The salt marshes of San Francisco Bay provide refuge for young fish, such as salmon and trout. The salt marsh plants shelter the fish from the sharp eyesight of predatory birds. The marsh is also habitat for the insects and crustaceans that these fish eat. Current research aims to discover what factors, such as salinity, water clarity, vegetation structure, water temperature, and dissolved oxygen content, contribute to a salt marsh’s performance as a **nursery**. With more information we will be able to better protect this key ecosystem function. Reestablishing healthy, productive nurseries may play a key role in restoring California’s coastal and inland fisheries.

Non-migratory, or resident, fish-eating birds like herons and egrets eat fish in the marsh channels. These birds nest in the tall trees and bushes of the uplands surrounding the salt marsh. Others, like the endangered California Clapper Rail and the Salt Marsh Song Sparrow, rely on the salt marsh for all of their essential needs: they nest in the salt marsh plants, eat the plants’ seeds, and eat the clams, mussels, and insects that live in the salt marsh.

Millions of migratory birds, such as the Phalarope, stop to eat, rest, and recover in the Baylands as they make their journey along the Pacific Flyway. Each bird species takes a specific route and rests in the Baylands. Most species stay for a few days, while others stay longer than a month. Many birds prefer the brine shrimp of the salt ponds over the other prey from the salt marsh. Due to the large quantity of prey, suitable habitat, and migration patterns, San Francisco Bay’s salt marshes and salt ponds are essential to the long-term success of many species of migratory birds.

**Nursery** – a place that protects and promotes the growth of young animals or plants.

**Pacific Flyway** – the bird migration route from Alaska to Patagonia along the west coast of the Americas.

**Did You Know?**

Shortly following California’s 1849 Gold Rush population boom, many salt marshes were surrounded by levees and converted to shallow evaporation ponds for salt production. Eventually, this salt pond network grew to 10,500 hectares – that’s 26 THOUSAND football fields of salt marsh removed!

Today, more than 70 bird species, numbering millions of birds, inhabit and breed or feed in the salt ponds. To protect the endangered plants, birds, fish, and mammals that rely on a healthy salt marsh ecosystem, the South Bay Salt Pond Restoration Project is restoring some salt ponds back into tidal marshes. The ecological diversity in the managed salt ponds makes it difficult for restoration managers to choose between salt marsh and salt pond habitat. How do you decide whether to manage areas for salmon nurseries or migratory bird rest stops? Today, researchers examine ways to assess the value of the salt pond and salt marsh habitats to help guide such restoration decisions.
THE ENDANGERED SPECIES ACT

The Endangered Species Act’s Goals: “to provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved... [and] to provide a program for the conservation of such endangered species and threatened species...” (ESA 1973, amended 1988)

How the Endangered Species Act works: The U.S. Fish and Wildlife Service and National Marine Fisheries Service are responsible for assessing, listing and managing endangered and threatened species. To be listed, species must face: habitat destruction, overutilization, disease or predation, ineffective regulation, and have other factors affecting their continued existence. After listing, the regulatory agencies identify the critical habitat the species need to survive, protect it, and outlaw activities that would harm the species such as habitat destruction. The regulatory agencies also develop and implement endangered species recovery plans. If a species recovers, it is taken off the endangered species list and continues to be monitored.

How the Endangered Species Act benefits other species: Endangered species recovery plans protect and restore not only the listed species, but its entire ecosystem. Human needs, including clean air and water, erosion control, and stable climates, are met by functioning ecosystems. The Endangered Species Act protects some of these essential ecosystems through habitat restoration plans.

SCIENTIST SPOTLIGHT

Christopher Higgins, Ph.D.
Department of Environmental Science and Engineering, Colorado School of Mines

Professor Higgins researches the properties of chemicals that affect their bioaccumulation in living organisms. Once accumulated in invertebrates and fish, toxic chemicals can be passed on through the food chain so that top predators, such as birds and humans, are exposed to high concentrations of chemicals. His interest in chemical bioaccumulation is based on potential concerns for both humans and ecosystems.

Many chemicals used today, such as the perfluorochemicals (PFCs) found in personal care products, do not behave as anticipated by the 1970s and 1980s models of bioaccumulation. These long-lived chemicals find their way into the environment and living organisms, though their impacts on biological systems are not yet well understood. Understanding the patterns of bioaccumulation will help us develop substitutes that do not accumulate as readily.

Professor Higgins points out that “Today we can detect very small amounts of chemicals. Just because they are there does not mean they are a problem, but does not mean they are not a problem either.” Through his research on PFCs, Dr. Higgins is helping to understand the bioaccumulation of chemicals that accumulate in marsh systems.

WAYS YOU CAN GET INVOLVED

• Learn more about the wildlife of the Baylands. Talk to your local nature center. Read about the Baylands online. A local resource for research on Baylands birds is: PRBO Conservation Science at prbo.org.
• Volunteer at one of the many Baylands nature centers.
• Plant a native garden that will need less pesticides and fresh water. With less water going toward human uses, more water flows through the natural system supporting fish habitat and contributing to the overall health of the Baylands ecosystem.
• Conserve water to increase natural water flows and reduce the effect of treated water on the marsh.

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