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**DIVISION OF FISH AND GAME OF CALIFORNIA
FISH BULLETIN No. 30
The Commercial Fish Catch of California for the Year 1929**



By
the Staff of the
BUREAU OF COMMERCIAL FISHERIES

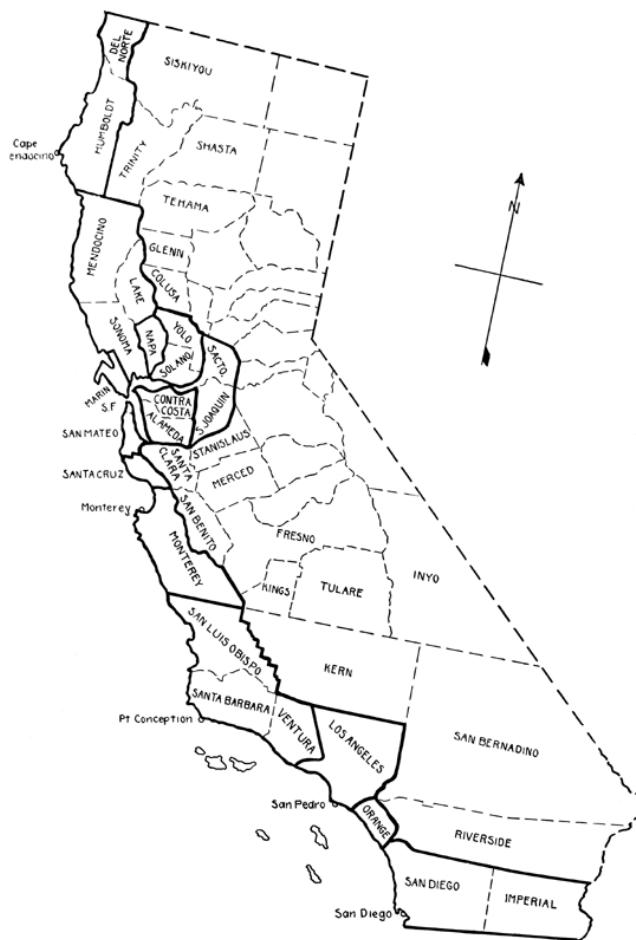


FIG. 1. Map of California. Districts where commercial fisheries products are landed outlined with heavy line.

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1. INTRODUCTION

By W. L. SCOFIELD

For many years the Bureau of Commercial Fisheries has collected complete statistics of the fish catch of California by means of a system of triplicate receipts which record the number of pounds of each species landed by each fishing boat each day. These receipts yield many types of detailed information concerning our fisheries. The annual total catch records have been published in the Biennial Reports of the Division of Fish and Game and also issued in the form of circulars for more ready distribution. Totals compiled by three-month periods have been published regularly in the quarterly magazine, California Fish and Game.

Monthly catch records have been compiled because of their significance in determining fishing seasons as well as furnishing basic information for the administration of our fisheries. For a number of years these monthly totals were not made public, but beginning in 1929 the Bureau of Commercial Fisheries issued Fish Bulletin No. 15 for the purpose of presenting the tables of monthly fish catch with explanatory text and illustrative graphs. This was followed in 1930 by Fish Bulletin No. 20. The present publication is therefore the third in this series of bulletins picturing the monthly as well as the seasonal and annual catch records for the various districts of the State of California.

Each boat engaged in commercial fishing in this State is required to register annually with the Bureau of Commercial Fisheries in order that we may have some gauge of the fishing effort expended in each district. The registration includes dimensions, type and power of the boat itself, as well as recording the kind of fishing pursued, number of men employed, months fished, amount and description of the gear operated in each fishery. Although these records have been useful to the bureau in many ways they have not before been summarized for publication. There is included in this bulletin such a summary to show the number, size and type of boats engaged in the fisheries of each district in the State.

The published statistics of the fish catch of California are usually expressed in terms of pounds landed. Our triplicate fish receipt records indicate the price per pound paid to the fisherman so that the catches may be expressed as money value rather than tonnage. For several years, Carl B. Tendick, statistical agent for the United States Bureau of Fisheries, has prepared from these receipts an annual report

for the federal bureau, including a valuation of the California catch. Through the courtesy of the United States Bureau of Fisheries, we are here including a brief valuation survey prepared by Mr. Tendick.

2. COMMON AND SCIENTIFIC NAMES OF FISHES, CRUSTACEANS AND MOLLUSKS

Compiled by LIONEL A. WALFORD

The common names used in this list conform to the names designated as official by the Division of Fish and Game of California. Inspection will reveal a few changes in the list published in Fish Bulletin No. 20, namely: California halibut instead of southern halibut, cultus instead of cultus cod, Pacific mackerel instead of mackerel.

The purpose of this list is to indicate as clearly as possible the scientific names assignable to each of the common names used in this publication. In cases where scientific names are under dispute by zoologists, the more familiar form is given.

Common name	Scientific name
Albacore	<i>Germo alalunga</i>
Anchovy	<i>Anchoviella compressa</i> <i>Anchoviella delicatissima</i>
	<i>Engraulis mordax mordax</i> <i>Engraulis mordax nanus</i>
Barracuda	<i>Sphyraena argentea</i>
Bonito	<i>Sarda chiliensis</i>
Cab- rilla—Mexican	<i>Epinephelus analogus</i>
	Various species of <i>Mycteroperca</i>
Carp	<i>Cyprinus carpio</i>
Catfish	<i>Ameiurus catus</i> <i>Ameiurus nebulosus</i>
<i>Corbina—Mexican</i>	<i>Cynoscion othonopterus</i> <i>Cynoscion xanthulus</i> <i>Micropogon ectenes</i> Other members of the family <i>Sciænidæ</i>
Cultus—Pacific	<i>Ophiodon elongatus</i>
Eel	<i>Cebidichthys violaceus</i> <i>Gymnothorax mordax</i> <i>Xiphister mucosus</i> Other stichaeids and blenniids
Flounder	<i>Platichthys stellatus</i> Possibly other <i>Pleuronectids</i>
Grayfish	<i>Alopias vulpes</i> <i>Isurus glaucus</i> <i>Mustelus californicus</i> <i>Rhinotriacus henlei</i> <i>Squalus suckleyi</i> Other sharks
Grouper	Various species of <i>Mycteroperca</i>
Hake	<i>Merluccius productus</i>
Halibut—Californi	<i>Paralichthys californicus</i>
a	
Halibut—Northern	<i>Hippoglossus hippoglossus</i>
Hardhead	<i>Orthodon microlepidotus</i> <i>Mylopharodon conocephalus</i>
Herring	<i>Clupea pallasii</i>
Kingfish	<i>Genyonemus lineatus</i> Small percentage of <i>Seriphus politus</i>

Mackerel-Pacific	<i>Pneumatophorus japonicus diego</i> 1
Mackerel-Horse	<i>Trachurus symmetricus</i>
Mullet	<i>Mugil cephalus</i>
Perch	Various members of the family Embiotocidae found in California
Pike	<i>Ptychocheilus grandis</i>
Pompano-California	<i>Palometa simillima</i>
Pompano-Mexican	Various species of Trachinotus, and possibly other carangids
Rock bass	<i>Paralabrax clathratus</i> <i>Paralabrax nebulifer</i>
Rockfish	All species of Sebastodes found in California
Sablefish	<i>Anoplopoma fimbria</i>
Salmon-King	<i>Oncorhynchus tschawytscha</i>
Salmon-Silver	<i>Oncorhynchus kisutch</i>
Sand dabs	<i>Orthopsetta sordida</i>
Sardines	<i>Sardina cærulea</i>
Sculpin	<i>Scorpæna guttata</i>
Sea-bass-Black	<i>Stereolepis gigas</i>
Sea-bass-White	<i>Cynoscion nobilis</i>
Shad	<i>Alosa sapidissima</i>
Sheepshead	<i>Pimelometopon pulcher</i>
Skate	Various members of the family Rajidae
Skipjack	<i>Katsuwonus plemais</i>
Smelt	Various species of the families Atherinidae and Osmeridae
Sole	<i>Eopsetta jordani</i> ; <i>Errex zachirus</i> ; <i>Parophrys vetulus</i> Several other pleuronectids
Split-tail	<i>Pogonichthys macrolepidotus</i>
Striped Bass	<i>Roccus lineatus</i>
Sucker—Sacramento	<i>Catostomus occidentalis</i>
Swordfish	<i>Makaira mitsukurii</i> ; <i>Xiphias gladius</i>
Tomcod	<i>Microgadus proximus</i>
Totuava	<i>Cynoscion macdonaldi</i>
Tuna—Bluefin	<i>Thunnus thynnus</i>
Tuna—Yellowfin	<i>Neothunnus macropterus</i>
Turbot	<i>Hypsopsetta guttulata</i> ; <i>Pleuronichthys decurrens</i> ; <i>Pleuronichthys ritteri</i> ; <i>Pleuronichthys verticalis</i> ; Possibly other pleuronectids
Whitebait	<i>Allosmerus attenuatus</i> ; Young of <i>Hypomesus pretiosus</i> , <i>Spirinchus thaleichthys</i> , and sometimes of other small fishes.
Whitefish—Ocean	<i>Caulolatilus princeps</i>
Yellowtail	<i>Seriola dorsalis</i>
CRUSTACEANS	
Crab—Market	<i>Cancer magister</i>
Shrimp—California	<i>Crago franciscorum</i>
Spiny Lobster	<i>Panulirus interruptus</i>
MOLLUSKS	
Abalone—Green	<i>Haliothis fulgens</i>
Abalone—Red	<i>Haliothis rufescens</i>
Clam—Cockle	<i>Paphia staminea</i> , and species of <i>Chione</i>
Clam—Pismo	<i>Tivela stultorum</i>
Clam—Softshell	<i>Mya arenaria</i>

1 Jordan and Hubbs (Carnegie Mus., Mem., vol. 10, p. 210, 1925) separated the California mackerel from the Japanese, making the former *Pneumatophorus diego*. However, according to G. S. Myers, the differing characters intergrade and the subspecific *Pneumatophorus japonicus diego* should be used.

Mussel	<i>Mytilus californianus</i>
	<i>Mytilus edulis</i>
Octopus	<i>Polypus hongkongensis</i> 2
	<i>Polypus bimaculatus</i> 3
Oyster—Eastern	<i>Ostreavirginica</i>
Oyster—Native	<i>Ostrealurida</i>
Squid	<i>Loligo opalescens</i>

2 Some scientists claim that this name is incorrect and should be *Octopus apollyon*, but for the purposes of this work the more familiar form has been used.

3 The name *Octopus* is claimed by some scientist to be the correct generic name, for the purposes of this work the more familiar form has been used.

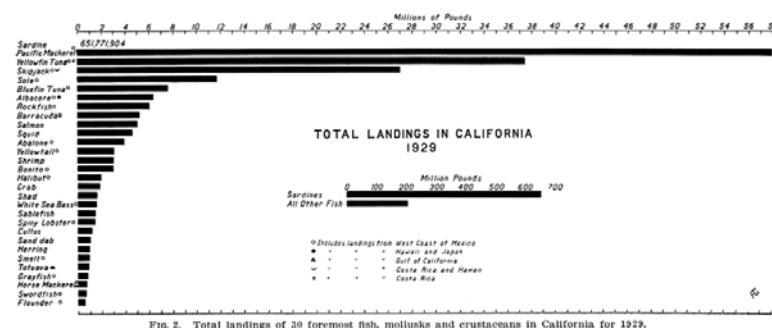


FIG. 2. Total landings of 30 foremost fish, mollusks and crustaceans in California for 1929.

3. COMPARISON OF TOTAL LANDINGS

By ANNIE GILLESPIE

3.1. 1929 FISH CATCH COMPARED WITH 1928

The total commercial landings of fisheries products for 1929 were nearly 300,000,000 pounds (or 47 per cent) greater than those for the previous year. The increase was due chiefly to the deliveries of the species used for canning, especially sardines, the landings of which were 55 per cent greater than in 1928. Of the total catch of 857,000,000 pounds, 652,000,000 pounds were sardines. The catch of Pacific mackerel for 1929 was 22,700,000 pounds (or 64 per cent) greater than that of the previous year. This increased utilization of mackerel and the greatly augmented sardine catch were the two outstanding features of the 1929 records of tonnage landed. Skipjack with an increase of 70 per cent and yellowfin tuna with 16 per cent were also factors which helped to swell the total. The increase of 30 per cent of all species from the west coast of Mexico should not be overlooked in comparing the 1929 with the 1928 figures. Due to importations from distant fishing banks, albacore showed a gain of 50 per cent. Bluefin tuna dropped off 6,000,000 pounds or 45 per cent, this being the only cannery fish with a smaller catch for 1929.

Among the species of fish delivered to the wholesale and retail markets of the State during 1929, there were only a few important deviations from the 1928 totals. The most significant changes were a 45 per cent increase in flounders and a 62 per cent gain for swordfish. Barracuda, a staple market fish in southern California, fell off 19 per cent from the 1928 total. The drop in totuava no doubt results from the fact that records obtained from Mexico for 1928 were not available for the 1929 catch from the Gulf. Minor changes were increases in the catches of Pacific cultus, sablefish and tomcod and a smaller catch of rock bass in 1929. Mollusks and crustaceans showed decided rises in five species: squid, shrimp, spiny lobster, abalone, and octopus. The catch of squid fluctuates greatly from year to year, and 1929 happened to be a big year with a total of 4,660,000 pounds, nearly 3 ½ times greater than in 1928. The crab catch for 1929 was close to the average for the four or five preceding years, but compared with 1928 alone there was a 50 per cent decrease, due chiefly to the fact that 1928 landings were unusually heavy. Eastern oysters show a decrease of 40 per cent.

The total catch by districts as shown in the following table:

	Pounds
Los Angeles	383,867,762
Monterey	337,617,759
San Francisco	64,035,744
San Diego	63,220,175
Northern Coast	5,309,127
Sacramento-San Joaquin Rivers	3,210,464
Total	857,261,031

indicates the relative importance of various fishing centers. The Los Angeles district, comprising San Luis Obispo, Santa Barbara, Ventura, Los Angeles and Orange counties, led the other districts in amounts landed. The bulk of its catch was cannery fish: sardines, tuna and mackerel. Second place went to Monterey-Santa Cruz, in which district most of the catch consisted of sardines. The increase in the sardine catch at San Francisco enabled that district (San Francisco, San Mateo and Marin counties) to take third place, although the Mexican tuna catch landed at San Diego brought that district to within a million pounds of San Francisco. The northern coast district, including Sonoma, Mendocino, Lake, Humboldt, and Del Norte counties, was far behind all the other seacoast districts in amounts landed but still ahead of the Sacramento River district which showed a relatively small total catch. The river district counties are Sacramento, San Joaquin, Solano, Yolo, Contra Costa, and Alameda.

A large proportion of fish landed at Los Angeles and San Diego was caught in foreign waters, as shown in the following table:

	Pounds
Mexico	65,113,411
Japan	5,798,175
Gulf of Lower California	912,435
Hawaii	102,629
Costa Rica	55,665
Total	71,982,315

The total foreign catch comprised 9 per cent of the total California landings in 1929. Albacore and skipjack taken in Hawaii and albacore from Japan were brought, frozen, to California canneries by ocean liners. Totuava and small amounts of other market fish were brought by truck and rail from the Gulf of California, Mexico. Tuna and an increased amount of market fish were caught off the west coast of Mexico, principally off Lower California, and landed in California. The landings from Mexican waters included three important fish that were formerly reported from California waters only: bluefin tuna, swordfish and flounders. Some of the tuna boats ranged far afield and a small amount of skipjack and yellowfin tuna was caught off Costa Rica.

Figure 3 compares the landings of locally caught southern California fish with the San Diego and Los Angeles deliveries of

fish caught south of the international boundary line. The sardine catch and landings of mollusks and crustaceans have been omitted to make the figures more comparable.

That the increase over 1928 is not accidental but the continuation of a steady upward trend can be seen in figure 4. Since 1921, with the exception of a slight decline in 1926, each year has shown an increase over the preceding year. The increase of 1929 over 1928, however, was greater than any other year.

