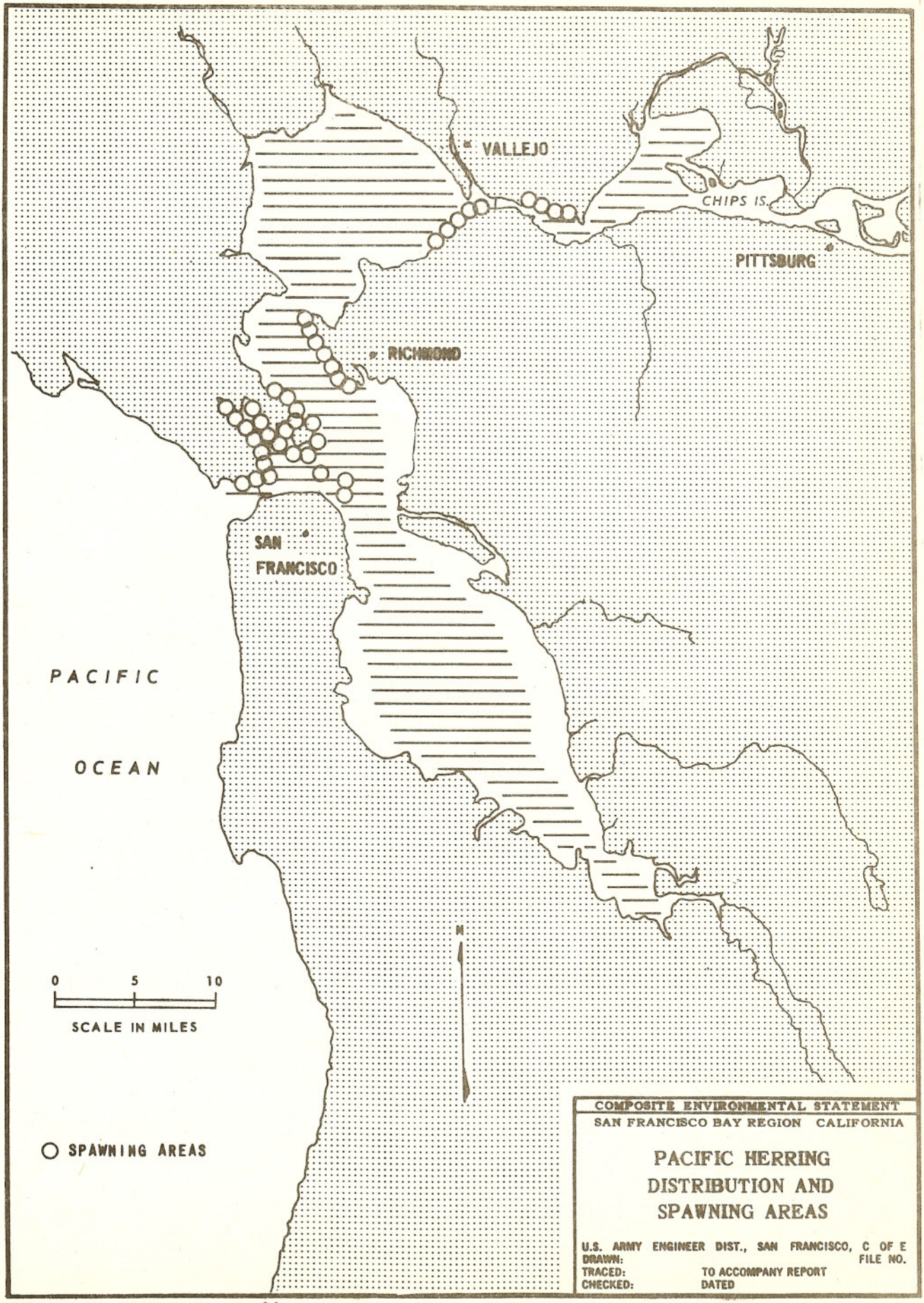


SOURCE: Delisle, G. 1966.

PLATE II-41

2.333 Both species are popular sportfish in the Bay with the White sturgeon being caught the most. Since 1964 the sturgeon fishery has been substantial but catch has been declining in recent years. From 1964 to 1969, annual catch was approximately 270,000 pounds (28).

2.334 Although the White sturgeon can be found from Baja California to the Gulf of Alaska, local populations appear to have a limited distribution. For example, tagging experiments of White sturgeon by California Fish and Game in the Bay estuary revealed that this species lives in the Bay and spawns in the rivers (112). For the most part, it does not venture beyond the Golden Gate. White sturgeon is found throughout the Bay system and is particularly abundant in San Pablo and Suisun Bays.

2.335 The Green sturgeon also ranges from Baja California to the Gulf of Alaska and even over to Japan. Unlike the White sturgeon, the Green sturgeon makes extensive ocean migrations from the Bay.

