



# THE STATE OF THE BIRDS SAN FRANCISCO BAY 2011

PRBO Conservation Science and the San Francisco Bay Joint Venture





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## Foreword

San Francisco Bay and its surroundings have always been in a state of change, but the rate and magnitude of changes have accelerated dramatically ever since gold mining in the mid-1800s deluged the Bay with sediments and contaminants. More recently, burgeoning urban development and the alteration of freshwater flows into the Bay – resulting from massive re-engineering of water distribution in the Sacramento-San Joaquin Delta – have increased pressures on natural ecosystems. And while the future is always uncertain, there is little question that sea level rise and storm surges will fundamentally alter both urban and natural areas around the periphery of the Bay.

In order to manage and conserve ecological systems in the context of past changes, and adaptively respond to ongoing and future changes, it is essential to understand where we are now. *The State of the Birds: San Francisco Bay 2011* summarizes what we currently know



Arrowhead Marsh, Oakland shoreline

about bird populations and their recent trends in the Bay Area.

San Francisco Bay is an area of hemispheric importance to migratory waterbirds. It harbors populations of species that have undergone evolutionary diversification in different parts of the Bay. Several of these populations are officially recognized as Threatened or Endangered, and others are of special



conservation concern. In a broader sense, birds are indicators of the overall condition of habitats and ecosystems in the Bay – the proverbial “canaries in the coal mine.” Tidal-marsh species can tell us not only about the condition of the marshes, but about the capacity of those marshes to provide huge benefits to people – ecosystem services – through flood protection and enhancement of water quality. And, at the end of the day, birds are an essential part of what makes San Francisco Bay a truly special place.

*The State of the Birds* report details the many factors that threaten bird populations in the Bay Area. Some of these – predators ranging from house cats to peregrine falcons; competition with invasive species such as barred owls; or continuing loss of habitat in the face of development – are clear and present dangers. Others, such as the drowning of marsh habitats due to sea level rise, are lurking in the future.

Yet others may be unintended consequences of our own conservation work. A major effort is now underway to restore a network of artificial



Shorebirds in San Francisco Bay

ponds once used for salt production to tidal marshes. This restoration will create new habitat for marsh-dwelling species such as Common Yellowthroats or Clapper Rails. At the same time, however, it will reduce the amount of shallow open-water ponds that some nesting birds, ducks, and wintering shorebirds currently use.

How these ripple effects play out may depend on whether other processes (such as sea level rise) create suitable habitat elsewhere. This largest restoration project on the West Coast is something to be proud of, especially as it moves forward with ongoing monitoring helping to

quantify the impact to birds, making course corrections as needed to ensure the most benefit for birds in the San Francisco Bay estuary.

Dealing with the conservation challenges is not simple. But neither is it impossible. At a time when news reports seem to contain only discouraging messages about the state of nature, *The State of the Birds* indicates that populations of many species in the Bay Area are stable or increasing, and it highlights several examples of conservation success. These, together with the many specific recommendations for actions by managers, scientists, or the public that may help to counter downward trends for other species, give hope.

Above all, the report emphasizes the importance of monitoring. We know what we know now because populations of several species in the Bay Area have been monitored for more than a decade. Continued monitoring will enable us to spot troubling trends and take actions to address the root causes before they become emergency-room cases.



## Overview

### The State of San Francisco Bay's Birds

San Francisco Bay, with its iconic beauty, is also the largest estuary on the West Coast. The region is remarkably diverse, not just in its human communities but also in the natural world. The diversity of habitats within the estuary provides many natural benefits to wildlife and people alike. Its waters nurture young fish. Its marshes filter pollutants and protect us from rising sea levels. The streams and rivers deliver fresh water into the estuary, and the forests and grasslands of the surrounding hills filter our air and sequester carbon. This rich mix of habitats and abundance of recreational opportunities contribute to the Bay Area being one of the most desirable places to live in the world.

In this first ever State of the Birds Report for San Francisco Bay, we learn that most bird populations are stable. Some species are clearly

benefiting from conservation action while others are struggling. The report highlights these trends, challenges, and the actions we can take to make a difference.

### Most Bird Populations are Stable

When we evaluated groups of bird species for each habitat, we found that most are now stabilizing. This includes birds dependent upon subtidal (submerged) habitats, tidal flats, marshes, and oak woodlands and the endangered Spotted Owl.

### Riparian Birds and Two Endangered Species are Increasing

Riparian birds – species that require stream-side habitat – and two of our threatened and endangered species, the Snowy Plover and Least Tern, are showing increases. Recently, the Snowy Plover has been increasing from very low levels, and the Least Tern may be starting to stabilize after years of population growth.



Over one million shorebirds use habitats in San Francisco Bay each year.

### Grassland and Coastal Scrub-Chaparral Birds are Losing Habitat

Species in these habitat types continue to be impacted by loss and degradation of habitat from development, invasive species and lack of natural disturbances such as fire. These trends are consistent with the declining trend found in the National State of the Birds Report, 2009.

## Species at Risk Across All Habitat Types

The California Clapper Rail, Western Sandpiper, Forster's Tern, Caspian Tern, Black-crowned Night Heron, Snowy Egret, Canvasback, scaup, and scoters are all showing declines. These birds occupy a variety of habitats including tidal flats, tidal marsh, managed ponds, and the subtidal zone.

### Looking to the Future

- **Sea level rise is a critical threat to wetland birds in the San Francisco Bay Estuary.** Ongoing science and monitoring must continue to improve our ability to predict the effects of



Surveying a tidal marsh for Clapper Rails and Black Rails – long-term monitoring research

sea level rise, in order to prioritize future land acquisition, management, and restoration efforts.

- **Extreme weather events, such as strong storms and heat waves,** may become more frequent as the climate changes. These unusually strong events can cause nest failure, facilitate predation, and cause individual bird death.
- **The South Bay Salt Pond Restoration Project will provide valuable lessons** for future marsh restorations within the Bay.
- **Better understanding of the needs of migratory shorebirds dependent upon tidal flat habitats and shallow ponds is needed** to maintain the San Francisco Bay as a place of Hemispheric Importance to over one million shorebirds.
- **Predators and invasive species,** both animal and plant, and native and non-native, remain an ongoing threat. Funding is needed for predator control, invasive removal, and outreach to the public on their role in reducing predators (such as feral cats) and invasive species.
- **Disturbance from human recreation, maintenance, and transportation activities** is something we can control and reduce to lessen pressures to birds during their sensitive nesting period.



Restored wetlands in Sonoma Baylands.

- **Continued monitoring of the Bay's bird populations is necessary** to evaluate our success at maintaining healthy ecosystems. Birds are the proverbial “canary in the coal mine.” Tracking their populations will help us solve problems before they become “emergency room” cases.
- **Public and private funding is needed** to ensure our ability to protect existing habitats, respond to new threats, and maintain and enhance the quality of Bay waters upon which birds and people depend.

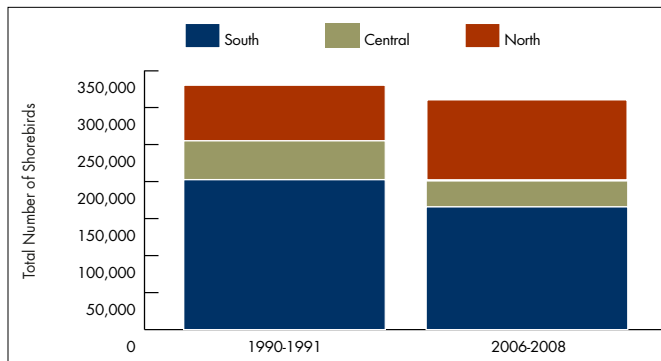


# Tidal Flats

Exposed twice a day by the Bay's low tides, tidal flats are teeming with life. Small clams, marine worms, and crustaceans feed more than one million shorebirds each year. Today, 42% of the Bay's tidal flats have been lost compared to historic levels.

In addition, shorebirds in San Francisco Bay are also dependent on salt ponds, many of which are now managed to maximize their value as shorebird breeding and foraging habitat. (See salt pond section for more information.)

San Francisco Bay is so critical to the health of shorebird populations that it has been designated a site of Hemispheric Importance for Shorebirds ([www.whsrn.org](http://www.whsrn.org)).



November high tide roost counts of shorebirds throughout San Francisco and San Pablo Bays.



Willet

**Status** — Overall stable, with a geographic shift from south to north.

**Trends** — Overall, the shorebird population in San Francisco Bay has remained stable since the 1990s, but an increase in the North Bay and apparent decrease in the Central and South Bays indicate a shift of shorebirds from south to north.

One of the more common species, the Western Sandpiper, appears to have declined Bay-wide.

Two other common species — Least Sandpiper and Willet — have increased greatly.

Keeping one million shorebirds in San Francisco Bay will require maintaining sufficient tidal flat habitat as well as other shallow water habitats, especially as sea level rises. The amount of tidal flat and other habitats needed by shorebirds should be determined.

## Threats

- **Primary threat: Loss of tidal flat feeding habitat** due to sea level rise, erosion from storm surges, and invasive plants (e.g., hybrid *Spartina*).
- **Loss of shallow water feeding habitat**, as former salt ponds transition to tidal marsh through active restoration or through levee failure due to impacts of sea level rise.
- **Reduction of food (invertebrates)** caused by invasions of non-native invertebrates, pollution, and climate change impacts.
- **Human-caused disturbance** to feeding and resting shorebirds, resulting in birds having less energy for migration and survival.
- **Loss of high tide roosting habitat** such as levees, islands, structures, and high ground as sea level rises, levees are removed or deteriorate, and islands within restored ponds are submerged.

## Actions

### Planning, Management, and Restoration

- **Plan for mudflat creation and sustainability** by conducting physical modeling exercises and assessing those results over time to ensure that current and future coastal defense (e.g., levees, rip-rap and seawalls), salt pond restoration, and development does not reduce mudflats. Future restoration should focus on increasing both tidal flat and tidal marsh habitats.
- **Maintain shallow pond** feeding and roosting habitat, especially when tidal flats are inaccessible during high tides.
- **Control non-native plants** that colonize mudflats (e.g., hybrid *Spartina*).
- **Remove non-essential barriers** such as dams, culverts, levees and other structures that inhibit natural flow and settling of sediment.
- **Restore watersheds** to facilitate movement of tidal flats to higher areas as sea level rises and promote movement of sediment downstream to feed tidal flats.
- **Minimize pollution from runoff** on paved surfaces, allowing rainfall to soak into the ground; convey and treat storm water runoff using landscape features such as rain gardens and other water conservation systems.
- **Manage for a mix of pond conditions** with depths ranging from 2 to 5 cm and salinities from 120 to 200 ppt. for optimum shorebird use.
- **Provide and protect roosting habitat** away from areas of frequent human use.
- **Reduce human-caused disturbance** (e.g., hiking, dog walking, boating) in areas where shorebirds feed in high densities (e.g., Napa River tidal flats, San Leandro Bay, and Hayward southward to southern San Francisco Bay). Collaborative planning between the San Francisco Bay Water Trail and the Bay Trail can consider actions to minimize disturbance.