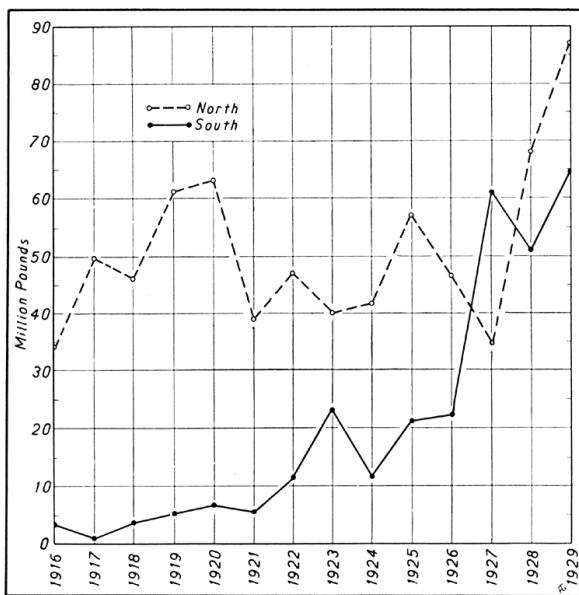


FIG. 3. Comparison of landings (exclusive of sardines, mollusks and crustaceans) in southern California from north and south of international boundary. North includes San Luis Obispo, Santa Barbara, Ventura, Los Angeles, Orange and San Diego counties. South covers landings from below the United States-Mexican boundary line

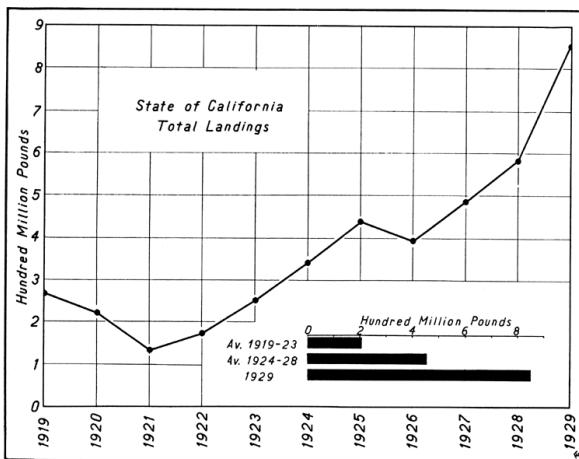


FIG. 4. Total yearly landings for State of California, including species of fish, mollusks and crustaceans, 1919-1929, inclusive

4. MARKET PRODUCTS

4.1. PART I. PRODUCTS SOLD IN THE FRESH FISH MARKETS

By W. L. SCOFIELD

The fish catch of California is delivered chiefly to canneries which are concentrated at a few ports. A much smaller portion of the food products taken from the sea is delivered fresh to the wholesale and retail fish markets of the State, and these markets are scattered along our entire coast line from Oregon to Mexico, but naturally the volume of business is concentrated at the ports nearest the centers of greatest population. These scattered fish markets, although insignificant, judged solely on the basis of pounds of fish landed, are after all of great importance to the people of the State for it is these markets that supply our homes and restaurants with fresh sea foods. Our markets supply us the year round with a bewildering variety that is equalled in few other parts of the world. The people of California are vitally concerned not only with the amount and quality of the foods handled in our fish markets but also with the question of whether our source of supply is being overworked, necessitating a curtailment of yield in the future. We will, however, confine ourselves here to the amounts of sea food products delivered to the markets and for convenience we adopt the term "market products" to include all fish, mollusks and crustaceans sold for consumption in a fresh condition, as contrasted with fish delivered to packing plants for the purpose of canning.

It is an outstanding fact that the volume of market products handled in California has remained fairly constant from year to year in spite of the rapidly increasing population of the State. To be sure there has been some growth in the total poundage but the increase is not great, especially during recent years. (See fig. 8.) Taking the last eight years as an example, the average yearly delivery of market products in California has been 62,700,000 pounds. (See fig. 5.) If we let this average represent 100 per cent we may express the market catch for each year as a percentage of this average, with the following result:

1922 69#	1923 89#	1924 109#	1925 107#	1926 99#	1927 117#	1928 96#	1929 114#
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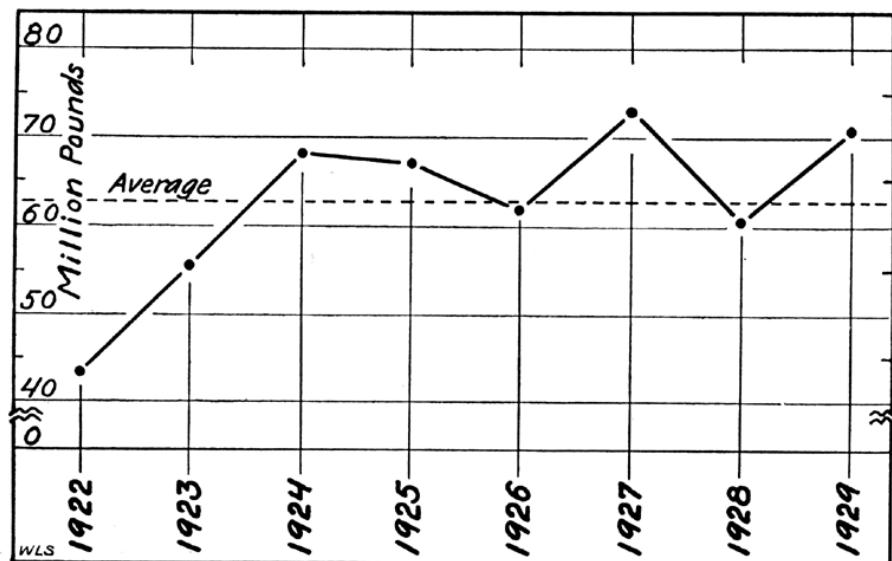


FIG. 5. Annual landings at the fresh fish markets of fish, mollusks and crustaceans (cannery fish omitted).

FIG. 5. Annual landings at the fresh fish markets of fish, mollusks and crustaceans (cannery fish omitted)

The 1929 deliveries of market products were an increase of 18 per cent over the previous year, but this gain is not so gratifying when we notice that 1928 was below average and that 1929 falls short of the figure reached in 1927. Figure 5 pictures the annual landings of market products in the State for the eight-year interval, 1922-1929.

4.2. PART II. IMPORTANT MARKET FISH

By ANNIE GILLESPIE

The most important of the fishes delivered almost exclusively to fresh fish markets are, in order of greatest amounts landed in 1929: sole, rockfish, barracuda, salmon, and halibut. (See fig. 6.) Large landings of mackerel, yellowtail and bonito are made to the markets, but these fish are also canned to a considerable extent.

The term "sole" is used to denote several species of closely related flatfish. Most of the sole taken in California is delivered to northern ports, chiefly San Francisco. The decline in salmon landings may be a partial explanation for the increased sole catch. (See fig. 6.) Because the supply of salmon could not keep up with the demand for fine fresh fish, another source of supply was drawn upon more heavily and sole is now meeting the demand in a satisfactory manner.

Rockfish is landed in greater or lesser numbers at every seacoast fishing town in the State. A large number of species of the genus *Sebastodes* comprises this category. The rockfish catch shows minor fluctuations from year to year, but no significant upward or downward trend appears.

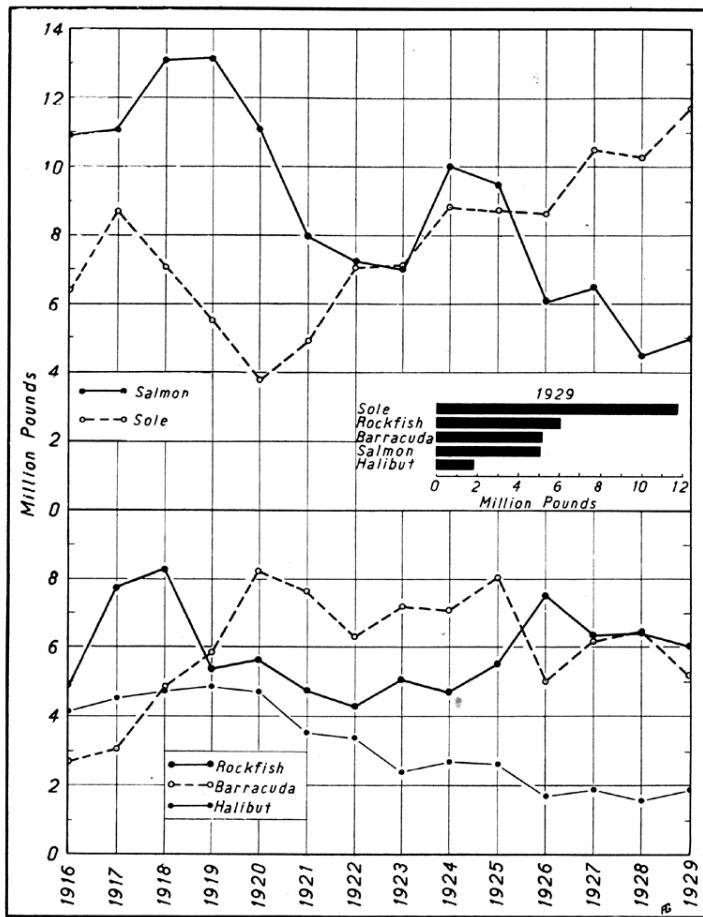


FIG. 6. Catches of the five important fresh fish landed in California, 1916–1929, inclusive

Barracuda is primarily a southern fish, being taken off the coasts of southern California and Lower California, Mexico. Since 1920, there has been a slight downward trend in the amounts delivered. In 1929 the Mexican importations amounted to 25 per cent of the total barracuda catch. Salmon is taken commercially in Sacramento, San Joaquin, Klamath and Smith rivers, and in the ocean from Monterey to the Oregon boundary. The fact that this fish is probably the most widely known and popular of all our aquatic and marine products, causes the decline of its total catch and an

indication of its depletion to be of general concern. Salmon landings are discussed in detail in another article in this bulletin. (See page 38.)

Two species of fish known as halibut are caught in California waters: the California halibut (*Paralichthys californicus*) and the northern halibut (*Hippoglossus hippoglossus*). The former is taken south of San Francisco, including Mexican waters; the latter from San Francisco north. The California halibut is by far the more important of the two. 4 of the total halibut catch for 1929, 16 per cent came from south of the United States-Mexican boundary. Halibut landings have shown an alarming downward trend, due to the decrease in the catch of the southern species. The California halibut is now the subject of an intensive boat catch analysis, which is being made with the hope that some remedy may be found, and recommendation made to help the situation.

5. IMPORTANT SHELLFISH

By ANNIE GILLESPIE

Shellfish form an important part of California's natural resources. Besides their value to fishermen and marketmen, they act as an inducement to the tourist trade, being featured by many eating places that specialize in sea foods and cater to vacationists. Some of the most lasting memories that seashore visitors take away with them are of clam chowders, abalone steaks, shrimp salads, and crab cocktails. That the shellfish are not without honor in their own land can be deduced from the fact that few Californians are unfamiliar with the sea food delicacies that the tourists relish.

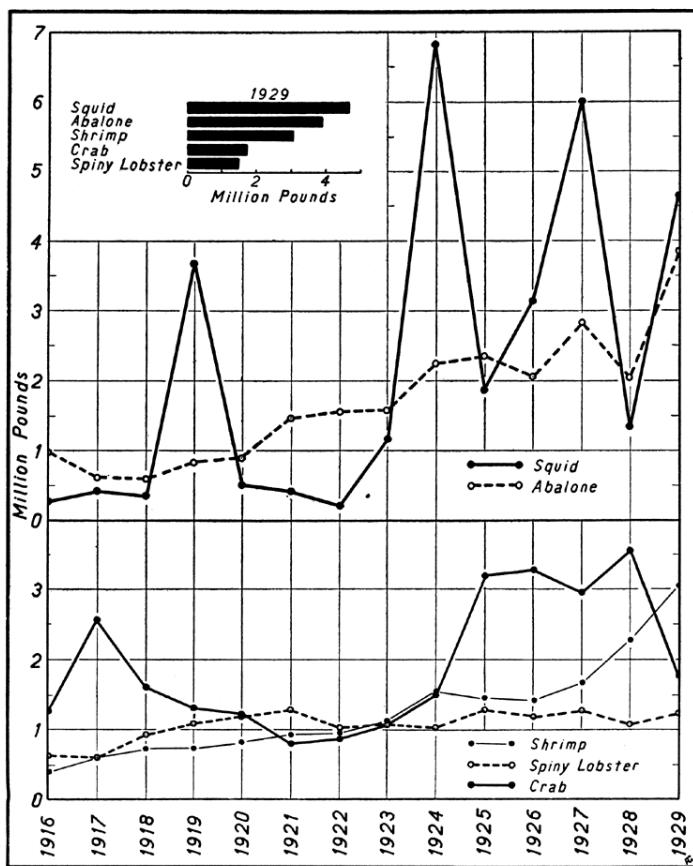


FIG. 7. Catches of the five important shellfish landed in California, 1916-1929, inclusive

of the numerous mollusks found along the coast, the following are taken commercially: squids, abalones, eastern and native oysters, octopi, mussels, Pismo clams, and several other species of clams. Squids and abalones, the greatest landings of which are made at

Monterey, are the most important of these. Squids are utilized fresh, dried and canned. Orientals in particular enjoy them, and quantities are exported to Asia. Great fluctuations in the squid catch take place from year to year (see fig. 7) due almost entirely to economic conditions in China, but possibly also to actual variation in abundance.

Abalones, taken exclusively for fresh consumption, have grown in popularity as people have learned to appreciate their fine flavor. Consequently their total landings have increased steadily during the last thirteen years. (See p. 59.)

Three kinds of crustaceans are taken commercially in California: shrimps, crabs and spiny lobsters, all of which rank high among California fisheries products, both in value and in amounts landed. In 1929, the leading crustaceans were the shrimps, the catch of which has steadily increased for some years. They are taken in San Francisco Bay exclusively and are used fresh in California or dried for export to China. Crabs are taken off the northern California coast from Monterey Bay to Eureka, and are used in the fresh state only. Until 1928 the crab catch showed a continued increase, but results in 1929 were disappointing, and shrimps passed the crabs in amounts landed for the first time since 1924. Spiny lobsters are taken off the southern California and Lower California coasts entirely for the fresh fish trade. Although local catches have remained relatively low, the exploitation of Mexican waters has caused the total to rise. In 1929 the importations from Mexico amounted to 73 per cent of the total catch.

In speaking of shellfish it is not amiss to mention that turtles occasionally find their way into fisheries records. These reptiles, it is true, are covered with horn rather than shell—but they look like shellfish. Most of these come from the west coast of Mexico, but once in a while a large sea turtle or leatherback is caught off California shores and delivered to the markets, to be made into soup or exhibited as a curiosity.

6. INCREASING UTILIZATION OF CANNERY FISH

By W. L. SCOFIELD

During the calendar year 1929, the fishery products landed in California amounted to 857,000,000 pounds, a figure breaking all previous tonnage records for this State. (This figure includes local landings of fish, mollusks, crustaceans, and frozen fish imported from Japan and Hawaii, as well as the fish brought up from the coasts of Mexico and Central America.) The former tonnage record was made in 1928, but in that year the high mark was due entirely to the increased deliveries made to cannery plants since the 1928 deliveries to the fresh fish markets of the State fell off somewhat from the figures reached in previous years. The 1929 increase over 1928 is to be found not only in the fish landed at the canneries but also in the deliveries to the fresh fish markets. However the great increase of 1929 is accounted for chiefly by the huge tonnage of fish intended for canning.

The 1929 increase in cannery fish was approximately 50 per cent, while the increase over 1928 in market products (fish, mollusks and

crustaceans) was only about 19 per cent. The following table expresses the relationship between the 1928 and 1929 landings.

	Cannery fish	Market products	Total
1928	522,560,000	60,490,000	583,050,000
1929	785,250,000	72,010,000	857,260,000
Increase	50%	19%	47%

Approximately 92 per cent of the fishery products of the State were landed at the canning plants in 1929. Because the amounts delivered to the markets have remained relatively constant and because there

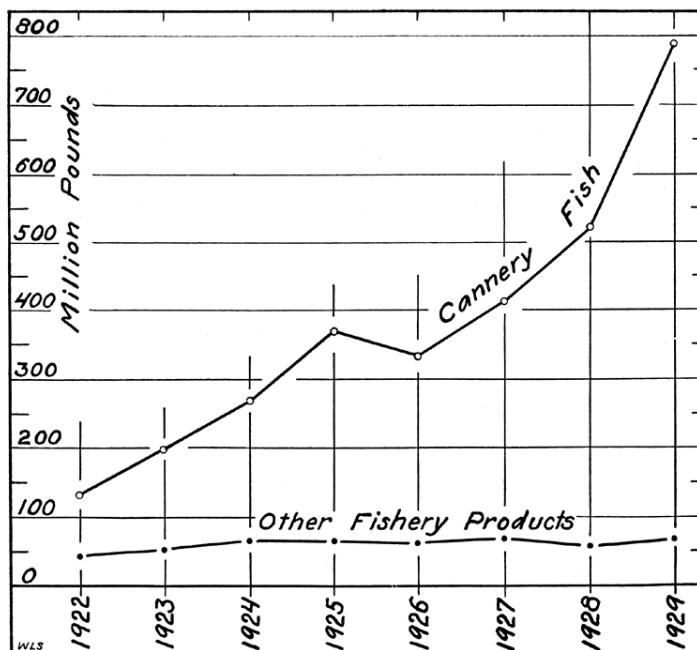


FIG. 8. Illustrating the great increase in the utilization of cannery fish and the relative constancy of all other fishery products landed in California during the 8-year interval, 1922-1929

has been a steady increase through the years in the cannery tonnage, the cannery catch of fish has been responsible for the growing California totals. Consequently the proportion of cannery fish to the total fishery products has increased from year to year. This is illustrated by the accompanying table in which cannery fish have been segregated from all other fishery products and expressed both as pounds landed and as a percentage of the total catch for each year. It will be noticed that in 1922 the cannery fish comprised three-fourths of the total, while in 1929 the fish delivered at packing plants made up over nine-tenths of the total landings in the State.

