

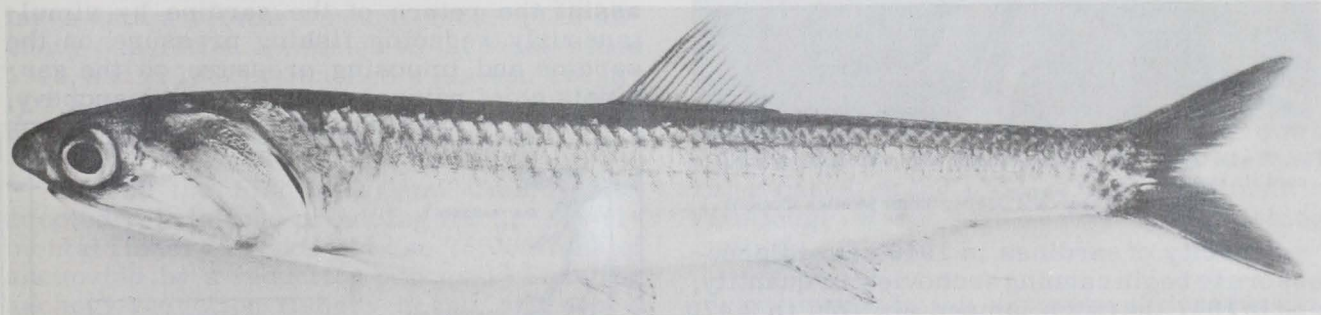
ANCHOVY--SMALL FISH, BIG PROBLEM

James D. Messersmith

A small but valuable fish of great interest to sports and commercial fishermen has been the subject of considerable concern in California recently. This is the anchovy--more properly known as the northern anchovy or Engraulis mordax.

It might be said that the basic use of the anchovy is as food for larger fish. Sportsmen are interested in the anchovy because it is the most desirable live bait available, and they yearly use more than 5,000 tons as live bait.

The anchovy also supports an important commercial fishery. Some of the commercial catch is canned, primarily for export, and a share is used in canned pet foods. In addition, huge quantities of the fish are reduced for use as a protein supplement in animal and poultry foods and for fertilizer.



(DFG photo: Jack W. Schott.)

During the past few years a spirited controversy over the anchovy has arisen among special interest groups concerned with fisheries. This controversy revolves around:

1. Recommendations by state, university, and federal marine scientists that a larger percentage of the available anchovy resource be harvested;
2. Requests by the fishing industry for larger reduction quotas; and,
3. Unyielding opposition to such proposals by sport fishermen who use anchovies for live bait and chum.

The controversy is intensified because the anchovy is important as forage for fishes of interest to sportfishermen and because of the history of the overharvested Pacific sardine resource.

What happened to the sardine?

The sardine fishery reached its peak in California in the thirties and early forties. In 1936 Dr. Frances N. Clark, then director of the State Fisheries Laboratory, predicted a decline of the sardine fishery on the basis of studies she made on the catch-per-effort of fishing boats. It had become increasingly more difficult for the boats to make high catches by that time. A succession of exceptionally good years delayed the decline, but the sardine fishery eventually collapsed.

Then, as now, the Fish and Game Commission and the Department of Fish and Game

were in favor of scientific management of fisheries, but they were unable to achieve a curtailment in the rate of harvest, and this contributed to the collapse.

Although the sardine population was allowed to decline, this does not mean now that nothing should be harvested. While scientific management implies that resources must not be overharvested, it also implies that resources should be utilized fully.

The Department's position is still consistent. It is still in favor of management--in favor of not overharvesting any of the marine resources--and in favor of not "giving away" the anchovies, either.

Reliable records of commercial anchovy landings used for human consumption, dead bait, feeding in fish hatcheries and mink farms, and reduction to oil and meal date from 1916. Average annual landings through 1921 were only 504.5 tons, mostly for reduction to oil and meal.

In 1919 a law was passed prohibiting the reduction of whole fish except under permit. Teeth were put into the law in 1921, resulting in reduced landings averaging 159 tons for the next 17 years. Between 1939 and 1946, landings averaged 1,454 tons.

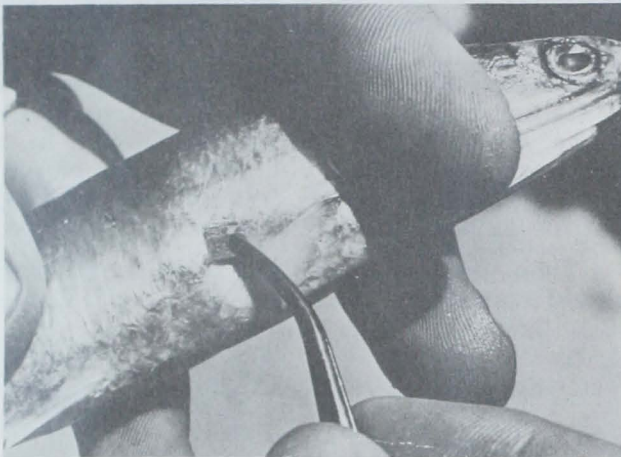


Fig. 2 - DFG biologist inserts a metal tag in an anchovy to record its movements.
(Photo: Bill Beebe, Santa Monica Outlook.)

Scarcity of sardines in 1946 caused processors to begin canning anchovies in quantity, and in 1947 the catch jumped six-fold to 9,470 tons. The landing capacity of the fishing boats exceeded the canning needs of plants, and excess deliveries were diverted to reduction plants.

To lower the amount of anchovies reduced, the Fish and Game Commission required each processor to place a high proportion of each ton of anchovies in cans.

