Salt Pond Restoration in San Francisco Bay

Balancing Wildlife Habitat Needs

The recent acquisition of more than 15,000 acres of commercial salt ponds provides an unprecedented opportunity to restore marshlands and improve the Bay ecosystem. The challenge? Maintaining current wildlife values while enhancing habitat for other species.

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The goal of the San Francisco Bay Joint Venture is to protect, restore, increase and enhance all types of wetlands, riparian habitat, and associated uplands throughout the San Francisco Bay region to benefit birds, fish and other wildlife.

In 2003, vast tracts of San Francisco Bay's industrial salt ponds were purchased by federal and state agencies and private organizations in a multi-million dollar, decades-long effort to restore the Bay to a healthy, functioning ecosystem.

The most ambitious wetland restoration on the West Coast, a hallmark of the project is the return of many of the Bay's salt ponds to salt marsh in order to create valuable new habitat for marsh-dependant species in decline.

The restoration of the ponds back to original marsh holds both hope and concern for the future of San Francisco Bay's wildlife. Over the past century, dozens of waterbird species have come to depend on the rich feeding, nesting and roosting resources found within the salt ponds.

A shared goal of all researchers, wildlife managers, and public interest groups involved in the restoration's design is to maximize the benefits to all species. Most agree a mix of different habitat types will bring the highest biodiversity. But what mix is best?

To help decision-makers with the difficult task of finding the best habitat mix, researchers at PRBO Conservation Science have developed a computer model capable of predicting the potential effect varying restoration scenarios will have on wetland bird communities.

The *Habitat Conversion Model* uses information from surveys of bird density and distribution in San Francisco Bay marshes and ponds to calculate the potential change to populations if certain habitats were lost or gained in the restoration process. Early results from the model indicate that potential negative impacts on waterbirds dependant on open and shallow water habitats would occur with the conversion of salt ponds to salt marsh. But the models also indicate these impacts can be mitigated if long-term management of extensive open water areas is designed into the restoration.

Maintaining a wetland *mosaic* that includes carefully designed tidal marsh, interspersed with salt ponds managed for appropriate depths and salt concentrations, can preserve and enhance the widest variety of San Francisco Bay's bird populations. The outcomes of these and other computer-based models will help wildlife managers determine which combination of salt pond and salt marsh habitats will maximize San Francisco Bay's biodiversity.

Continued partnerships and strong support from the public will be essential to maintain the Bay's striking diversity and abundance of birds well into the future.

Finding the balance:

The habitat conversion models indicate that conversion of all salt ponds to vegetated marsh could more than triple song bird populations. But, Western Sandpiper populations would decrease significantly due to the loss of important salt pond foraging and roosting habitat.

Song Sparrow: Dave Gardner
Western Sandpiper: Stuart MacKay

Salt Pond Habitats

of the San Francisco Bay

Why do salt ponds attract so many different bird species? The answer lies in the diverse opportunities to roost, nest and forage that result from active salt production. During the highly dynamic process of salt extraction, bay water is pumped through a series of ponds that become progressively saltier as water evaporates. At any one time, a variety of ponds exist, each with different depth and salinity characteristics. Because different fish and invertebrates thrive at each salinity level, the result is a diversity of food - for a diversity of birds!

Because of its immense value for wildlife, San Francisco Bay has been designated as a "Wetlands of Hemispheric Importance" by the Western Hemisphere Shorebird Network Reserve

LOW SALINITY SALT PONDS receive water directly from the Bay. Here, the diversity of invertebrates is high, though abundance is lower than in saltier ponds. Small sandpipers and dabbling ducks search for worms, crustaceans and water plants in shallow ponds while terns, cormorants, and pelicans dive for fish in deeper ponds.

TIDAL MARSH consists of extensive areas of salt-tolerant plants and meandering channels, and is home to several endangered species, including the California Clapper Rail. Salt ponds adjacent to large expanses of marsh contain the greatest variety of waterbirds of any habitat in the Bay. At low tide, shorebirds feed in marsh channels, moving into nearby ponds during high tide. Dabbling ducks and other water-column feeders move in the opposite direction - feeding in the flooded marshes at high tide, and moving into the nearby salt ponds at low tide.

SALT PANNES were open, shallow, salt-encrusted expanses within the upper expanses of thickly-vegetated salt marsh. Due to development of upland habitats, few natural pannes remain. But temporarily dry salt ponds provide many of the original functions of the salt pannes. Here, shorebirds forage for flies during winter high tides, and the federally-threatened Western Snowy Plover nests in summer.

HIGH SALINITY PONDS have salinity levels 3 to 4 times that of seawater. Fish and most invertebrates can't tolerate high salinities, but brine fly and brine shrimp populations explode in these super-salty environments. High salinity ponds support large populations of shorebirds, grebes, and gulls. During migration, hundreds of thousands of phalaropes can be found in high salinity ponds - and nowhere else in the Bay.

POND LEVEES AND ISLANDS within the salt pond complex are used for nesting by stilts, avocets, and Western Snowy Plovers. Federally endangered Least Terns also nest on the levees, along with thousands of Forster's Terns and California Gulls. Levees and islands are also important roost sites for shorebirds throughout winter and migration.

Artwork by Alan Pearson

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