

What is an ecosystem?

An ecosystem is generally defined as a community of organisms living in a particular environment and the physical elements in that environment with which they interact. (<http://www.enviroliteracy.org/category.php/3.html>)

Within each ecosystem, there are **habitats** which may also vary in size. A habitat is the place where a **population** lives. A population is a group of living organisms of the same kind living in the same place at the same time. All of the populations interact and form a **community**. The community of living things interacts with the non-living world around it to form the ecosystem. The habitat must supply the needs of organisms, such as food, water, temperature, oxygen, and minerals. If the population's needs are not met, it will move to a better habitat. Two different populations can not occupy the same **niche** at the same time, however. So the processes of **competition, predation, cooperation, and symbiosis** occur.

Habitats, then, are specific to a population. Each population has its own habitat. For example, a population of ants has its own habitat. Several populations may share a habitat. For example, in a small pond several aquatic populations may co-exist in the same water at the same time. An aquarium is a good example of a shared habitat.

Biomes are ecosystems where several habitats intersect. The Earth itself is one large biome. Smaller biomes include **desert, tundra, grasslands, and rainforest**.

<http://www.fi.edu/tfi/units/life/habitat/habitat.html>

The San Francisco Bay-Delta Watershed

The ecological hub of the California Central Valley is the Sacramento-San Joaquin Delta and Bay. For many decades, government entities, non-profit organizations, and the private sector have engaged in managing, protecting, regulating, and in some cases propagating fish and wildlife species of the Bay and Delta - yet many populations have not recovered sufficiently and remain in decline. In spite of constant human intervention to repopulate fish and wildlife that have commercial, recreational and biological importance to society, populations have not been sustained at stable, healthy levels that support historic use of those resources.

Historic efforts of individual species regulation and management have been replaced by an integrated systems approach that aims to reverse the fundamental causes of decline in fish and wildlife populations. A systems approach recognizes the natural forces that created historic habitats and use these forces to help regenerate habitats. The Bay-Delta ecosystem is not simply a list of species.



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Rather, it is a complex living system sustained by innumerable interactions that are physical, climatic, chemical, and biological in nature, both within and outside of the geographic boundaries of the Delta. (from Volume 1: Ecosystem Restoration Program Plan, July 2000)

The State of California has defined four Ecological Zones in the Delta:

Upland River-Floodplain

Definition: Rivers, streams, and associated riparian corridors that extend from headwaters elevations in the Coast Ranges, Cascade Range and Sierra Nevada to the point near the floor of the Central Valley where they merge with alluvial river-floodplain ecosystems.

Alluvial River Floodplain

Lowland rivers constitute those waterways and their floodplains that traverse the alluvial deposits of the Central Valley. The actual geomorphic "dividing line" between "upland" and "lowland" river-floodplain systems generally occurs at about the 300 ft. elevation contour. Lowland river-floodplain systems of the Central Valley are distributed across a vast area, covering thousands of square miles.

Delta

The easternmost (upstream) portion of the estuary, and today is clearly delimited by a legal boundary that includes areas that historically were intertidal, along with supra-tidal portions of the floodplains of the Sacramento and San Joaquin Rivers. Today's legal Delta extends between the upper extent of the tidewater (near the city of Sacramento on the Sacramento River and Mossdale on the San Joaquin River) and Chipps Island to the west, and encompasses the lower portions of the Sacramento and San Joaquin river-floodplain systems as well as those of some lesser tributaries (Mokelumne and Calaveras Rivers). The Sacramento and San Joaquin Rivers enter the Delta from the north and south respectively, where they join and together discharge their contents near the western margin of the Delta.

Greater San Francisco Bay

That part of the estuary between Chipps Island and the Golden Gate. It includes four major embayments: Suisun Bay and Marsh, San Pablo Bay, and central and south San Francisco Bay.



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Within the Ecological zones are habitat types:

Tidal perennial aquatic (including shallow water and tide flats)

Tidal perennial aquatic habitats, particularly areas less than 9 feet deep at mean high tide, are important habitat use areas for many species of fish and wildlife in the Delta. The substantial loss of historic shallow-water areas, primarily as a result of reclamation of tidally influenced habitat and channel dredging, has reduced the available habitat area for associated fish and wildlife. Loss of shallow-water areas has also caused a reduction in primary and secondary productivity which contributed to changing the historic foodweb of the Delta.

Nontidal perennial aquatic

Nontidal perennial aquatic habitats, particularly areas less than 6 feet deep, are important habitat-use areas for many species of fish and wildlife. The substantial loss or degradation of nontidal perennial aquatic habitats, primarily as a result of reclamation of wetlands and alteration of streamflows, has reduced the available habitat area for associated fish and-wildlife.

Tidal sloughs

Open-ended sloughs provide unique, generally low-velocity habitats and important migratory pathways for many species and important habitat for wildlife and waterfowl along the riparian corridors of the sloughs. Levee construction and channel dredging over many years has converted the gradual sideslopes supporting marsh and tideflat habitat along sloughs to steep-sided, high-velocity channels with narrow or nonexistent shoreline habitat.

Midchannel island and shoal

Midchannel islands and shoals provide unique remnant shallow-water edge habitat in many Delta channels. They typically support willow scrub, tule marsh, and tidal mudflat habitats and associated wildlife and fish. Midchannel islands and shoals have been shrinking or disappearing as a result of progressive erosion. Loss of this habitat has reduced nutrient cycling, and foodweb support functions.

