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BAY-DELTA OVERSIGHT  
COUNCIL

DRAFT

**BRIEFING PAPER ON  
BIOLOGICAL RESOURCES OF THE  
SAN FRANCISCO BAY/  
SACRAMENTO-SAN JOAQUIN  
DELTA ESTUARY**

**PART II**

**WILDLIFE AND PLANT RESOURCES**

Bay-Delta Oversight Council

October 1993

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**LISTING OF BRIEFING ITEMS  
BDOC BRIEFING ON BIOLOGICAL RESOURCES OF THE  
SAN FRANCISCO BAY/SACRAMENTO-SAN JOAQUIN  
DELTA ESTUARY**

**PART II:**

**WILDLIFE AND PLANT RESOURCES**

- I. Introduction
- II. Executive Summary
- III. Estuary Biological Resources
  - A. Status, Trends and Factors Controlling the Estuaries Wildlife and Plant Resources
    - 1. Status and Trends
    - 2. Factors Affecting Wildlife and Plant Resources
  - B. Perspectives and Issues of Concern to Agencies and Public Interest Groups (Issue papers prepared by the Agencies and Groups)
    - 1. "Challenges to the Waterfowl and Crane Resources of the Sacramento-San Joaquin Delta" by Various Authors, Ducks Unlimited
    - 2. "Challenges to the Waterfowl, Resources of the Suisun Marsh" by Fredric Reid, Ducks Unlimited
    - 3. "Challenges to the Waterfowl Resources of the San Francisco Bay" by Fredric Reid, Ducks Unlimited

# INTRODUCTION

## INTRODUCTION

### **Briefing Materials on Wildlife and Plant Resources of the San Francisco Bay/Sacramento-San Joaquin Delta Estuary**

This briefing packet and the previous packet presented at the October meeting provide basic information on Estuary Biological Resources. Its two components deal separately with aquatic resources and wildlife and plant resources. This package deals with the later. The final version of the Biological Resources packet will combine this Wildlife and Plant Resources paper with the previously presented Aquatic Resources paper.

Also included are representative perspectives regarding these topics submitted by experts in the Estuaries biological resources. Time constraints did not allow for canvassing all agencies and concerned public groups, however, we believe that the coverage provided does encompass a fairly comprehensive identification of the major issues.

The Executive Summary seeks to provide an overview of the material of the material contained herein. It deserves emphasis, however, that the Summary should not be considered a substitute for the full text of the issue papers. Rather, it is meant to provide merely a snapshot of the major points raised since the characterization and flavor of the entire prepared pieces simply cannot be replicated in the Summary.

Perspective papers are reproduced as submitted. The BDOC staff has not attempted to edit, interpret or otherwise characterize the issues or concerns being raised. The Executive Summaries of the perspectives represent a sincere attempt to objectively highlight the key points raised. It is here acknowledged that, especially with regard to data, the summaries are cursory at best.

This package covers the Wildlife and Plant resources of the Estuary, and begins with a background paper on the status of the resources. This status paper is followed by a paper which discusses the factors which affect the abundance of the resource. These papers are intended to present as objective an overview as possible.

Following the discussion papers, prepared comments are included, representing particular perspectives and concerns relating to the Wildlife and Plant resources as submitted by experts in the field.

# EXECUTIVE SUMMARY

## EXECUTIVE SUMMARY

### **WILDLIFE AND PLANT RESOURCES IN THE SAN FRANCISCO BAY AND SACRAMENTO/SAN JOAQUIN DELTA**

#### **STATUS AND TRENDS**

##### **GENERAL**

The condition of the wildlife and plant resources of the San Francisco Bay and Sacramento-San Joaquin Delta region is a product of both historical and ongoing impacts of human developments and activities and natural processes.

A diverse assemblage of wildlife and plant species inhabit the Estuary's channels, smaller rivers, creeks, and wetlands. For several species groups, such as wintering and nesting waterfowl, the Estuary provides essential habitat. The diversity and health of the Estuary's plant communities are crucial indicators of the health of this important ecosystem.

