COMMENTS REGARDING CHANGES IN THE FISH AND WILDLIFE RESOURCES OF THE BAY AREA

The purpose of this section is to reiterate some of the changes which have occurred in the fish wildlife resources of the Bay Area and to discuss the reasons for them insofar as possible. Where appropriate, it will also be indicated where information on the magnitude, value and recreational importance of the resource is lacking, and if possible, to indicate what must be done to obtain the necessary information.

COMMERCIAL FISHERIES

Records of commercial fish landings are available subsequent to 1915. In general, catch statistics over long-term periods can be indicative of the condition of the resource. However, they are not always a true index of abundance since consumer demand, vagaries of weather, wage disputes, technical advances and other factors may influence the catch greatly. Sudden changes in the rate of exploitation, caused by the discovery of new uses or obsolescence of fishery products, further complicate the interpretation of catch records. As an example, the landings of a particular fishery may gradually increase over a period of time, giving the impression of a healthy resource; however, the increased landings may be due to an increase in effort or efficiency of the forces exploiting the resource rather than an increase in the size of the stock. Thus, a fish population may actually be declining while landings are on the increase. If such a condition should continue, a sudden decline may be expected.

The Schooling, Pelagic Bait and Forage Fishes

Several noteworthy changes have taken place in this group of fishes. The most outstanding is the rise and decline of the sardine fishery. The fishery reached tremendous proportions as the industry developed an expanding market for sardine products. The Bay Area fleet entered the sardine picture in earnest about 1925. Landings gradually increased until 1939; then, after a few more years of good fishing, the fishery completely collapsed. Bay Area landings plummetted from over 284 million pounds in 1944 to less than 300,000 pounds in 1948. Overfishing is presumed to be the principal cause, although oceanographic factors may also be involved.

Anchovies, like sardines, are principally caught in the ocean. There is no indication that the population off the Bay Area has undergone any appreciable change. Since they are not taken in the Bay, there is no way of knowing how the stocks which enter San Francisco Bay compare in magnitude with those of former years. Considering present conditions in San Francisco Bay it is improbable that the Bay supports an equal or greater population of anchovies.

Herring, smelt, and whitebait catches in the Bay Area have not changed appreciably since 1915. It is probable that these three species could support heavier exploitation than they are now subjected to.

There has been an appreciable decrease in the populations of the schooling, pelagic bait, and forage fishes within the Bay during the past seventy years, judging from the conditions described in the early literature. For example, the paucity of these fishes in the South Bay at the present time is in strong contrast to the descriptions of their abundance some eighty or ninety years ago. Perhaps other factors could be cited as having an adverse effect on this group of fishes, but certainly none is more obvious than pollution. Large areas of the South Bay are, and have been, polluted since before the turn of the century. The littoral zone and tidal flats have been particularly affected. Generally, these areas are the most frequented by fish since they are more productive of food organisms.

There is a tremendous void in our knowledge with respect to the seasonal abundance and use of the Bay by this group for spawning. There is a definite need for study along these lines to aid in evaluating the importance of the Bay to fish and wildlife. Herring, for instance, which are forage for many other fish species, spawn in the Bay; thus, if the Bay is an essential feature of their life history, its degradation by pollution would be reflected in the piscivorous species which feed upon herring.

Flatfishes

At present, the entire flatfish catch of the San Francisco Bay Area is taken in the ocean. The average annual catch during recent years has been about four million pounds or about one-half of what it was between 1915 and 1937. The rapid decline in the fishery between 1938 and 1942 was caused by the sudden shift to shark fishing. A large proportion of the fishermen of the San Francisco fishing fleet are of Italian birth, and when World War II broke out, they were restricted from fishing as a security measure. As a result, the landings dropped severely. Landings have now recovered to about one-half their former level, but further increases can only be expected to occur slowly.

Flatfishes are no longer taken commercially in the Bay itself. The industry has shifted to the north where

the most suitable species for the fillet and frozen fish trade are more abundant. The species taken in the ocean off San Francisco have been used primarily in the restaurant and fresh fish trade. However, dealers are able to supply the latter trades from their operations in the north, and therefore need not operate out of San Francisco. These are the primary reasons the landings in this fishery are now below those of former years.