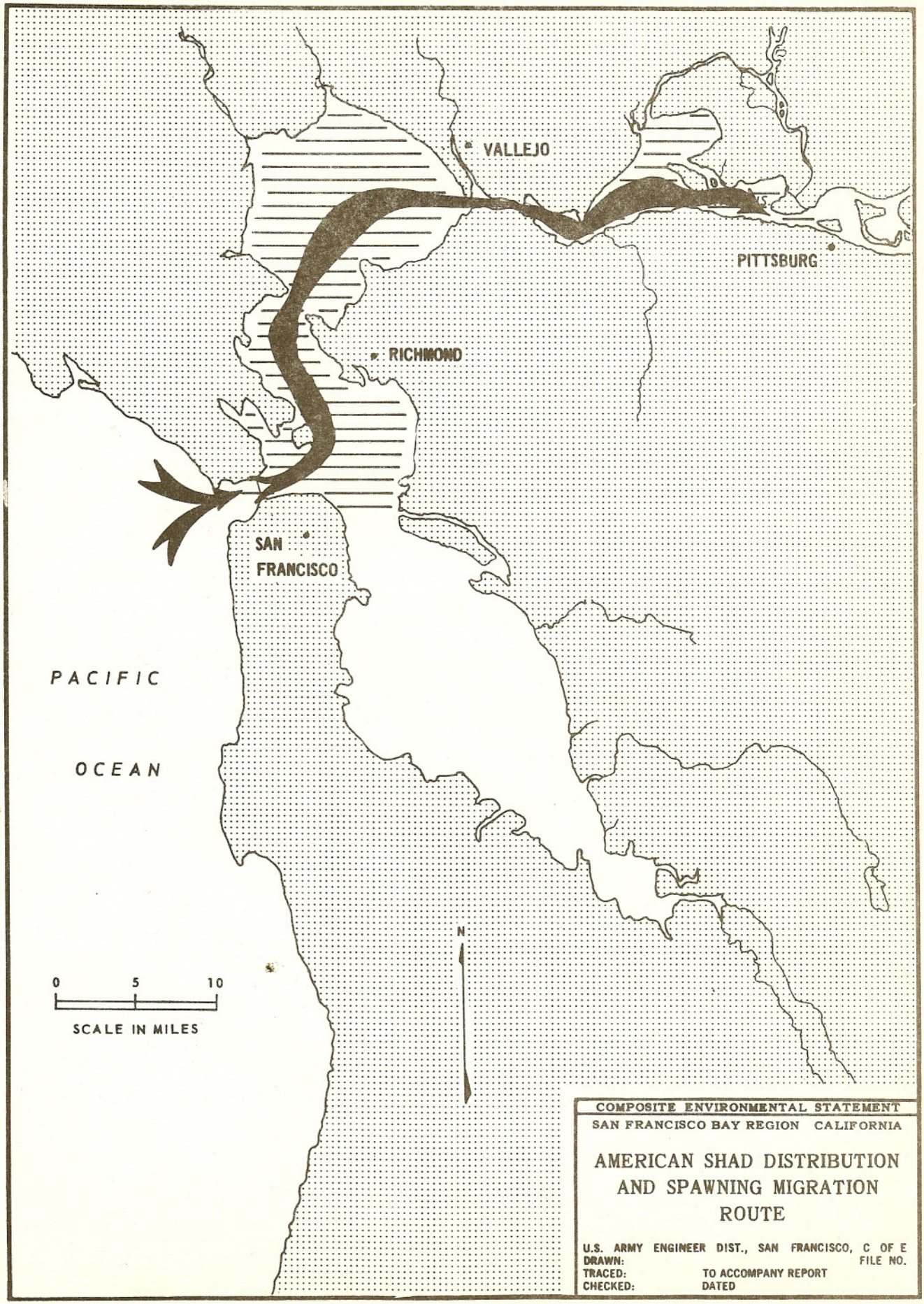
2.336 Spawning apparently occurs in the spring in the Sacramento River where sturgeon eggs have been collected. There is no direct evidence of spawning in the Delta or in the San Joaquin River but sturgeons are often caught in both areas. After spawning, the adults move back downstream and for the White sturgeon, the fertilized eggs are adhesive, sticking to bottom vegetation and rocks (similar to Pacifc herring eggs). Although no data are available, this is also probably true for the Green sturgeon since all species of sturgeons studied thus far have sticky egg masses. Once the eggs hatch, the young-of-the-year sturgeons immediately begin to migrate downstream into the Delta; the Delta being an important summer nursery. The Opossum shrimp and the amphipod Corophium are important food items of juvenile sturgeons in the Delta. Further downstream in Suisun Bay, in addition to the two food items mentioned above, the Franciscan bay shrimp is heavily preyed upon. In San Pablo Bay, young sturgeons diet on bay shrimps, the Macoma clam, the benthic amphipods Photis californica and Corophium spp., isopods and crabs (59).

2.337 As adults, they scurry along the shallow flats feeding on a host of different bottom organisms. In fact, it appears that sturgeons, particularly White sturgeons, spend most of their time on these flats, such as in north San Pablo Bay, foraging on annelid worms, nematodes, bay shrimps, Cancer crabs, bivalves (Gem clams, Macoma's Japanese littleneck clams and mussels) snails, barnacles and on various small fish (Striped bass, Starry flounder, goby, Pacific herring and their eggs, Northern anchovy, Plainfin midshipman and Staghorn sculpin). In Suisun Bay, bivalves made up the principal diet of the adult White sturgeon year-round whereas in San Pablo Bay herring eggs constituted a good portion of their diet in winter and spring (103).

2.338 American shad. This species, belongs to the same family as the Pacific herring but is somewhat larger than the herring. The shad can reach a length of 30 inches whereas the herring grows no longer than 18 inches. The shad was not native to the west coast but was introduced in 1871 from the Atlantic to create an anadromous fisheries, similar to that on the east coast. Shad has become successfully established on the west coast and supported a large commercial fisheries in San Francisco Bay until 1957. Sportfishing for shad has become popular since 1950 and has grown considerably. It is especially popular in the Delta and Sacramento River.