There are several species unique to the Estuary which have experienced declining trends in their numbers and distribution, many of which are threatened with extinction. The factors influencing wildlife and plant species and their relationship to the environment are complex. Focusing on the status and trends of key wildlife species, special status plants, and plant communities help to illustrate the more general status and trends within the entire system.

##### **WILDLIFE HABITATS AND PLANT COMMUNITIES**

Historically the Estuary, a region where salt and freshwater mix, supported a vast complex of tidal salt, brackish and freshwater marshes and riparian woodlands. The wetlands within this historical range of tidal marshes were influenced by varying saline conditions throughout the year. Today, only remnants of the historic marshes exist.

Mudflats and salt ponds are the predominant wetland types found in the San Francisco Bay region today. San Pablo Bay has an abundance of intertidal mudflats and farmed wetlands, and the Suisun Bay/Marsh is primarily comprised of diked brackish marshes. Most farmed wetlands occur in the Delta and North Bay. The largest diked seasonal wetland in the Estuary is the Suisun Marsh. The following is a brief description of some of the most important community types found in the Estuary.

### Tidal Marshes

Tidal marshes are areas that are exposed to the daily tidal cycles and vary in the amount and influence of the salt water tides versus the freshwater influences of rivers and creeks. At least 82% of the region's tidal and salt marshes have been filled or converted to other wetland types. Tidal marshes currently comprise 44,370 acres of the Estuary's wetlands. Tidal salt, brackish and freshwater marshes in the Estuary are dominated by sparse to dense stands of emergent vegetation. The exact distribution of plant species within these marshes is dependent on the length of the period of submergence, sediment salinity, and competition between species. Species distribution also varies with elevation.

Brackish marshes occur where the tidal salt water from the Bay has been diluted by freshwater runoff. Today brackish marshes are common in Suisun Bay and San Francisco Bay in areas of local freshwater influence. Brackish tidal marshes are predominant in areas experiencing freshwater influences of the Delta, local rivers, creeks, and sloughs. The Bay's tidal brackish marshes support several rare or endangered species: such as the soft bird's-beak (special status plant species), and California black rail and California clapper rail (both special status bird species).

### Freshwater Marshes

Freshwater marshes include areas that are both seasonally and permanently flooded by primarily fresh water. The vegetation that grows in these marshes is generally not tolerant to saltwater. Freshwater marsh, which comprises less than one percent of the Bay's area, can primarily be found in the western and southern Delta. Additionally, freshwater marshes also occur in the North Delta in isolated locations. This represents only a fraction of the historical acreage. Freshwater marshes in the Delta include a successional progression of community types that range from tules and reed grasses to more complex tule and shrub communities on higher elevation, older islands or river bank sediment deposits. There are at least 57 wildlife species associated with this community type, including American bittern, pied-billed grebe, marsh wren, tri-colored blackbird, western pond turtle, giant garter snake and beaver.

### Intertidal Mudflats

Mudflats are living systems of diatoms and other microalgae, protozoans and a multitude of arthropods, annelid worms, and mollusks. Exposed mudflats are exploited as a food source by millions of shorebirds, which are probably the most prominent wildlife group associated with this community type. Wintering shorebirds of the Pacific Flyway use these mudflats for feeding habitat, migratory staging areas and refugia.

### Vernal Pools

Vernal pools are seasonal pools of water that fill with rainwater during the winter and evaporate by the end of spring. Impervious soils block the downward percolation of water, causing the water to pond and creating a highly specialized habitat. Vernal pools occur on the western edge of the Delta near Lindsey Slough and in the southwestern portion of the Delta around the town of Byron. Vernal pools are of great botanical significance. More than 200 plant species are found in vernal pool communities, and over ninety percent of them are considered California natives. As compared to other wetland types, vernal pools contain the greatest number of special status plant species. These pools are imperiled by the continuing loss and modification, through land development and agricultural activities, of the specialized topography and soil conditions that are the foundation for the formation of these pools.

