



## High Tides and Rising Seas: Can the California Ridgway's Rail Survive in Existing Habitats?

Historic hunting and habitat loss has resulted in the endangered status of California Ridgway's Rail (*Rallus obsoletus obsoletus*) in San Francisco Bay. Restoration actions on local saltmarshes have been undertaken in part to benefit the rail, such as removal of invasive hybrid *Spartina* grasses, conversion of saltponds, and native species plantings. However, many basic ecology aspects of this rail remain poorly understood. Two studies led by USGS researchers now provide insights on how tidal inundation and invasive *Spartina* influence its survival, and whether artificial habitats can provide refuge in extreme tides.

One study from 2007 to 2010 found that annual survival rates of California Ridgway's Rails at four South San Francisco Bay saltmarshes were very low and worst in a marsh uninvaded by hybrid *Spartina*. In invaded marshes, rail survival dropped to levels similar to that observed in native marshes, once hybrid *Spartina* eradication efforts began. Time of year and tidal inundation were significant factors for survival, with lowered survival during the winter and during periods when tide height was more extreme.

These relationships suggest that vegetation habitats that provide refuge from predation may be especially important for promoting self-sustaining rail populations. To investigate this lead, USGS deployed 10 artificial floating islands near Arrowhead Marsh during the winters of 2010-11 and 2011-12. California Ridgway's Rails used these islands almost immediately after deployment, and two factors influenced the probability that an island would be used: tide height and time of day. Whenever tide levels flooded the marsh plain at Arrowhead Marsh, rail use of the islands by California rails occurred more than 300 times as often. However, this pattern was only evident during daylight hours, suggesting that this species only selects refuge habitats during the day.

### This Brief Refers To:

Overton, CT, JY Takekawa, ML Casazza, TD Bui, M Holyoak, DR Strong. 2015. **Sea-level rise and refuge habitats for tidal marsh species: can artificial islands save the California Ridgway's rail?** *Ecological Engineering* 74:337-344. doi:10.1016/j.ecoleng.2014.10.016

<http://www.werc.usgs.gov/ProductDetails.aspx?ID=5140>

Overton, CT, ML Casazza, JY Takekawa, DR Strong, M Holyoak. 2014. **Tidal and seasonal effects on survival of the endangered California clapper rail: does invasive *Spartina* facilitate greater survival in a dynamic environment?** *Biological Invasions*. doi: 10.1007/s10530-013-0634-5 <http://www.werc.usgs.gov/ProductDetails.aspx?ID=5003>



Cogswell Marsh during a king tide in 2008. California Ridgway's Rail survival is lowest during winter floods when habitat is diminished; artificial habitats appear to offer substitute refugia. Cory Overton/USGS.

### MANAGEMENT IMPLICATIONS

- Endemic saltmarsh species such as California Ridgway's Rail are at risk from long-term habitat changes due to sea-level rise and land-use change, and from short-term changes due to tidal flooding. Rail survival is lowest during the winter and when marshes flood, concentrating rails in smaller and smaller patches of habitat.
- Use of artificial floating islands at Arrowhead Marsh by California Ridgway's Rails was very high when tides inundated the marsh plain.
- Given the changes in the distribution and composition of modern day saltmarshes, escape cover during tidal inundation may need to be supplemented if tidal marsh obligate species are to survive. Artificial habitats may provide California Ridgway Rails with short term relief from habitat change and sea-level rise in tidal marsh environments, particularly during the winter when native vegetation senesces.

### RESEARCH CONTACT

**Cory Overton and Michael L. Casazza**  
Dixon Field Station  
[coverton@usgs.gov](mailto:coverton@usgs.gov)  
[mike\\_casazza@usgs.gov](mailto:mike_casazza@usgs.gov)  
[www.werc.usgs.gov/ridgwaysrails](http://www.werc.usgs.gov/ridgwaysrails)