### Scientists

- **Determine the amount of ponds, other shallow water habitat, and tidal flats** needed to support the Bay's breeding and migratory shorebirds.
- **Conduct early winter Bay-wide shorebird surveys** annually to spot potential declines quickly. Participate as a citizen scientist in the Pacific Flyway Shorebird Survey ([www.prbo.org/pfss](http://www.prbo.org/pfss)).
- **Monitor site-specific shorebird response** to restoration, and study how mudflat characteristics influence habitat quality for shorebirds.
- **Conduct research to better understand and predict changes in tidal flat habitat** in the context of sea level rise and potentially decreasing sediment supply.



Greater Yellowlegs

# Managed Ponds



Commercial salt ponds were constructed around the edge of San Francisco Bay beginning in the mid 1800s. Many former salt production ponds in San Francisco Bay have recently transitioned to public ownership and are being restored and managed for wildlife. These shallow ponds now provide habitat for hundreds of nesting terns, gulls, and shorebirds, and roosting and feeding habitat for hundreds of thousands of migrating and wintering shorebirds and ducks.

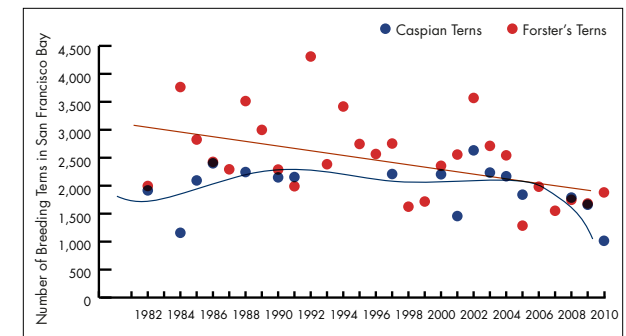
The South Bay Salt Pond Restoration Project (15,100 acres) plans to restore 50–90% of the South Bay ponds to a mix of tidal marsh and shallow managed ponds. The Napa-Sonoma Marshes Wildlife Area in the North Bay is restoring 4,200 acres of salt ponds to tidal marsh. Cargill Salt still manages about 11,000 acres for salt production, all in the South Bay.



Forster Terns at nest site

**Status:** Mixed.

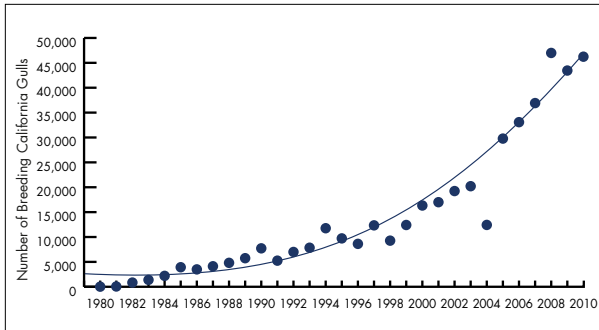
As restoration progresses, the bird community may change: tidal marsh species (pages 12–13) will colonize newly created salt marsh habitat; some waterbirds, such as shorebird and duck species that use open water or tidal flats, may move out. Ongoing monitoring will track how bird species and numbers change over time.



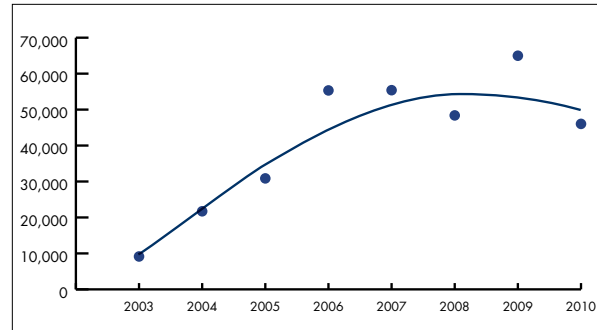
## Forster's and Caspian Tern use of salt ponds

– Declining; Forster's Tern breeding population varies annually, but is declining Bay-wide. Caspian Terns show a decrease, especially in recent years.

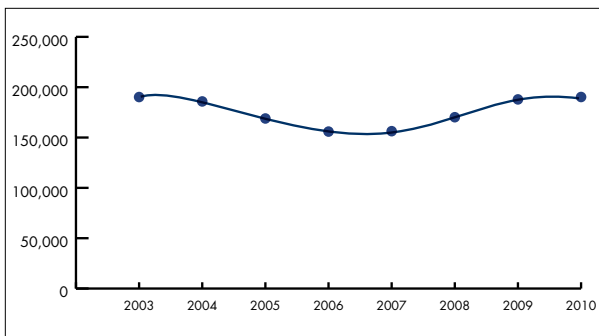




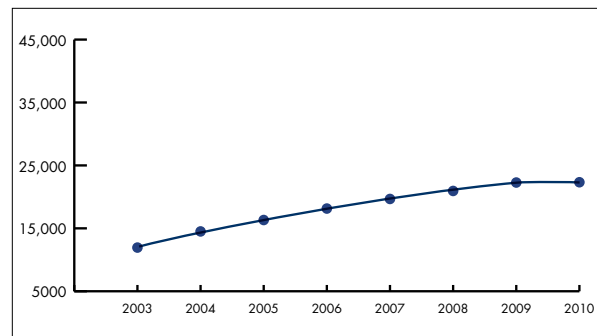
**California Gulls** (South Bay ponds) – Increasing rapidly; the population is now at 46,000 gulls.



**Wintering Dabbling Ducks** (South Bay ponds) have increased in the last seven years: see the Success Stories section, page 34.



**Spring-Migrating Small Shorebirds** (North and South Bay ponds) – have remained relatively stable.



**Spring-Migrating Medium-sized Shorebirds** (North and South Bay ponds) – have increased slightly, according to eight years of monitoring by USGS.\*

\*Data for medium-sized and small shorebirds and dabbling ducks come from peak counts for shorebirds (spring) and ducks (winter) in North and South Bay ponds.

**Nesting Shorebirds** (South Bay ponds) – Population trends unknown, underscoring the need for ongoing monitoring of breeding shorebirds. American Avocets and Black-necked Stilts are the most abundant nesting shorebirds; breeding American Avocets estimated at 1,380 pairs and 590 pairs estimated for Black-necked Stilts, as of 2003.

**Note:** The Western Snowy Plover also nests in the salt ponds; see the Endangered Species section, page 24.

### Threats, Actions

Please turn to page 10.

# Managed Ponds

(continued from page 7)

## Threats

- **Primary threat: Loss of shallow pond habitat** for roosting, foraging, and nesting waterbirds. Wintering and migratory shorebirds roost and feed in salt ponds at high tide. Ducks utilize shallow low salinity ponds to forage and roost. Terns and shorebirds nest on islands and levees in pond habitat.
- **Rising sea levels** from global climate change may increase water depths or erode levees and nesting islands, impacting habitat for wintering, migrating, and nesting birds.
- **Nest predation and competition from a growing population of California Gulls**, which prey upon eggs and chicks or displace nesting waterbirds. Forster's and Caspian Terns have already been displaced from some of their historic nesting colonies by gulls.

- **Contaminants impairing bird reproduction.** Mercury, a legacy of years of mercury mining and use of mercury in gold mining, is a prevalent contaminant throughout the San Francisco Bay. Mercury is especially high in the South Bay, where runoff from a large mercury mine in the upper watershed has released, and continues to release, mercury-laden sediments. Mercury impacts waterbird reproduction, specifically for the Forster's Tern, in which 48% of breeding adults are at or above high risk of impaired reproduction due to their present methylmercury concentrations.



American Avocets in breeding plumage.



Shorebirds in managed pond habitat.

## Actions

### Planning, Management, and Restoration

- **Convert a large proportion of salt ponds** to managed ponds. Maintain ponds with appropriate depths – and habitat of varying salinities – to benefit nesting, migrating, and wintering shorebirds and ducks.
- **Practice adaptive management** by monitoring waterbird responses to restoration and modifying restoration as needed (as in the South Bay Salt Pond Restoration Project).
- **Continue to create islands within managed ponds for breeding and roosting birds.** Experiment with adding vegetation to some islands to create cover for chicks.
- **Improve dissolved oxygen within managed ponds** by optimizing water flow between pond and Bay waters and reducing nutrient inputs from adjacent uplands.
- **Conduct an education campaign** to highlight the connection between urban waters and the Bay.
- **Slow the growth of the California Gull population** by reducing gull access to trash at local landfills and other areas. Evaluate whether **lethal** removal of target gulls helps reduce predation pressures on nesting waterbirds.
- **Identify, protect, or manage key existing waterbird nesting areas Bay-wide,** given that waterbird populations may be affected by a reduction of pond habitat.

### Scientists

- **Monitor changes in abundance** of breeding, migrating, and wintering waterbirds over time to evaluate the overall effects of restoration.
- **Determine current breeding population size of nesting American Avocets and Black-necked Stilts.** Monitor their use, density, and reproductive success at created islands.
- **Assess habitat characteristics that enhance waterbird densities,** (e.g. water quality, water depth, salinity, invertebrate biomass, island characteristics), and provide restoration project managers with habitat characteristics that could maximize densities of waterbirds in the remaining ponded habitat as tidal marsh restoration proceeds.
- **Suggest ways to reduce the population growth of California Gulls** and their impact on other breeding waterbirds by identifying the causes of population growth and evaluating methods to control it.
- **Assess and track the changes in methylmercury concentration** in nesting Forster's Terns, American Avocets, and Black-necked Stilts as tidal restoration proceeds. Determine reproductive threshold concentrations of methylmercury in waterbirds to assess changes in risk of contaminant exposure as a result of tidal restoration efforts.