### Diked Wetlands

Diked wetlands are former tidal areas which, through the use of dikes, are partially or totally excluded from tidal action. Diked wetlands generally support salt and brackish wetland vegetation. The Suisun Marsh is the largest diked wetland in the Estuary, supporting a large portion of Central California's waterfowl population and is especially important in dry years. The Suisun Marsh is also important to shorebirds as a migration stop-over area and to raptors because of the abundance of prey species.

### Farmed Wetlands

Farmed wetlands are agricultural lands which still retain values for wildlife habitat. Farmed wetlands are the Estuary's most abundant wetland type. The majority of these farmed wetlands are in the Delta and North Bay. Most are converted tidal brackish and freshwater marshes and are found in the interiors of Delta islands. These areas are important feeding areas for wintering waterfowl. Grains such as corn, sorghum, and wheat are planted commercially by farmers and provide, as a by-product wildlife food and cover. In the absence of the historical extent of native wetland areas, farmed wetlands provide important substitute habitat.

### Riparian Woodland

Riparian woodlands are generally restricted to the banks of streams and channels. An estimated 768,000 to 960,000 acres of riparian woodland was believed to have existed in the Estuary before reclamation occurred. Presently, riparian woodland covers only 12,513 acres of wetland habitat in the Estuary. Riparian woodland habitat is the rarest wetland habitat in the Estuary and is critical habitat for

wildlife supporting a large and diverse group of species. Riparian habitats provide a multitude of benefits including nesting and cover, water temperature control through shading, aquatic habitat for fish and insect species, and a source of carbon through leaf and insect drop.

### Uplands

The historic extent of upland communities in the Estuary is not well documented. Historically, uplands immediately adjacent to the tidal marshes of the Bays probably consisted of perennial bunchgrass prairies, coastal scrub, and valley oak woodland/savannah. In the Delta, at about the 100 year flood line, riparian forest graded into valley oak savannah and broad reaches of perennial grasslands interspersed with vernal pools. The losses of these native habitats, especially adjacent to wetland communities, has had a severe effect on many wildlife species leading many to become special status species.

Currently, broad-leaved evergreen forest is the most common native upland community. The most common non-native upland community is urban landscaping.

## **SPECIES STATUS AND TRENDS**

### Birds

Historically, tidal and freshwater marshes, overflow lands, and waterways in the Central Valley and Estuary once served as a wintering and migratory haven for tens of millions of shorebirds and waterfowl, supporting nearly all of the Pacific Flyway's wintering waterfowl. Today, the Estuary plays a critical, synergistic role along with Sacramento Valley ricelands and waterfowl areas, and the grasslands in the northern San Joaquin Valley to continue to support nearly two-thirds of the Pacific Flyway's wintering waterfowl. Flooded croplands in the Delta provide the largest acreages of "wetland" available to waterfowl in winter.

Statewide waterfowl populations for many species of ducks and geese are at all time lows. These declines have been attributed to weather (recent drought), habitat loss, contaminants, and predation on both the wintering and nesting grounds.

The San Francisco-San Pablo Bay system is recognized as a site of hemispheric importance to shorebirds.

Several special status bird species inhabit the Estuary. The declines that have produced their special status have been caused by a number of factors including habitat loss in the Estuary and in other parts of the species' range, including Canada and

other regions of California. The following species are of concern in the Estuary:

Western Snowy Plover	Salt Marsh Yellowthroat
Brown Pelican	Suisun Song Sparrow
California Least Tern	Alameda Song Sparrow
Marbled Murrelet	San Pablo Song Sparrow
California Black Rail	Tri-colored Blackbird
California Clapper Rail	Bald Eagle
Greater Sandhill Crane	Swainson's Hawk

### Mammals

Historical accounts of wildlife attest to large and diverse populations of mammals. Grizzly bears, sea otters, pronghorns and tule elk were numerous. In the Delta, once abundant mammalian fauna is now dominated by species which are more adept at tolerating human populations, such as skunks, raccoons, opossums, and ground squirrels and aquatic species such as beavers, muskrats, minks and river otters. The red fox, an introduced species, has expanded its population considerably to the detriment of native species, particularly ground nesting birds such as the clapper rail and least tern. Most of the changes in species abundance and composition occurred many decades ago after the arrival of gold miners and trappers, and agriculture in the Delta.