2.339 Adult shads become abundant during the winter as they migrate from the ocean into the Bay and begin moving upstream to spawn in the spring and early summer. It is during this spawning migration that shads are taken by anglers. As they migrate through San Pablo Bay and the Delta, they feed on zooplantkon (principally on the Opossum shrimp) and spawn in the Sacramento River and in the Delta. Many adults die after spawning but the death rate is unknown. The fertilized eggs are pelagic, floating in the water column, and hatch within four to six days as they drift downstream.

2.340 Young shads, like the adults, feed on the abundant zooplankton in the Delta and Suisun Bay and mature in the Bay estuary for about a year. By the following fall, most are out of the Bay until they are ready to spawn. Plate II-42 shows the American shad upstream migration route and distribution in the Bay system and Plate II-43 depicts its upstream and downstream migratory trend through Carquinez Strait by months.



SOURCE: Delisle, G. 1966.

PLATE II-42

2.341 Steelhead rainbow trout. The Steelhead rainbow trout belongs to the salmon and trout family (Salmonidae). Steelheads primarily spawn from December through April in the Sacramento River and its tributaries, and at one time, abundantly spawned in the San Joaquin River system. Only a few spawn there now (primarily in the Mokelume River) and it is thought that reduced flows and increased water temperatures in the summer in the San Joaquin River are the principal causes of the reduction. Historically, steelheads spawned in many of the small tributaries of San Pablo and San Francisco Bays but many of these tributaries have been blocked, dammed, channelized and become dry during the spawning, and nursing period of the steelhead (spring and summer). A few steelheads are still sporadically seen in some of these tributaries, however (25). In addition to the Sacramento River, steelheads spawn but less abundantly in the Napa River (and therefore most pass through Mare Island Strait) and in several smaller creeks that drain into the Bay. After spawning, some adults die but most move back downstream.

2.342 The fertilized eggs are buried in the stream gravel and after two to three months, hatch. The young remain in freshwater for one to two years and begin there downstream migration during winter and spring when cool temperatures and high flows prevail. There is a smaller downstream run in the fall. By the time they reach the ocean, they are six to ten inches long.

2.343 Adult steelheads generally return to the stream from which they hatched to spawn several years later. The smell of the stream water is thought to be their navigation guide and thus maintaining the water quality of these streams is of utmost importance for their survival. Their upstream and downstream migratory trend through Carquinez Strait and Napa River by months are shown on Plate II-43.

2.344 The sportfishery for steelheads is most popular in Sacramento River during the spawning period and in the summer. Few are taken in the ocean or in the Bay estuary by anglers. Approximately 60,000 angler-days per year can be attributed to steelhead fishing in the central valley (28).

2.345 Chinook salmon. As mentioned previously, salmon and trout belong to the same family and thus the Chinook salmon (often called the King salmon) and the Steelhead rainbow trout are related. Both have similar life histories.

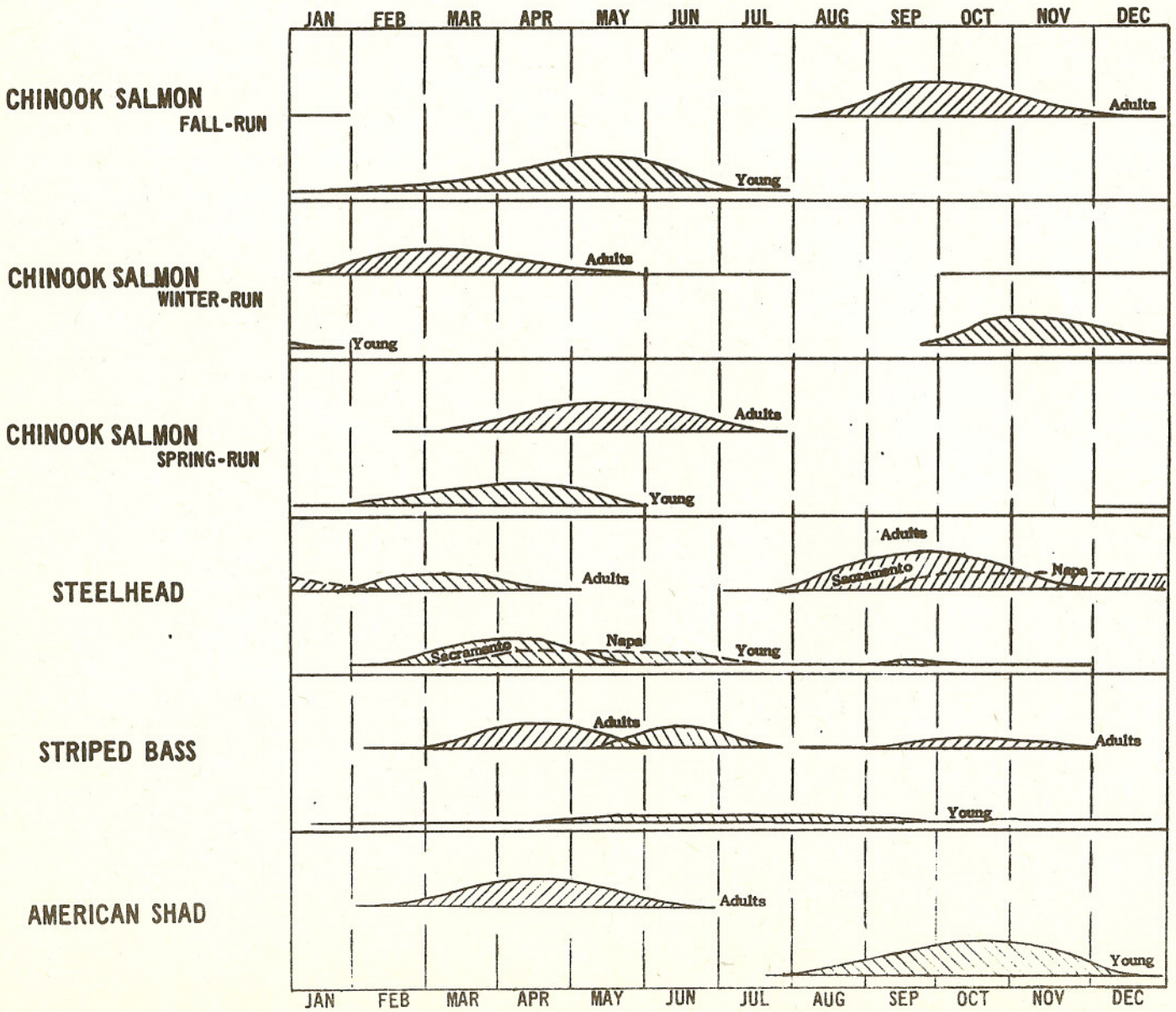
2.346 Probably the most important spawning area for Chinook salmon along the California coast is the Sacramento-San Joaquin River system. According to California Fish and Game, approximately 75 percent of California's entire annual Chinook salmon landings (commerical and sport fisheries) eminate from the SacramentoSan Joaquin River system (28). Annual commerical landings approximated 500,000 fish within the last few years and sportfishing for Chinooks in the ocean has exceeded 100,000 fish. In the Sacramento River, another 25,000 Chinooks are annually taken by anglers (28).

