# Monitoring Birds in Tidal Wetlands of the San Francisco Estuary

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## BACKGROUND

Bird species' presence and function in a given marsh are determined by physical and biotic factors, as well as demographic constraints imposed by their life histories. We are investigating how the heterogeneity of physical processes, plants, habitat, and landscape affect the structure and ecological function of the tidal marsh bird community. We are examining distribution and abundance patterns of a broad spectrum of ecologically and taxonomically diverse birds in both restoring and natural marshes. We are also assessing important stressors on bird populations, such as predators and flooding risk. Collaboration with the other IRWM teams will allow us to study interactions of birds with vegetation and how birds may be limited or influenced by landscape-level factors, hydrological and geomorphic processes, and prey (fish and invertebrates).
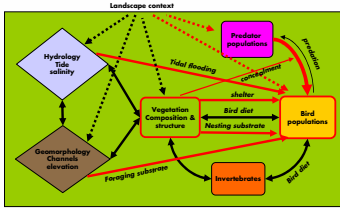


Birds play important and diverse roles in the tidal marsh ecosystem. The specific functions that they carry out in a given marsh will be determined by the influence of, and interaction with, physical *and biotic factors*, as well as *demographic constraints* imposed by their life histories.

## OBJECTIVE

To assist the California Bay-Delta Authority (CALFED) in the assessment of conservation and restoration efforts in the San Francisco Estuary, we have implemented a comprehensive monitoring program for avian species in the tidal wetlands of Suisun and San Pablo Bays, as well as the Delta, as part of the Integrated Regional Wetland Monitoring (IRWM) project. Our pilot project, focused on tidal marsh habitat (the subject of major restoration activities in the Estuary), will lay the foundation for a longer-term avian monitoring program to assess changes in ecosystem processes affected by wetland restoration.

## METHODS

To implement this program, we are using a combination of general marsh surveys that provide information about most species, and specialized surveys for taxa that can only be so monitored (such as Clapper Rails and Black Rails). An important component of our program is to determine reproductive success of select species in restored and reference marshes, which has not previously been studied. In addition, we will analyze reproductive performance of heron and egret colonies in relation to habitat composition and heterogeneity.



## Demographics



Our research assesses the distribution and abundance of priority species or species-groups, identifying within-site variation, between-site variation, and temporal variation (seasonal and annual), and the underlying processes that produce such variation.

The graphs below show the density of Common Yellowthroat (*Geothlypis trichas*), Song Sparrow (*Melospiza melodia*), and Marsh Wren (*Cistothorus palustris*) across sites and seasons (January 2003 – June 2004).



Common Yellowthroat



Song Sparrow



Marsh Wren
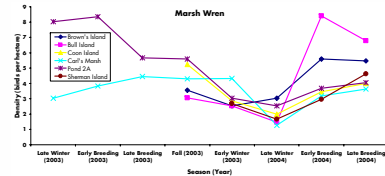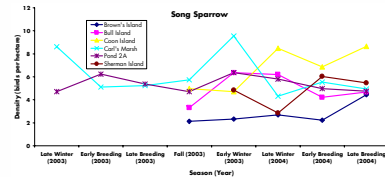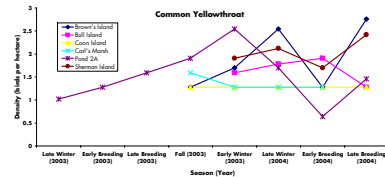
## Reproductive Success



We are estimating reproductive success parameters for select species, including quantification of predation and examination of habitat and landscape features that influence reproduction. Within intensive survey areas nesting density, territory size, nest success, egg and hatchling survival are estimated. The maps below are preliminary territory maps for Song Sparrow from 4 paired ancient/old vs. newly restored) sites.

First Row: China Camp (ancient/old) and Carl's Marsh (newly restored).
Second Row: Benicia (ancient/old) and Pond 2A (newly restored).



## Herons and Egrets



Each colony is visited four times per nesting season to get colony description, size, timing of nests, reproductive success.

This map displays an inventory of known heron and egret colonies within northern San Francisco Bay Estuary.



Great Blue Heron
Great Egret
Snowy Egret
Black-crowned Night-Heron
Cattle Egret

Colonies in the southern San Francisco Bay area are monitored by the San Francisco Bay Bird Observatory.

## Predation



We are obtaining information about important stressors on bird populations, such as predators (winter-time and breeding season) and flooding risk, through collaboration with other teams.

This graph presents preliminary data about the reproductive success of Song Sparrows in the 2004 breeding season.



Song Sparrow Reproductive Success 2004

China Camp    Carl's Marsh    Pond 2A    Bush Ranch    Benicia