All about Wetlands

What are wetlands and why are they important?
Learn the answer to these and many more questions!

Is there a body of water where you live? If you live in the San Francisco Bay Area, you are probably really close to water, whether it be a creek, river, lake, or bay. Despite its urban and industrial character, San Francisco Bay and the Sacramento-San Joaquin River Delta remain perhaps California's most important ecological habitats.

Wetlands

A wetland is a place where the land is covered by water, either salt, fresh or somewhere in between. Marshes and ponds, the edge of a lake or ocean, the delta at the mouth of a river, low-lying areas that frequently flood—all of these are wetlands.

Learn more about wetlands by watching the "Fabulous Wetlands" video!

Wetlands support high concentrations of animals—including mammals, birds, fish and invertebrates—and serve as nurseries for many of these species. California's Dungeness crab, California halibut, and Pacific salmon fisheries rely on the bay as a nursery. Wetlands also support the cultivation of rice, a staple in the diet of half the world's population. And they provide a range of ecosystem services that benefit humanity, including water filtration, storm protection, flood control and recreation. Wetlands are the world's water filters. They trap pollutants such as phosphorus and heavy metals in their soils, transform dissolved nitrogen into nitrogen gas, and break down suspended solids to neutralize harmful bacteria.

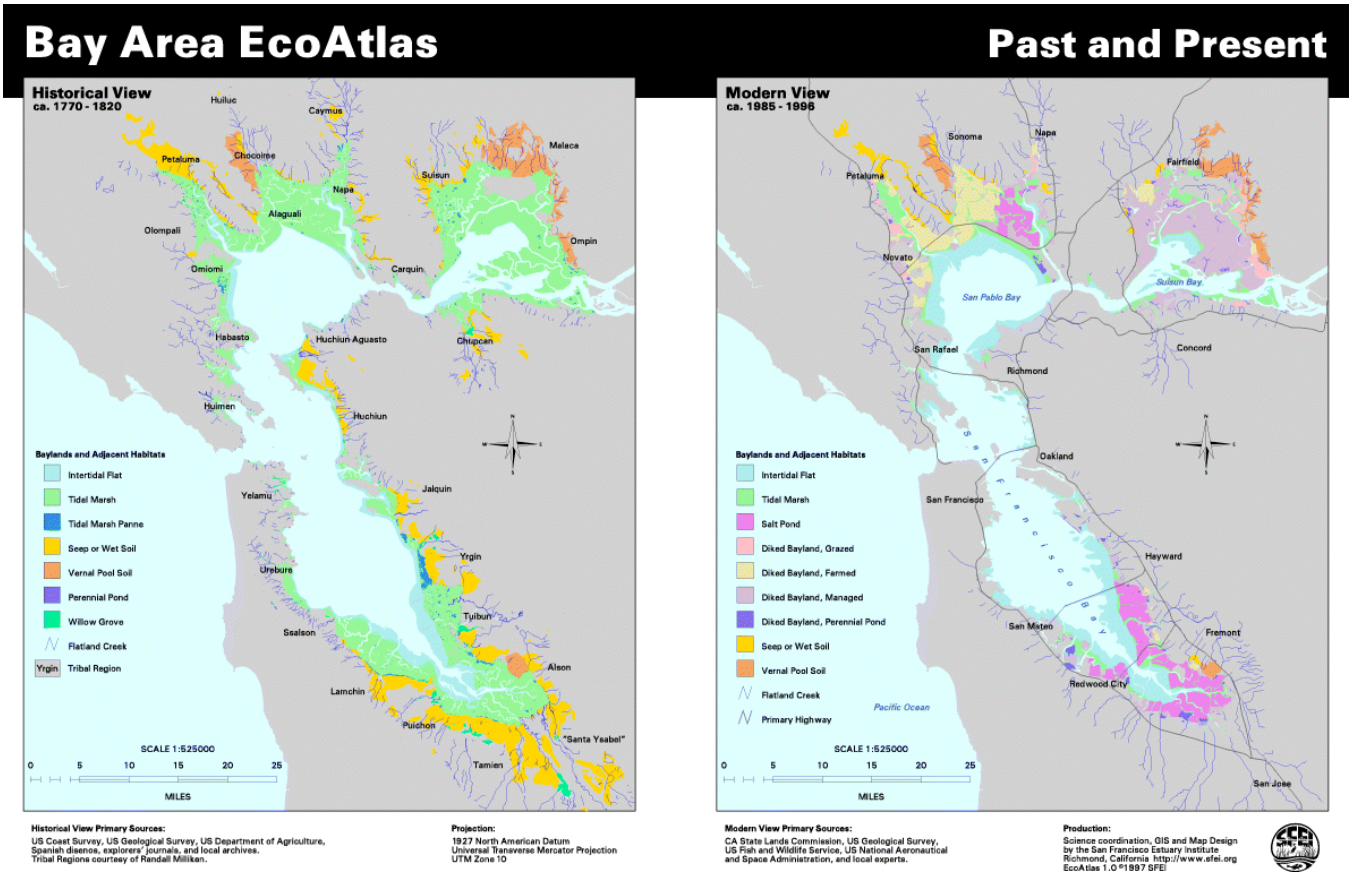
Figure 1: Wetland at Don Edwards San Francisco Bay National Wildlife Refuge. Photo Credit: Miguel Marquez