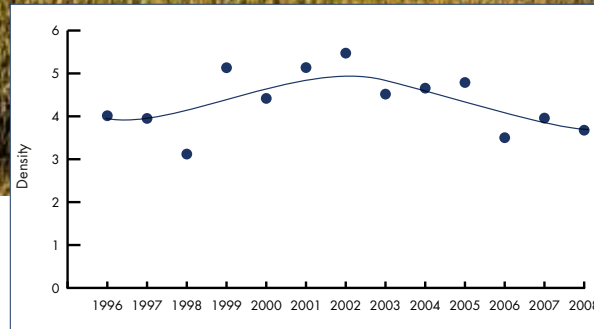
**Success Story** • South Bay Salt Pond Restoration Project – See page 32



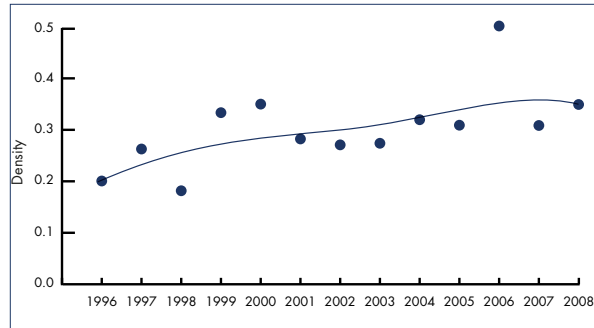
# Tidal Marsh



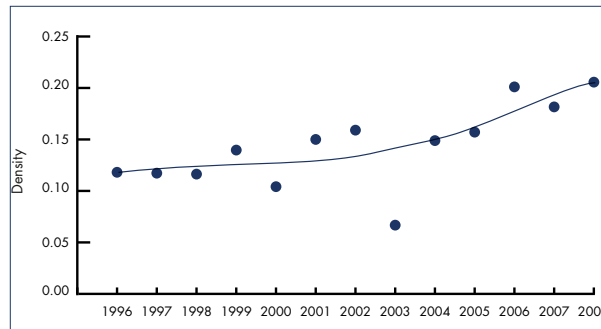
Tidal marshes are the vegetated, tidally influenced wetlands found along the edges of San Francisco Bay and associated channels. Pacific cordgrass, pickleweed, and other specialized plants adapted to salty water provide important habitat for many animal species, such as young salmon and other fishes, rails, songbirds, shorebirds, egrets, ducks, and the endangered salt marsh harvest mouse. Some animals, like the indicator species here and the salt marsh harvest mouse, are endemic to the tidal marshes of San Francisco Bay – meaning they do not occur anywhere else in the world. While 80% of historic tidal marsh habitat has been lost since the mid-1800s, growing marsh restoration efforts are reversing this trend and causing the acreage to increase again.



**Song Sparrow** – caption



**Saltmarsh Common Yellowthroat** – caption



**California Black Rail** – graph caption

**Status:** Stable to increasing

The three species chosen to indicate the state of the tidal marsh are Song Sparrow, Common Yellowthroat, and Black Rail. Data were collected from over 200 locations throughout San Francisco Bay Estuary using 5-minute point count surveys during April–May to assess breeding season density (birds per hectare).

**Song Sparrow** – Stable overall (decreasing North Bay and Suisun Bay; increasing South Bay)

**Salt Marsh Common Yellowthroat** – Increasing

**California Black Rail** – Recently increasing.

**Note:** For California Clapper Rail, see Endangered Species section, page 20.



California Black Rail

## Threats

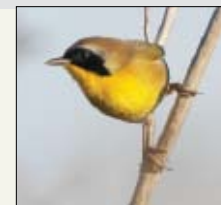
- **Primary threat: Rising sea level** resulting in some marshes “drowning” or disappearing and other marshes transitioning from fresh water to brackish marsh or from high marsh to low marsh as a result of sea level rise. Limited space remains along the Bay’s shoreline for marshes to expand or regenerate.
- **Loss and conversion of restorable marsh** due to urbanization (especially in south and central Bay) threaten potential future marsh locations.
- **Extreme storm events** push water beyond typical high tide levels, eroding marsh habitat and flooding high marsh, critical as refugia for marsh birds. High water can flood nests and push rails and other marsh animals to higher ground and adjacent urbanized areas, where they are vulnerable to predators. High water events are predicted to become more severe and more frequent with climate change.
- **Invasive plants**, particularly invasive *Spartina* hybrids (crosses between native cordgrass and introduced cordgrasses), cover mudflat areas and channels, eliminating important feeding sites for shorebirds and marsh birds. Pepperweed invades marshes and channel edges, outcompeting gumplant and other native marsh plants required by Song Sparrows and Common Yellowthroats for nesting and cover.
- **Introduced and increased predators** such as non-native red foxes, Norway rats, house cats, and native raccoons, corvids, and gulls prey upon birds nesting in marshes surrounding the Bay. Predator numbers are usually inflated near urban areas.
- **Pollution, contaminants, and toxic events** such as oil spills directly kill birds as well as vegetation, fish, and invertebrates. Mercury, PCB’s and other contaminants affect reproduction.

## Actions

### Planning, Management, and Restoration

- **Support and use Sea Level Rise Modeling Tools** to better understand impacts on tidal marsh habitat due to climate change, and to prioritize areas for preservation and restoration of marsh habitat. For an example of a model focused on predicting Bay-wide changes to the tidal marsh ecosystem, visit [www.prbo.org/sfbayslr](http://www.prbo.org/sfbayslr).
- **Identify and protect upland areas** for marshes to move to as sea level rises.
- **Promote restoration in high priority areas** like the Petaluma and Napa River systems and South San Francisco Bay that are better able to cope with rising sea levels.
- **Promote re-use of clean sediment** from dredged navigation channels to jump-start marsh restoration in subsided areas or to help marshes keep pace with sea level rise in the future.
- **Restore high ground refugia**, such as broad levee slopes and gradual upland transitions, with native vegetation to offer birds and small mammals refuge from high tide events.
- **Support the South Bay Salt Pond Restoration Project**, and promote it as a model for future restoration efforts. This large restoration project can serve as a demonstration project as it is being adaptively managed to ensure the most benefit to the San Francisco Bay ecosystem.
- **Halt development on existing or potential future baylands** including salt ponds, diked baylands, and uplands with future marsh potential.
- **Control introduced predators** such as red foxes and feral house cats, especially in areas with high concentrations of marsh birds. Educate the public about the impact of cats on bird populations and remove feral cat feeding stations.
- **Reduce native predator populations** (raccoon, skunk, crow and raven) by eliminating or securing food waste in parks, residential areas, businesses and other sources near the Bay.
- Monitor and control introduced Invasive plants early when costs are lower or when a direct threat to marsh birds is likely.

Common Yellowthroat



### Scientists

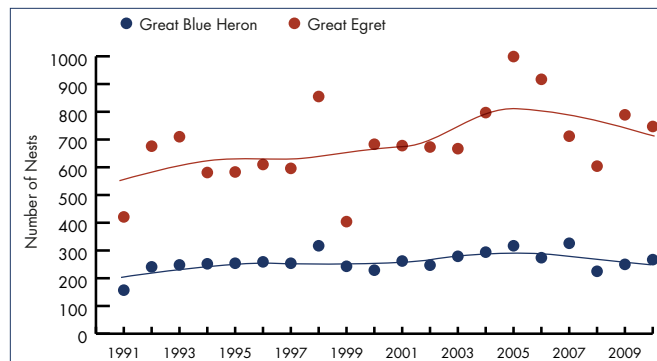
- **Monitor marsh bird population sizes and reproduction annually** to determine Bay-wide trends and to evaluate the success of conservation efforts. Make results known to conservation practitioners and the public.
- **Advance predictive modeling** of future habitat conditions and bird response to guide habitat acquisition and restoration.
- **Assess contaminant thresholds** in birds to evaluate impacts of mercury and other toxins to marsh birds.

# Tidal Marsh Hérons & Egrets

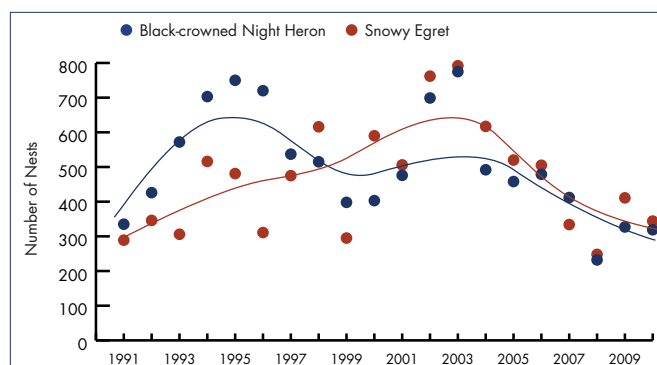


San Francisco Bay's herons and egrets depend on large trees, dense types of vegetation, and man-made structures surrounded by tidal marsh, tidal mudflats, and non-tidal wetlands for nesting (spring and summer) and feeding year-round. Important feeding sites also include creeks and ponds.

View a map of the locations of all known egret and heron colonies in the San Francisco Bay Area: [www.egret.org/googleearthheronries](http://www.egret.org/googleearthheronries).



**Great Blue Herons** (blue) and **Great Egrets** (red) reveal dynamic but generally stable populations.



**Black-crowned Night-Herons** (blue) and **Snowy Egrets** (red) show dramatic variation in nesting abundances; however, recent trends (since 2005) suggest regional declines.

**Status:** Stable to decreasing.

The number of nests of herons and egrets throughout San Francisco Bay show dramatic variation from year to year with an apparent decrease in the last 5–10 years. Large between-year declines are related to heavy rainfall, which can reduce the survival of young birds before they are old enough to breed.



Great Egret feeding half-grown chicks





Great Blue Heron



Great Egret



Snowy Egret



Black-crowned Night-Heron

## Threats

- **Primary threat: Loss or disturbance of colony nesting sites** from damage to nest trees or construction activities (noise) that scare birds away from nesting sites.
- **Loss of wetland feeding areas** close to the nesting colony (within 1–6 miles). Greater distance between nest and feeding areas reduces the chance of survival for their young.
- **Degradation of wetland feeding areas** and associated declines in prey (fish, small mammals, invertebrates).
- **Nest predation by native or non-native animals**, such as raccoons, feral cats, raptors, or ravens.
- **More intense winter storms**, as predicted with climate change, lowers the survival of young egrets and herons.