Saline emergent wetlands

Saline emergent wetland habitats, including brackish and saline wetlands, are important, habitat-use areas for fish and wildlife dependent on marshes and tidal shallows in the Bay Delta and support several special-status plant species. The loss or degradation of historic saline emergent wetlands, primarily as a result of



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reclamation of tidally influenced wetland: for agriculture, has substantially reduced the habitat area available for associated fish and wildlife species. Several plant and animal species closely associated with tidal saline emergent wetlands have been listed as endangered under the State and federal Endangered Species Acts, primarily as a result of the extensive loss of this habitat type. Loss of the habitat has reduced nutrient cycling, and foodweb support functions.

Fresh emergent wetlands

Tidal and non-tidal fresh emergent wetland habitats are important habitat-use areas for fish and wildlife dependent on marshes and tidal shallows and support several special-status plant species. The loss or degradation of historic fresh emergent wetlands has substantially reduced the habitat area available for associated fish and wildlife species.

Seasonal Wetlands

Seasonal wetland and aquatic habitats are important habitat-use areas for many species of fish and wildlife. Loss or degradation of historic seasonal wetlands, primarily as a result of urban development and reclamation of wetlands for agriculture, has substantially reduced the habitat area available for waterfowl, shorebirds, and other water birds. Loss of vernal pool habitat, in particular, has directly resulted in the listing of several vernal pool-dependent species as threatened or endangered under the federal Endangered Species Act. The loss of seasonal aquatic floodplain habitat, primarily as a result of levee construction and alteration of riverflows, has substantially reduced floodplain refuge habitat for fish and spawning habitat for the Sacramento splittail. Loss of this habitat has reduced water storage, nutrient cycling, and foodweb support functions in the Bay Delta.

Riparian and shaded riverine aquatic

Shaded riverine aquatic habitat (SRA) is a major component of the Bay-Delta riparian and riverine aquatic habitat ecosystem element. SRA habitats are important habitat areas for one or more life stages of most fishes that inhabit the Bay Delta region. The loss or degradation of historic riparian vegetation from river and stream channelbanks and alteration of nearshore aquatic habitat have primarily been caused by channelization, stabilization of channelbanks with riprap, and construction of levees. Control of flows and diversion of water have altered the hydrologic conditions that historically supported riparian vegetation. The loss of SRA has directly contributed to declines in populations of associated native fishes



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and reduced an important source of nutrients and allochthonous material in streams and Delta sloughs.

Riparian and Riverine Aquatic Habitats (Riparian scrub, woodland, and forest habitat)

Riparian scrub, woodland, and forest habitat is the other major component of the riparian and riverine aquatic habitat ecosystem element. Many species of wildlife, including several species listed as threatened or endangered under the State and federal Endangered Species Acts and several special-status plant species in the Bay-Delta region are dependent on or closely associated with riparian habitats. Compared with all other habitat types in California, riparian habitats support the greatest diversity of wildlife species. Degradation and loss of riparian habitat have substantially reduced the habitat area available for associated wildlife species. Loss of this habitat has reduced nutrient cycling, and foodweb support functions in the Bay-Delta region. Valley oak woodland habitats are important habitat-use areas for many species of wildlife in the Bay-Delta region. The loss or degradation of historic stands of valley oak woodland has substantially reduced the valley oak woodland habitat area available for associated wildlife.

Fresh water fish habitats

Freshwater fish habitats and native fishes are closely linked in the Central Valley as the health of the native fish populations is largely dependent on the health of their habitats. Generally the fish habitats include standing waters, flowing waters and artificial waters. These habitats have additional utility as this classification scheme assumes that use by fishes also is representative of use by less well-known aquatic organisms such as insects and amphibians.

Inland dune scrub

Coastal scrub is associated with inland sand dunes and is limited in the Bay-Delta region to the vicinity of the Antioch Dunes National Wildlife Refuge. This habitat area supports two plant and one butterfly species listed as endangered under the federal Endangered Species Act.

Perennial grasslands

Grasslands are important breeding and foraging habitat areas for many species of wildlife and support several special-status plant species. Historically common throughout most of the Central Valley, most perennial grassland in the Bay-Delta region focus area has been lost or has been converted to annual grassland.



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Agricultural Lands (Agricultural wetlands)

Following extensive loss of native wetland habitats in the Bay-Delta region, some wetland-associated wildlife species have adapted to the artificial wetland environment created by some agricultural practices and have become dependent on agricultural wetland areas to sustain their populations at current levels.

Agricultural wetlands include rice lands; fields flooded for weed, salinity, and pest control; stubble management; and tailwater circulation ponds.

Agricultural Lands (Agricultural uplands)

Following extensive loss of some native upland habitats, upland-associated wildlife species have adapted to the artificial upland environment created by some agricultural land use and have become dependent on agricultural upland areas and fence line vegetation to sustain their populations at current levels.

Sources:

Environmental Literacy Council webpage

<http://www.enviroliteracy.org/category.php/3.html>

The Franklin Institute: Resources for Science Learning webpage

<http://www.fi.edu/tfi/units/life/habitat/habitat.html>

Illinois Biodiversity Basics, Illinois Department of Natural Resources, Chicago Wilderness, World Wildlife Fund

CalFed Bay-Delta Program, Ecosystem Restoration Program Plan Volume 1: Ecological Attributes of the San Francisco Bay-Delta Watershed, July 2000.



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