POUNDS OF FISHERY PRODUCTS LANDED IN CALIFORNIA
1922-1929

Year	Cannery fish	Percentage of cannery fish to total	Other products	Total
1922	130,930,000	75	43,060,000	173,990,000
1923	197,970,000	77	55,780,000	253,750,000
1924	272,050,000	80	68,040,000	340,090,000
1925	370,070,000	83	67,070,000	437,140,000
1926	332,380,000	84	62,330,000	394,710,000
1927	413,490,000	85	73,310,000	486,800,000
1928	522,560,000	90	60,490,000	583,050,000
1929	785,250,000	92	72,010,000	857,260,000

In the figures of cannery fish we have included the important landings at the packing plants and have omitted such packs as salmon and

squid since they are insignificant compared with the sardine, mackerel and tuna packs. The proportion of sardines delivered to the fresh fish markets in the various districts of the State was not determined with exactness, but of the total sardine catch only a small fraction of 1 per cent was retailed as fresh fish. Mackerel is a species that formerly was sold almost exclusively in the fresh fish markets but the canning of this species began on a large scale in 1928, and in 1929 only about 10 per cent of the catch was retailed as fresh fish. Practically the entire catch of albacore, skipjack, yellowfin tuna, and bonito is used for canning. About nine-tenths of the bluefin tuna was canned. In 1929 more of the catch (50 per cent) of yellowtail was canned than was usual in former years and half of the total was sold in the markets.

The combined catches of these eight cannery species is but a little short of 794,000,000 pounds, which is 92 per cent of the total landings of the State for 1929, including imported fish, mollusks and crustaceans. About 99 per cent of the total landings of these eight species was utilized in packing plants. The accompanying table presents the 1929 catches of the chief cannery species giving the poundage and percentage of the total used in the canneries of the State.

CANNERY SPECIES (1929)

Species	Cannery	Percentage of total used in canneries	Fresh	Total
Sardines.....	651,000,000	100	770,000	651,770,000
Mackerel.....	52,570,000	91	5,410,000	57,980,000
Yellowfin Tuna.....	36,630,000	98	810,000	37,440,000
Skipjack.....	27,000,000	100	0	27,000,000
Bluefin Tuna.....	6,680,000	89	850,000	7,530,000
Albacore.....	6,110,000	100	0	6,110,000
Bonito.....	2,730,000	94	190,000	2,920,000
Yellowtail.....	1,530,000	50	1,540,000	3,070,000
Totals.....	784,250,000	99	9,570,000	793,820,000

The catches of fish intended for canning were landed in the region of Los Angeles and Monterey with lesser deliveries at San Diego, Pittsburg (near San Francisco) and at Hueneme (Ventura County). As mentioned before, we have not included the small amounts canned of such species as salmon and squid. The accompanying table presents the pounds of cannery fish landed in 1929 at each of the above mentioned localities.

CANNERY FISH (1929)

By Districts

Species	San Pedro and Hueneme	Monterey	San Diego	San Francisco	Total
Sardines.....	283,000,000	323,100,000	3,900,000	41,000,000	651,000,000
Mackerel.....	43,850,000	90,000	8,630,000	-----	52,570,000
Yellowfin Tuna.....	11,690,000	-----	24,940,000	-----	36,630,000
Skipjack.....	11,610,000	-----	15,390,000	-----	27,000,000
Bluefin Tuna.....	5,490,000	-----	1,190,000	-----	6,680,000
Albacore.....	6,020,000	-----	90,000	-----	6,110,000
Bonito.....	2,510,000	-----	220,000	-----	2,730,000
Yellowtail.....	680,000	-----	850,000	-----	1,530,000
Totals.....	364,850,000	323,190,000	55,210,000	41,000,000	784,250,000

7. THE VALUE OF THE COMMERCIAL CATCH OF FISHERY PRODUCTS IN CALIFORNIA

BY CARL B. TENDICK, Agent, United States Bureau of Fisheries

As the fisheries are one of California's important natural resources, the question is often asked, "How valuable is the commercial fish catch of the State?" For four consecutive years the writer has compiled the total valuation by species of the fish catch of California.⁵ These valuations are based on the sale price of fishery products as landed by the fishermen at the docks, and are herein shown to the nearest one thousand dollars.

In 1929, the fisheries of California had a total valuation of \$12,870,000. (See table 25, page 132.) This is an increase of more than 24 per cent over 1928, and establishes a new high record. It is interesting to note here that the 1929 record is five times as large as the valuation for 1904, twenty-five years previous. A graphic presentation of the total annual valuations of the fisheries of California for the past four years (see fig. 9) illustrates the remarkable growth that has taken place in recent years.

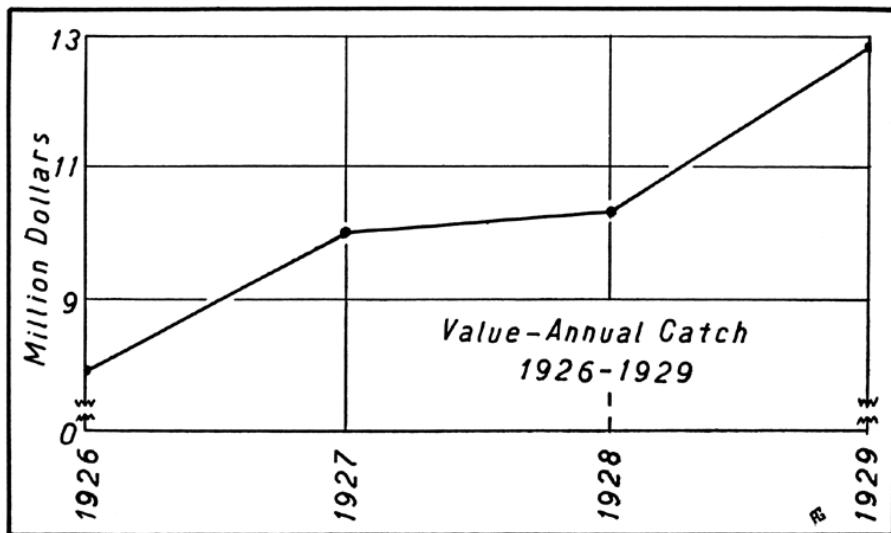


FIG. 9. Represents the trend of the value of the commercial fish catch of California, 1926-1929.

FIG. 9. Represents the trend of the value of the commercial fish catch of California, 1926-1929

In 1929, thirty species of fish yielded an income of over \$40,000 each in California. These accounted for 97 per cent of the total landed value of the fisheries. It is noted that the eleven highest, each having a valuation of more than \$250,000, constituted almost 84 per cent of the total. The diagram of the valuations of each of these thirty species (see fig. 10) shows the importance of each. Although a wide variation exists between the several species, it is found that the average price of the so-called "market fish," excluding shellfish, is about 6½ cents per pound.

Approximately 65 per cent of the total valuation of the catch in 1929 represents the value of fish utilized by the canning industry. The five tunas, sardines and mackerel formed the basic species for this industry, while a few other varieties of fish and shellfish were canned in minor quantities.

Dividing the State into geographic districts⁶ it is found that the total valuation of the fish catch was distributed as follows:

Northern coast	3.6 per cent
San Francisco	15.2 per cent
Monterey	18.2 per cent
San Pedro	38.8 per cent
San Diego	24.2 per cent

The northern district, with a production which was valued at \$460,000, increased 20 per cent over 1928. Salmon and halibut, yielding \$293,000 and \$83,000, respectively, were the leading species, and accounted for almost 82 per cent of the total valuation for the district.

The San Francisco district yielded \$1,956,000, including whale products and dry salt cod, which are not included in the State's catch records. This is an increase of 6 per cent over 1928. The twelve

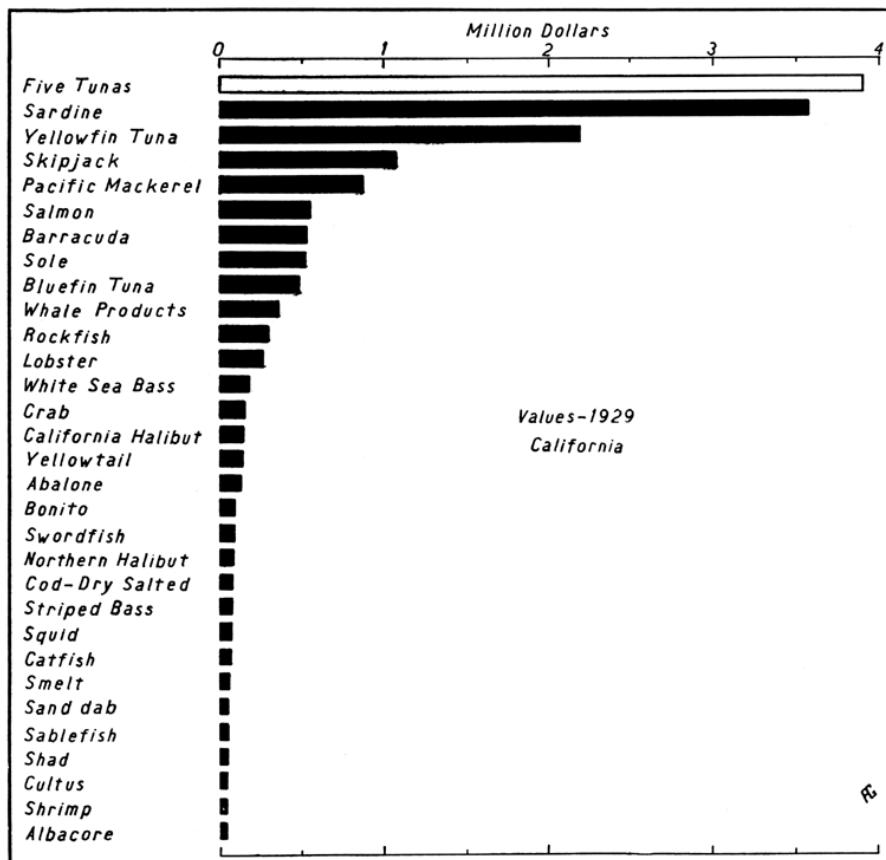


FIG. 10. Value of 30 leading species landed in California during 1929. Also combined value of the 5 tunas (albacore, bluefin, bonito, skipjack, and yellowfin).

FIG. 10. Value of 30 leading species landed in California during 1929. Also combined value of the 5 tunas (albacore, bluefin, bonito, skipjack, and yellowfin)

species graphed in figure 11, to show their respective values, constituted 91 per cent of the district's total.

Monterey district, with a total yield valued at \$2,340,000, increased 37 per cent over 1928. Sardines yielding an income of \$1,788,000 accounted for 76 per cent of the district's total. The values of the five leading species are shown in figure 12.

The San Pedro district had a total fisheries revenue of \$4,990,000, including receipts from south of the international boundary, which amounted to \$1,227,000. This is an increase of almost 19 per cent over 1928. Sardines, tuna and mackerel, yielding 78 per cent of the total income, constitute the principal species utilized by the canning industry, while the other species generally enter the fresh fish trade marts. The values of the twelve leading species are shown in figure 13.

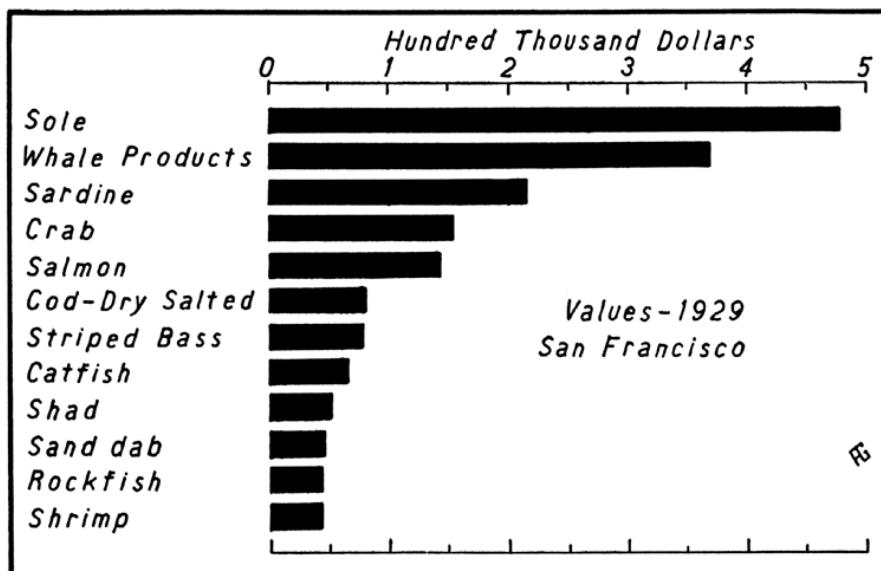


FIG. 11. Represents the values of the 12 leading fishery products landed in the San Francisco district in 1929. Their combined value constituted 91 per cent of the district's total valuation.

FIG. 11. Represents the values of the 12 leading fishery products landed in the San Francisco district in 1929. Their combined value constituted 91 per cent of the district's total valuation

The San Diego district, with a production appraised at \$3,125,000, increased 42 per cent over 1928. of this, the yield from south of the international boundary was \$2,416,000 or 77 per cent. The tunas, amounting to \$2,280,000 or 73 per cent of the total, are the principal cannery fish. The eleven principal species together with their values are shown in figure 14.

Considering the yield of the imports from south of the international boundary separately, we find this area had a production valued at \$3,643,000 or 28 per cent of the total for the State. This is an increase of 31 per cent over 1928 for this area. Approximately two-thirds of the products which are represented in this value are landed in the San Diego district and the remainder in the San Pedro district. The revenue from eight species constituted almost 99 per cent of the total valuation for the area. These eight species are graphed (see fig. 15) to show the total value of each and the value of the landings in the two districts of the State.

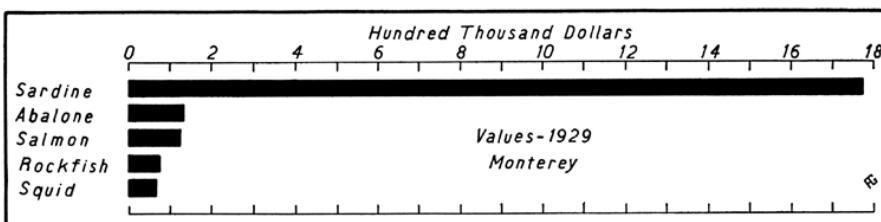


FIG. 12. Represents the values of the 5 leading fishery products landed in the Monterey district in 1929. Their combined value constituted 94 per cent of the district's total valuation.

