

Evaluating the plasticity of a “specialized” rodent in a highly-invaded estuary

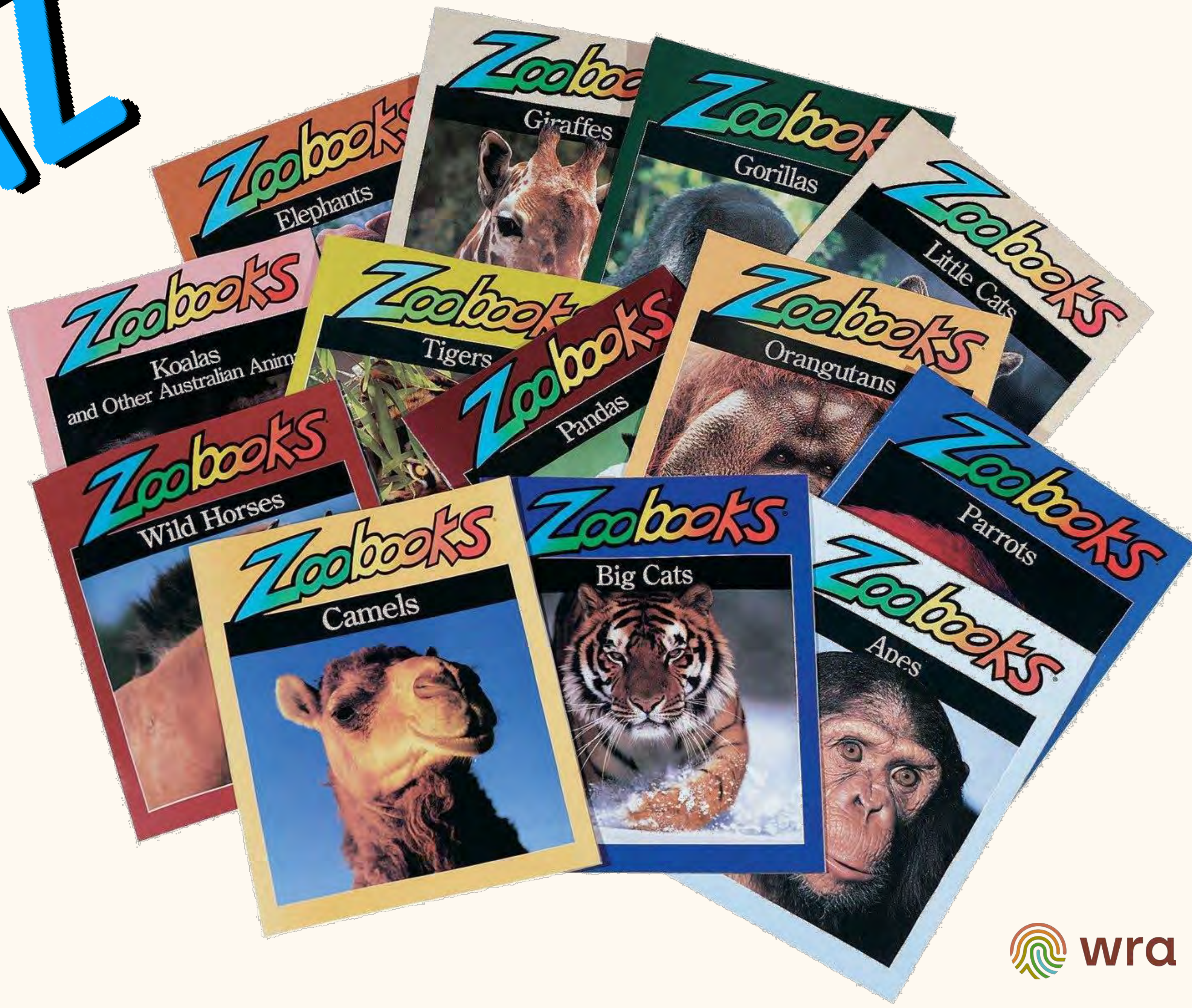
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POP QUIZ



Mammals with strict plant associations are rare

Giant Panda



Bamboo



Mammals with strict plant associations are rare

Koala



Eucalyptus



Mammals with strict plant associations are rare

Salt Marsh Harvest Mouse



A mouse and its plant.

