second, ectoparasites, such as fleas, are potential carriers of disease, which may kill the host vertebrate and spread to other populations. This is of particular concern because species of this genus of flea, *Orchopeas*, have been implicated in transmission of epidemic typhus (Sonenshine et al. 1978), and plague (Gage et al. 2000, Davis et al. 2002), including at least one case involving this very species, *O. leucopus* (Holdenried and Morlan 1955). More studies are necessary to determine the effects of parasites and ectoparasite-borne diseases on populations of the endangered salt marsh harvest mouse regarding survivability, physiology, reproduction, and the relationships between flea abundance and host density (Krasnov et al. 2002).

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