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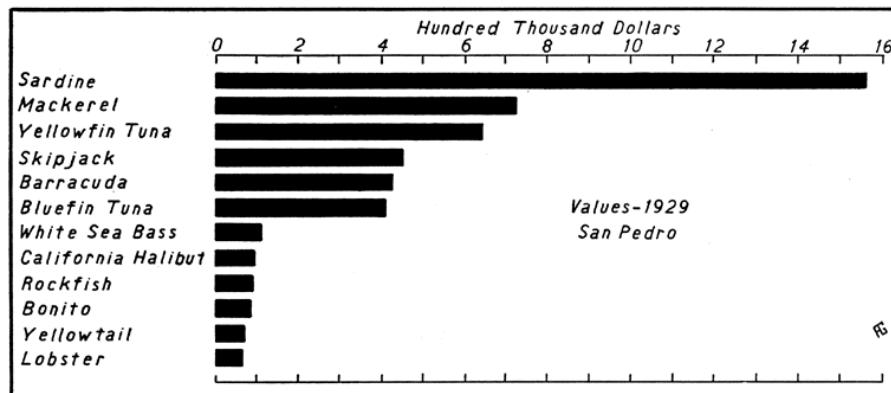


FIG. 13. Represents the values of the 12 leading fishery products landed in the San Pedro district in 1929. Their combined value constituted 95 per cent of the district's total landings

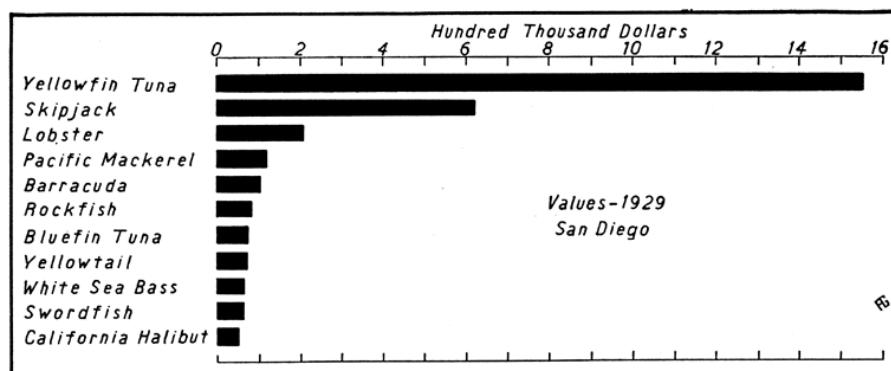


FIG. 14. Represents the value of the 11 leading fishery products landed in the San Diego district in 1929. Their combined value constituted 97 per cent of the district's total valuation

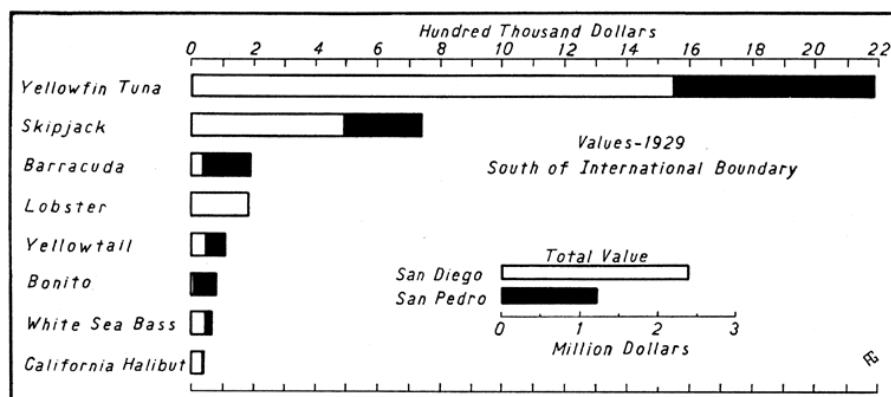


FIG. 15. Represents the value of the 8 leading fishery products taken south of an extension of the international boundary in 1929. Their combined value constituted almost 99 per cent of the total valuation for this area. The white portion of the bars represents the value of landings at San Diego, and the black portion the value of landings at San Pedro. The insert represents the total value of fishery products landed in each district

8. EXPANSION OF TUNA FISHING AREAS

BY GERALDINE CONNER

It comes as rather a shock to most of us, in considering the 1929-1930 tuna landings, to realize that we must use a map of the Western Hemisphere to show the area over which the California tuna fleet is now fishing. The high seas off the coast of Mexico first lured the California fishermen southward, and for twelve years intensive tuna

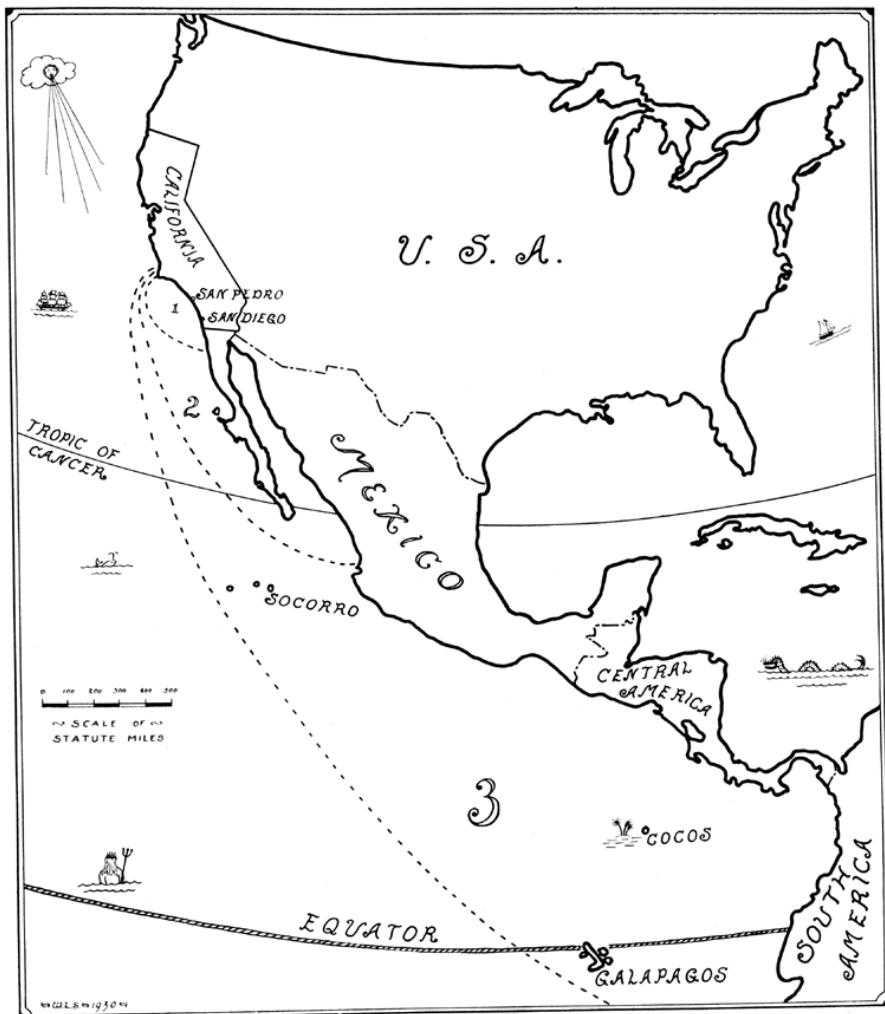
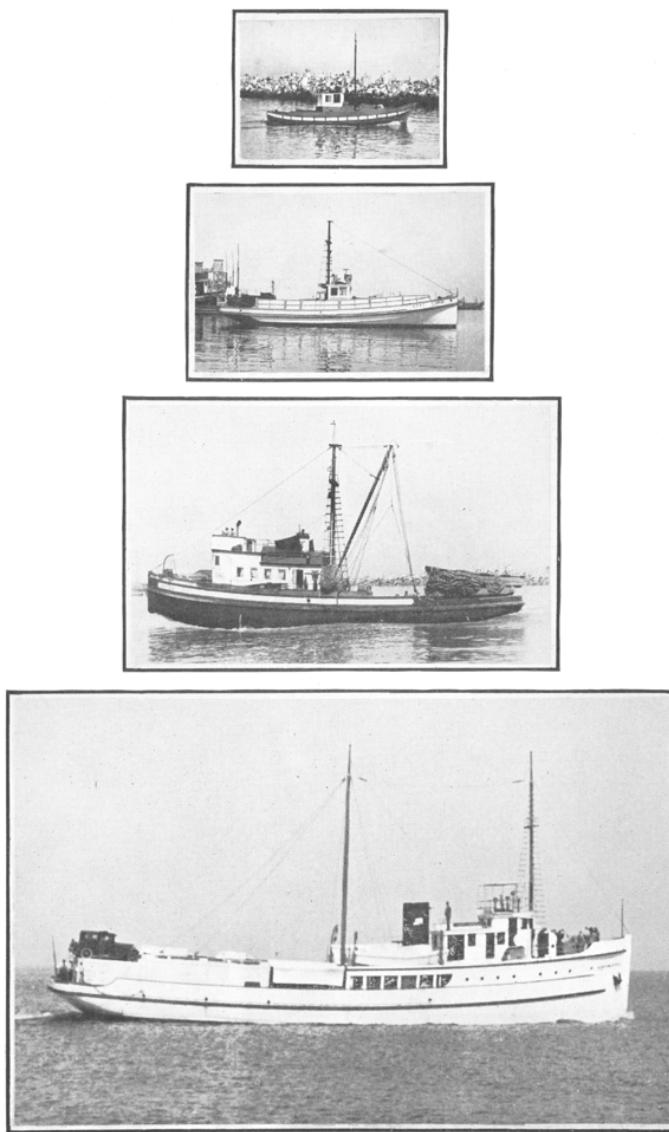


FIG. 16. Map showing areas fished by California tuna fleet. No. 1: 1911-1917. No. 2: 1918-1926. No. 3: 1927-1930.

FIG. 16. Map showing areas fished by California tuna fleet. No. 1: 1911-1917. No. 2: 1918-1926. No. 3: 1927-1930

fishing has been carried on along the coast of Lower California as far south as Cape San Lucas, which is about on the Tropic of Cancer. Within the past three years a marked expansion of this area has taken place. Better boats permitted the fishermen to venture on toward the



CAPTION FOR ILLUSTRATIONS ON OPPOSITE PAGE

FIG. 17. Evolution of the tuna fishing boat. (1) Jig boat used in early albacore fishing in area No. 1 on map, within easy reach of the canneries. Catch carried on deck. Length range approximately 25 to 35 feet. (2) Albacore or small live bait boat used in area No. 1 and occasionally in area No. 2, fishing under protection of a tender. Length range, 35-60 feet. Catch carried on deck. (3) Purse seine type tuna boat used in area No. 2 introduced with net fishing for tuna. Capable of longer trips, carried catch in the hold with ice taken from home port. Length range 50 to 85 feet. (4) Tuna cruiser capable of operation in area No. 3. Well-insulated hold and auxiliary refrigeration plant for protection of catch. Length range, 90 to 160 feet. Note comparison in size of automobile with bait tank upon which it is carried. Photographs by the staff members of the California State Fisheries Laboratory, 1930

equator, past Central America to South America. By 1930 beautiful tropical islands in the Pacific, known only through romantic literature of adventure, had become landmarks for the California tuna fishermen.

The tuna fishing grounds off the west coast of the United States are dwarfed in a comparison with those below the international line upon which our boats are drawing. Because of the very decided changes which have taken place in both the area and the fishing boats, we are presenting some of the facts which have led up to the present development.

If we were to attempt to show the area from which California tuna canneries drew their supplies for these past three years, it would require a map of half the globe. Catches made by the Japanese fishing fleet off the coast of Asia, and the Hawaiian fishermen in mid-Pacific, are being brought by ocean liners under refrigeration to California canneries for packing. Prior to 1929, only albacore had been shipped across the Pacific but during that year skipjack was included in the frozen fish received from Hawaii. These imports affect the output of the packing plants and the fact that each year the quantity of overseas fish has increased is of interest, but the Japanese and Hawaiian fisheries are of little concern to us as yet.

The tuna fisheries of Latin America are a different matter. Following a natural continuation of the continental shelf off our coast, separated from us only by a line on the map, easily accessible to our boats and fishermen, these fisheries have rapidly become the mainstay of our tuna industry. In 1929, 72 per cent of the tuna packed in the California canneries came from south of the line. (See fig. 19.)

The expansion of this fishing area and the development of California's tuna industry has been an interesting story. Apparently imbued with the spirit of southern California where progress has been made in leaps and bounds, an immense tuna canning industry has been built up at the ports of San Pedro and San Diego and has continued to grow despite the fact that the distance between the source of supply and the canneries is ever increasing.

The accompanying map (see fig. 16) will give at a glance the three general fishing areas, each indicating a distinct step in the development of the fishery. The photographs of the tuna boats show the effects of the expansion of the fishing area on the development of the fishing craft. The graphs are self-explanatory and show the catch of all tunas from north and south of the line (see fig. 19) and of each individual species from year to year (see fig. 20). The downward trend of the local fishery and the upward trend of the fishery to the south is quite apparent in the graphs.

8.1. FISHING AREA NO. 1

Although experimental packs of small amounts of tuna had been made as far back as 1903, it was not until 1911 that the first pack of commercial significance was put up simultaneously at San Pedro and San Diego. It consisted of albacore which had hitherto been valued only as a sport fish with no particular merit as food and far from the delicacy into which it later developed.⁷ The fish were caught within a

few hours, run of the canneries by small jig boats, approximately thirty-feet long. The fishing was done by most primitive methods, and the catch was carried on deck with little or no protection from the sun.

Three years later there were eleven canneries operating in southern California, and six years later in 1917 albacore had reached its peak of 34,000,000 pounds landed.

Thus, tuna canning was established in California and grew with unforeseen rapidity to a place of importance among southern California's industries. The source of supply was practically at the front

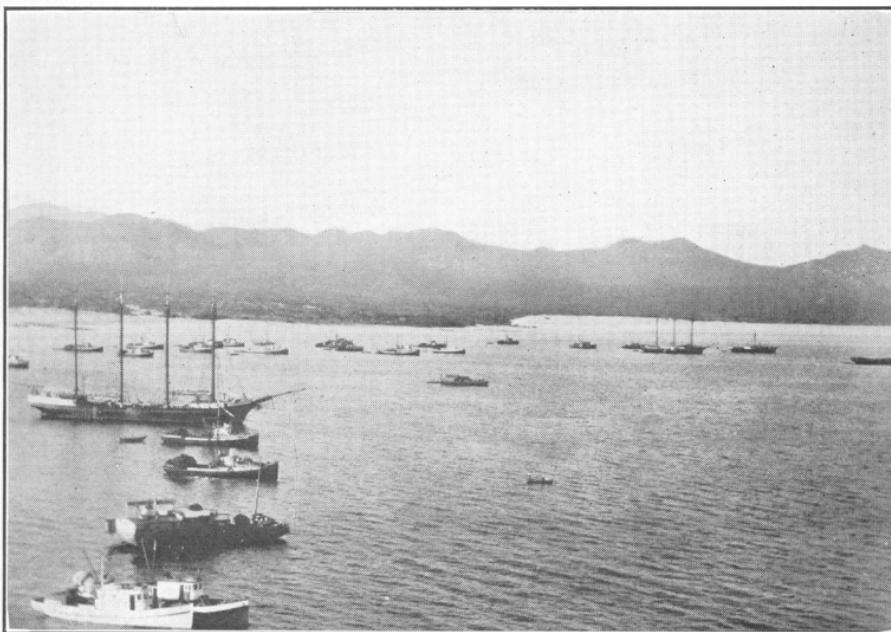


FIG. 18. Tuna fleet anchored at Cape San Lucas, Mexico, March, 1928. Lumber schooners converted into cannery receiving vessels, supply barges, live bait and purse seine boats. Photograph compliments of H. W. Crickmer of San Pedro, California.

FIG. 18. Tuna fleet anchored at Cape San Lucas, Mexico, March, 1928. Lumber schooners converted into cannery receiving vessels, supply barges, live bait and purse seine boats. Photograph compliments of H. W. Crickmer of San Pedro, California

door of the canneries along 350 miles of the coast line of the United States. The little boats made their catch and returned to port the same day. At times the price was as low as \$30 a ton for the cleaned fish, but the fishing was as remunerative then as it would later be when albacore brought \$300 a ton.

8.2. FISHING AREA NO. 2

In 1918 the albacore catch dropped to one-quarter of the amount which had been landed the year before. The canneries could not stand idle between the sardine seasons, and although bluefin tuna were caught locally, they were not taken in sufficient quantities to offset the decline in the albacore fishery. The canneries turned to skipjack, yellowfin and bonito. From off the coast of Lower California, Mexico, quantities of halibut, barracuda and lobsters had been brought, and it was to this source the fishermen turned for tuna. Although the Mexican fishing grounds would have developed as a source of supply for cannery fishes.

despite the failure of the albacore, there is not a doubt but that this was the chief incentive for expansion to the south.

The year 1918 marks, then, the start of intensive use of fishing area No. 2, revolutionizing the fishing craft, stirring up international difficulties, and increasing the cost of the fish. Barges were sent down the coast of Lower California stocked with ice, fresh water, fuel and food, to be anchored on the fishing grounds and the small fishing boats worked under their protection. In 1918, one floating cannery was sent to Magdalena Bay but operated with only mediocre success, so that the catches were for the most part transported to the California canneries on fast, large vessels. Turtle Bay, Magdalena Bay and Cape San Lucas became centers of activities, and the fishing area was extended one thousand miles to the south. Only desultory competition was offered by either Mexican boats or canneries; but the Mexican government, realizing that the marine resources in the ocean adjacent to her coast were being exploited entirely for the benefit of another nation, imposed export duties, licenses and taxes on the fish and import duties on the supplies which increased with the growth of the activities until they became prohibitive.

The pilgrimage to the south brought about the use of purse seines in the tuna fishery and purse seiners were brought south from Alaska and Washington. By 1920, there had been a noticeable decrease in the number of hook-and-line fishermen. By 1923, half of the tuna which were packed were coming from the south of the line; and by this year, the Mexican tuna fishery had passed the experimental stage and had been put on a practical working basis.

In 1925, the albacore staged a comeback with 25,000,000 pounds landed, but the Mexican tuna fishery also took a spurt upward and both yellowfin and skipjack showed record catches of over 12,000,000 pounds each. This year, purse seine boats were successfully used at Cape San Lucas and had practically supplanted the smaller boats in the fishery. By 1926, the Mexican export duties had risen to great heights and the fishermen were bootlegging fish across the line. Situations had arisen which were bringing about irrevocable complications with which California alone was unable to cope. An international treaty was drawn up between the United States of America and the United Mexican States, covering all illegal operations at the border, but little was accomplished to alleviate matters in the fisheries. Mexico had in mind but two thoughts—the collection of her duties and the control of the seas beyond the three-mile limit where the tuna were caught. The United States government was interested in the conservation of a food supply and in scientific studies of fishes common to the two countries, as well as in the retention of amicable relations with Mexico. The decline of some of her own fisheries had made her realize the importance of proper care of these virgin banks.