Why the strong association with pickleweed?

Salt marsh harvest mouse (*Reithrodontomys raviventris*)

- Only mammal restricted to coastal wetlands
- Highly adapted for marsh habitat
- Endangered
- Managed as pickleweed obligate





“...during the summer they scatter out into the *Salicornia*...”
Dixon 1908



“...it utilizes common **pickleweed**, *Salicornia virginica*, as its preferred habitat...”
Shellhammer 1989



“...vegetation analyses of live trap data of [SMHM] showed that... **pickleweed** cover, [was] primarily associated with mouse locations...”
Bias and Morrison 2006



“...[SMHM] occurred in sites with greater height and percent cover of **pickleweed**...”
Marcot et al. 2019

Perennial Pickleweed

(*Salicornia pacifica*)



- Halophytic perennial succulent
- Occurs in saline marshes and alkaline soils
- Blooms: Summer/Fall
- Dormant: Winter

**Most dominant
plant species in
marshes of the
San Francisco
Estuary.**

A deeper look...

Modern research reveals the nuance.

Salt Marsh Harvest Mouse Habitat Associations



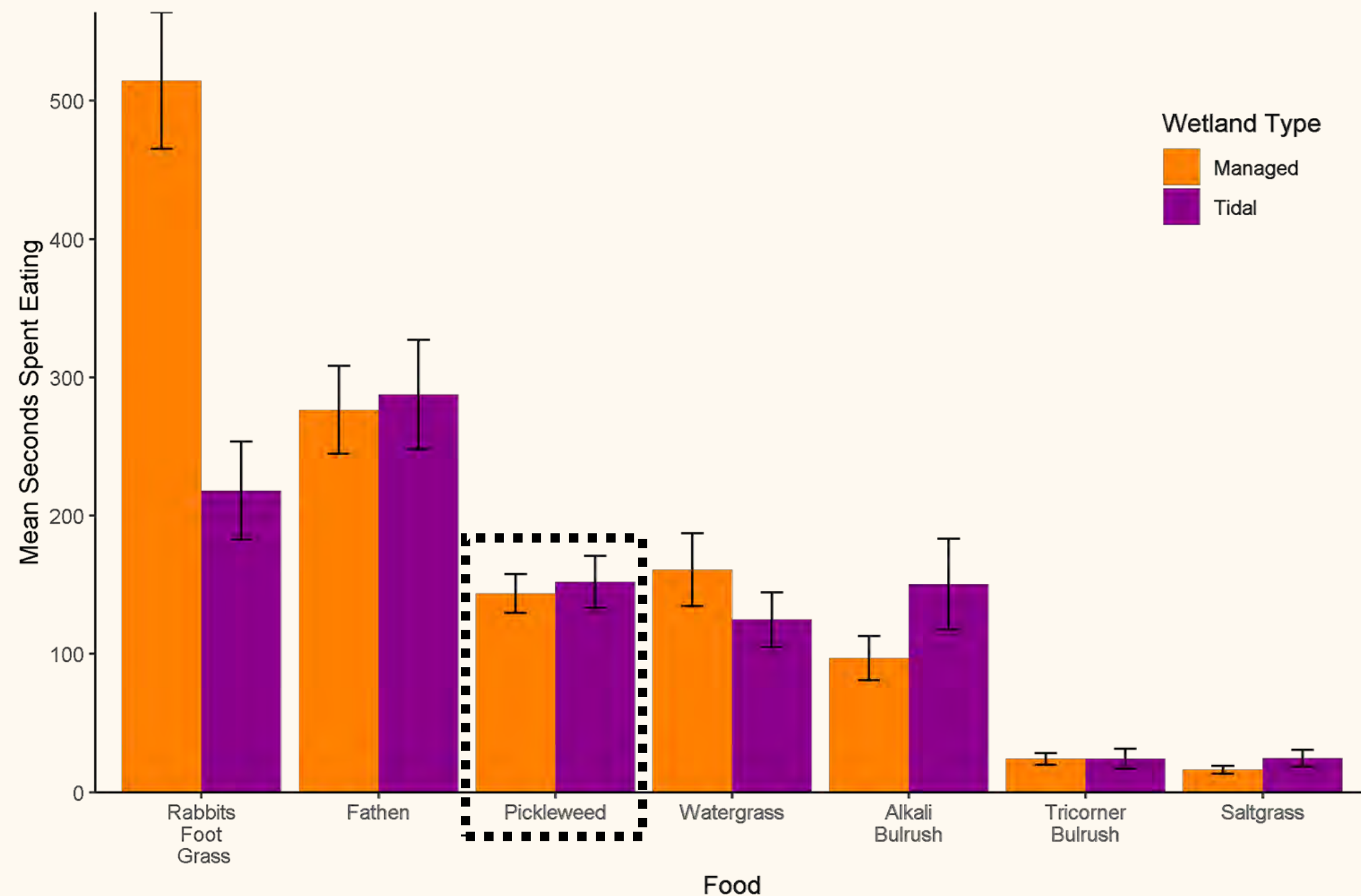
Diet Selection

**Habitat
Selection**

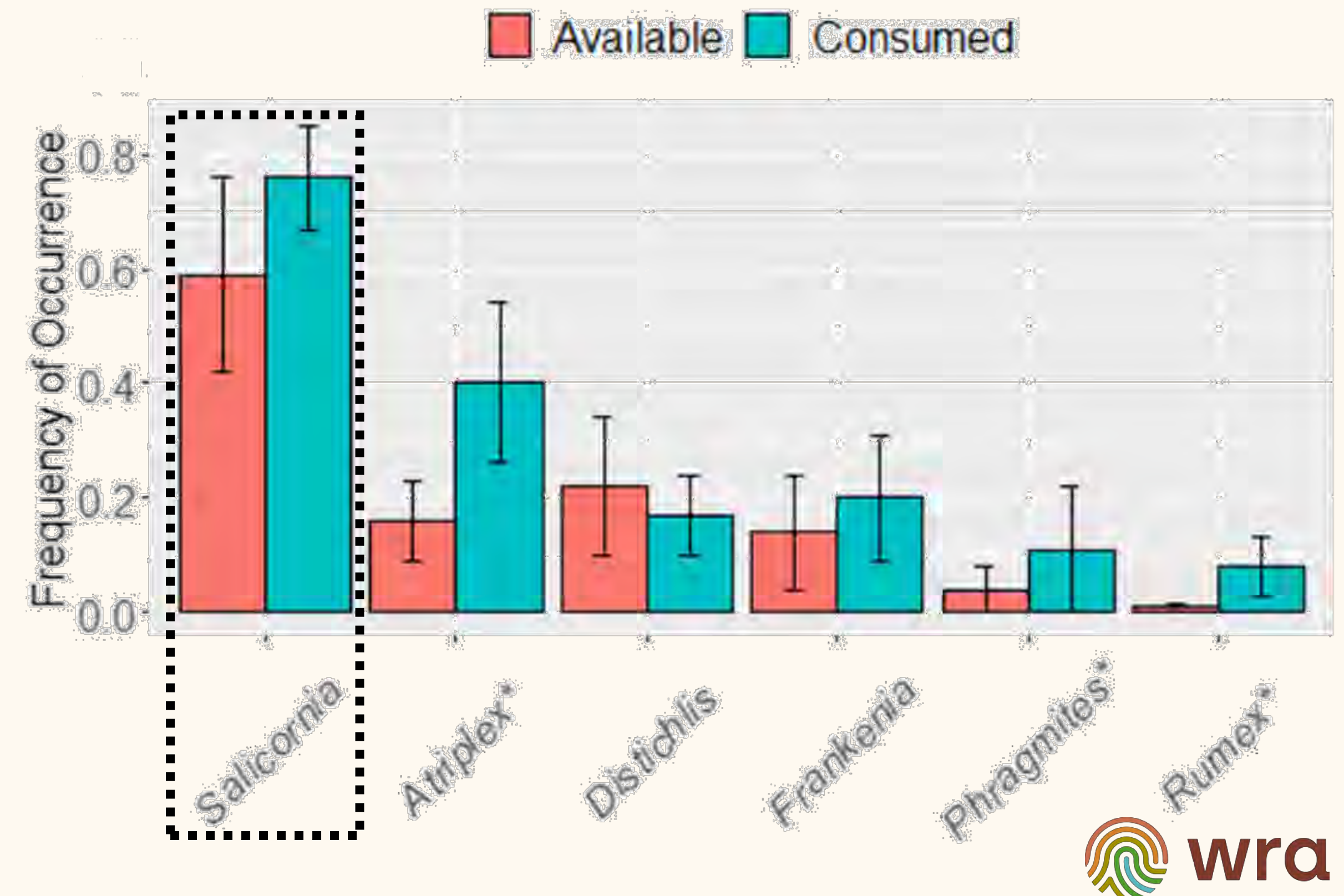
**Density and
Demography**

Diverse Diet

- Cafeteria Trial – Smith et al. 2019
- 39 plant and insect species
- Fecal Metabarcoding – Aylward et al. 2022
- 48 plant genera