## Actions

### Planning, Management, and Restoration

- **Protect and restore tidal marsh and tidal flat habitat within 1–6 miles of nesting sites.** This is the most urgent action needed to protect or sustain heron and egret nesting populations in San Francisco Bay.
- **Provide year-round protection to colony nesting sites.** They are frequently destroyed when trees or other habitat features are removed or damaged during the non-breeding season (fall and winter). Such protection depends on local action recognizing that heron and egret use of surrounding areas depends on the year-round protection of colony sites.
- **Create 200-meter buffer zones** of no human activity around nesting areas during the nesting season (January–August).
- **Protect and restore wetland areas surrounding colony sites.**
- **Create and protect clumps of native trees** at distances of five miles or greater from existing colonies, preferably near open water.

### Scientists

- **Improve models** of heron and egret habitat sensitivity as potential biological indicators of wetland condition, and identify factors that can determine the linkage between colonies and surrounding habitat.

**Success Story** West Marin Island National Wildlife Refuge – See page 32

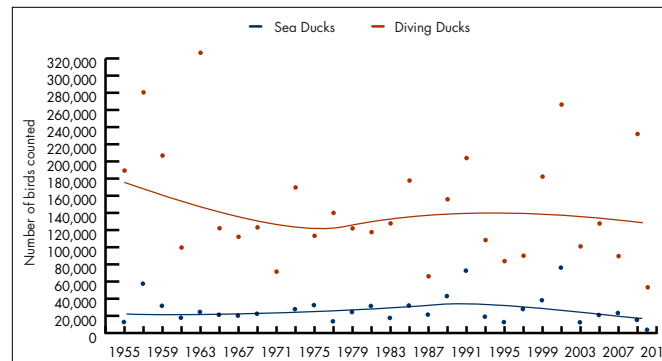
# Subtidal



Subtidal habitat is the habitat below the surface of San Francisco Bay, typically submerged. Birds using the subtidal habitat in the Bay feed on fish, shellfish (including mussels), invertebrates, underwater plants, and algae.



Canvasback



**Sea Ducks** (blue) and **Diving Ducks** (red) – caption for this graph



Greater Scaup



Surf Scoter

**Status:** Most diving and sea duck species are stable, but four species are declining.

The species of sea and diving ducks wintering in the San Francisco Bay show stable populations, with the following exceptions:

**Canvasback (a diving duck):** Nationally, Canvasback numbers are highly variable around a long-term average of about 600,000. Locally, their wintering numbers in the Bay have shown long-term decline, perhaps due to habitat loss in the Bay or the creation of habitat in areas like the Central Valley.

**Scaup (a diving duck) and scoters (sea ducks)** are declining throughout North America as well as in the Bay. The San Francisco Bay populations of these two groups of ducks represent, on average, between 40 and 50% of all scaup and scoters counted in the Pacific Flyway. If conditions change in San Francisco Bay, a large percentage of the population may be affected.

## Threats

- **Primary threat: Reduced quality and quantity of wintering habitat** from increasing contaminants (selenium, cadmium, and mercury); **loss of deep pond habitat; and changes in prey species composition and availability due to climate change, invasive species, and sediment deficits.**
- **Climate change and sea level rise, resulting in changed salinities and water depth.** This could alter prey composition and herring spawning.
- **Loss of herring stock** in San Francisco Bay and along the Pacific Coast. **Herring spawn is important in diving duck diets, particularly for scoters during spring migration, but also used heavily by scoters and scaup in San Francisco Bay.**
- **Disturbance from boat traffic** flushes resting or foraging ducks off the surface of the water.
- **Winter oil spills** have the potential for catastrophic impact to duck populations.
- **Declining availability of quality breeding habitat** in Alaska, Canada, and the northern Intermountain West Region.

## Actions

### Planning, Management, and Restoration

- **Ensure that wintering habitat remains available** for sea ducks and diving ducks, by restoring and preserving deeper and less saline water ponds within restoration areas such as South San Francisco Bay and Napa.
- **Minimize pollution from runoff** by working with local governments and communities to create programs that reduce runoff (e.g. reducing impervious surfaces) and upgrade storm water and sewage treatment plant facilities.
- **Reduce contaminant release** when conducting restoration activities by maintaining deeper water depths. Special care should be taken to minimize actions that increase contaminant release (mercury, selenium, and cadmium) or methylmercury production in shallow water areas.
- **Minimize disturbance** in key foraging areas from recreational and ferry boats, especially in the following areas: the northern end of San Pablo Bay, near eelgrass beds, and within the central part of San Francisco Bay from the Bay Bridge to the San Mateo Bridge.
- **Encourage restoration of eelgrass**, which is a substrate for herring spawn and prey species like crabs, mussels, and small fish.
- **Implement the Subtidal Habitat Goals Report recommendations** for the restoration, protection, and science needed to protect this habitat type – [www.sfbaysubtidal.org](http://www.sfbaysubtidal.org).

### Scientists

- **Continue the USFWS mid-winter waterfowl survey**, which has provided a consistent record of winter waterfowl populations since 1955.
- **Study prey density and waterfowl feeding behavior** to determine high quality habitat that should be protected or enhanced (e.g. eelgrass, creek mouths, ponds, shoals).
- **Model carrying capacity** of intertidal and subtidal habitats to help set wintering population goals. Current efforts have shown the value of San Pablo Bay subtidal habitats, and point to prey distribution and fish and shorebird competitors as key elements in future modeling efforts which incorporate all sub-bays.
- **Evaluate the effects** of human disturbance on foraging and roosting birds.
- **Model sea level rise, salinity and sediment** to help predict how benthic prey availability in subtidal and intertidal habitats may change in the future.
- **Determine habitat connectivity** among San Francisco Bay, migratory corridors, and breeding areas to help establish Flyway-wide conservation efforts year-round.



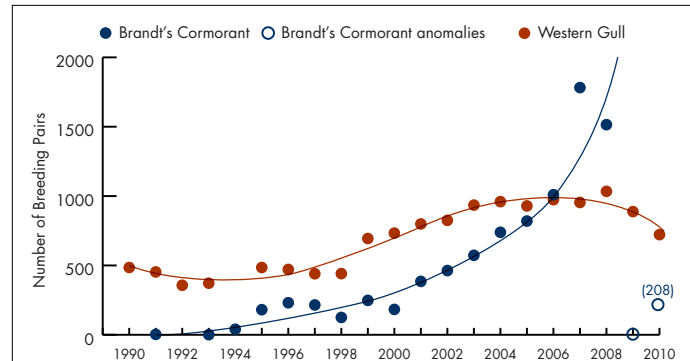
# Human-created Habitats



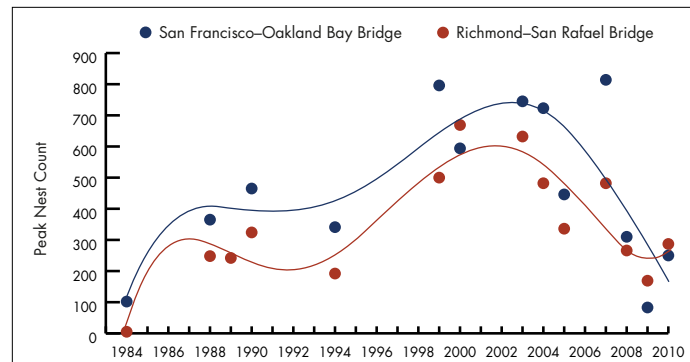
Several human-created habitats are used by birds: levees, bridges, and buildings, to name a few. Data on the bird use of all these habitats are not available. In this section we discuss two key places, Alcatraz and some of the Bay's bridges, where bird monitoring data exist.

Alcatraz, once a barren sandstone rock originally inhabited by seabirds, faced a long period of human settlement. In the last 20 years, the island has once again begun to attract seabirds that use its human-created structures as home.

Over 100 feet above the water the I-beams and other support structures under the roadways of the Richmond-San Rafael Bridge and the San Francisco-Oakland Bay Bridge serve as nesting platforms for Double-crested Cormorants.



**Brandt's Cormorants:** Alcatraz Island reproductive success.



**Double-crested Cormorants:** Bay bridges number of nesting pairs.

## Status: Stable

Seabirds are long-lived birds; thus their populations can withstand occasional years of poor reproduction or reduced reproductive effort. Because of this, evaluating the status of a nesting colony is done by looking at the reproductive success or breeding population size. The figures at left present over two decades of data on reproductive effort for cormorants and gulls..

## Western Gull and Brandt's Cormorant:

Stable. In 20 years of monitoring the nesting success of these long-lived seabirds, reproductive success has remained largely constant until 2009 and 2010. The complete nesting failure in 2009 and 2010 was likely due to a low anchovy population throughout the Central California coast region.

**Double-crested Cormorant:** Stable, though their reproductive success has varied over the last 26 years. In 2009 and 2010, these cormorants showed a sharp decline, but they appear to be recovering. The low number of nesting pairs in 2009 was likely due to a low anchovy population throughout the Central California coast region.

## Threats

- **Primary threat: Human disturbance**, including maintenance activities, tourism, and boating, can all cause seabirds to abandon the nesting colony.
- **Lack of food** due to steep declines in common prey species, as evidenced by the 2009 region-wide anchovy crash, can cause seabirds not to breed.
- **Losing nesting sites on human-created structures.** On Alcatraz, if nesting areas are opened for public tourism during the spring and summer, nesting habitat will be lost.
- **Contaminants accumulation in adult birds**, in high concentrations, can affect reproduction and chick survival. Cormorants are fish-eating birds and are at risk of accumulating contaminants (e.g., mercury, lead) from San Francisco Bay.
- **Climate change effects** such as extreme high temperatures result in heat stress in nesting birds (nausea, dizziness, seizures, death) and nest abandonment, as witnessed in 2008 on Alcatraz Island.

## Actions

### Planning, Management, and Restoration

- **Adjust timing of maintenance and construction activities and manage tourism** to reduce bird disturbance during the months of February–July. If not possible, maintenance and construction personnel should work with biologists on ways to limit disturbance.
- **Create new habitat on bridges and piers** when possible. Explore using methods of social attraction to draw birds to newly built ‘cormorant condos’ (artificial nesting structures on the new San Francisco–Oakland Bay Bridge).
- **Re-install historic buoys at Alcatraz** and work with the Bay Conservation Development Commission to implement seasonal closures to create a boat-free buffer zone during the seabird nesting season.
- **Educate tourists on Alcatraz about the sensitivity of nesting seabirds.** National Park Service programs should continue to increase tourist awareness of nesting seabirds on Alcatraz, especially with regard to closed areas during the nesting season.