2.347 There are evidently three distinct genetic groups of Chinook salmon that spawn in the Sacramento-San Joaquin River system as identified by three separate spawning runs per year. These are known as the fall, winter and spring runs and are depicted in Plate II-43. The fall run is the largest of the three and the natural reproduction of this run is supplemented by three hatcheries in the Sacramento River tributaries. Several hundred thousand Chinooks constitute the fall run. Spawning occurs from October to March after which the adult Chinooks die. The young move downstream to the ocean from January through July.

2.348 The next largest run is the winter run composing of about 60,000 Chinooks. Spawning only occurs in the main stem of the Sacramento River which takes place in May and June. The newly hatched migrate downstream from October through January.

2.349 The third run or spring run consists of less than 10,000 Chinooks which has been affected by upstream water development projects. Spawning occurs primarily in the main stem of the Sacramento River in September and October. Young-of-the-year migrate toward the ocean from December through March.

MIGRATORY TRENDS OF ANADROMOUS FISH IN VICINITY OF CARQUINEZ STRAIT



LEGEND

upstream

downstream

Compiled from various sources: Skinner (1962), Calif. Fish & Game (1968), and pers. comm. with Calif. Fish & Game personnel.

PLATE II-43

2.350 The bulk of the yearling Chinook salmons move downstream in the spring and feed primarily on immature aquatic insects. Once they reach the ocean they grow rapidly and tend to migrate northward although exact whereabouts are unknown. In the ocean they feed on anchovies, rockfishes, herrings, squids, young crabs and shrimps. When they are ready to spawn they move inshore and through the Golden Gate, and there is evidence that they are guided by the smell of the tributary which leads them to the spawning area from which they were born.

2.351 Striped bass. Like the American shad, the Striped bass was introduced from the Atlantic in the 1870's. Obviously stripers have adapted well to their new environment since they are one of California's top ranking sportfish. For the most part, the Striped bass is confined to the Bay estuary although some venture outside the Golden Gate (some are caught from Tomales Bay south to Monterey Bay).

2.352 During the summer and winter months, the majority of the Striped bass population (which is estimated to be between 1.5 and 4 million) is found in San Pablo Bay southward. The spawning migration begins in the spring and moves upstream through the Delta into the Sacramento River. Few stripers migrate into the San Joaquin River above the Delta. The major spawning areas are in the Delta between Antioch and Venice Island and in the Sacramento River, where spawning takes place in April and May in the Delta, and May and June in the Sacramento.

2.353 The eggs are pelagic and hatch in two to five days. Young-of-the-year spend their first summer in the upstream end of Suisun Bay and feed on zooplankton, especially on the Opossum shrimp. As they grow older, they move farther downstream into San Pablo Bay and southward. As adults, they feed on smaller fish (anchovy, Shiner surfperch, White surfperch, herring and others) and on bay shrimps (Crangon spp).

2.354 Plate II-43 depicts their upstream and downstream migratory trend by months through Carquinez Strait.

2.355 (c) Brackish and Freshwater species. The "faunal break" described in the Sub-tidal Benthic Habitat discussion also applies to pelagic fishes. Other than anadromous fishes, only a few marine species occur in Suisun Bay and the great majority of fish are brackish and freshwater species. Some of the more abundant ones include the Tule surfperch (the only

freshwater surfperch), Largemouth bass, Bluegill and Black Crappie. Except for the Tule perch, the above fishes belong to the same family (Centrachidae) and constitute a relatively small but popular sport fishery in Suisun Bay and upstream. In Suisun Bay, centrarchids feed abundantly on the Opossum shrimp and the amphipod, Corophium.