EXPLORE MORE ABOUT THE PACIFIC FLYWAY WITH THIS FILM PRODUCED BY CORNELL LAB OF ORNITHOLOGY: **VOICES OF THE PACIFIC FLYWAY**

It is estimated that in the last 150 years, approximately 90% of San Francisco Bay's tidal wetlands have been lost or seriously degraded. The few remaining salt marshes now represent most of California's remaining salt marsh, supporting a number of endangered species and providing key ecosystem services such as filtering pollutants and sediments from the rivers.

The Bay is a key link in the Pacific Flyway. Millions of waterfowl annually use the bay shallows as a refuge. Two endangered species of birds are found here: the California least tern and the Ridgway's Rail. As the tides go in and out, exposed bay muds provide important feeding areas for shorebirds.

Without wetlands, cities have to spend more money to treat water for their citizens, floods are more devastating to nearby communities, storm surges from hurricanes can penetrate farther inland, animals are displaced or die out, and food supplies are disrupted, along with livelihoods.



Threats

Human activities threaten wetlands in several different ways. Stressors to wetlands can be chemical (e.g. toxic chemicals), physical (e.g., sedimentation), or biological (e.g., non-native species).

Figure 2: Garbage found at the fishing pier in Fremont, CA. Photo Credit: Miguel Marquez

POLLUTION AND WATER QUALITY

Wetlands act as natural water filters, but they can only do so much to clean up the fertilizers and pesticides from agricultural runoff, mercury from industrial sources and other types of pollution. The input of pollutants, such as sediment, fertilizer, human sewage, animal waste, road salts, pesticides and heavy metals can exceed the wetland's natural ability to absorb such pollutants and cause degradation. Pollutants can come from urban, agricultural, silviculture and mining runoff, air pollution, leakage from landfills and dumps, and boats stirring up pollutants around marinas.

DEVELOPMENT

As wetlands shrink, cities grow, and there is growing concern about the effect of this pollution on drinking water supplies and the biological diversity of wetlands.

Cities bring **impervious** surfaces including sidewalks, roads, parking lots, roofs, and buildings that do not allow rain to flow back into the soil. Instead, rain water is washed away and flows into storm drains carrying many urban pollution with it into creeks, rivers, bays, and the ocean. Many large urban areas have re-routed creeks and rivers into cement channels and culverts that direct rain water away to prevent flooding. Changing a rivers natural course and flow disrupts the water cycle and puts more stress on wetlands.

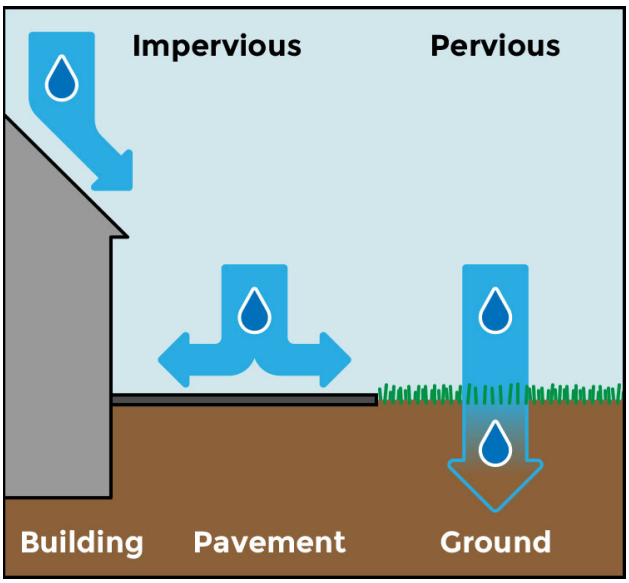


Figure 3: Pervious ground allows water to pass through, seep or soak in. Impervious ground such as pavement does not allow water to pass through, seep or soak in, so it flows over or away into another area.

OVERCONSUMPTION (Water use)

As the human population grows, the demand for water increases, mostly as a result of overuse for irrigation. Overconsumption of water dries out lakes and rivers and causes falling groundwater tables. It has a negative impact on wetlands, on biodiversity, on wildlife and landscape.

SUBSIDENCE

Land subsidence is a gradual settling or sudden sinking of the Earth's surface due to removal or displacement of subsurface earth materials. The principal causes include:

- aquifer-system compaction associated with groundwater withdrawals
- drainage of organic soils
- underground mining
- natural compaction or collapse, such as with sinkholes or thawing permafrost

More than 80 percent of known land subsidence in the U.S. is a consequence of groundwater use, and is an often overlooked environmental consequence of our land and water-use practices. Increasing land development threatens to exacerbate existing land-subsidence problems and initiate new ones.