### Scientists

- **Assess contaminants through studies of nesting birds.** Failed-to-hatch eggs have been collected opportunistically from the bridge colonies, but eggs should be collected and analyzed for contaminants on an annual basis. Relating cormorant contaminants with prey contaminants can help identify which fish species carry the most contaminants in the San Francisco Bay. Further research on lethal levels of these contaminants in Double-crested Cormorants should be considered.
- **Prey studies are needed.** A better understanding of Double-crested Cormorant diet is needed, since food affects the survival of this population.
- **Conduct complete annual monitoring** of all known Double-crested Cormorant breeding sites, especially the South Bay power towers.



Double-crested  
Cormorant

### Success Story

Seabirds on Alcatraz  
Island – See page 33.



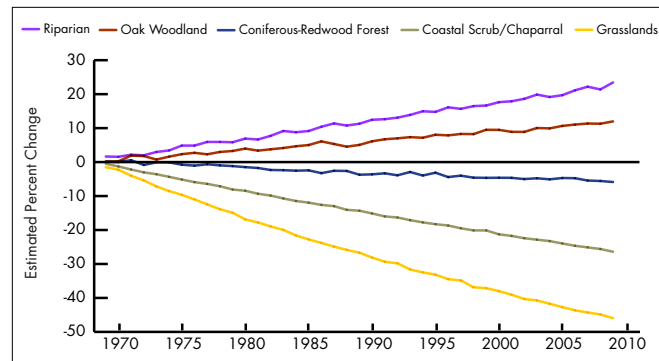
Western Gull at nest site, Alcatraz  
Island



# Upland Habitats



Surrounding the waters and wetlands of San Francisco Bay are a variety of 'upland' habitats including the five most common types – coastal scrub-chaparral, coniferous-redwood forests, grasslands, oak woodlands, and riparian (streamside) forests. These vegetation communities vary in their mix of native and non-native plant species and the composition of bird communities they support.



**Birds in Upland Habitats.** Data are from the Breeding Bird Survey for 14 routes in eight Bay Area counties.



Savannah Sparrow in grassland



Acorn Woodpecker in oak woodland

## Status: Mixed

Each upland type was assigned a suite of indicator species that best represent that habitat in the Bay Area. Over the 42 years of study:

Indicators for **riparian birds show an increase** of greater than 20%. Riparian habitats are recognized as one of the most important upland habitat types in the West for birds and other wildlife. Streams were heavily impacted in the past. In response to the listing of imperiled salmonids and concern for water quality, stream restoration has increased dramatically over the past several decades, benefitting birds as well.

Indicators for **oak woodland and coniferous-redwood forest birds are stable**.

**Coastal scrub-chaparral and grassland birds are declining**, coastal scrub by 27% and grasslands by over 45%. Species in these habitat types continue to be impacted by loss and degradation of habitat. These trends are consistent with the declining trend found in the National State of the Birds Report, 2009.



## Threats

- **Primary threat: Habitat loss and degradation** caused by land-use changes such as open space conversion to housing or intensive agriculture, **invasions of native and non-native species**, and **lack of ecological disturbances** such as fire. For example, the two habitat types with the greatest bird declines, coastal scrub-chaparral and grasslands, are transitioning to other habitat types due to lack of disturbance, the invasion of native species such as Douglas fir, non-native plant species such as broom, and annual grasses that alter fire regimes.
- **Under appreciation for the habitat value of scrub-chaparral and grasslands.** Not typically thought of as beautiful or in need of protection, scrub-chaparral is seen as an eyesore or fire hazard and a “clear the brush” attitude reduces habitat.
- **Climate change** affects vegetation type and water availability, thereby altering the amount, type, and quality of habitats available to birds.
- **Gaps in scientific knowledge** to inform and evaluate land management decisions and policy actions.



Wilson's Warbler in riparian habitat



Wrentit in coastal scrub-chaparral

## Actions

### Planning, Management, and Restoration:

- **Adopt and implement** the “Uplands Habitat Goals” and “Bay Area Critical Linkages” documents [www.bayarealands.org](http://www.bayarealands.org).
- **Control the most destructive invasive species** and support and participate in the Bay Area Early Detection Network ([www.baedn.org](http://www.baedn.org)).
- **Use disturbance** (e.g., fire and grazing) to create and maintain diverse upland habitats.
- **Promote conservation on private lands**, including thorough use of economic incentive programs.
- **Continue to restore riparian areas.**
- **Promote wise water use** in order to maintain stream flows and groundwater recharge.
- **Educate the public** on the value of habitats such as coastal scrub-chaparral and grasslands.

### Scientists

- **Determine which species are most vulnerable to the effects of climate change.**
- **Map future distributions** of species under climate and land use change.
- **Monitor upland birds** to track distribution and abundance changes and nest success and survival.
- **Identify Bay Area species population targets**, working with the San Francisco Bay Joint Venture.
- **Study the use of grazing** and other disturbances as vegetation management tools.

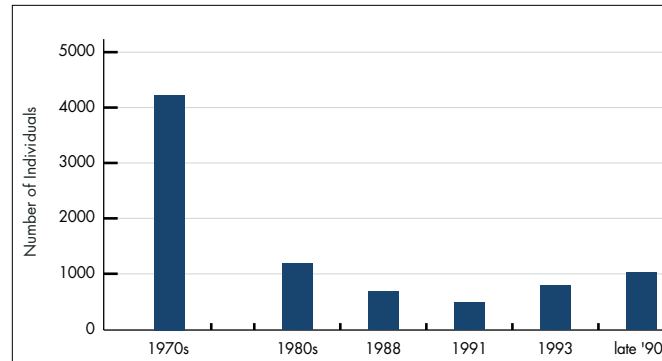
**Success Story** Riparian restoration on Chileno Creek (Marin County) – See page 34.

# Endangered Species

## Clapper Rail



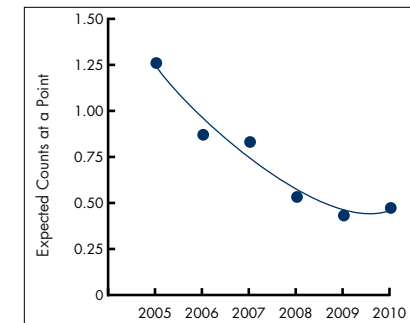
California Clapper Rails nest in the tidal marshes of San Francisco Bay, and recovery of this species has been the primary impetus for marsh restoration around the Bay. Unfortunately, the Clapper Rail struggles to survive because of habitat loss, predator pressure, and invasive species. The growing threat from sea level rise also threatens the Clapper Rail.



**Clapper Rail** populations likely reached a low point in the early 90s. Baywide Clapper Rail population estimates from multiple sources using multiple methods should be interpreted with caution.

**Status:** Decreasing

**Clapper Rails** in San Francisco Bay have decreased dramatically from historic levels. Tens of thousands roamed the undiked marshes before the California Gold Rush. Since the mid-1900s, development on Bay shores pushed Clapper Rails into smaller and smaller marshes separated by wide swaths of urban landscape.



Standardized Bay-wide point count surveys for Clapper Rails show a steep decline that may be leveling off.

## Threats

- **Primary threat: Predators**, including introduced predators such as Norway rats, house cats, and red foxes prey on Clapper Rails and their nests. Some native species of raptors, snakes, and mammals also prey on Clapper Rails.
- **Invasive non-native plant species** can reduce nesting and foraging habitat for Clapper Rails, even changing the invertebrate community on which they feed. Perennial pepperweed reduces high-tide refugia and hybrid *Spartina* may reduce channel and mudflat areas important for foraging rails. However, invasive plant control/removal decisions should always consider short-term and long-term effects on birds (e.g., invasive *Spartina* eradication may have contributed to significant reductions in Clapper Rail populations at some sites and should proceed with caution).
- **Pollution, contaminants, and toxic spills** (including oil spills) directly kill rails, vegetation, fish, and the invertebrate community that sustains marsh wildlife. Toxins (e.g., mercury, lead) accumulate in rails, impairing their reproduction and survival.
- **Rising sea levels from global climate change** will drown some marshes and increase nest flooding, making the habitat unsuitable for Clapper Rails. See [www.prbo.org/sfbayslr](http://www.prbo.org/sfbayslr) to view maps of projected change in marsh habitat and changes in bird and plant species distribution.

**Success Story** Carl's Marsh – See page 32.

## Actions

### Planning, Management, and Restoration

- **Prioritize sites:** Use the most current and thorough scientific modeling of climate change scenarios to prioritize areas for acquisition and restoration (an example is PRBO's sea level rise modeling tool: [www.prbo.org/sfbayslr](http://www.prbo.org/sfbayslr)).
- **Acquire and restore uplands and diked areas** where current shoreline marsh may migrate as sea level rises.
- **Control predators** by eliminating cat feeding stations, supporting predator control programs, and by keeping marshes, public parks, and adjacent housing areas free of garbage.
- **Enforce regulations** on unlawful recreation in sensitive marshes.
- **Conduct active marsh planting** in restored areas where plants are not regenerating on their own, or in sites where non-native plant removal has reduced overall plant cover.
- **Restore high ground adjacent to marshes**, such as levees and uplands with dense vegetation, to offer birds refuge from high-tide events.
- **Locate public access points** and trails to the Bay shore away from Clapper Rail habitat.

- **Continue funding and support for tidal marsh restoration** such as the South Bay Salt Pond Restoration Project, which aims to restore over 15,100 acres of former salt ponds to a diversity of habitat types to benefit all birds including tidal marsh-dependent species.

### Scientists

- **Support research** that seeks to understand marsh development processes in the face of sea level rise, and potential management actions that can mitigate these impacts.
- **Study the effect of trail use** to Clapper Rails, both direct impacts from disturbance as well as potential increased predator access from trails.
- **Support research** on Clapper Rail population trends (including reproductive success, which has not been closely studied at a Bay-wide scale), habitat use, and the impacts of invasive hybrid *Spartina* and its removal.
- **Support research** that can inform how to create upland transition zone habitat as refugia for Clapper Rails.
- **Update habitat models** as new data become available, to better predict areas where tidal marsh will persist given sea level rise.



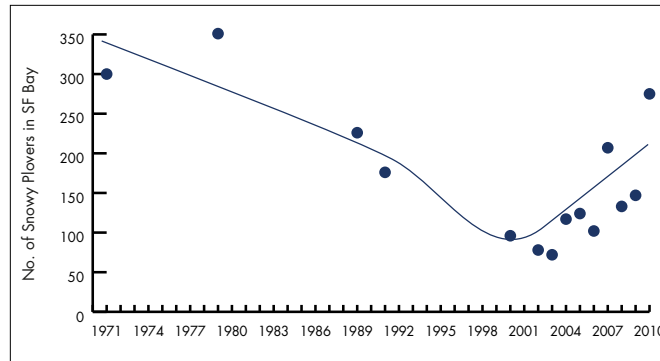
# Endangered Species

## Western Snowy Plover



The Western Snowy Plover is a federally threatened species under the Endangered Species Act. Primarily found nesting on coastal beaches, a subset of the population nests in San Francisco Bay. Plovers use dry pond bottoms, isolated islands, and levees in managed ponds as well as active salt ponds for habitat.

yellow background a problem?