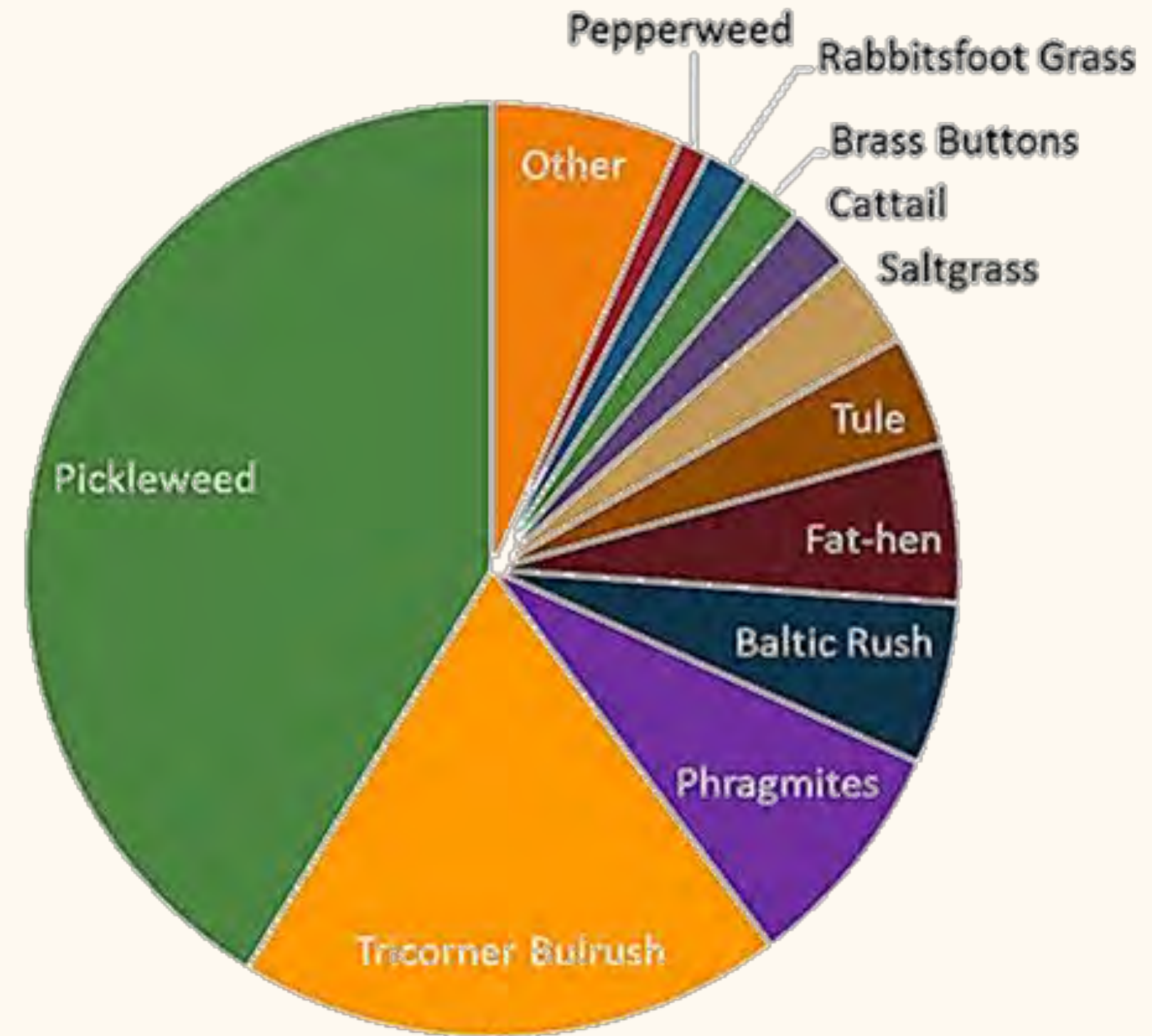


*Invasive. Error bars indicate SE.



Diverse Habitat Selection

- SMHM were captured in >40 dominant plant species – Smith et al. 2020
- Pickleweed presence had only moderately positive effect on occupancy – Alyward et al. 2023



Mean Catch Per Unit Effort (\pm SD)

0.25

0.2

0.15

0.1

0.05

0

Tidal

Tidal/Diked

Diked

Upland



Density and Demographic Data

Spring and fall trapping in four habitat types from 2020-2023. McInnis Marsh, Marin County.

Ok, so maybe the mouse isn't really a specialist?

What does this have to do with weeds?

Tidal Marsh

++ Water

+++ Pickleweed

+ Weeds

++ SMHM



Diked Marsh

+ Water

+ Pickleweed

+++ Weeds

+++ SMHM



Upland

-/+ Water

- Pickleweed

+++ Weeds

-/+ SMHM



We can't assume all weeds are harmful to wildlife



Smooth cordgrass
Spartina alterniflora

Cal-IPC Rating: High

Outside general range of SMHM activity.

Unlikely to substantially impact the species.

Food value unknown.

Algerian sea lavender
Limonium ramosissimum

Cal-IPC Rating: Limited
CDFA Rating: B

Native species not likely important habitat component.

Invasive unlikely to have impact.

Food value unknown.

Perennial pepperweed
Lepidium latifolium

Cal-IPC Rating: High

Can form large stands.

Negatively impacts native species.