Pollution, therefore, probably has not affected the flatfish fishery insofar as the quantity of the landings is concerned. However, it should be reiterated here that there is a remote possibility of the Bay being a nursery area for several species of flatfish taken in the ocean. The actual relationship between the immature fish in the Bay and the adults taken in the outside fishery is not known and deserves investigation.

On the Atlantic Coast, the dependence of flounders on estuaries has been well documented.

Bottom Fishes

Bottom fish, such as lingcod and cabezon, entering the commercial fishery, are taken entirely in the ocean. Landings in the San Francisco Area underwent a severe reduction between 1936 and 1950 but are now recovering. The cause for the reduced landings was economic (lack of demand) rather than a scarcity of fish.

These fish have not been taken commercially in the Bay for at least thirty years, and, therefore, there is no way to compare their present abundance with that of earlier years. It would require a special study to determine the abundance of bottom fish in the Bay.

Sharks, Skates, and Rays

A major change in this fishery occurred between 1938 and 1942 when the annual landings soared to more than 5,000,000 pounds as compared to a normal 200,000 to 400,000 pounds. This abrupt increase in landings was triggered by a demand for the oil of soupfin shark livers, a rich source of Vitamin A. When a synthetic Vitamin A product was developed, the fishery subsided to its normal level. There is no evidence indicating any change in the fish population itself.

Mollusks

The molluscan fisheries of the Bay Area have undergone a tremendous change from the heyday of the early 1890's. The landings dropped continuously until 1930 when the introduction of the Pacific oyster resulted in a temporary increase. However, efforts at culturing this species in the Bay Area have subsided until at the present time the total amount produced in the San Francisco Area is less than 400,000 pounds.

Pollution appears to be the major factor contributing to the downfall of the oyster industry in this area. There are still extensive areas available for oyster culture but water quality is inadequate to produce a satisfactory product. Health agencies have quarantined many sections of the Bay as possible sources of contamination.

It would be most desirable to restore water quality conditions in the Bay to a level compatible with oyster culture. The potential in this industry, as discussed in a previous section, is tremendous.

A few pollution-tolerant species of clams are still quite abundant around the Bay, but in the main the public health hazard renders them unusable for human consumption.

Crustaceans

Crustacean landings in the Bay Area since 1910 have consisted primarily of the market crab. Annual production of this species has consistently exceeded four million pounds for the last thirty years. Although wide fluctuations appear, there has not been a major change in the fishery and it may be assumed to be in good condition.

The Bay shrimp fishery is now lagging far behind production of former years. This is due in part to economic conditions, in part to restrictive legislation and, perhaps, to some extent, to pollution. Here, again, is a case in which the catch data fail in properly appraising the condition of the fishery. Economic factors have depressed the landings and it is impossible to know exactly how abundant the species is. Nevertheless, it appears that the resource has dwindled appreciably from former levels.

Shrimp is a major component of the diet of a great number of fish species in the Bay, and factors favoring the fishery would serve to benefit those species as well as bolster the shrimp market.

This is another species about which accurate information on present distribution and abundance is lacking. An intensive study of Bay shrimps would be most desirable from the standpoint of the condition of the resource and its relation to pollution in the Bay and to review the potential of the resource with respect to further commercial exploitation.

Freshwater Commercial Fishes

The fishery for these species was relatively stable. In 1953, the legislature abolished the commercial catfish fishery, after investigation indicated a decline in the resource and a growing sport fishery with competing demands for the available fish. Then, in 1957, when the salmon and shad gill net fishery was banned, commercial fishing virtually ceased in the Delta, and the roughfish also dropped out of the commercial landings.

ANADROMOUS FISHERIES

Any detailed analysis of the factors affecting the abundance and landings in this group of fishes would be exceedingly difficult. Environmental conditions have been so greatly modified by man's activities that it is virtually impossible to ascertain the relative effect of any one factor on these resources.

King Salmon

The commercial fishery formerly consisted of the gill net fleet, which always operated inside the Golden Gate, and the ocean troll fleet. The former was abolished by the legislature in 1957.

The gill net fishery landings exhibited tremendous fluctuations from year to year throughout the recorded history of the fishery. However, the trend over the ninety-year period for which catch figures are available was downward. The 1957 catch was the smallest ever recorded.