8.3. FISHING AREA NO. 3

By 1927, the treaty had been abrogated and the fishermen had solved one of the gravest problems confronting them by building boats suitable for high seas fishing which would enable them to operate entirely outside of the jurisdiction of Mexico. Formerly, although the fish were not caught in Mexican territorial waters, they had been hauled within

the three-mile limit thus making them subject to the duties. Further, it had been necessary for the boats to go in close to shore for sardines for bait.

The year 1927 marks another revolutionary step in fishing boat history. Rumors that tuna were abundant far to the south had often been received, but the boats had hitherto been too small to venture far from the coast. The new tuna cruisers built for the high seas fishing

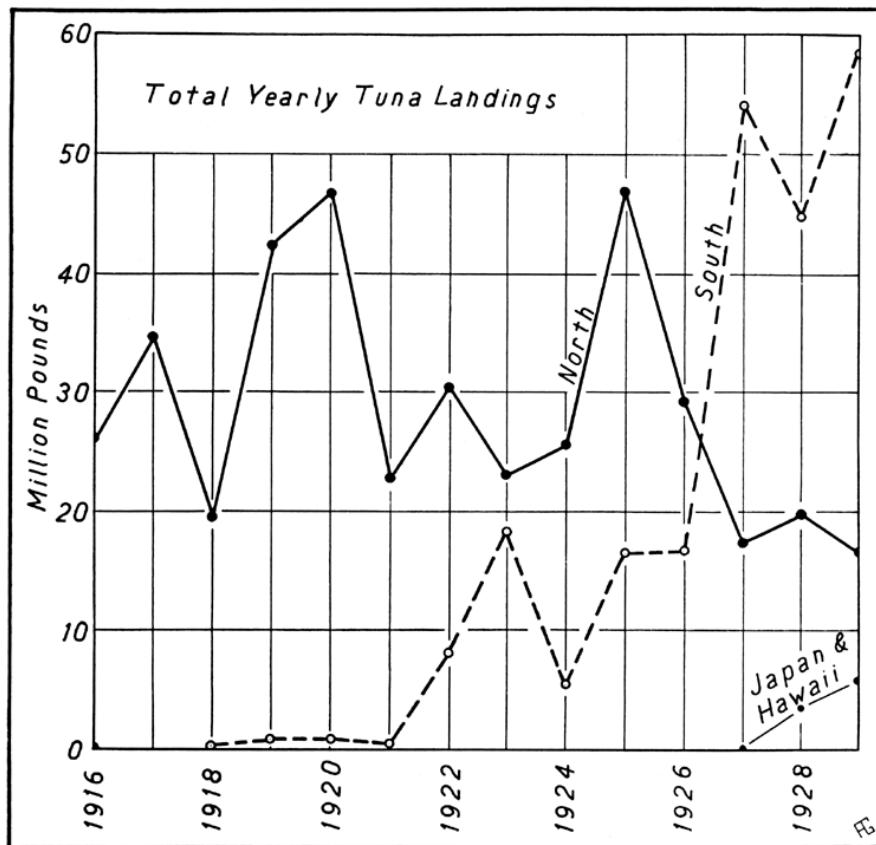


FIG. 19. Comparison of total yearly tuna landings from north and south of international boundary, 1916-1929, inclusive.

FIG. 19. Comparison of total yearly tuna landings from north and south of international boundary, 1916-1929, inclusive

off the coast of Mexico had been planned especially to meet the requirements; they were not makeshifts as had formerly been the case with many of the tuna boats. They carried sufficient fuel and fresh water storage space, large bait wells in the hold and bait tanks on deck. Electric refrigeration had solved the ice problem. Wireless added to the safety, and comfortable quarters improved conditions for the fishermen.

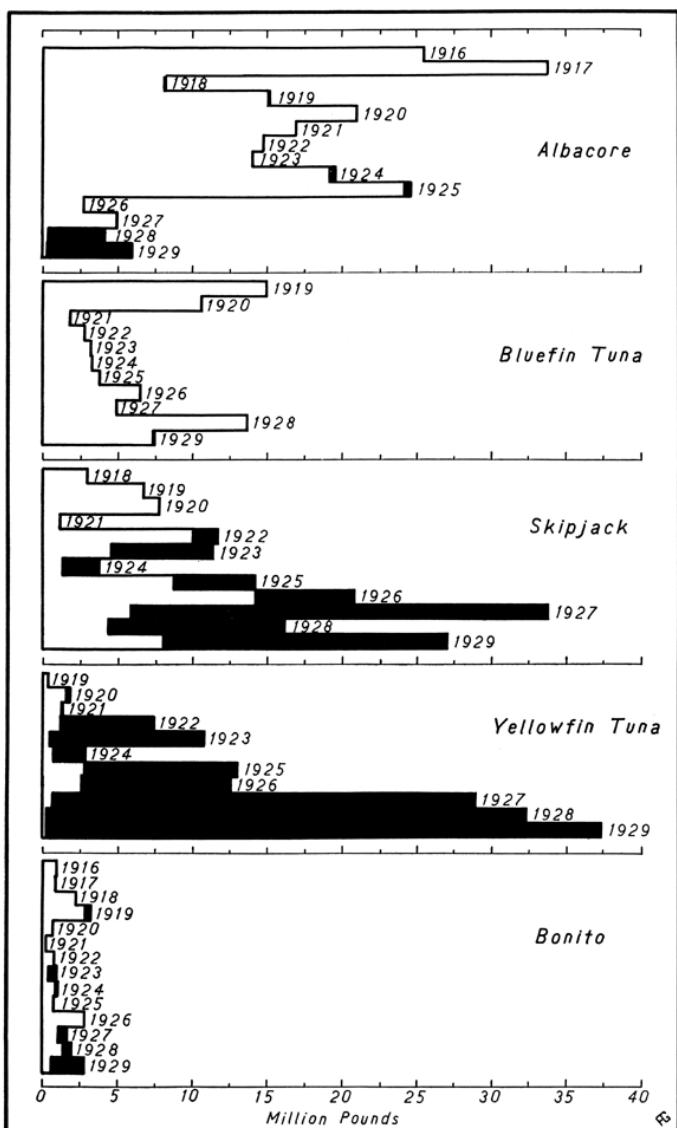


FIG. 20. Yearly landings of the 5 tunas. Light bars show local catch; dark bars show amounts from foreign fishing grounds.

FIG. 20. *Yearly landings of the 5 tunas. Light bars show local catch; dark bars show amounts from foreign fishing grounds*

It was not surprising, then, that in 1927, catches were reported from the Socorro and Clarion islands. The next step came when in 1929 tuna were brought to the home canneries on a California boat which had been fishing off the coast of Costa Rica, Central America. The catches were made in the vicinity of the Cocos Island, world famous for its hidden treasures of pirate loot. By 1930, the equator had been reached. Several boats had fished in the vicinity of the Galapagos Islands off the coast of South America. This increased the tuna fishing area to a 3500-mile stretch. Although the amounts of tuna brought from these distant fishing grounds have not been great in comparison with the total landings, it is most probable that they will increase from year to year.

8.4. 1929 TUNA FEATURES

A new high mark of 81,000,000 pounds was reached in tuna landings for 1929. This was 10,000,000 pounds more than the 1927 landings which had been the high point up to that time. Of this amount, 72 per cent was from south of the international boundary, 21 per cent from local waters, and 7 per cent was from Japan and Hawaii.

The combined value of the 5 tunas exceeded that of any other species including sardines, the catch of which was over 652,000,000 pounds or 8 times greater than the poundage for the tunas.

Albacore (*Germo alalunga*): Locally caught albacore reached a new low point of 269,056 pounds, while the imports from Japan and Hawaii were greater by one-third than the year before, with a total of 5,841,229 pounds.

Bluefin Tuna (*Thunnus thynnus*): The bluefin tuna catch of 7,526,857 pounds was considerably less than in 1928. The unusual feature for the year was the fact that 50,487 pounds of this total were brought in from Mexican waters. Prior to this year all the bluefin had been taken locally.

Skipjack (*Katsuwonus pelamis*): The skipjack landings amounted to 27,066,588 pounds. Seventy per cent of this amount came from south of the international boundary and 29 per cent was taken locally. The remaining 1 per cent was an introductory shipment from Hawaii.

Yellowfin Tuna (*Neothunnus macropterus*): The 37,444,924-pound catch of yellowfin held it in the leading place it had acquired among the tunas in 1928. Ninety-nine per cent was taken below the international boundary and but 1 per cent in local waters.

Bonito (*Sarda chiliensis*): Although the 2,918,544 pounds of bonito landed were insignificant in comparison with the amounts attained by the other tunas, this was a good catch for bonito. In past years most of the bonito was taken locally, but it is interesting to note that only 20 per cent came from the waters off our coast in 1929.

9. SARDINES

By MILTON J. LINDNER

The California sardine catch for 1929 reached the astounding total of 651,770,000 pounds—over three-fourths of the entire amount of fish landed in the State during that year. This enormous augmentation of 231,500,000 pounds over 1928 occurred in spite of the fact that during the latter part of 1929 a closed season was in operation for the first time, which restricted the taking of sardines for canning and reduction purposes. At Monterey and San Francisco the season begins on August 1st of one year and ends February 15th of the next year, while in southern California November 1st is the starting date and March 31st the closing date. This closed season did not go into effect until the summer of 1929; therefore only the latter part of the 1929 fishing year was influenced by the act (see fig. 23), whereas in previous years no restriction was placed on the fishery, except "gentlemen's agreements" among the packers.

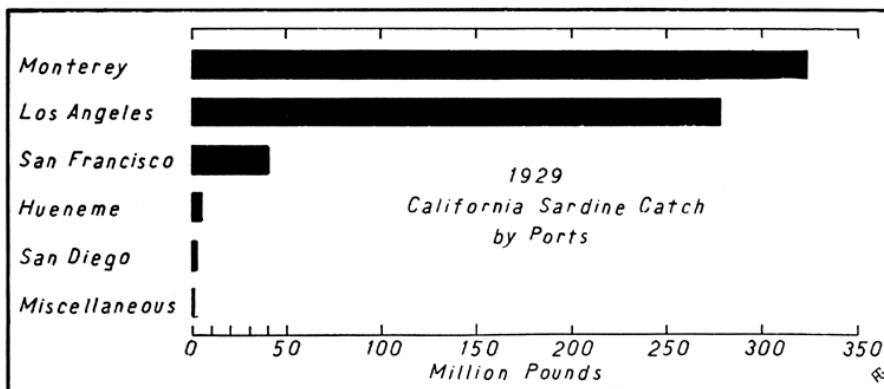


FIG. 21. The 1929 California sardine catch, by ports, illustrating the enormous landings at Monterey and Los Angeles; the smaller amounts at San Francisco, Hueneme, and San Diego; and the insignificant tonnage brought to towns other than those in which canneries are located.

FIG. 21. *The 1929 California sardine catch, by ports, illustrating the enormous landings at Monterey and Los Angeles; the smaller amounts at San Francisco, Hueneme, and San Diego; and the insignificant tonnage brought to towns other than those in which canneries are located*

Other notable changes in the sardine fishery during 1929 consisted in the alteration of the type of gear used at Monterey and the opening of a cannery at Hueneme in November. At Monterey purse seine and ring lampara nets replaced the conventional lampara net. The replacement of fishing gear began in August and by the end of December was practically universal throughout the entire Monterey fleet. The new nets seemed to be more efficient than the lampara for catching sardines, hence the exodus of the lampara.

Although the sardine is found along the entire coast of California, the fishery, interestingly enough, does not prevail throughout the State but is confined to 5 ports from San Francisco south (San Francisco, Monterey, Hueneme, Los Angeles and San Diego), with Monterey and Los Angeles by far the largest takers (see fig. 21). This results from the sardine being used almost exclusively for canning and reduction purposes, and the plants which do this work are situated in the above mentioned 5 localities, with Monterey and Los Angeles having the greater number. The other ports in order of their importance for sardine fishing are: San Francisco, Hueneme and San Diego.

With the exception of San Diego, the catch at each of the ports has been increasing rapidly every year (see fig. 22), which brings forth the often asked question: "How long will the fishery maintain such an

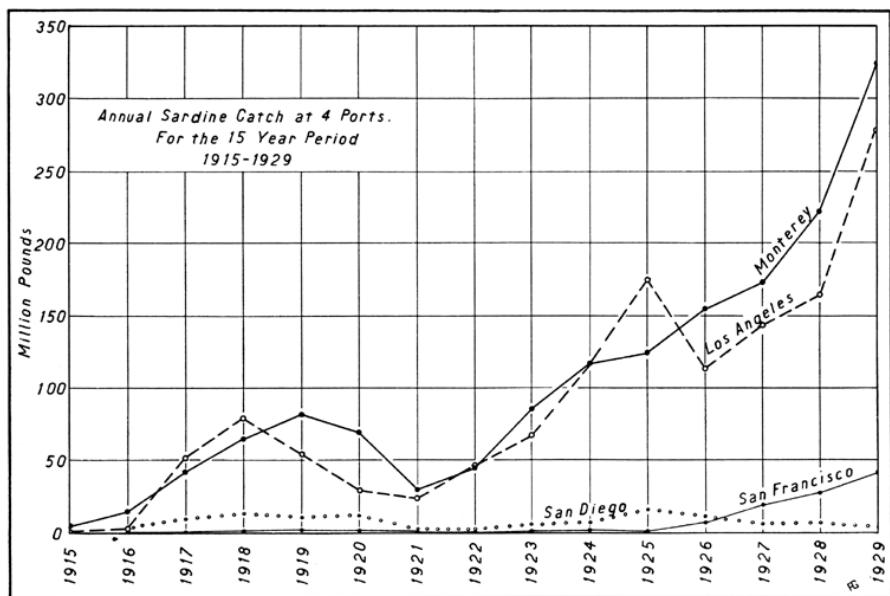


FIG. 22. Fifteen-year trends of the sardine catch for the 4 major California ports.

FIG. 22. Fifteen-year trends of the sardine catch for the 4 major California ports

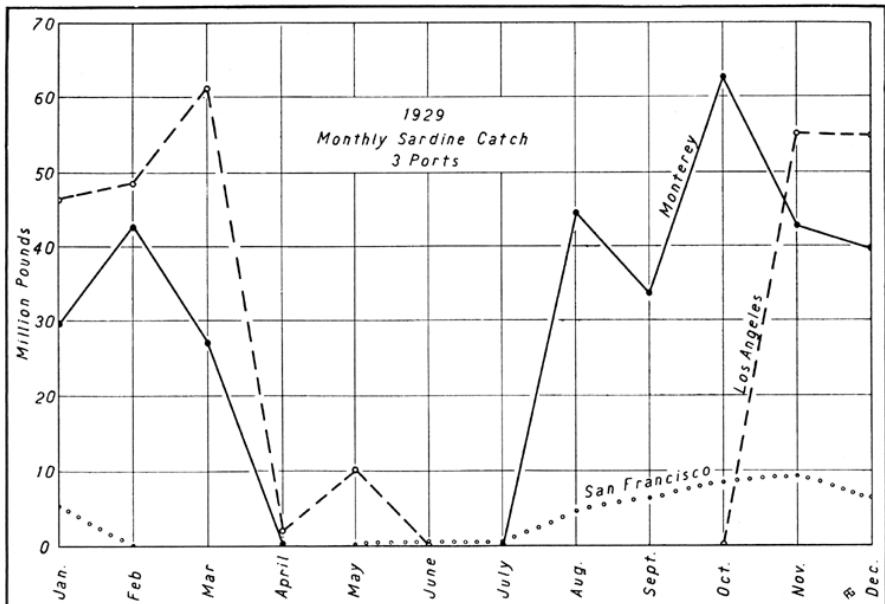


FIG. 23. Represents the monthly sardine catch for Monterey, Los Angeles and San Francisco during 1929. The Monterey and San Francisco fishery begins earlier in the fall and ends sooner in the spring than does the Los Angeles fishery.