2.356 Other brackish and freshwater fishes of Suisun Bay but of lesser recreational importance than the centrachids are the Threadfin shad and pond smelt (see Table II-20). The bottom freshwater fishes of Suisun Bay such as the Carp, suckers and White catfish were mentioned under Subtidal Benthic Habitat.

2.357 (4) Birds of the open bay. Birds typical of the open water include waterfowl, grebes, loons, cormorants, gulls, terns, pelicans and occasional pelagic species such as petrels. There is considerable overlap of habitats utilized by waterbirds. Many species rely on marsh habitat for feeding and nesting, others feed on grain fields, and many others feed in the open water itself.

2.358 The Bay Area surpasses in size all other estuarine areas along the California Coast, and according to Delisle, the Bay Area is "absolutely essential as a resting place, feeding area and wintering ground for a vast segment of the waterfowl populations of the Pacific Flyway" (45).

2.359 Every year in the late summer and early fall, and during years of drought, the Bay Area becomes particularly important to waterfowl by virtue of its large expanse of open bay habitat, and the relative scarcity of such habitat elsewhere. Under such conditions, up to 20 percent of the wintering duck population within California had been attracted and held within the Bay. Peak numbers of wintering waterfowl are usually observed in the Bay Area during November and as many as 1,000,000 birds have been observed in Suisun Bay alone (45).

2.360 Of the waterbirds using the open bay, the puddle ducks and geese use the area primarily for open water resting while the other species use the open water as a feeding area.

2.361 The diving ducks of which the Canvasback is a prime example, utilize the bay primarily in the winter as a feeding and resting area. The U.S. Fish and Wildlife Service has estimated that approximately two-thirds of the wintering population of Canvasback in California and 50 percent of the Pacific Flyway population utilize the Bay Area as a feeding and resting ground (265).

2.362 In 1960, Alkali bulrush was the major food of an estimated 88 percent of the wintering ducks, including Pintails, Mallards, Shovelers and Green-winged teals. Waterfowl feed heavily on the leafage of Brass buttons in the winter from mid-December until their spring departure. Waterfowl use of Fat hen nearly tripled between the 1960 and 1971 surveys. The use of Fat hen peaks in November and December, the same period that pond levels are at their highest (28).

2.363 Of the many environmental factors which control the distribution and growth of plants in the Suisun Marsh, two exert the greatest influences: length of soil submergency and soil salt concentrations.

2.364 The most common waterbirds utilizing the Bay's open water habitat are listed below.

TABLE II-22

WATERBIRDS OF SAN FRANCISCO BAY
OPEN WATER HABITAT

Common Name	Scientific Name
Mallard	*Anas platyrhynchos*
Gadwall	*Anas strepera*
American widgeon	*Anas americana*
Pintail	*Anas acuta*
Green-winged teal	*Anas crecca*
Cinnamon teal	*Anas cyanoptera*
Northern sholver	*Anas cypeata*
Wood duck	*Aix sponsa*
Redhead	*Aythya americana*
Ring-necked duck	*Aythya collaris*
Canvasback	*Aythya valisneria*
Lesser scaup	*Aythya affinis*
Greater scaup	*Aythya marila*
American goldeneye	*Bucephala clangula*
Barrow's goldeneye	*Bucephala islandica*
Bufflehead	*Bucephala albeola*
Ruddy duck	*Oxyura jamaicensis*
American scoter	*Oidemia americana*
White-winged scoter	*Melanitta deglandi*
Surf scoter	*Melanitta perspicillata*
American merganser	*Mergus merganser*
Red-breasted merganser	*Mergus serrator*
Canada goose	*Branta canadensis*
White-fronted goose	*Anser albifrons*
Snow goose	*Chen hyperborea*
American Coot	*Fulica americana*

TABLE II-22 (Cont'd)

Common Name	Scientific Name
White pelican	*Pelecanus erythrorhynchos*
Brown pelican	*Pelecanus occidentalis*
Double-crested cormorant	*Phalacrocorax auritus*
Common loon	*Gavia immer*
Pacific loon	*Gavia arctica*
Red-throated loon	*Gavia stellata*
Eared grebe	*Podiceps caspicus*
Western grebe	*Aechmophorus occidentalis*
Pied-billed grebe	*Podilymbus podiceps*
Western gull	*Larus occidentalis*
Herring gull	*Larus argentatus*
California gull	*Larus californicus*
Ring-billed gull	*Larus delawarensis*
Bonaparte's gull	*Larus philadelphia*
Glaucous-winged gull	*Larus glaucescens*
Forster's tern	*Sterna forsteri*
Caspian tern	*Hydroprogne caspia*

SOURCE: Mod. from Skinner, 1962.

2.365 (5) Marine mammals. Marine mammals of the Bay, like birds of the open bay, cannot be appropriately classified under any one estuarine habitat described above. Harbor seals, especially, feel equally at home whether they are in the water or hauled out on a tidal flat or in the saltmarsh resting.

2.366 The most commonly seen marine mammal in the Bay is the Harbor seal, Phoca vitulina. Harbor seals have been sited in Suisun Bay but most stay in San Pablo Bay southward. The ones in the Bay seem to be a non-migrating population and are estimated to number several hundred individuals. According to California Fish and Game, 100-400 seals have been observed at the mouth of Mowry Slough in South Bay (Alameda County) during the mating season in the spring (28). Smaller groups are periodically seen at Newark Slough, just north of Mowry Slough; Calaveras Point at the mouth of Coyote Creek; and Castro Rock near the Richmond side of the Richmond-San Rafael Bridge.