**Snowy Plover** graph caption



Snowy Plover chicks

**Status:** Uncertain – appears to be recovering in the South Bay.

Snowy Plovers in the San Francisco Bay have decreased from historic numbers but more recently show an increasing trend possibly reflecting improved survey effort. Snowy Plover reproductive success is low in the Bay and has decreased over the past four years.

## Threats

- **Predators** impact Snowy Plovers by preying upon their eggs and chicks. Nest cameras have documented a large suite of predators, including California Gulls, Common Ravens, Northern Harriers and the native gray fox. Maintaining predator control measures is costly and funds are scarce.
- **Habitat loss** from salt pond conversion projects is a threat to the Snowy Plover as some of the ponds it nests in are former salt ponds that are now being converted to marsh in the North and South Bay.
- **Rising sea level** from global climate change may submerge the shallow ponds where Snowy Plovers nest.
- **Disturbance to nesting plovers** by the public, from future public access and recreation trails.

## Actions

### Planning, Management, and Restoration

- **Continue to control predators** in San Francisco Bay to reduce depredation of plover eggs and chicks.
- **Remove feral cat feeding stations** near plover nesting areas in the South Bay and educate the public about the need for this action.
- **Continue to create and improve plover nesting** within restoration projects. Specifically, continue to create nesting islands, shallow ponds, and cover for plover nests and chicks.
- **Maintain 500 nesting plovers in San Francisco Bay**, as set by the US Fish and Wildlife Service Western Snowy Plover Recovery Plan. The South Bay Salt Pond Restoration Project aims to support 250 breeding Snowy Plovers. Other Federal and State agencies need to collaborate to develop a strategy to support at least 250 additional plovers within San Francisco Bay.
- **Provide dry spring nesting habitat and late season nesting habitat.** Initiate managed pond draw-down early enough in the spring to provide dry early season nesting habitat and continue to draw down ponds throughout the season to create optimal late season nesting habitat.
- **Prevent avian predators from nesting and perching** near nesting plovers by modifying the design of power towers and by removing predator perches (e.g. sign posts, old duck hunting blinds).

- **Prevent California Gulls** from establishing colonies near plover nesting habitat.
- **Practice adaptive management.** Support ongoing monitoring of managed ponds and nesting islands to determine their effectiveness in supporting plovers. Employ an adaptive management approach to pond design, acreage and public access if the current plan proves to be ineffective.
- **Conduct public outreach** to reduce disturbance to nesting plovers from **public access and use of recreation trails**. Close trails seasonally around nesting habitat.

### Scientists

- **Experiment with substrates that provide cover.** Test the effectiveness of oyster shells on the pond bottom to camouflage Snowy Plover nests and chicks, reduce predation, and increase nesting density.
- **Assess the implications of public access on nesting plovers** to determine the level of disturbance likely from future public access and trail use. Determine consequence of disturbance on flushing rates, nest temperatures, incubation duration, and nest success of the plovers.

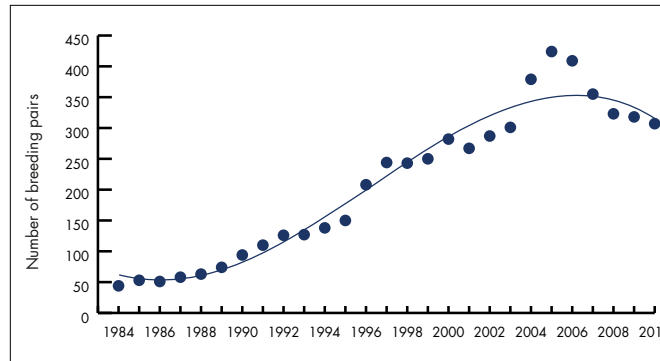
# Endangered Species

## California Least Tern

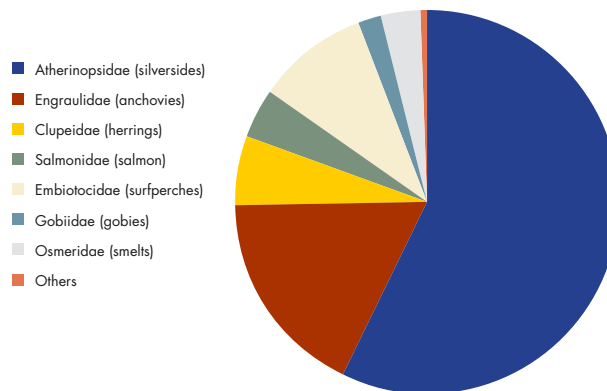


The largest colony in San Francisco Bay is located at Alameda Point on the runway complex of the former Naval Air Station, Alameda. The 3.9 hectare breeding area is surrounded by a chain link fence.

Smaller colonies can be found at Napa-Sonoma Marshes Wildlife Area, Montezuma Wetlands, and Hayward Regional Shoreline.



**Least Tern** graph caption



**Least Tern** diet graph caption

### San Francisco Bay Status: Stable

Since 1984, the Alameda colony has increased at a rate of 9.7% pairs per year but appears to have stabilized in the last decade.

Dropped prey items have revealed the diet and foraging habits of Least Terns at the Alameda Point colony from 1981 to present. They show that small estuarine fishes are the dominant prey item. Since the 1990s, northern anchovy and surfperches have declined in the tern's diet, while Clupeids (e.g. herring, sardine) have increased. Understanding prey items is important because diet is critical to tern reproductive success.



## Threats

- **Primary threat: Avian predators** including falcons, hawks, owls, crows, and ravens prey upon young and adult terns. Human activities, such as leaving food for predators and altering native habitat, result in higher than normal predator populations.
- **Development of the Naval Air Station** looms the base has been decommissioned.
- **Encroaching vegetation** is reducing the nesting area available to the birds. The California Least Tern needs bare ground for nesting and roosting. Encroachment of vegetation reduces the amount of nesting habitat.
- **Low flying aircraft** over the nesting colony flush adult terns from their nests, leaving young and eggs vulnerable to predators and unfavorable weather conditions.
- **Sea level rise from climate change** threatens to submerge the colony site, as it is built on reclaimed land close to sea level.
- **Loss of common prey species**, such as the region-wide anchovy crash in 2009, can result in fewer feedings to chicks, nutritional deficiencies, and higher rates of chick death.
- **Contaminants** can directly kill birds, but they also kill the prey items that birds depend upon for food. California Least Terns feed on fish and are at risk of accumulating contaminants (e.g., mercury and lead) found in San Francisco Bay. These contaminants, in great enough concentrations, can affect survival and breeding success.

## Actions

### Planning, Management, and Restoration

- **Continue predator management**, especially of Peregrine Falcons. The increase in local Peregrine Falcon attacks on the terns at Alameda Point is a growing concern. Authorization to permanently remove marauding Peregrine Falcons from Least Tern sites needs to be given to predator management personnel by the appropriate State agency.
- **Control vegetation** by continuing to apply herbicide, remove weeds, and add gravel to the nesting substrate.
- **Reduce air traffic disturbance** by expanding outreach to local airports and pilots regarding impacts to the endangered Least Tern.
- **Secure/identify adequate undeveloped space** beyond the existing colony to allow for colony movement or persistence in the long-term, give the uncertain future of the Navy's presence.

### Scientists

- **Study the diet and energy requirements** of developing terns and evaluate the nutritional content of common prey species.
- **Monitor contaminant impacts** to terns. Failed-to-hatch eggs should continue to be collected and analyzed for contaminants. Further research on lethal levels of these contaminants in Least Terns is needed.

**Success Story** Monitoring Least Terns at Alameda Point – See page 35.

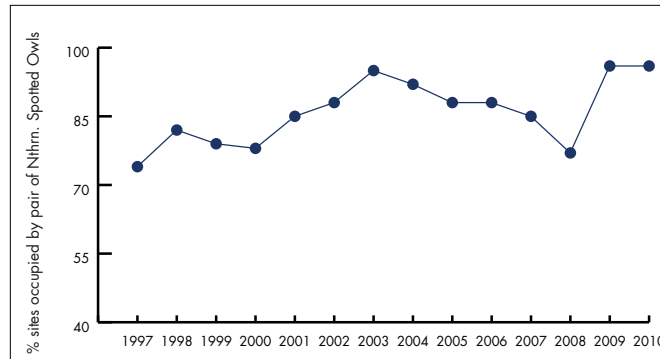
# Endangered Species

## Northern Spotted Owl

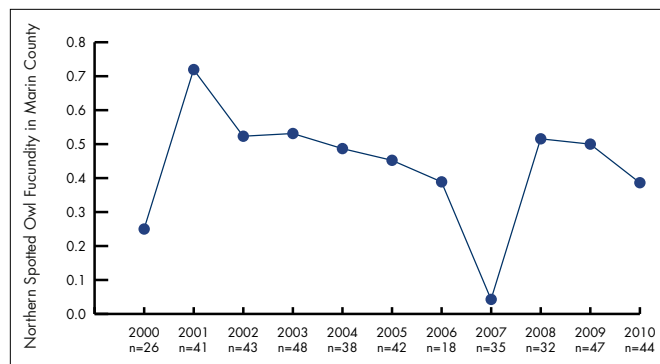


In the San Francisco Bay Area (primarily Marin County), Northern Spotted Owls nest in both old growth and mature second-growth forests of Douglas-fir, coast redwood, bishop pine, mixed conifer-hardwood, and other evergreen hardwood trees. This varies from the rest of the population of Northern Spotted Owls in the Pacific Northwest, where they are commonly associated with mature coniferous forests.

In Marin County, unique forest types are Bishop pine and evergreen forests.



Percent of Northern Spotted Owl sites surveyed that were occupied by a pair. All sites are not surveyed every year; however, sites surveyed likely reflect the overall population of owls in Marin County. In general, the number of Northern Spotted Owls in Marin County appears stable.



Title of graph / caption info

**Status:** Stable, but more monitoring needed.

While fecundity is generally high, we lack survival data for owls, which may be more important to the overall number of birds in the population.