FIG. 23. Represents the monthly sardine catch for Monterey, Los Angeles and San Francisco during 1929. The Monterey and San Francisco fishery begins earlier in the fall and ends sooner in the spring than does the Los Angeles fishery

"enormous drain?" We are unable to enter any lengthy discussion of the subject here; but we might point out what appear to be some of the danger signs: the failure of local waters to supply the ever increasing

annual catch resulting in a rapid extension of fishing areas in all localities; and the expansion of the "period of scarcity" at Monterey.⁸

A comparison has been made of the catch of California sardines with closely related species of 5 other countries (pilchard of British Columbia)

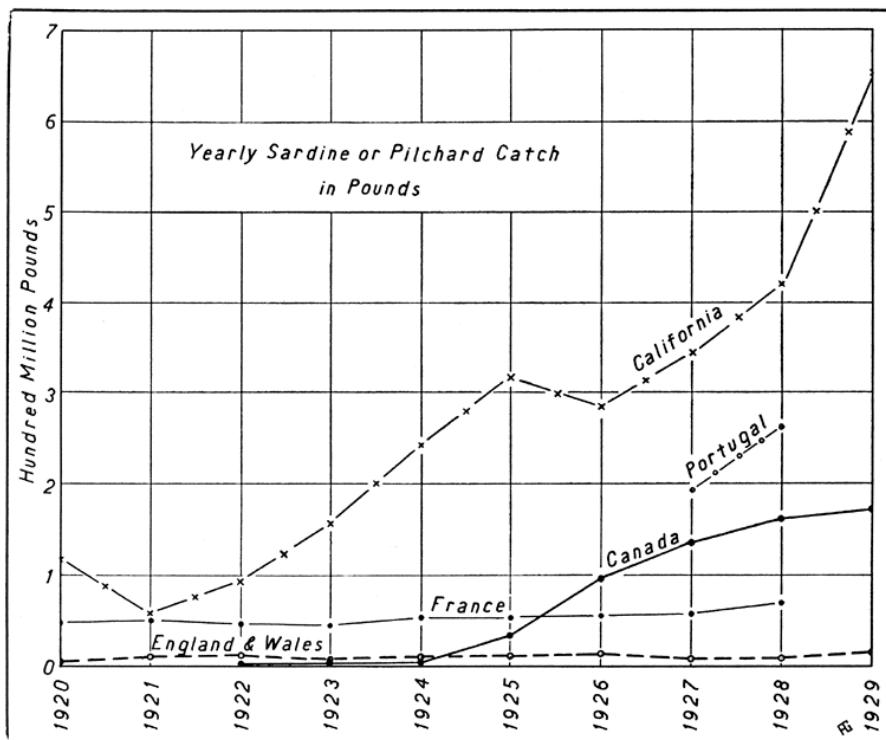


FIG. 24. Yearly pilchard or sardine catch for California, Portugal, Canada, France, and England-Wales. France and England-Wales have had a consistent fishery since 1920, while the California and Canadian fishery has been increasing rapidly

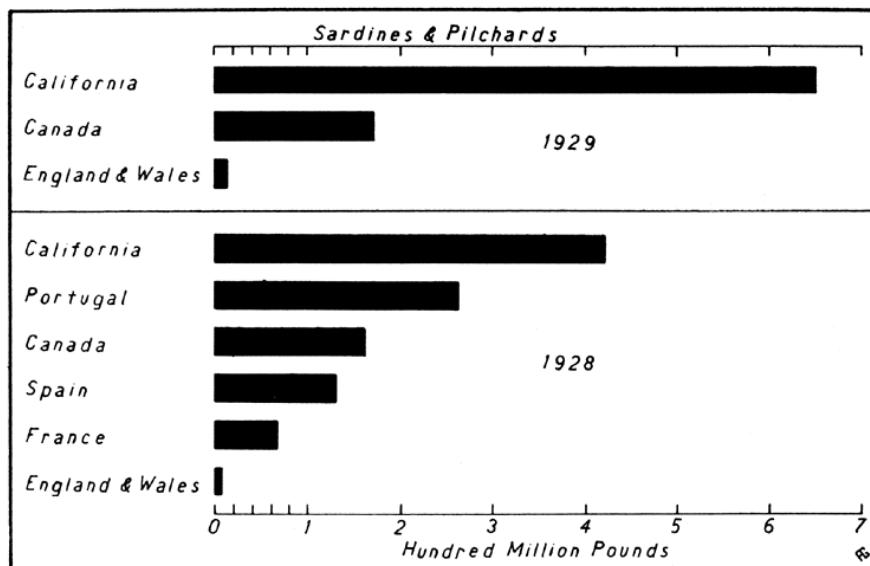


FIG. 25. Comparison of the sardine or pilchard catch of California, Portugal, Canada, Spain, France, and England-Wales for 1928; and California, Canada and England-Wales for 1929

and England, sardinha of Portugal, sardine of France)⁹. It will be noticed from figure 24 that California's total far outranks those of the other countries: Portugal is second and Canada (British Columbia) is third. It should be mentioned that all of the countries that fish for the sardine and its allied species are not included

cluded here (although most of the major ones are), as we have no available statistics for the omitted nations.

10. MACKEREL

By D. H. FRY, Jr.

The mackerel catch, which jumped from 5,000,000 in 1927 to 35,000,000 in 1928,¹⁰ continued to skyrocket, and reached a total of 58,000,000 pounds in 1929. That high point brought operations to at least a temporary close, for the 1930 landings will be far below those of the other two years.

There are numerous theories about the reasons for the drop in the demand for canned mackerel. That which seems likely to be the greatest contributing factor is the arrival of a period of general business depression and unemployment before the product had become firmly established. Under these conditions, competition with the more widely known products, such as salmon and sardines, probably has been far harder on mackerel than would have been the case if business conditions had been better.

Large scale mackerel canning operations started in the Los Angeles district in 1928 and at San Diego in 1929. By the beginning of 1929, most of the Los Angeles packers had entered the mackerel business, and several had found it so profitable that they began installing special tanks

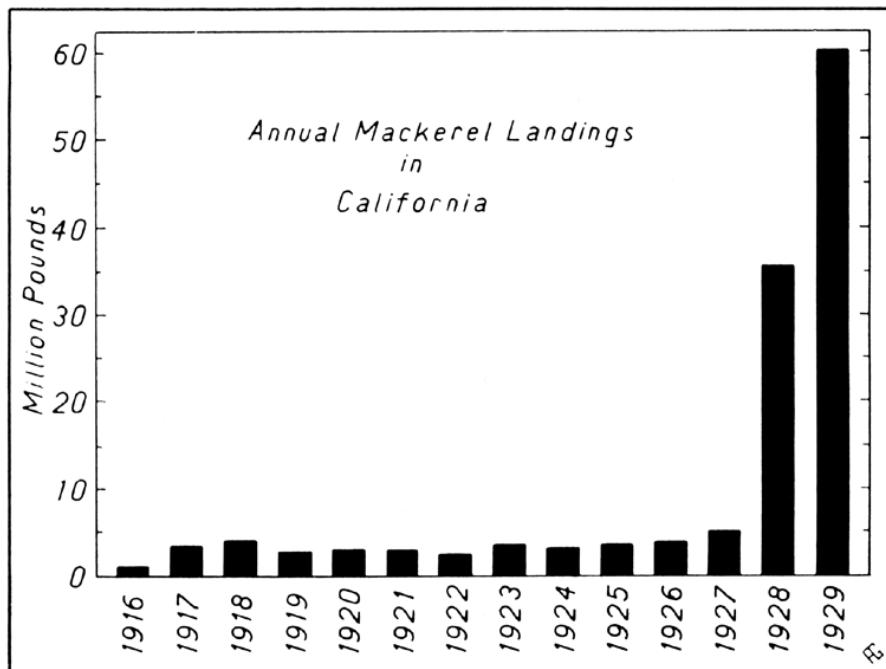


FIG. 26. Annual mackerel landings. Horse mackerel included.

FIG. 26. Annual mackerel landings. Horse mackerel included

and machinery to enable them to handle even more of these fish. The resulting pack, combined with that of San Diego, was so huge that it flooded the market and lowered the price to a point where canning no longer paid. To make matters even worse the demand fell off and most of the packers now (August, 1930) have large amounts of

TABLE 1
CASES OF MACKEREL CANNED IN CALIFORNIA, 1928-1929

	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929
San Pablo District:												
1 pound.....	3,400	1,003	3,241	258	200					10,723	337,136	477,570
½ pound.....	4,668	6,344	73							4,717	4,717	30,392
¼ pound.....												
½ pound oval filters.....							3					
						3,783	5,229					
San Diego District:												
1 pound.....		65							4		25,110	86,246
½ pound.....		17								216		7,574
¼ pound.....		17								270		
½ pound oval.....			13							9		
Monterey District:												
1 pound.....							271				1,030	1,476
½ pound oval.....										547		
State totals:												
1 pound.....	3,400	2,061	3,211	258	200	271			4	10,723	383,276	565,292
½ pound.....	4,668	6,361	81							236	4,923	45,956
¼ pound.....												
½ pound oval.....							3				247	
						3,783	5,229			546		

Division of Fish and Game

TABLE 1
CASES OF MACKEREL CANNED IN CALIFORNIA, 1928-1929

mackerel on hand. Naturally they do not intend to continue large scale mackerel operations until they empty their warehouses.

Figure 26 shows the total landings of the State for the past 14 years. The low and comparatively even trend of the early landings was due primarily to the fact that in former years mackerel was almost entirely a market fish; and the rise in 1928 and 1929, mentioned above, was due to canning operations. Table 1 gives the number of cases canned in each district since 1918. The relative importance of the mackerel landings in the various California districts for 1928 and 1929 is shown in figure 27. Los Angeles leads in both years, chiefly because there were more cannery packing mackerel in that district than in all the rest of the State. In addition, the fresh fish landings of mackerel at San Pedro are the largest in California. At San Diego the cannery packed on a comparatively small scale in 1928, but with more enthusiasm in 1929. The fresh fish landings of mackerel in San Diego are fair sized. Orange County had rather insignificant landings in previous years, but

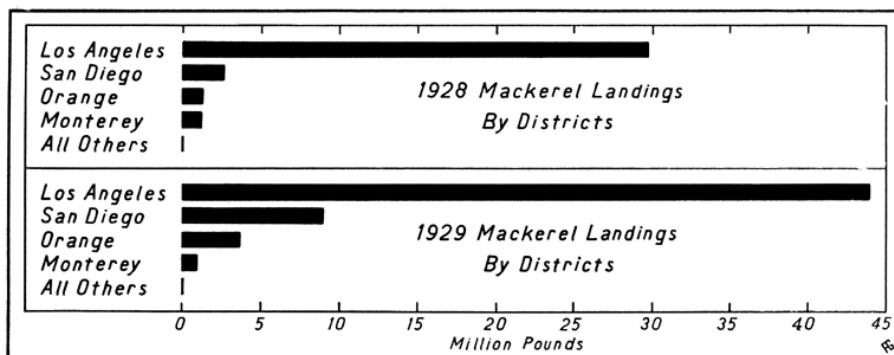


FIG. 27. California mackerel landings by districts.

FIG. 27. *California mackerel landings by districts*

in 1928 trucked large quantities of locally caught fish from Newport to canneries in the Los Angeles district. At Monterey, fresh fish landings have always been large, but there has never been any great amount of mackerel canned there. In no other districts are mackerel landings of any consequence. Mackerel are present also off the Mexican coast, but as the California supply has been entirely adequate, the market price has been low and the Mexican export duty has been high, very few mackerel are brought up from south of the border. off Ventura, Santa Barbara and San Luis Obispo counties, the fish are to be found, but there are no canneries or fish-shipping points in the district and the local population is so sparse that the fresh fish consumption is small. North of Monterey mackerel landings are low because of the comparative scarcity of the fish.

11. SALMON

By G. H. CLARK

Some of the fisheries with which we deal are confined within a comparatively small area, so that the problems confronting us are limited to a definite locality. This is not so with a great part of the salmon fishery. The salmon taken in the rivers are native of a specific stream—we know that we are dealing with only one population and that group within a narrow region—the river. On the other hand, the vast sea trolling salmon fishery is almost unlimited in extent of fishing area and its population is very likely made up of king salmon native to streams from San Francisco Bay, California, to Alaska. Within our own State of California, ocean fishing extends from Monterey to the Oregon State line—600 miles of coast line and many miles out to sea. In addition, the same species of fish is found along the coasts of Oregon, Washington, British Columbia and Alaska. It has been shown by tagging experiments that the chinook salmon migrate between British Columbia and Oregon, Washington and California, so that our problems, whether statistical or purely biological, become coastal questions. Salmon fishing has become a community interest—what affects California may affect Oregon, Washington, British Columbia and perhaps Alaska, and *vice versa*. In the studies of abundance, is it enough that Oregon knows the quantity of catch off her coast? Or would the more reliable index of the population be the catch of a given species of fish for the entire Pacific coast? And so with the other states and provinces!

The same may apply to other biological or legal problems. We in California may be aided by our neighboring States; they in turn assisted by us on the salmon question. This interest is shown by the existence of the Pacific Salmon Federation, an organization made up of the conservation agents of Washington, Oregon, California, British Columbia, Canada, Alaska, and the United States government, all of which are interested in salmon conservation. The federation meets each year to discuss salmon problems and to give an account of the progress of salmon work and of future plans. A review of the last meeting, held at Stanford University, California, in March, 1930, will give a fairly comprehensive idea of the accomplishments of last year (1929) and the hopes for future work. At this meeting, all organizations were represented except the State of Washington.

The committee on statistics presented to the federation a plan for the collection, tabulation and publication of uniform salmon statistics for the Pacific coast. The plan provided for a central agency to carry on the work. It was to be taken under consideration by the several interested parties. A report on the abundance of salmon in the Bristol Bay regions showed by means of total landings a decreasing catch, and further demonstrated that analysis of boat catches was not practical for the area in question. The preliminary boat catch analysis of the Columbia River salmon was given with no definite conclusions, but with discussion of methods employed and the excellence of data obtained. Some time was taken up with the

reports of tagging experiments in Alaska, British Columbia and the three States. Results showed that man was obtaining more and more of an understanding of the movements of the fish in these localities and has more clearly demonstrated the intermingling of the salmon from streams along the coast.

The committee on fishways advised that additional experimental work should be carried on with fishways and screens, and the federation unanimously declared that more should be known of the seaward migration of young salmon and trout. It should be ascertained if the young migrants could go down over high dams without injury. All efforts heretofore have been to get the adult salmon up over the dams, but to what avail, if the young all perish on the descent? An outstanding statement of one of the members was that: "The most vital question which confronts salmon interests today is high dams." Experiments with the different types of fish screens, electrical and mechanical, gave hope of saving millions of small fish each year in the salmon streams. A resolution was passed by the federation that the experimental work on screens and fishways continue, and that a biologist be appointed to assist the engineers.

A most important phase of particular interest to California came up next, that of ocean trolling for salmon. It was shown that sea trolling had been detrimental to salmon in some localities. Resolutions were passed by the Oregon Trolling Vessels Association and by the California State Legislature at its last session, to the effect that some means of protecting the small salmon should be executed and that the Pacific States interested in ocean trolling should plan a means for uniform control. A resolution was adopted by the federation urging the representatives of the Pacific States to meet and draft a bill for their respective legislatures to have a uniform ocean season for sea fishing during June, July, August, and up to September 15th, thus coinciding with California's present law.

Experiments conducted with sockeye salmon on artificial and natural propagation revealed the fact that the greatest mortality by either method was when the young were first hatched and the fry had to shift for themselves in fresh water. The transplantation of salmon in various streams tributary to the Columbia River revealed that salmon keep their inherent race characteristics as to time of spawning, and so to obtain good results salmon must be transplanted to localities similar to those of their native grounds. It was demonstrated from experiments conducted at Karluck River, Kodiak Island, Alaska, that the returns from known escapements can be calculated within a fair degree of accuracy. A program for the investigation of the pink salmon in Alaska regarding racial studies and stream surveys was given, together with a plan for an investigation of physical changes in the spawning fish.

The meeting of the Pacific Salmon Federation helped to strengthen the bonds between the several governments present, and to further the solving of mutual salmon problems that are of international scope and which have been under controversy for the last few years.

To return to more local problems, in California we have had trouble again with violations of the ocean fishing law in regard to closed season. Marin County fishermen brought suit against the

Division of Fish and Game to restrain it from arresting them for transporting salmon from the high seas over a closed district to an open district and for possessing salmon in a closed district which had been taken in an open area. The case was brought up for the San Francisco Bay fishermen but was decided in favor of the California Division. This test case arose out of a similar one at Eureka last spring (1929) which the Division lost, but which has been appealed to the Supreme Court. Another like action was taken by Santa Cruz fishermen and was decided in their favor. There is a need for more rigid salmon laws in this State and for a uniformity of open season along the coast.