2.367 Harbor seals are very timid and quiet mammals, and because of their timidness, they are not found where there is a clamor of human activity, such as ports, harbors, and marinas, It is unlikely then that dredge/disposal operations from the regularly maintained project sites would directly affect them. Harbor seals are very mobile creatures with acute sense organs and thus can easily avoid localized areas of dredging and disposal activities.

2.368 Occasionally, a few other marine mammals are seen in the Bay but are rarely seen beyond Treasure Island. They normally stay close to the entrance of the Golden Gate. These include the Harbor porpoise and the well known California sea lion. Marine mammals occurring outside the Golden Gate are discussed under Marine Biological Characteristics Off the Central California Coast.

2. Terrestial Environment.

2.369 a. Wildlife Habitat. The freshwater marshes, riparian systems, unimproved and agricultural lands of the Delta boast a larger and more varied terrestrial flora and fauna than do the more westward areas of the Bay system (81). Although terrestrial wildlife habitat decreases in abundance westward of the Delta, the quality is of high value to the aesthetic and recreational enjoyment of the people of the urban Bay area.

2.370 Terrestrial habitat considered here consists of the relatively flat, open uplands immediately above the tidal flats, saltmarshes and salt ponds (i.e. above MHHW) within a ten mile wide strip along the shores of the Bay system. The elevation of the areas considered is up to 50 feet above mean higher-high water. The reason for these boundaries of 10 miles in width and 50 feet in elevation is because they are considered to be the practical limits of pumping capability for hydraulic pipeline of dredge material to upland disposal areas and of possible direct project-induced impacts on the terrestrial environment.

2.371 Nearly all of these lands, except for the highly industrialized and urbanized portions, are of value to wildlife. Even dry and denuded lands may be of some value by providing seclusionary buffer zones for adjacent vegetated habitat.

2.372 The open uplands consists of mainly flat, grassy and weedy areas situated between the tidelands and the grassy foothills, It is part of the Bay plain upon which most Bay Area cities are built. The lower portions of the open upland receive some tidewater through small tidal meanders and high tidal seepage, but not enough to support a salt marsh. Some of these lands, notably from San Pablo Bay eastward, exclude most tidewater by means of agricultural dikes constructed mostly around the turn of the century. The dikes converted tidelands into pasture and grain fields. Lower portions of the open uplands, whether diked or undiked, are often used as natural pasture or lie fallow because of low productivity. Brackish water often lies just below the surface, which excludes deep rooted plant species and reduces productivity. In winter, low pockets with tidal seepage and rainwater provide resting and feeding habitat for migratory waterfowl. These pockets support such high valve saltmarsh species as Pickleweed (Salicornia sp.), Alkali heath (Frankenia grandifolia), Brass buttons (Cotula coronopifolia), Saltbrush (Atriplex semibaccata), and Salt grass (Distichlis spicata).

2.373 At slightly higher elevations where soil drainage is improved and saline influence is minimal, vegetation is usually more profuse. As stated by Werminski (256), "the open upland areas closely resemble the dikes, except that many of the native salt-tolerant species may be absent. As on the dikes, several important non-native grass species are joined by a diverse group of other non-native herbaceous plants, resulting in a "weedy" groundcover that extends beyond the fields and pastures to re-invade the fringes of adjacent developed areas. In addition to being predominantly alien species, a high proportion are "annual" plants, completing their entire life cycle in a single growing season. As a result, in winter and spring -- when water is adequate -- these "weedy grasslands" can become quite tall and rank; yet as the weeks advance toward summer, the landscape dries, the rich, green colors fade, and the vegetation gradually assumes the tawny brown color that will characterize the long rainless months ahead".

2.374 Some of these lands have been filled with dredged material in order to raise the elevation above tidal seepage for increased agricultural productivity or for future land development which was subsequently not permitted. Such lands, depending on tillation, leaching rate, etc., take an undetermined number of years to become vegetatively productive.

2.375 As listed by Munz, some of the more common plants of the open upland area are in Table II-23 (117).

TABLE II-23

COMMON TERRESTRIAL PLANTS OF
THE OPEN UPLAND AREAS SURROUNDING THE BAY AREA

Common Name (Scientific Name)	
Storksbill (Erodium sp.)	Pea (Lathyrus sp.)
Pepper-grass (Lepidium oxycarpum)	Posion Hemlock (Conium maculatum)
Mustard (Brassica sp.)	Fennel (Foeniculum vulgare)
Wild Radish (Raphanus sativus)	Coyote Bush (Baccharis pilularis)
Sheperd's Purse (Capsella bursa-pastoris)	Brass Buttons (Cotula coronopifolia)
Chickweed (Stellaria sp.)	Groundsel (Senecio sp.)
Sand Spurrey (Spergularia marina)	Milk Thistle (Silvbum marianum)
Miner's lettuce (Montia perfoliata)	Bull Thistle (Cirsium lanceolatum)
Dock (Rumex sp.)	Prickly Sow-thistle (Sonchus asper)
Australian Saltbush (Atriplex semibaccata)	Brome grasses (Bromus spp.)
Scarlet Pimpernel (Anagallis arvensis)	Salt Grass (Distichlis spicata)
Fiddleneck (Amsinckia sp.)	Foxtail (Hordeum sp.)
Bur Clover (Medicago hispida)	Italian Ryegrass (Lolium multiflorum)
Yellow Sweet Clover (Melilotus indica)	Wild Oat (Avena sp.)