Several Delta mammal species are important furbearers and are economically beneficial within the Delta area. These include the badger, beaver, bobcat, coyote, grey fox, mink, muskrat, opossum, raccoon, spotted skunk, striped skunk, and long-tailed weasel.

Several mammal species are currently species of special concern due to loss of habitat and habitat alteration or degradation. These are:

- San Pablo Vole
- Riparian Brush Rabbit
- Salt Marsh Harvest Mouse
- Suisun Ornate Shrew
- Salt Marsh Wandering Shrew

### Amphibians

Amphibians of the Estuary are generally found in marsh or riparian habitats, although a few also reside in upland areas. Introduced species such as the bullfrog, are now abundant and widely disruptive to many amphibian species in the Estuary.

The California Tiger Salamander, Foothill Yellow-legged Frog and the California Red-legged Frog are species of special concern. The loss of amphibian species is of concern throughout California as well as in other parts of the world.

### Reptiles

Most reptiles of the Estuary are restricted to upland or agricultural habitats. The only aquatic reptiles are the western garter snake, the giant garter snake, and the western pond turtle which are considered to be declining.

### Invertebrates

Less is known about the overall status of invertebrate species than other animal groups. Species that historically have been restricted to special habitats are the most vulnerable to habitat loss and alteration. The Valley Elderberry Longhorn Beetle and five vernal pool invertebrate species are special status species due to extensive habitat loss of riparian forests and vernal pools, respectively.

### Plants

The Estuary's tidal marshes, seasonal and permanent wetlands, and uplands are made up of a diverse assemblage of plant species. Botanists recognize that the diversity and vigor of the Estuary's plant species are indicators of the health of the Estuary's entire ecosystem. Several factors such as species diversity, number of exotics, and favorable reproductive conditions are all key components of a healthy ecosystem. The large number of listed and candidate plant species indicates a declining trend. Nineteen special status plant species are associated with habitats in the Estuary region. Four species, the Mason's lilaeopsis, the Delta tule pea, the Suisun Marsh aster and the California hibiscus, are of particular concern in the Estuary due to their narrow distributions and close association with declining habitat types.

# FACTORS AFFECTING THE WILDLIFE AND PLANT RESOURCES OF THE SAN FRANCISCO BAY AND SACRAMENTO-SAN JOAQUIN DELTA

## HABITAT ALTERATION AND DEGRADATION

Drastic alterations to the natural Bay-Delta system occurred during the last century as a result of hydraulic mining and land reclamation activities. Habitat loss and alteration continue today. Habitats are being fragmented into areas that are only remnants of the original ecosystem. Concentrating wildlife into smaller, isolated areas makes them more vulnerable to disease and predation.

Loss of habitat has affected all groups of wildlife and plant species. Lost has been roosting and foraging habitat for tundra swans, Pacific white-fronted geese, snow geese, Canada geese and ducks, as well as upland refugia habitat for the California clapper rail and the salt marsh harvest mouse. Extensive diking of tidal marshes has affected bird, mammal, amphibian and reptiles species.

Continual rebuilding and maintenance of the levee system has caused continued declines in the riparian forest-dependent species such as the Swainson's hawk and Valley elderberry longhorn beetle. Narrowly distributed native plant species continue to suffer declines due to loss and disturbance of habitats.

## AGRICULTURAL PRACTICES

Agriculture is both detrimental to and of positive value to native wildlife species. Agricultural development has caused a decline in native wetland habitats available to wildlife, including vernal pools which are critical habitats for a number of narrowly distributed plant and invertebrate species.

Yet agricultural lands continue to provide important feeding and resting habitat for the Pacific Flyway waterfowl and shorebird populations. The practice of flooding fields in the winter to leach out salts and control weeds and insects, provides shallow water habitat for many species. Pasture lands are important wintering areas for the greater sandhill crane.

