

Behavioral Responses of Birds to Invasive *Spartina* in San Francisco Bay Salt Marshes

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Introduction

Spartina alterniflora was introduced to San Francisco Bay in the early 1970's. Soon after, it hybridized with the native *S. foliosa* and this hybrid form has spread and is now thought occupy over 2000 acres of tidal marsh¹. The profound changes in habitat structure and composition that accompany the *S. alterniflora* invasion will likely have the greatest impact on species that are wholly dependent on the tidal salt marsh system. Alameda song sparrows (*Melospiza melodia pusillula*), a California Species of Special Concern, are affected not only by the *S. alterniflora* invasion directly, but also indirectly by new competitive interactions with marsh wrens (*Cistothorus palustris*) who are occupying the newly available cordgrass habitat. In this study, we examined how the cordgrass invasion affected nesting habitat preferences, reproductive success, and breeding territory distribution of song sparrows. We also examined the breeding territory distribution of marsh wrens, territory overlap between the two species, and destruction of sparrow eggs by wrens.

¹ <http://www.spartina.org/>



Fig. 1
Song sparrows do use invasive *Spartina* as nesting habitat

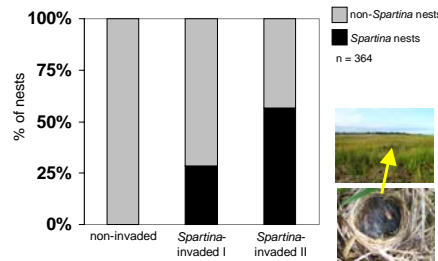


Fig. 4
Evidence of marsh wren egg destruction

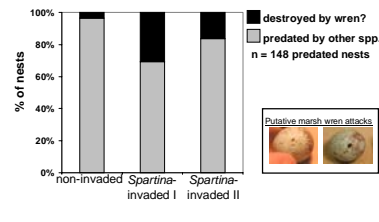


Fig. 5
Song sparrow and marsh wren territories in relation to each other and to invasive *Spartina*

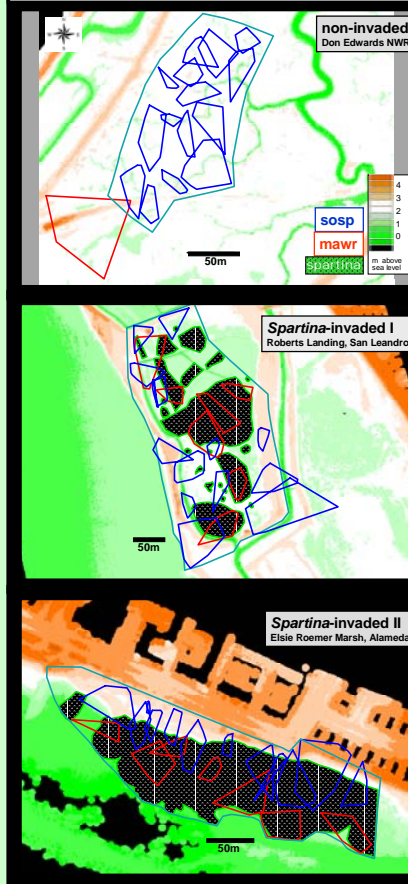


Fig. 2
Nests in *Spartina* are more likely to flood

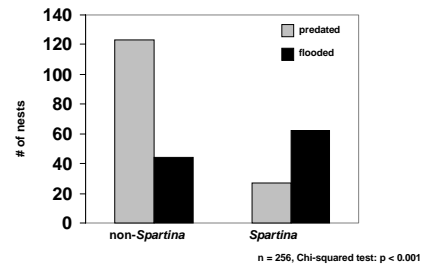
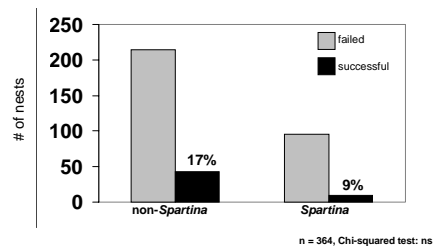
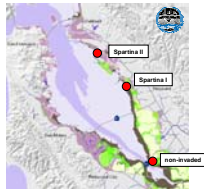


Fig. 3
Fledging success low, particularly in *Spartina*



Methods

Our three study sites were located in South San Francisco Bay; two were invaded by the *S. alterniflora x foliosa* hybrid and one was not.



During the breeding season (February - August) in 2002 and 2003, we examined song sparrow reproductive success by locating a total of 364 nests and following their fates (i.e., successful, or failed due to tidal flooding or predation).

In 2002, we used focal observations of color-banded birds to map the territorial boundaries for each male song sparrow and marsh wren. Using GPS and GIS technology along with aerial photographs, the territory data were then combined with vegetation data to examine the extent of species overlap as well as the correlation with invasive *Spartina* habitat.

CONCLUSIONS

- Song sparrow nests that are placed in invasive *Spartina* are rarely successful and most often fail due to tidal flooding.
- It is likely that marsh wrens are destroying sparrow eggs and may be a significant factor in reducing the reproductive success of sparrows in *S. alterniflora*-invaded marshes.
- It is extremely rare for a sparrow to have a territory comprised entirely of invasive *S. alterniflora* (i.e., they all have at least some areas of native vegetation).
- Song sparrow and marsh wren territories are segregated with wren territories being more highly correlated with areas of invasive *S. alterniflora*.
- Results suggest that the *S. alterniflora* invasion may be negatively impacting song sparrow populations in South San Francisco Bay.

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