The Bay Area's population of **Northern Spotted Owls** is thought to be stable; however, thorough population monitoring is not available as all sites are not monitored every year.

Current monitoring occurs on the following public lands: Point Reyes National Seashore, Golden Gate National Recreation Area, Marin Municipal Water District, Marin County Open Space District, and California State Parks (Tomales Bay, Mount Tamalpais, Samuel P. Taylor).

## Threats

- **Primary threat: Barred Owls** pose a threat to Spotted Owls by competing for space and food and through direct, aggressive interactions. Currently, the number of Barred Owls in the Bay Area is relatively small but is predicted to increase.
- **Rat poisons.** Spotted Owls feed upon rats; when rats have been poisoned with rodenticides used by residents and businesses, the owls can become sick or die
- **Sudden Oak Death** changes the forest structure and plant composition, and the loss of tanoaks in particular threaten the owl's preferred food source, the dusky-footed woodrat, which depends on the tanoak for cover and food.
- **Loss of forests** due to urban development along national park and county open space boundaries, and the threat of wildfires, reduces the suitable foraging, roosting, and nesting habitat for Northern Spotted Owls.
- **Human activities**, such as extended presence near Spotted Owl nest trees and noise disturbance from yard maintenance, tree trimming, and construction activities in the communities neighboring owl nesting sites, can disturb nesting owls and may prevent them from feeding their young. Community awareness of regulated protections for Spotted Owls is lacking.
- **Genetic isolation.** The Marin County population of Northern Spotted Owls is isolated from populations to the north because of a break in forested habitat needed for dispersal. Small populations, such as those found in Marin County, are at a higher risk of local extinction.

## Actions

### Planning, Management and Restoration

- **Follow U.S. Fish and Wildlife Service guidelines** for protecting Spotted Owls. Restrictions for habitat modifications around Spotted Owl territories are in effect year-round and modifications to potential Spotted Owl habitat may require consultation with USFWS personnel.
- **Limit loud noises**, such as motorized gardening equipment, during the nesting season (February 1st to July 9th) near Spotted Owl habitat.
- **Discontinue the use of rodenticides** as a means to kill pests in areas with Spotted Owl habitat. Residents and business owners should consider rodent prevention and trapping instead of poisons that harm more than the rodent.
- **Communicate to the public** the USFWS guidelines pertaining to activities such as noise disturbance and construction near Spotted Owl habitat during the nesting season (February 1st to July 9th).

### Scientists

- **Continue and expand monitoring** of Spotted Owl and Barred Owl populations on public lands. Current research is ongoing in Marin County but should be expanded to include Sonoma and Napa counties, on both public and private lands.

### Public

- **Leave owls alone.** Spotted Owls reside near many busy trails in the Bay Area, and it is not uncommon for fledgling owls to perch on the ground. If you see an owl, give them space and keep pets on leash. The parents will continue to care for a fledgling owl on the ground.
- **Discontinue the use of rodenticides** as a means to kill pests. Residents and business owners should consider rodent prevention and trapping instead of poisons that harm more than the rodent.



Spotted Owl fledgling

**Success Story** Spotted Owl monitoring on public lands – See page 34.



# Policy

The human population of the San Francisco Bay Area has more than tripled since the 1950's, yet the ponds, open waters, mudflats, and marshes continue to support rich and abundant birdlife. Protection of birds and their habitats has resulted from decades of public involvement, conservation investments, and a strong framework of laws and regulations. However, we cannot assume that all threats to birds and their habitats have been averted and that all protection is permanent. We need an engaged public and informed decision-makers to continue to protect the hundreds of thousands of majestic and ecologically important birds that depend on the San Francisco Bay Estuary region.

The future state of the birds in San Francisco Bay region is at significant risk, resulting from the urban use of the area, the looming threat of climate change and associated sea level rise, and funding limitations during this period of economic uncertainty. It is time to develop and support solutions that benefit our environment, economy, and community. A more resilient San Francisco Bay will be better for birds, people, and the economy: healthy tidal marshes provide

flood protection as sea levels rise, healthy streams improve our water quality, diverse and abundant bird populations provide us with recreation, inspiration, and enjoyment, and their presence in the Bay Area indicates the sustained quality of those habitats and the services they provide. Today the most fundamental policy challenges to maintaining and enhancing conservation in the Bay Area, across a broad array of habitat types, can be grouped into four categories: 1) funding; 2) climate change including sea level rise; 3) threats from development; and 4) balancing public use with adequate protections for birds. The State of the Birds Report offers policy recommendations for each.

## Funding

Our ability to protect existing habitats and respond to new threats is compromised without adequate funding to: 1) acquire, restore, and manage important habitats in public spaces; 2) continue incentives for the private protection of open spaces; and 3) continue efforts to maintain and enhance the quality of Bay waters upon which birds and people depend.



Caitlin Robinson-Nilsen (left) and Cheryl Strong band Black-necked Stilt Chicks at Hayward Regional Shoreline.

To protect birds in San Francisco Bay region:

- Support the efforts of the San Francisco Bay Restoration Authority (California Government Code §66700 et seq.) to establish a regional funding program in the Bay Area. Doing so would support wetlands restoration, enhancement, and management, and associated public access and flood management.

- Support full funding for the Federal Land and Water Conservation Act, the North American Wetlands Conservation Act, and other relevant federal authorities to increase and improve wetland habitats and wetland-dependent bird populations.
- Support federal appropriations to the U.S. Army Corps of engineers for wetland restoration projects authorized in the Water Resources Development Act, appropriations for the San Francisco Bay National Wildlife Refuge Complex, and appropriations for NOAA and USEPA for programs focused on wetlands restoration and water quality improvements in San Francisco Bay.
- Ensure adequate funding for the San Francisco Bay Regional Water Quality Board's effective enforcement of the Federal Clean Water Act and the Porter-Cologne Water Quality Control Act (California Water Code §13000 et seq.), and to local jurisdictions for infrastructure improvements to aid in keeping sewage and animal waste out of the Bay and reducing storm-water pollution, to reduce the threat of catastrophic spills and improve water quality and supply for wildlife and for people.
- Ensure adequate funding for the early detection of non-native invasive plants and aquatic

organisms and continue the systematic removal and control of the species that pose a significant threat to birds' habitats in the Bay region such as invasive *Spartina* hybrids.

- Restore full funding for the Williamson Act (California Government Code §51200 et seq.), which has historically provided critically important property tax incentives and prevents urban development for over 1.23 million acres of upland bird habitat and open spaces in the nine-county Bay Area region. State funding for this program has been deeply cut and is threatened with elimination.
- Support continued state funding for the San Francisco Bay Area Conservancy Program of the State Coastal Conservancy, which provides grants to multiple organizations for wetland restoration and other projects that benefit birds, and support funding for the California Department of Fish and Game to manage their ecological reserves and wildlife areas in the San Francisco Bay Area.
- Increase local funding for habitat acquisition and management actions by entities such as



caption on Alcatraz cooperative success

Open Space Districts, land trusts, and other nongovernmental organizations active in protecting habitats in the Bay Area.

- Support science and monitoring associated with restoration and management projects that answer key uncertainties and help guide priorities for future bird habitat protection and enhancement.

### **Climate change and sea level rise**

To ensure that critically important habitat areas for people and birds are preserved, we encourage:



# Policy

(continued from page 31)

- Rapid reduction of greenhouse gases through the full implementation of AB 32, the California Global Warming Solutions Act of 2006 (California Health and Safety Code §38500 et seq.), and support for national climate change legislation to help mitigate the most extreme levels of climate change.
- Full implementation of the California Climate Adaptation Strategy of 2009. On the issues of sea level rise, discouraging urban development in areas containing habitat and habitat restoration potential and that are vulnerable to sea level rise.
- The acquisition and restoration of remaining open space areas in proximity to existing wetlands to provide for future habitat refugia for tidal marsh and tidal flats, birds and other wildlife in the face of rising sea level; and to allow for tidal wetlands to migrate up the shoreline as the Bay rises.
- When practical, encourage the use of natural shoreline protection and buffer lands such as tidal marsh, eelgrass and oysters, and rocky subtidal habitat, in contrast to sea walls and other artificial barriers that are prone to catastrophic failure and provide little habitat value.

- Support dredging policies and regulations that require beneficial re-use of material currently being disposed offshore or in-bay. Sediment that is in the system will enable marshes to better build and keep pace with sea level rise, protecting not only marsh and mudflat habitats but enabling them to serve their natural functions as buffers against sea level rise and storm events.

- Support science and monitoring to improve our ability to predict the effects of climate change as a means to prioritize future land acquisition, management, and restoration efforts and mitigate sea level rise impacts.

## Threats from development

With the population of the Bay Area estimated to grow to over eight million people by the end of this decade, there will be additional pressures to fill baylands and adjacent restorable uplands for urban development. To ensure that habitat protection and restoration objectives can be met, we encourage that:

- Further development should be prohibited on Bay wetlands or lands adjacent to, and restorable to, wetland conditions.

- Efforts to exempt projects, or to weaken existing development protection provisions of the California Environmental Quality Act (California Public Resources Code §21000 et seq.) or the McAtteer-Petris Act (California Government Code §66600 et seq.) establishing the Bay Conservation Development Commission (BCDC), should be opposed.
- Implement the Climate Change amendments to BCDC's Bay Plan.
- **The recommendations in the Subtidal Habitat Goals report should be implemented in order to maintain and improve fish and wildlife habitat in the Bay.**
- Utilize decision-support tools, such as that developed by the Bay Area Open Space Council's Upland Habitat Goals project, and the San Francisco Bay Sea Level Rise decision support tool developed by PRBO Conservation Science and its partners, as resources for determining priority parcels for future protection and restoration.
- The San Francisco Bay Regional Water Quality Control Board should complete and adopt its





Tidal marshland is likely to be inundated by sea level rise. Here, winter rainwater and an extreme high tide flood the Bay shore.

Wetlands and Riparian Area Protection Program recommendations in order to provide protection for many bird species.