Advances in agricultural practices have adversely affected the value of these lands as habitat. Efficient farming produces less wasted grain, fewer weed seeds and less cover for wildlife. Extensive land leveling to help manage water more efficiently eliminates many wetland plant species which grow in low areas and provide wildlife food, nesting cover and increase habitat diversity. Additionally, repeated discing, plowing, mowing, burning and haying limits the ability of wintering and nesting waterfowl to use these lands as habitat.

## **FLOOD CONTROL AND LEVEE PROJECTS**

A combination of upstream diversion and storage of stream flows has reduced the transport of sediments and nutrients that feed downstream wetland habitats and overflow areas. The practice of rip-rapping levee waterside slopes reduces aquatic and riparian habitats, adversely affecting the species dependent on these habitats. However, maintaining existing wildlife habitats within the islands depends on the existence of the levee system because many islands are below sea level. Breaching the levees would cause the total loss of these island wildlife habitat areas and instead convert them to open water areas of little value to wildlife.

## **WATER OPERATIONS AND WATER QUALITY**

Water development and water supply operations in the Delta affect salinity distributions within the Estuary, which, in turn, alters the distribution of wetland habitat. This benefits some species and is detrimental to other species. In general, more salt tolerant vegetation provides less favorable habitat for waterfowl. However, salinity intrusion associated with water development has probably enhanced the Estuary for shorebirds. In the Suisun Marsh, salt water intrusion further upstream into Suisun Bay could increase the rate of conversion of the remaining tidal brackish marsh to tidal salt marsh. This would adversely affect managed brackish marshes, altering vegetation and decreasing waterfowl food sources. However, implementation of the Suisun Marsh Plan of Protection by the Department of Water Resources and the U.S. Bureau of Reclamation has reduced the risk of this happening.

## **POLLUTANTS**

Contaminant exposure impacts can result in slight changes in nesting behavior to complete reproductive failure. In several instances, elevated levels of selenium have been measured which can cause selenium toxicosis and reproductive impairment in water birds. Other contaminants known to be present in concentrations that could threaten wildlife populations in the Estuary include cadmium, mercury, and silver; chlorinated hydrocarbons and polycyclic aromatic hydrocarbons.

## **HUNTING**

Intensive, uncontrolled hunting can adversely affect the number and distribution of wildlife populations. However, limited hunting can provide a net beneficial effect in areas which are managed for hunting. Managed duck clubs provide valuable food and cover plants, as well as nesting and breeding habitat for waterfowl and other wildlife.

The harvesting of reptile and mammal species is regulated so that adverse effects from

harvesting do not occur. For example, in response to concerns over the declining population of the western pond turtle, the Fish and Game Commission is expected to set a limit of zero for this species in 1994.

## **OTHER FACTORS**

Several other factors contribute to the current status of wildlife and plant resources in the Estuary. Recreational development and boat traffic cause loss of habitat, shoreline erosion, and disturbance to wildlife species. Introduction of species such as the bullfrog and red fox, as well as numerous plant species, cause direct losses through predation or indirect losses through competition for limited space and resources. Domestic animals impact native species through direct predation and loss of habitat by grazing.

## **CONCLUSION**

The Estuary provides a haven for nesting and migrating waterfowl and essential foraging and roosting areas for shorebirds. Tidal marshes and seasonal wetlands also provide habitat critical to a unique array of other wildlife species. The Estuary is home to a diverse assemblage of plant species. The health and vigor of these plant communities provides a meaningful indicator of the status and trend of the Estuary's ecosystem.

The quantity and quality of available habitat is one of the most important factors limiting these wildlife and plant populations. Degradation and conversion of habitat from land reclamation, agriculture and urbanization are the primary factors affecting the population status and stability of wildlife and plant species. The preservation of remaining riparian habitat and wetlands, and ultimately increasing their acreage, is the most important and effective action needed to reverse the overall declines in the Estuary's populations of plant and animal species.