FRAGMENTATION

Habitat fragmentation occurs when habitat is reduced in size and the distance between remaining habitat patches increases. Although wetlands are naturally patchy and separated by a terrestrial matrix, structural and functional connectivity can be disrupted by habitat loss and fragmentation.

Fragmentation can negatively impact large-bodied or wide-ranging species that depend on large areas of favorable habitat to survive by reducing landscape patch-size and increasing movement barriers. Fragmentation increases the amount of “edge” in a landscape, which can negatively impact wildlife by causing changes in abiotic (increased sunlight and higher wind speeds) and biotic (increased risk of predation and brood parasitism, invasion of non-native species) conditions, making the habitat unsuitable for some native species.

HOW WOULD YOU SOLVE SOME OF THESE THREATS?

SEE “WHAZZ’ UP WITH WETLANDS?” ACTIVITY TO FIND OUT MORE!

Figure 4: Aerial views of South San Francisco Bay. In this image you can see an example of habitat fragmentation. The green shows the habitat areas and you can see many buildings and highways dividing up the habitat areas. Photo Credit: Peter West Carey

Isolation of habitats can negatively impact species that require access to multiple small habitat patches to survive by reducing their access to resources. Increased isolation of habitats can lead to inbreeding, which can cause genetic abnormalities and weaknesses.

CLIMATE CHANGE

Climate change brings a variety of alterations to patterns of water and climate. In places where the temperature increase is raising the sea levels, the coastal wetlands are being submerged or drowned. In other places where higher temperatures are triggering droughts, the wetlands are also drying out. Thus, wetlands are getting lost both due to higher and lower water levels induced by the varying effects of climate change in different parts of the world.

DAMS AND LEVEES

Hydrologic alterations can significantly alter the soil chemistry and plant and animal communities. These alterations can be the results of: deposition of fill material, draining, dredging and channelization, diking and damming, diversion of flow and addition of **impervious** surfaces in the watershed, which increases water and pollutant runoff into wetlands.

Dams alter the natural flow of a river to meet human needs. However, such alterations in the river flow create great disturbances in the ecosystems dependent on the river. Wetland areas like swamps, marshes, etc., might suffer from a lower or a higher flow of water than normal due to the

construction of dams. Thus, dams have the power to permanently damage the wetland ecosystems. There are possibilities for building dams or locating them in more sustainable ways that limit impact on existing ecosystems, but many have been very destructive to wetlands.

INVASIVE SPECIES

The introduction of invasive species, either intentionally or unintentionally, can put pressure on native plants and animals, eventually pushing them out of their native habitat. This damages the diversity of a biotic community and can cause other species to leave the area in favor of a more suitable habitat.

GRAZING AND AGRICULTURE

Some agricultural practices can lead to increased levels of nutrients and pollutant loads (in the form of pesticides, fertilizers and animal feces), resulting in increased phytoplankton and aquatic plant growth leading to algal bloom. The regulation of rivers and streams can change the frequency, duration and extent of flows, affecting critical life stages of water dependent species including fish and waterbirds. This can affect the health of wetlands and their roles in the formation and replenishment of soils and in maintaining water quality.

Protections

Figure 5: A great blue heron is waiting patiently for it's evening meal in a wetland. Photo Credit: Tony Vallez

The Clean Water Act (CWA) 1972 is the primary federal law in the United States governing water pollution. Its objective is to restore and maintain the chemical, physical, and biological integrity of the nation's waters; recognizing the responsibilities of the states in addressing pollution and providing assistance to states to do so, including funding for publicly owned treatment works for the improvement

of wastewater treatment; and maintaining the integrity of wetlands.

The Clean Water Act was one of the United States' first and most influential modern environmental laws. Its laws and regulations are primarily administered by the U.S. Environmental Protection Agency (EPA) in coordination with state governments, though some of its provisions, such as those involving filling or dredging, are administered by the U.S. Army Corps of Engineers. Its implementing regulations are codified at 40 C.F.R. Subchapters D, N, and O (Parts 100-140, 401-471, and 501-503).

The Migratory Bird Treaty Act of 1918 (MBTA), is a United States Federal Law, (16 U.S.C. 703-712, MBTA, implements four international conservation treaties that the U.S. entered into with Canada in 1916, Mexico in 1936, Japan in 1972, and Russia in 1976. It is intended to ensure the sustainability of populations of all protected migratory bird species. The statute makes it unlawful without a waiver to pursue, hunt, take, capture, kill, or sell the listed species of migratory birds.

Habitat Restoration Projects

Figure 6: American white pelicans resting on an island in a wetland in the South Bay. Photo credit: Tony Vallez

The South Bay Salt Pond Restoration Project is the largest tidal wetland restoration project on the West Coast. When complete, the Project will restore 15,100 acres of industrial salt ponds to a rich mosaic of tidal wetlands and other habitats. This project will restore habitat, enhance recreation, and protect communities from sea level rise.

***For more information visit* The South Bay Restoration Project Website**

What can you do to help? Check out the "*Salty Pledge*" and let us know how you can help wildlife and habitat!