Little structural value, but SMHM eat it.

Oppositeleaf Russian thistle
Salsola soda

Cal-IPC Rating: Moderate

Can form large stands.

May negatively impact native species.

High structural value & SMHM eat it.

Which ones should we worry about?

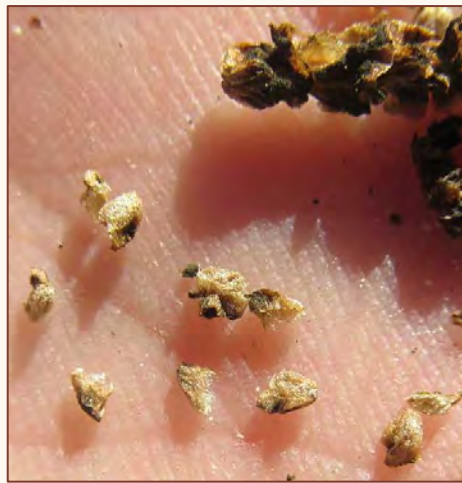
Lepidium latifolium

- Forms large stands
- Changes soil chemistry
- Little structure and understory
- Seeds small, difficult to reach
- Programmatic control efforts



Salsola soda

- Forms large stands
- Complex structure, protective cover
- Large, long-lasting, accessible seeds
- Occurs beside pickleweed
- Local manual control efforts



What makes a weed “good” for salt marsh harvest mice?

- Ecological function!

Does it provide: food – shelter – high tide refuge – nesting habitat?



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How do we judge a weed?

We must evaluate impacts AND value for wildlife.

Where do we concentrate our very limited resources to benefit wildlife?

- What does our permit require?
- What is the potential for harm to wildlife?
- What harm might control cause to wildlife?
- What can we afford to do? Now? Later?
- What ecological benefit might it provide to wildlife?



Interested in
learning
more?



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