11.1. CALIFORNIA SALMON CATCH FOR 1929

Some rather surprising results have presented themselves in the 1929 catch figures of salmon. The two districts at the southern range of salmon fishing, *i. e.*, Monterey and Santa Cruz, have increased their catches somewhat over the previous year (1928). The

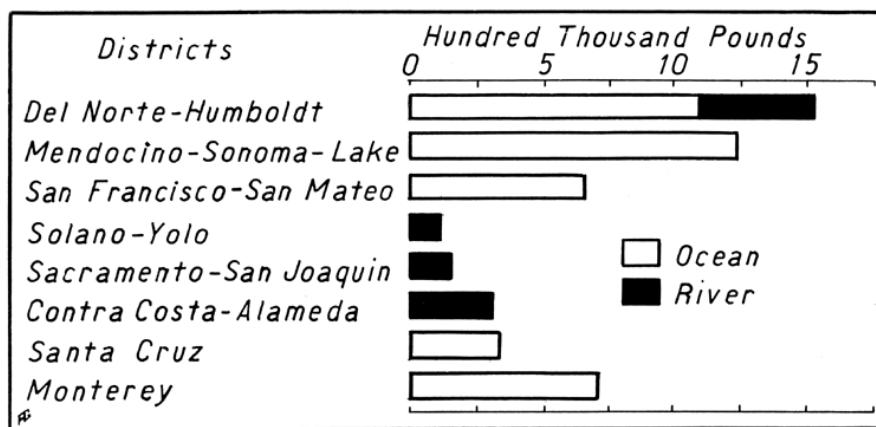


FIG. 28. Landings of salmon in California by districts and waters for 1929.

FIG. 28. *Landings of salmon in California by districts and waters for 1929*

Monterey catch increased from 259,000 pounds in 1928 to 715,000 in 1929, and the Santa Cruz deliveries from 75,000 pounds to 339,000 in 1929. (See fig. 28.) This is most surprising in view of the fact that both districts have been steadily failing in salmon catches. Fortunately, J. O. Snyder of Stanford University, who has been watching the salmon on our coast for years, was on hand at Monterey in 1929 and sampled the catch. By means of the scales of these fish he has determined their age. In a paper given before the Pacific Salmon Federation in March, 1930, he stated that the 1929 salmon catch at Monterey was made up of at least 60 per cent of two- and three-year fish, as contrasted with 1920, when only about 10 to 25 per cent of the commercial catch was made up of young fish. There is the possibility of a dominant year class coming into Monterey Bay in 1929. However, the catch in 1928 and 1929 was noticeable for the lack of large fish, and even if an exceedingly large year group has dominated, the catching of these small young fish will leave very few salmon to grow larger and mature. If this is the case, in all probability we shall see practically no salmon taken in Monterey Bay in the future years.

The catch of salmon off San Francisco Bay continued its decline which has been taking place since 1927. (See fig. 28.) The catch has no significant points; it is made up entirely of ocean-caught fish which dropped off about 157,000 pounds in 1929 from the 1928 figure.

The two other ocean-fishing areas of California—Mendocino and Del Norte-Humboldt—changed little in their catch during 1929. Mendocino dropped off from 1,563,000 pounds in 1928 to 1,230,000 in 1929. The Del Norte-Humboldt district increased from 731,000 in 1928 to 1,091,000 pounds in 1929. The decrease of one is about equal to the increase in the other.

It may be well to mention again at this time that the figures for the ocean-trolling localities are not as significant as those of the river catches. We know that salmon have a wide range at sea, and one year the bulk of the fish will be taken in waters off San Francisco while the next year perhaps in the Del Norte-Humboldt area. Or perhaps the schools will be in Oregon. These distant migrations from the parent stream rather upset any definite opinion which might be given on the condition of any one ocean district. Monterey Bay seems to act independently of the other sea districts and follows the fluctuations of the

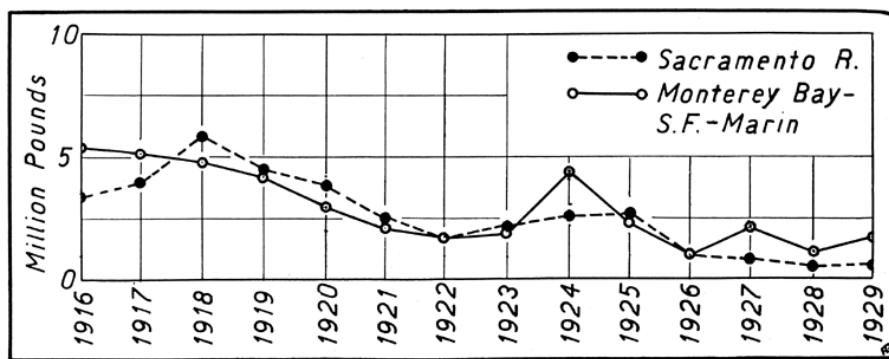


FIG. 29. Salmon take in Sacramento River as compared with ocean fish caught in Monterey Bay and off San Francisco during 1916-1929.

FIG. 29. *Salmon take in Sacramento River as compared with ocean fish caught in Monterey Bay and off San Francisco during 1916-1929*

Sacramento River catches (see fig. 29), but it is not certain that the Monterey salmon are all native of the Sacramento River, because marked Klamath River fish have been caught in Monterey Bay and also marked salmon from the Sacramento have been taken off the Humboldt coast. So, if the marked fish are representative, it would seem that in the ocean population there is an intermingling of the various salmon native to the several streams along the coast. If we are to form an opinion on the abundance of salmon taken in the ocean year after year we must use the total catch of fish captured in sea-trolling operations along the California coast. The combined ocean landings have a slight downward trend. (See fig. 30.) The ocean catch for 1929 was 4,034,000 pounds, an increase from the last high point in 1924 of 2,341,000 pounds.

On the other hand the records of salmon taken in the rivers of the State have a different meaning. It has been shown beyond a doubt that salmon return to the streams in which they were hatched, so that fish taken in fresh water streams are native to that river. We are better able to judge by the total catch each year whether the landings are

increasing or decreasing in the rivers because there is no intermingling of salmon of other streams, except for occasional strays.

The total river caught fish in California for 1929 amounted to 1,011,000 pounds, a very slight decrease of 23,000 pounds from 1928. (See fig. 30.) However, we should not combine the river catches as we necessarily do the ocean, but consider each stream as a separate unit. The Sacramento River fisheries (made up of the returns from the Solano-Yolo, Sacramento-San Joaquin, and Contra Costa-Alameda counties) show a very minor increase over the previous year. In 1928 the catch was almost 554,000 pounds; the increase in 1929 amounted to only 27,000 pounds. This is the first increase over the preceding year that this fishery has experienced since 1925, at which time the catch was about 2,779,000 pounds. The decline in the last five years, as can be readily seen, has been very rapid. (See fig. 29.)

The Klamath River catches have fluctuated considerably since records have been kept. The landings in the later years are not comparable with the earlier ones as greater portions of the season have been closed. However, the last five years (1925–1929) are similar in length of fishing

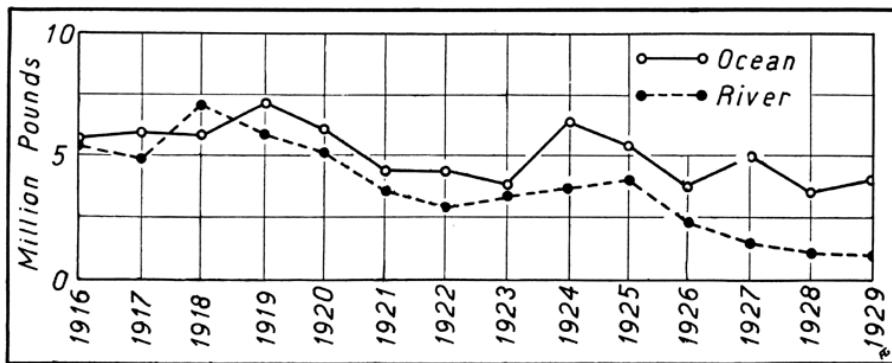


FIG. 30. Comparison of river and ocean-caught salmon in California from 1916 to 1929.

FIG. 30. Comparison of river and ocean-caught salmon in California from 1916 to 1929

time, and since 1925 there has been a relatively sharp decline. In 1925 the catch was 956,000 pounds while the 1929 take was but 322,000 pounds, a decline of 634,000, which is considerable for so small a fishery. The 1929 figure is a gain of 13,000 pounds over 1928. Although not large, it is at least encouraging. The 1929 catch for Smith River, the northernmost salmon stream, was about 108,000 pounds, a decline of 64,000 pounds from the 1928 total. The landings of this stream, while never great, have declined tremendously since 1925, its high point of 309,000 pounds. There has been little or no change of season during which salmon are taken in any of the localities, ocean or river, during 1929. (See fig. 31.)

The total catch of salmon for California has had a gradual decline. (See fig. 32.) The ocean fishery since 1921–1922 has bolstered it up considerably, but regardless of this, the trend from 1924 and 1925 when all forces were at work at ocean trolling, has been steadily on the decline. In 1925 the total salmon taken in the State amounted to slightly over 9,525,000 pounds, while in 1929 the catch was 5,044,000 pounds, a decrease of over 4,000,000 pounds in five years; the 1928 figures showed a decrease of over 5,000,000 pounds!

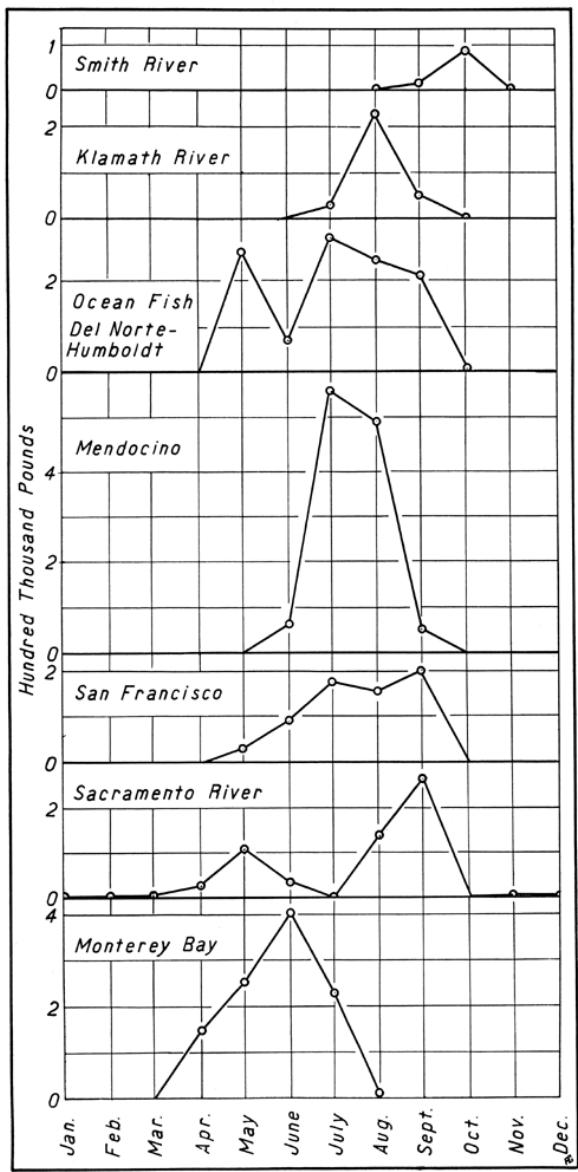


FIG. 31. Catch by months at salmon fishing centers in California during 1929.

FIG. 31. *Catch by months at salmon fishing centers in California during 1929*

We may well look to our salmon. What was said last year¹¹ can bear repetition. The depletion of our rivers is most evident and likewise the more easily and accurately gauged, but our ocean fishery is vague, and the combined catches for all sea areas indicate but slight dropping off. If we are to assume that most of our ocean fishery in California is made up of a salmon population native to our rivers, then the necessary deduction is that very likely our sea fishery is as depleted as that of our rivers. If, as is indicated by tagging experiments, it were not for the fact that perhaps salmon not native to our streams uphold the ocean catch, the records themselves might show plainly the depletion in our sea fishery. The migration may work two ways: Some of our fish may also be taken outside of our State as we take wandering salmon native to streams in other states; an additional reason for believing the entire California salmon fishery is depleted.

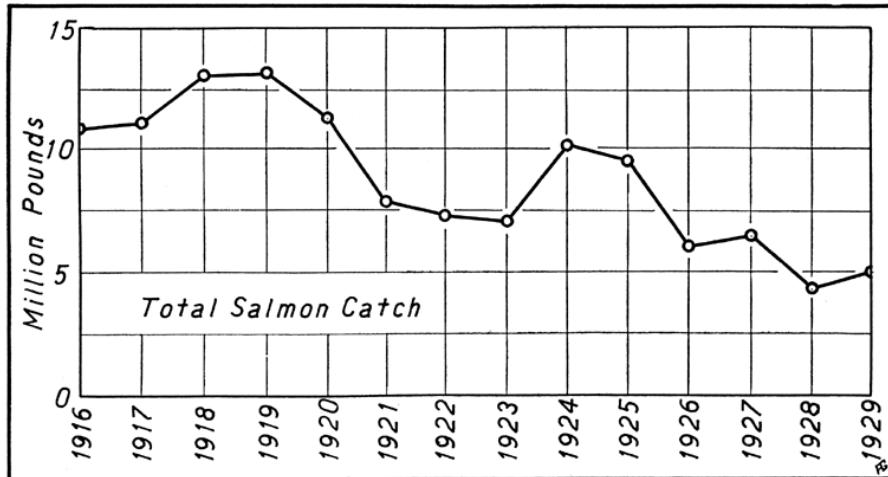


FIG. 32. Total salmon catch of California from 1916 to 1929.

FIG. 32. Total salmon catch of California from 1916 to 1929

12. YELLOWTAIL

By D. H. FRY, Jr.

A superb game fish, the yellowtail,¹² is apparently being fished out, simply because it is a good enough food fish to command a fair market price. When there are many better food fishes it seems deplorable to wipe out one of the best salt water game fishes on the Pacific coast. With the possible exception of the jewfish, the yellowtail is probably the only great game fish that an amateur fisherman is at all likely to take in southern California waters unless he is able to charter a launch and an experienced boatman. At the present rate, however, the yellowtail may soon join the list of game fishes much talked about but seldom seen.

For the past several years the commercial fishermen have been getting less and less yellowtail from California waters and more and more from Mexican, in spite of the heavy Mexican taxes. San Diego and Los Angeles districts are the chief landing places of yellowtail in California. Both the Mexican and local fish are brought to these ports. At San Diego some local yellowtail are being landed, but they are very small, usually from 2 to 5 pounds—a 15-pound local specimen is almost a rarity. At Los Angeles, catches have fallen to less than 2 per cent of the high point in 1918.

The landings of California and Mexico are given in figure 33. Figure 34 shows the approximate proportion of the total catch which went to the canneries each year. The peak in 1918 was caused by a combination of war prices, the demand for all kinds of canned fish, and the "eat less meat" campaigns. The local supply at that time seemed entirely adequate—almost all the fish taken came from California waters. The sharp drop in 1919 seems to have been partly due to a drop in the supply as well as to a decreased demand. In 1920 and 1921 the post-war slump brought the demand still lower, especially for yellowtail to be canned. The packs of 1918 and 1919 were larger than could be sold at that time, and after the war the canneries found it hard to get rid of the yellowtail still on hand. After the low point, however, the demand grew and the supply was increased

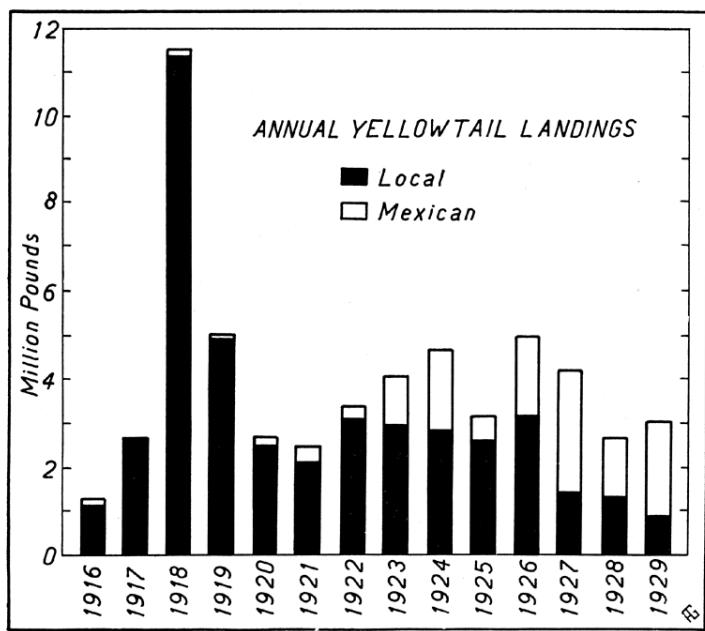


FIG. 33. Annual yellowtail landings from local and Mexican waters

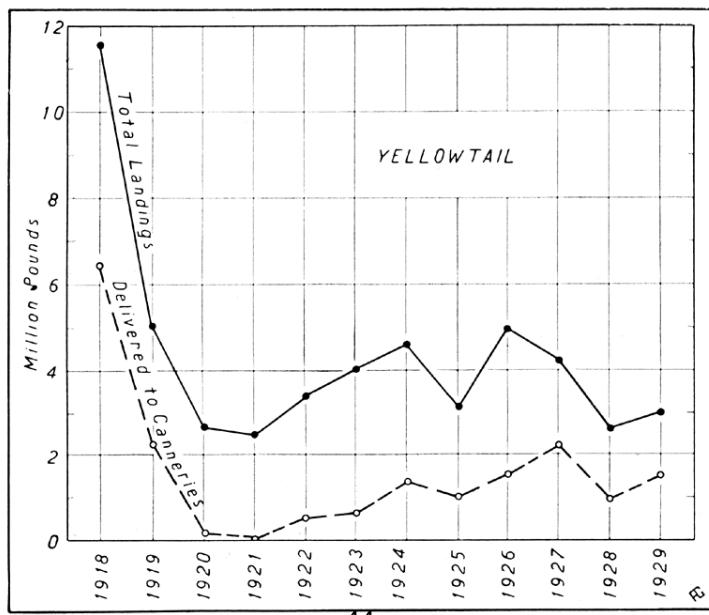


FIG. 34. Total and cannery yellowtail landings. Cannery landings from 1918–1922 are calculated from amounts packed

to a certain extent by the importation of fish from Mexico, until 1926. In the three years which followed, local landings fell off to such an extent that even increased catches from Mexico were not enough to keep the total landings from going down hill. Figure 35, giving the district landings of yellowtail for 1918 and 1929, shows the extent to which the local catch has fallen off.