2.376 The uncultivated portions of the open upland and dikes, provide important cover and nesting for pheasants, meadowlarks, other ground-nesting birdlife, mammals and reptiles. Grain fields and cultivated pasture, while providing food and cover, are not useful for nesting because of the operation of farm machinery. Burrowing species such as rodents and Burrowing owls utilize dikes, and both cultivated and non-cultivated fields. Pheasants, shorebirds, ducks and other wildlife sometimes nest on undistrubed dikes and descend into adjacent grain fields and tidelands for food.

2.377 Other minor terrestrial habitat associated with the open uplands are the adjacent grassy hills, urban areas, freshwater ponds and refuse dumps. Each of these areas has both common as well as unique ecological associations among its flora, vertebrate and invertebrate populations.

2.378 Many birds seen foraging over or upon the above mentioned lands, such as the birds-of-prey and perching birds, nest in trees located out of the tidelands or open uplands. Several species, such as the Burrowing owl, and Longbilled marsh wren are permanent residents. Others, such as the winter visitant Water pipit are seasonal only. Three sub-species of the Song sparrow (Melospiza melodia) are totally dependent upon San Francisco Bay Area salt marshes. Their status is undetermined and under study for possible inclusion on the Endangered or Rare Species Lists. Endangered and rare species are covered under their own heading.

2.379 The following list of birds includes most of the common and prominent terrestrial species which forage in the open uplands and/or tidelands of the area covered by this environmental statement.

TABLE II-24

TERRESTRIAL BIRDS NEAR SAN FRANCISCO BAY[1/]

Common Name	Scientific Name	Occurrence
Turkey Vulture	Cathartes aura	Common; permanent resident; open fields and hills
White-tailed kite	Elanus leucurus	Fairly common; premanent resident; marshes, open fields and hills
Red-tailed hawk	Buteo jamaicensis	Common; permanent resident; open fields and hills
Golden eagle	Aquila chrysaetos	Permanent resident; uncommon; open fields and hills
Marsh hawk	Circus cyaneus	Fairly common; marshes, open fields and hills
Prairie falcon	Falco mexicanus	Uncommon; permanent resident; open fields and hills
Sparrow hawk	Falco sparverius	Abundant; permanent resident; open fields and hills
Ring-necked pheasant	Phasianus colchicus	Common; permanent resident; open fields and hills
Rock dove (domestic pigeon)	Columba livia	Permanent resident; common; bays; open fields and hills
Mourning dove	Zenaida macroura	Permanent resident; fairly common; open fields and hills
Barn owl	Tyto alba	Permanent resident; common; open fields and hills
Burrowing owl	Speotyto cunicularia	Permanent resident; fairly common, open fields and hills
Short-eared owl	Asio flammeus	Fairly common; winter visitant; marshes, open fields and hills

1/Includes most of the common and prominent terrestrial species of the marshes and adjacent open uplands from San Francisco to Antioch.

TABLE II-24 (Cont'd)

Common Name	Scientific Name	Occurrence
Western kingbird	Tyrannus verticalis	Fairly common; summer visitant; open fields and hills
Ash-throated fly-catcher	Myiarchus cinerascens	Fairly common; summer visitant; open fields and hills
Black phoebe	Sayornis nigricans	Permanent resident; fairly common; marshes, open fields and hills
Say's phobe	Sayornis saya	Fairly common; summer and winter visitant; open fields and hills
Horned lark	Eremophila alpestris	Permanent resident; fairly common; open fields and hills
Violet-green swallow	Tachycineta thalassina	Fairly common; summer visitant; marshes, open fields and hills
Tree swallow	Iridoprocne bicolor	Permanent resident; fairly common; summer visitant; marshes, open fields and hills
Rough-winged swallow	Stelgidopteryx ruficollis	Fairly common; spring and summer visitant; marshes, open fields and hills
Barn swallow	Hirundo rustica	Fairly common; summer visitant; marshes, open fields and hills
Cliff swallow	Petrochelidon pyrrhonota	Common; spring and summer visitant; marshes, open fields and hillls
Crow	Corvus brachyrhynchos	Abundant; permanent resident; open fields and hills

TABLE II-24 (Cont'd)

Common Name	Scientific Name	Occurrence
Long-billed marsh wren	Telmatodytes palustrus	Common; permanent resident; marshes
Robin	Turdus migratorius	Permanent resident; abundant; winter visitant; fairly common; summer visitant; open fields and hills
Varied thrush	Ixoreus naevius	Abundant to uncommon (seasonal); open fields and hills
Western bluebird	Sialia mexicana	Fairly common; winter visitant; open fields and hills
Pippit, Water	Anthus spinoletta	Fairly common; winter visitant; marshes, open fields and hills
Loggerhead shrike	Lanius ludovicianus	Common; spring visitant; fairly common; winter visitant; open fields and hills
Starling	Sturnus vulgaris	Fairly common; bays; permanent resident; marshes, open fields and hills
Yellow-rumped (Audubon's) warbler	Dendrocia cornota auduboni	Abundant; winter visitant; open fields and hills
Yellowthroat	Geothlypis trichas	Permanent resident; common; marshes
Western meadowlark	Sturnella neglecta	Abundant; permanent resident; marshes, open fields and hills
Red-winged black-bird	Agelaius phoeniceus	Adundant, permanent resident; marshes, open fields and hills