With the temporary resurgence of the sardine through 1951, anchovy canning declined. But with the collapse of the sardine fishery in 1952, anchovy landings increased to 27,891 tons and to 42,918 tons in 1953.

Because of economic conditions and presumably low consumer acceptance of the canned product, landings declined to 19,400 tons in 1957 and 5,200 tons in 1958. Landings did not again exceed 5,000 tons until 1966

when, for the first time in more than forty years, anchovies were fished solely for reduction purposes.

Anchovies are very important in California as live and dead bait. Records of the live bait catch were initiated in 1939 and, except during World War II, have been submitted voluntarily ever since. These records account for most of the catch, but are not complete because some operators do not submit records.

When records were first started, live bait landings were 1,074 tons and accounted for 58 percent of the statewide anchovy catch. Since 1950, anchovy live bait landings have fluctuated between 3,800 and 6,800 tons, averaging 5,570 tons for the past several years.

Why the interest in harvesting anchovies in large quantities?

In 1964 the California Cooperative Oceanic Fisheries Investigations (CalCOFI) Committee proposed an ecological experiment to assist the return of the sardine by simultaneously reducing fishing pressure on the sardine and imposing pressure on the sardine's chief natural competitor, the anchovy.

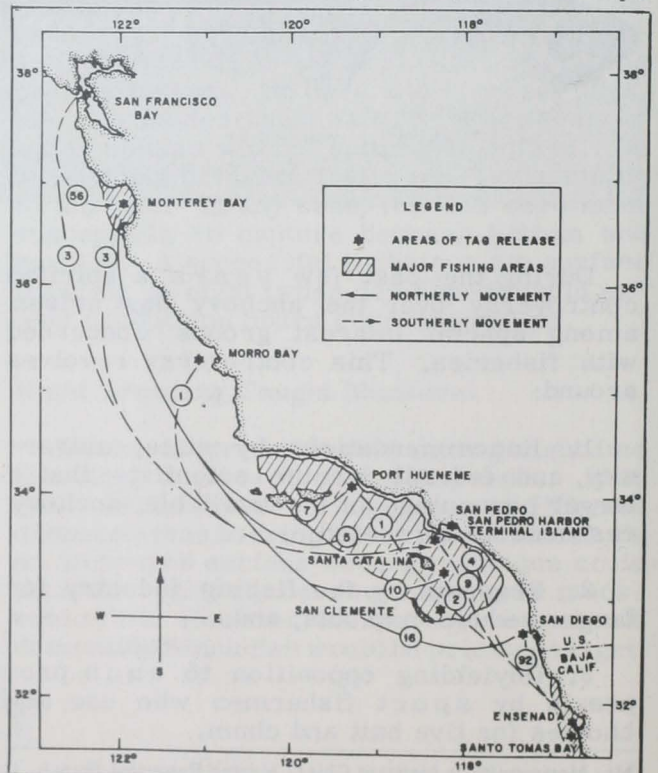


Fig. 3 - DFG chart depicts gross movements of anchovies tagged and recaptured from March 14, 1966 through May 31, 1969.

The proposed experiment consisted of three phases:

1. A controlled anchovy harvest of 200,000 tons with an annual quota for approximately three years.

2. Quota adjustments on the basis of findings during phase 1.

3. Restoring ultimately the predecline balance between sardines and anchovies and maximizing the harvest of both species consistent with all uses.

CalCOFI noted that if both the sardine fishery and competition from anchovies are affecting the sardine population--and if the objective was to bring back the sardine in the shortest possible time--there should be fishing on anchovies and a complete moratorium on sardine fishing.

At the time of this proposal the total spawning biomass of anchovies in the California Current was estimated to be between 1.8 and 2.25 million tons based on egg and larva data available through 1958. (The anchovy population continued to increase since 1958, and in 1962 it reached a plateau roughly 2.5 to 4 times greater than the 1958 estimate. It remains there today.)

In 1965 the Fish and Game Commission adopted regulations providing for an experimental fishery to take and use 75,000 tons of anchovies by a reduction process. Thus the anchovy reduction fishery began, and zones were established. A season was set and fishing was prohibited within three miles of the mainland shore.

When the Commission authorized the anchovy reduction fishery, the Department of Fish and Game initiated a project responsible for monitoring the fishery and conducting any biological studies on the anchovy necessary for resource management.

Project objectives included determination of migratory habits, estimates of population size and mortality rates, catch locations, catch per unit of effort, number and pounds of anchovies landed, the age-composition of the catch, and other fishery statistics. Initial efforts were directed toward tagging and tag recovery, and fishery monitoring of the commercial reduction and live bait fisheries.



Fig. 4 - This commercial fish net holds between 60 and 80 tons of sparkling anchovies. The average size is $5\frac{1}{2}$ to 6 inches.
(DFG photo: The author.)

When the Fish and Game Commission established the reduction fishery, it laid down rules under which the fishery was to operate, rules based on the state of the Department's knowledge of the resource and of fishing methods.

For example, an experimental reduction fishery was authorized because of the consensus that there was a large under-utilized resource. Quotas were set and processor permits were required in order to control the growth of the fishery. Declarations of intent were required of fishermen when it became apparent that it would simplify enforcement problems.

Fishing zones were established because, in the absence of migration data, it was thought necessary in order to prevent over-fishing in local areas, especially where these areas bordered prime live bait fishing grounds.

The concern was that areas bordering the live bait fishing grounds might be depleted and that they may not be replenished, by migrations, during the closed season and prior