There are several explanations which could account for the decrease. One cause can be ascribed to water development projects in California. Virtually every permanent stream the full length of the Central Valley has one or more dams constructed across it. These have eliminated spawning areas and adversely affected temperature and flow regimes. Unscreened water diversions also take a heavy toll of small fish.

Since both the gill net fishery and the ocean troll fishery operated on the same salmon stocks the latter certainly contributed substantially to the reduction in the gill net landings. There has been a large increase in the size of the ocean troll fleet and its catch over former years as well as a spectacular increase in the ocean sport fishery in the last 15 years.

Although the salmon resources certainly have been overfished at various periods throughout the last 50 or 60 years, it is quite unlikely that overfishing alone has been responsible for the long-term decline.

Pollution has also been involved in the salmon decline. However, it is impossible to demonstrate the relative effects of pollution on the resource. Mining and logging pollution and silt have been prevalent in some streams, domestic sewage and dairy pollution in others, and cannery and winery wastes in still others. Along the Bay proper, the numerous industrial waste outfalls threaten the small downstream migrants which are inadvertently swept into the vicinity of them. Untreated or inadequately treated domestic sewage discharges both in the Bay and in upstream tributaries create similar problems.

Striped Bass

Generally speaking, this fishery has remained relatively stable. The species was completely removed from the commercial category in 1935 and since then has been subjected to hook-and-line fishing only, except for fish which were taken incidentally with shad and salmon by the gill net fishery. The sport fishery is so intense it is believed that up to 25 percent of all legal-sized fish are removed from the fishery each year.

A review of the catch records and other pertinent data revealed a decline in the fishery from 1944 through 1955. As a consequence, further restrictions in size and bag limits were put into effect to bring the fishery into balance. This appears to have been accomplished.

Under present conditions, it appears that the sport fishery is now exerting sufficient pressure to have a definite influence on striped bass stocks. The governing factor, however, lies in the change in environmental conditions. These have been modified so greatly over the past fifty years that there has been an appreciable loss in the total habitat available to striped bass.

At least three adverse factors, excluding angling, are affecting the striped bass population: reclamation, water development projects, and pollution. It would be next to impossible to evaluate the relative importance of each. Reclamation, many years ago, resulted in extensive habitat changes which removed rich nursery grounds. Water development projects have modified temperature, flow, and salinity patterns in the Delta and in spawning areas, and numerous diversions take a heavy toll of fish. Pollution has resulted in an extensive loss of habitat, destruction of forage organisms, and, frequently, in the outright killing of the fish themselves.

The absence of striped bass in many areas of the Bay may be taken as rather clear evidence of pollution. South San Francisco Bay in particular can be cited, and there are other once-favorable localities which are now similarly devoid of striped bass.

Shad

Shad landings, in the past, have been influenced strongly by economic conditions. Generally the catch was considerably less than the fishery could have supplied. Nevertheless, there appears to have been a definite decline in the fishery, unrelated to economic conditions, and presumably caused by the same factors which have influenced salmon and striped bass populations. The most significant recent development with respect to the shad resource is the evolution of the sport fishery in the past few years.

WATERFOWL

There has been a decided reduction in the waterfowl of the Bay Area, both in resident and wintering populations. Reclamation of the marshlands and tidal flats has unquestionably been the major causative factor in the decrease. Most of the breeding areas around

the Bay have been eliminated, reducing the number of resident waterfowl to insignificance. There are still extensive areas used by birds for wintering purposes, but the prime habitat is gone. In the early days, overhunting was undoubtedly a serious factor in diminishing waterfowl numbers.

Pollution has affected waterfowl and shorebirds in the Bay Area through both habitat destruction and direct mortality through disease organisms and toxic substances. In numerous instances, birds have been lost when wings and feathers have become coated with oil or other petroleum products floating in the water.

Although marginal areas undoubtedly would harbor greater numbers of birds in the absence of pollution, relatively few areas are so contaminated that birds cannot tolerate them. Nonetheless, the destruction of aquatic plants and the bottom fauna by polluting substances contributes to the scaricty of waterfowl and shorebirds. Birds can make only limited use of areas which do not provide food or shelter.