Threats
Habitat loss due to:
- filling
- diking
- subsidence
- changes in water salinity
- Invasive plants
- Climate change (Sea Level Rise, marsh conversion to mudflat, extreme weather events)
- Oil spills
- Shift in rainfall to later in the winter

Habitat suitability is limited by:
- small size (=small populations and decreased genetic viability)
- Fragmentation (limits dispersal)
- lack of other vital features such as sufficient escape habitat
Fragmentation
5.5 Feet Sea Level Rise

- All marsh habitat in California lost
  - All marsh dependent species lost
- Some marsh habitat becomes subtidal
- Aquatic and mudflat foragers benefit?
Genetic Bottleneck

- Southern subspecies has dramatically lower ability to respond to change
- Could hinder recovery
- Translocation may be necessary in the future
Development – Losing Future Habitat Now
Disease

Hantavirus in brief
How the virus spreads to humans
1. Virus found in rodent feces
2. Infected feces becomes airborne
3. Inhaled by humans

Symptoms
- Early Later, 1-2 days
  - Chills
  - Dry cough
  - Fever
  - Headache
  - Muscle
  - Nausea, vomiting
  - Aches
  - Shortness of breath

Characteristics
- Most prevalent in rural areas
- Campers and hikers more likely to catch the virus, because tents rest on the ground
- Cannot be spread between humans

Infected mice in the Bay Area
California deer mice showing signs of hantavirus infection from 2001-10. No data for Solano or San Joaquin counties.

<table>
<thead>
<tr>
<th>County</th>
<th>Number collected</th>
<th>Number infected</th>
<th>Percent infected</th>
</tr>
</thead>
<tbody>
<tr>
<td>San Mateo</td>
<td>87</td>
<td>9</td>
<td>10.3%</td>
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<tr>
<td>Contra Costa</td>
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<td>Marin</td>
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<tr>
<td>San Francisco</td>
<td>13</td>
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</tr>
</tbody>
</table>

Source: U.S. Centers for Disease Control and Prevention, California Department of Public Health, McClatchy-Tribune

BAY AREA NEWS GROUP
Contaminants – Chronic and Acute Threats
Management
SMHM Monitoring

https://www.youtube.com/watch?v=_P8uG45zioc


Survey Types

- Live Trapping
- Camera Trapping
- Acoustic Monitors
- eDNA?
• Preferred habitat is pickleweed
• Activity period
• Distance moved
• Move up in veg or upland?
• Use of invasive plants – Lepidium, Phragmites, Salsola
• Will not cross roads or open space
• Both subspecies of SMHM become torpid
• SMHM will can move over 100m in a night (300m Rice 1974) likely move more in marginal habitat
• Home range
• Breeding likely March thru November
• Salt marsh harvest mice commonly occur in the upper portions of salt marshes where terrestrial grasses are absent or remote, while western harvest mice tend to be dependent on proximity to terrestrial grass vegetation
Myth vs Reality

- Salinity may influence salt marsh harvest mouse habitat independent of its correlation with *Sarcocornia*. Zetterquist (1978) found that salt marsh harvest mice were most abundant in portions of diked salt marshes where salinity was extremely high. A high physiological tolerance for salt in food and water (Fisler 1965; Coulombe 1970) may confer a competitive advantage.

- Routine flooding and draining associated with conventional methods of waterfowl marsh management in Suisun Marsh may cause prolonged submergence of salt marsh harvest mouse habitat, and negatively affect species.

- Tidal restoration will improve SMHM habitat
Tidal Marsh Restoration is not the only answer

High densities of SMHM Waterfowl management and mouse conservation
To Think About