### Public use and bird protection

A balancing act exists in wildlife conservation: the needs of sensitive wildlife populations versus the need to connect the public with the outdoors and provide opportunities to observe wildlife. We recommend the following policy considerations to accommodate habitat protection and outdoor recreation:



Clapper Rail, dependent on tidal marsh habitat in the Bay

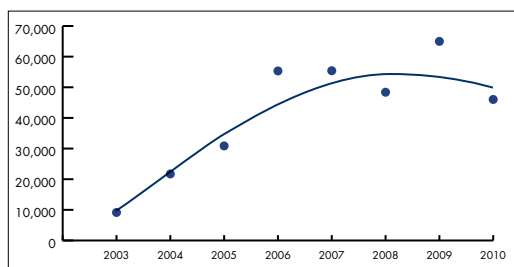
- Protect and enhance values of tidal marsh, managed pond, open Bay, and other sensitive habitats, particularly those utilized by listed and sensitive wildlife species. Where wildlife would be negatively impacted by public use, public access should be limited. As much as possible, access should be designed in ways and locations that provide both public enjoyment and reduce impacts to sensitive habitats and species.

- Regulations regarding dogs and cats should be implemented to protect key shoreline areas used by endangered bird species.
- New boat launching and access points should be developed away from sensitive habitats. Boating activities should avoid those areas that provide important foraging and resting for diving ducks, grebes, and waterbirds during the migratory and wintering seasons when those species are present.
- Study impacts of public access on wildlife as a means to improve future planning for beneficial public access.
- Support educational programs and facilities to help the public to appreciate, understand, and value birds and the ecology of San Francisco Bay.

# Success Stories

## Managed Ponds South San Francisco Bay Salt Pond Restoration

With the transfer of over 15,000 acres to public ownership in 2003, the South Bay Salt Pond Restoration Project is the largest wetland restoration on the West Coast. An early goal in the long-term restoration plan was to reduce salinity in open ponds from their inherited toxic production concentrations to those of ambient bay waters. The U.S. Geological Survey began monitoring birds and water quality from the start of the project, and has documented increases in shorebirds and ducks as the restoration has proceeded. Examples include the 480 acre Island Ponds that were opened to tidal action in 2006. As salinity declined from 160 to less than 20 ppt, average numbers of dabbling ducks increased from zero in 2003 to over 4,000 birds at high tide on a given winter day in 2009. In the larger Alviso system and across the South Bay's managed ponds dabbling ducks such as Northern Shoveler increased substantially through winter 2010. The restoration project occurs within a designated area of Hemispheric Importance for migratory and wintering shorebirds such as



Dabbling ducks have increased in South Bay ponds.

Western Sandpipers. Further north, in the Eden Landing pond complex, small shorebirds during spring have increased from 10,000 to over 50,000 birds observed in monthly surveys as water depths declined in former commercial salt ponds now maintained as seasonal wetlands. Numerous ponds are planned for enhancements or restoration to tidal marsh within a 50-year time horizon, and continued monitoring is critical to learn from successes or unexpected changes that can feed back into adaptive management in this extremely important area for birds within San Francisco Bay.

—L. Arriana Brand and Cheryl Strong

## Tidal Marsh Carl's Marsh

Carl's Marsh is a great example of successful tidal marsh restoration. After this 42-acre dry fallow field was breached in 1994, sediment began accumulating with each tidal cycle, and the site is now a lush tidal marsh supporting a diversity of birds including several endangered California Clapper Rails. This collaborative project between California Department of Fish and Game (CDFG) and Sonoma Land Trust was more successful than expected. The transition from fallow agricultural land, to productive mudflat habitat for shorebirds, to a fully vegetated marsh was rapid, occurring within the first five years. Carl's Marsh now supports over 60 pairs of breeding Samuel's Song Sparrows. This subspecies of Song Sparrow is found only in the tidal marshes of San Pablo Bay and is recognized by CDFG as a Bird Species of Special Concern.



Clapper Rail

—Julian Wood and Nadav Nur

## Tidal Marsh Herons and Egrets

### West Marin Island

The West Marin Island National Wildlife Refuge is a protected home to one of the largest nesting colonies of herons and egrets in the San Francisco Bay, and is a true bird conservation success story. During the 1980s the Marin Islands were slated for development. Over the next 12 years, local citizens, the Friends of the Marin Islands, the California Coastal Conservancy, the Trust for Public Land and at least 14 other agencies and organizations participated in the establishment of the Marin Islands National Wildlife Refuge and State Ecological Reserve. Senator Barbara Boxer designated September 19 as Marin Islands National Wildlife Refuge Day in 1992.

The establishment of West Marin Island Wildlife Refuge was largely due to data provided by ongoing monitoring, which began in 1979 and documented the importance of the island to nesting herons and egrets. Region-wide monitoring of heronries throughout the San Francisco Bay area by Audubon Canyon Ranch substantiated the importance of this nesting colony and now guides the management of the Marin Islands National Wildlife Refuge. Today the Refuge is home to over 500 nesting pairs of herons and egrets each year.

—John Kelly



Great Egrets

## Human-created Habitats

### Seabirds on Alcatraz Island

Prior to human settlement, Alcatraz Island was home to thousands of nesting seabirds, as indicated by the guano-covered sandstone. As early human settlement took place, birds left the island and did not return throughout the military and prison history. Over a century later, Alcatraz became part of the Golden Gate National Recreation Area (GGNRA), a unit of the National Park Service (NPS), and birds slowly began to return to reclaim the island.

The Brandt's Cormorant colony on Alcatraz is one of the few known estuarine breeding sites for this species. Pigeon Guillemots are not known to breed elsewhere in the San Francisco Bay. The Western Gull and Black-crowned Night Heron colonies are the largest in the Bay. Currently, this diversity of species exists in a delicate balance with the considerable human presence both on and around Alcatraz Island. Over the last 10 years, PRBO Conservation Science and the NPS have been monitoring the return of the nesting birds and especially the growth of the cormorant colony.

With cooperative efforts between biologists and NPS staff, improved public outreach (signage, bird interpretive displays, tours), and island management (**altered tourism, maintenance and construction activities** to protect nesting birds) human-caused disturbance to the cormorants has been reduced and the colony has grown.

—Sara Acosta



Brandt's Cormorant.



Pigeon Guillemots



# Success Stories

## Upland Habitats

### Chileno Creek, Marin County

Sally and Mike Gale live and work on a 600-acre ranch first purchased by Sally's great-grand father in 1856. The Gale Ranch is located in Marin County's picturesque Chileno Valley, where agriculture has been a way of life for 150 years. Mike and Sally took over operation of the ranch in 1993 and currently tend a humanely raised grass-fed beef herd of about 100 cows as well as other farm enterprises such as u-pick apples.

Mike and Sally are stewards of the land and quickly noticed that the creek running through their property, Chileno Creek, was completely lacking vegetation and drying out in the summer. The Gales recognized the need to revive Chileno Creek in order to retain soil and prevent creek sedimentation, keep evaporation in check, retain water, replenish groundwater, and provide better wildlife habitat. Working with the Marin Resource Conservation District, the Natural



Wilson's Warbler



graph caption

Resource Conservation Service, and the Students and Teachers Restoring a Watershed Program (STRAW), the Gales undertook a seven-acre riparian restoration project.

The restoration has successfully increased native vegetation (see figure), especially to benefit birds. PRBO Conservation Science biologist Tom Gardali notes "The number of bird species found on the Gale Ranch has increased significantly since their restoration project began. The growing populations of the 33 bird species inhabiting the ranch tell us the restoration is really paying off."

Over the years, neighboring ranches joined in and the cumulative effect in Marin and southern Sonoma counties has greatly increased the number and diversity of birds (see figure).

—Tom Gardali

## Endangered Species

### Spotted Owls

For over 10 years, the National Park Service, Marin Municipal Water District, and Marin County Open Space have been conducting surveys on their lands to ensure that Northern Spotted Owls are not disturbed by management activities. Their commitment to the protection of Spotted Owls has resulted in better timing of management activities (e.g., trail work) to avoid disturbance to nesting owls and increased knowledge about the status of Northern Spotted Owls in Marin County.

—Renee Cormier and Dave Press



Adult Spotted Owl

## Endangered Species—Least Tern Watch

### Monitoring and Protecting a California Least Tern Breeding Colony

Tern Watch is a volunteer predator observation program at Alameda Point. The intention of Tern Watch is to give a broader picture of predator presence during the least tern breeding season, allowing USFWS to conduct proactive predator management. Annually, volunteers are recruited and trained to observe the tern colony from a vehicle outside the colony fence line, for three hours at a time. Volunteers record predator and Least Tern activities during daytime hours, seven days a week.

Not only are the Tern Watch data useful for understanding the local predators at the Least Tern colony, but the volunteers themselves act as predator deterrents. The physical presence of a human in their vehicle close to the Least Tern colony appears to deter many avian predators from entering the nesting area, thus giving more protection to the terns. The Tern Watch volunteers also record least tern activities and their responses to predator presence. While conducting a tern watch, each volunteer is able to enjoy the behaviors and nature of the Least Terns in their breeding habitat, a rare sight to see.

In 2010, the presence and vigilance of volunteers at the Least Tern colony helped thwart several hunting attempts made by juvenile Peregrine falcons. The quick response time by volunteers alerting the biologists of predators enabled them to chase off marauding predators in time.

—Meredith Elliot and Mark Rauzon



Least Tern incubating eggs

## Marshland on Reclaimed Shoreline

### Sonoma Baylands

Much of the historic marshland in the North Bay was diked and cut off from the Bay in the late 19th century for farming oat hay and other crops. From 1991 to 1995, a 322-acre site purchased by the Sonoma Land Trust and known as Sonoma Baylands became a signature and pioneering project of



wetland creation with the use of dredge materials from the Port of Oakland and the adjacent Petaluma River entrance channel.

While it took many years to establish, the site now boasts large numbers of shorebirds (sometimes as many as 18,000 individuals) with at least 23 species amassing on the mud before and after high tides. As rising water pushes the birds off these restored bay mudflats, they pause at the Baylands for a last frantic forage before moving to upland habitats where they rest and preen until the tide begins to drop again. During high tide in the winter, 18 species of ducks and geese have been recorded in the aquatic habitats within the Sonoma Baylands. With its ability to attract large populations of wading birds, the site is also attractive to diurnal raptors including Merlin, Prairie and Peregrine Falcons. Surveys for endangered California Clapper Rails by PRBO ecologists since 2008 have documented their presence, along with Black Rails, in the restored Sonoma Baylands

The restoration and rehydration of Sonoma Baylands has enhanced opportunities for San Pablo and San Francisco Bay's wildlife, especially birds, in ways only dreamed of 30 years ago.

—Caroline Warner and Rich Stallcup



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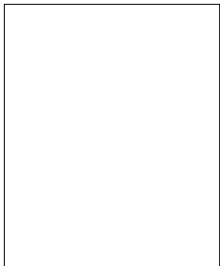
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