TABLE II-24 (Cont'd)

Common Name	Scientific Name	Occurrence
Brewer's blackbird	Euphagus cyanocephalus	Abundant; permanent resident; marshes, open fields and hills
Brown-headed cowbird	Melothrus ater	Permanent resident; common; open fields and hills
House finch (Linnet)	Carpodacus mexicanus	Abundant; permanent resident; open fields and hills
Pine siskin	Spinus pinus	Fairly common; winter visitant; open fields and hills
American goldfinch	Spinus tristis	Fairly common; permanent resident; open fields and hills
Lesser goldfinch (Green-backed)	Spinus psaltria	Abundant; permanent resident; open fields and hills
Savannah sparrow	Passerculus sandwichensis	Permanent resident; fairly common; marshes, open fields and hills
White-crowned sparrow	Zonotrichia leucophrys	Abundant; permanent resident; open fields and hills
Song Sparrow	Melospiza melodia	Abundant; permanent resident; marshes

SOURCE: Ruth, 1969.

2.380 The unimproved, riparian, and agricultural areas of the Delta boast a larger and more varied mammalian fauna and flora than do the salt marsh areas of the Bay Area (81). There are a few furbearers of some economic importance in the Delta and overlapping also into the Bay Area. They include mink, muskrats, beavers and raccoons. The small game mammals include jack rabbits, brush rabbits, cottontails and squirrels.

2.381 Most rodents and other small mammals in the open uplands of the Bay Area depend on low shrubby or grassy vegetation for rufuge and food supply. Pastures, grainlands, fallow fields, and dikes provide such habitat.

2.382 Mammals of the salt marshes and tidal meanders of the Bay Area consist mainly of small animals whose life styles and relationships with other salt marsh organisms are closely related to tidal fluctuations in the marsh result in areas which are regularly covered with water and are available for occupancy by mammals only during low tides. The lowest intertidal marsh zone may be covered with spring tides severely limiting the areas available for refuge or food supply for marsh mammals.

2.383 Mammals usually occupy a narrow zone of marsh plants in the upper limits of tidal action but must be able to use additional immediate shelter at times of crises as during foraging flights of predator birds.

2.384 The most severely limiting factors affecting the distribution and viability of mammals in the Bay Area are associated with "reclaiming" or other land use changes which diminish the natural vegetation, or otherwise alter the habitat.

2.385 Tables II-25 and II-26, list most of the common and prominent mammals, amphibians and reptiles in the intertidal and adjacent open upland areas surrounding the Bay.

TABLE II-25

TERRESTRIAL MAMMALS NEAR
SAN FRANCISCO BAY 1/

Common Name	Scientific Name	Occurrence
Opossum	Didelphis marsupialis	Permanent resident; bays; common; open fields and hills
Broad-handed mole	Scapanus latimanus	Permanent resident; common; open fields and hills
Trowbridge shrew	Sorex trowbridgei	Permanent resident; common; open fields and hills
Big Brown Bat	Eptesicus fuscus	Permanent resident; fairly common; aerial; open fields and hills
Pallid bat	Antrozous pallidus	Permanent resident; common; aerial; open fields and hills
Mexican free-tailed bat	Tadarida brasiliensis	Permanent resident; common; aerial; open fields and hills
Raccoon	Procyon lotor	Permanent resident; common; marshes
Long-tailed weasel	Mustela frenata	Permanent resident; common; open fields and hills
Striped skunk	Mephitis mephitis	Permanent resident; fairly common; open fields and hills
Coyote	Canis latrans	Permanent resident; fairly common; open fields and hills
Beechey ground squirrel	Otospermophilus beecheyi	Permanent resident; common; fields and hills
Botta pocket gopher	Thomomys bottae	Permanent resident; common; open fields and hills
California pocket mouse	Perognathus californicus	Permanent resident; fairly common; open fields and hills
Heermann kangaroo rat	Dipodomys heermanni	Permanent resident; fairly common; open fields and hills

TABLE II-25 (Cont'd)

Common Name	Scientific Name	Occurrence
Santa Cruz kangaroo rat	Dipodomys venustus	Permanent resident; fairly common; open fields and hills
Western harvest mouse	Reithrodontomys megalotis	Permanent resident; fairly common; marshes
Salt marsh harvest mouse	Reithrodontomys raviventris	Permanent resident; fairly common; marshes
Deer mouse	Peromyscus maniculatus	Permanent resident; common; open fields and hills
California meadow mouse	Microtus californicus	Permanent resident; common; marshes, open fields and hills
Muskrat	Ondatra zibethica	Permanent resident; bays; common; marshes
Norway rat	Rattus norvegicus	Permanent resident; bays; common; marshes
Black rat	Rattus rattus	Permanent resident; bays; marshes
House mouse	Mus musculus	Permanent resident; bays; open fields and hills
Jackrabbit	Lepus californicus	Permanent resident; common; open fields and hills
Audubon cottontail	Sylvilagus auduboni	Permanent resident; uncommon; open fields and hills
Brush rabbit	Sylvilagus bachmani	Permanent resident; fairly common; open fields and hills

1/ Includes most of the common and prominent species of the marshes and adjacent open uplands from San Francisco to Antioch.

SOURCE: Ruth, 1969.