The catches of the San Diego and Los Angeles districts, where almost all California yellowtail are landed, are shown in figure 36 for the years 1916 to 1929. At San Diego, landings declined rapidly

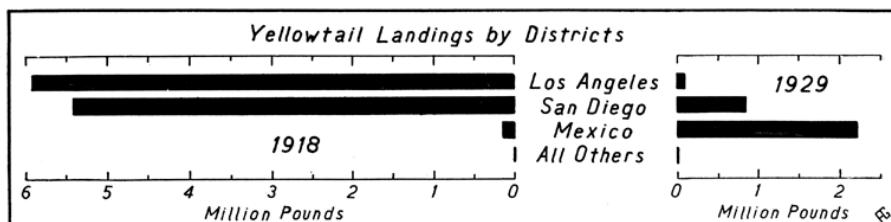


FIG. 35. Yellowtail landings by districts in 1918 and 1929.

FIG. 35. *Yellowtail landings by districts in 1918 and 1929*

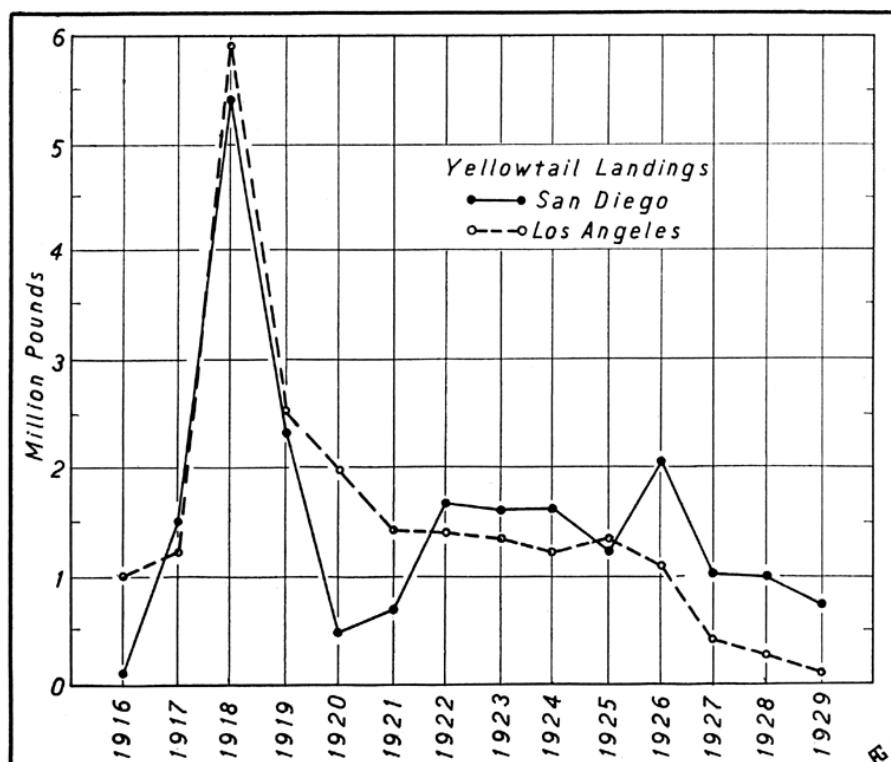


FIG. 36. Annual yellowtail landings in Los Angeles and San Diego counties.

FIG. 36. *Annual yellowtail landings in Los Angeles and San Diego counties*

after the wartime peak until 1920; picked up until 1922, and since that time have followed a gradual downward trend until 1929. Judging from the 1930 run so far (August) the total for that year will be still lower. Conditions at San Diego seem bad, but at San Pedro they are very much worse. The drop from nearly six million pounds in 1918 to a million and a half in 1921 was caused principally by the drop in demand. From that time on the fishery should have picked up. Instead it began rapidly dwindling away, and in 1929 the local yellowtail catch was only 105,000 pounds, less than one-tenth of what should have been the low point in 1921.

TABLE 2
CASES OF YELLOWTAIL CANNED IN CALIFORNIA
1918-1929

	San Pedro District, size of can			San Diego District, size of can			State total, size of can		
	1/4 pound	3/4 pound	1 pound	1/4 pound	3/4 pound	1 pound	1/4 pound	3/4 pound	1 pound
1918.....	28,337	2,824	405	31,737	8,328	405	65,274	11,152	11,152
1919.....	8,279	243	3	10,517	12	5	29,025	418	418
1920.....	5,538	218		1,453	200		1,671		
1921.....						48		48	
1922.....									
1923.....	3,136	311		23			3,350	315	315
1924.....	1,489	1,425		3,963	367		5,352	2,362	2,362
1925.....	101	9,140	2,190	1,190	284	101	10,046	2,524	2,524
1926.....		3,230	1,180	1,516	208			1,583	1,583
1927.....	50	6,514	1,510	51	6,037	4,478	101	12,851	5,988
1928.....	30	5,031	2,021	2,077	10,709	2,317	217	15,643	6,543
1929.....		586	516	3,028	436	201	3,628	612	817
1929.....		2,802	3,043	2,966	2,332	4,133	2,966	5,154	7,176

On the basis of catch figures, it would appear that the yellowtail fishery is being depleted, but catch figures alone do not form a sufficient basis for judging whether or not there has been depletion. Probably the most important item to consider in connection with the landings of yellowtail is the price paid for the fish. A decrease in price could cause the fishermen to turn to other fields. Instead of showing such a drop, the yellowtail prices at the fresh fish markets more than doubled over the period from 1922 to 1929. In spite of such an incentive, the fishermen were unable to find as many fish as before. Restrictive legislation may cause a decline in total catch of a fishery in which there is no depletion, but there has been no such legislation enacted to protect the yellowtail. A decrease in the fishing area can cause decline in landings, but in the case of yellowtail, the area has been extended far into Mexican waters, notwithstanding the fact that the Mexican government makes fishing in its territory exceedingly expensive. Added to this is the fact that boats at San Diego are finding but few small yellowtail where there used to be many large ones, and at San Pedro as a general rule they are finding no yellowtail at all. Of course there is the standard argument of people who do not wish to admit the existence of depletion: "The fish may have changed their feeding grounds and be just as abundant as ever somewhere else." This could be true. But working on such a theory would never help out a fishery that had been depleted.

13. ALASKA CODFISH

By RICHARD S. CROKER

During the last few years, the offshore fishing grounds supplying California ports have undergone a startling development. Southern California tuna boats now venture not only to Mexico as they have for many years, but to Central America and far-off Ecuador to make their catches. Japanese and Hawaiian fishermen are sending albacore across the Pacific in refrigerated steamers. Halibut vessels from Eureka are pushing up the Oregon coast. The Gulf of California is being tapped for fresh market fish. But long before any of these offshore fisheries were even dreamed of, California ships had successfully commenced the Alaska codfish and salmon fisheries.

In 1863, Captain Matthew Turner, of the brig Timandra of San Francisco, commenced the industry that has grown into the present day Alaska cod fishery.¹³ His trip was part of a trading voyage to the Siberian coast. The trial was successful and the following year his ship and one other made the trip to northern waters. In 1865 seven ships brought in codfish both from Asiatic and Alaskan waters. The fish were cured aboard ship, brought to San Francisco and sold on the street. Until 1891, San Francisco was the only Pacific port where codfish vessels were outfitted. There are several reasons for the leadership of San Francisco. In the first place the fishing banks are nearly as close to San Francisco as they are to any other port.

The Shumagin Islands are approximately 1550 nautical miles from Seattle, 1900 from San Francisco. The San Francisco region itself furnishes a better market than the northwest offers and in addition is closer to Oriental and Latin-American markets. Being the only port where ships could outfit in early days gave the California city a big head start. In 1891 the Puget Sound region became a factor, and ships from Seattle, Tacoma, Anacortes, and neighboring ports have threatened San Francisco's supremacy ever since.

The Pacific codfish industry has been beset by vicissitudes ever since its inception. The prestige and actual power of the Atlantic cod fishery has acted against it from the first and only the courage of the packers and the quality of their products have carried the industry through. Every time the larger companies had a successful season any number of promoters would be inspired to send out schooners, only to create a glutted market and be wiped out. The

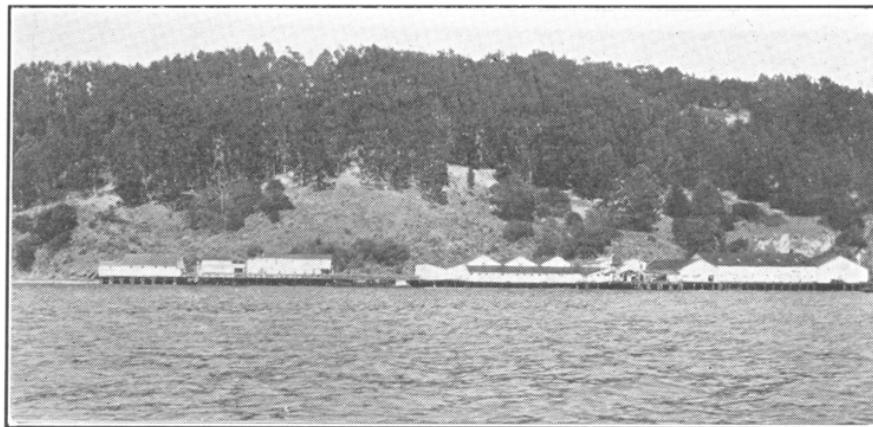


FIG. 37. Codfish plant of the Union Fish Company at Belvedere, California. Photograph by Donald Croker, May, 1930.

FIG. 37. Codfish plant of the Union Fish Company at Belvedere, California. Photograph by Donald Croker, May, 1930

list of failures reads like a roll call of San Francisco and Seattle business men. Worn-out schooners were sent north, many to be lost. Salting plants were built, many to rot in idleness. Most of the unsuccessful San Francisco promoters were bought out by one or the other of the two California companies that have come down to the present from pioneering days. These companies are now known as the Union Fish Company¹⁴ and the Alaska Codfish Company.

Because Alaska cod are landed in California in a prepared—salted—state, the amounts brought in do not appear in California fresh fish catch figures. Nevertheless, this Alaska fishery has been essentially Californian since its beginning nearly seventy years ago. The ships catching the fish and the plants where they are salted are owned by Californians. The fishermen spend the off-season in California. The fish are landed and prepared for market in the State and distributed from San Francisco. The Alaska cod has earned a place in California fishing history and deserves some recognition in any discussion of our fishing industry.

The Alaska cod 15 (*Gadus macrocephalus*) is still considered by most ichthyologists to be a different species from the Atlantic cod (*Gadus callarias*). There are no external differences except possibly the larger head of the Pacific cod, and internally the main distinction is the smaller air bladder of the Pacific form. In flavor and food value there is little if anything to choose between the cods of the two oceans. The cod of the Pacific attains weights of about 60 pounds, but 30 is considered quite large.

The habitat of the Alaska cod is along the eastern coast of the Pacific from Washington north to the northern part of Bering Sea and down the Asiatic coast as far south as Japan. The areas where cod are most numerous are the most northern part of the Pacific Ocean, Bering Sea and Okhotsk Sea.

The schooners engaged in the cod fishery were not built as fishing boats. They are 3- and 4-masted schooner-rigged vessels of approximately

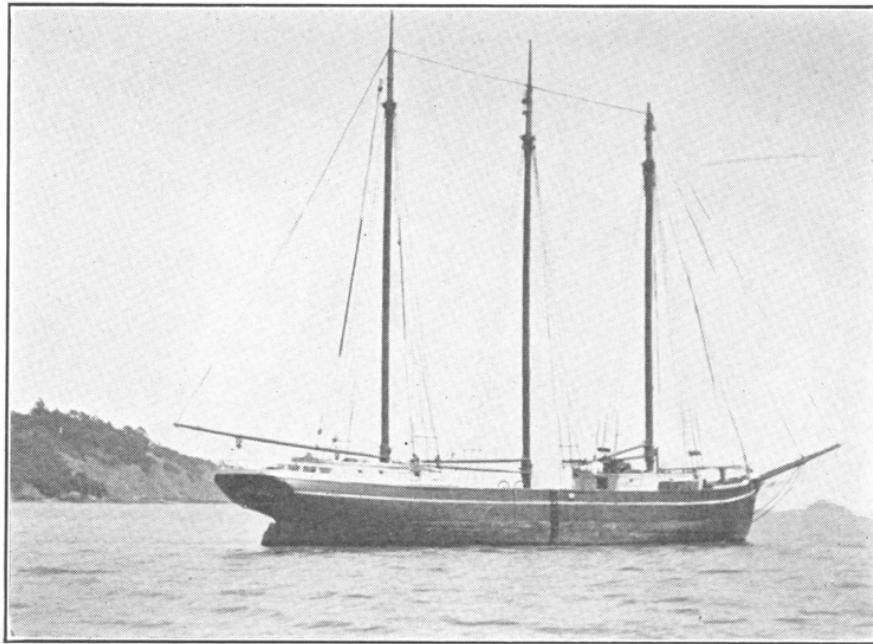


FIG. 38. Codfish schooner lying at anchor off Belvedere. Photograph by Donald Croker, May, 1930.

FIG. 38. Codfish schooner lying at anchor off Belvedere. Photograph by Donald Croker, May, 1930

150 to 450 tons net, formerly used as cargo and trading vessels. Some of them occasionally take a season off to act in the movies, to tender tuna from Lower California to San Pedro, or to lie idle.

The ships leave San Francisco Bay in the early spring, from late in January to March, taking about 25 days to make the run to the fishing grounds under sail. The cod are caught on the relatively shallow banks (approximately 12 to 50 fathoms) on both sides of the Alaska Peninsula. The first catches were made on the Asiatic banks in the Okhotsk Sea and around the Shumagin Islands on the Alaska side of the North Pacific. In 1882 the Bering Sea fishery was begun. It has continued to

the present. The Shumagin fishery has spread to include the several banks of the North Pacific on the Alaska side. The last San Francisco fare from the Okhotsk Sea was in 1909, except for landings of Japanese ships in 1918, 1919 and 1920.

The fishing is done from dories sent out from the schooners. The fishermen use long hand lines with hooks baited with pieces of fish. The dories have been equipped with outboard motors for several seasons. The motors increase the dories' range and allow them to take advantage of short periods of calm during stormy weather. The dories are able to make several trips during the long summer day, usually returning at meal times so the fishermen can eat aboard ship. Often a trip is made after supper, and some diligent fishermen do not return for meals but content themselves with taking along a piece of bread or salt pork in their dories. The schooners carry dress gangs to clean and split the fish as soon as they are brought in by the fishermen. When not engaged in cleaning, the members of the dress crew fish over the schooner's rail, getting paid for their fish in addition to receiving regular wages. The fishermen are paid according to the number of fish they have caught. Pay day follows the arrival of the ship in San Francisco Bay. Many of the fishermen squander their whole earnings in one big party or have it stolen by confidence men in the city. These unfortunate ones often work at the salting plant until the schooners leave the following spring.

The fish when brought aboard ship are beheaded, cleaned and split open lengthwise, leaving a double piece joined at the back. The split fish are lightly salted and kench'd in the hold. In kenching, the fish are piled skin-side down, alternating napes and tails. The top fish is placed back- or skin-side up. Individual kenches or piles are about 4 feet long, as wide as the hold, and as high as space will permit. When the kench is finished, salt is poured on top of the pile and allowed to seep down among the lower fish. The salt draws the moisture out of the cod, drying as well as salting them. The liquid runs into the bilge and is pumped out. Codfish are very "watery" and shrink a great deal when salted. The shrinkage of the fish causes the kench to become lower so that more fish can be piled on top and more salt added. The fish are quite dry when they reach San Francisco. The salt is made on San Francisco Bay and carried north by the schooners.

In addition to the regular fishing schooners, the various companies maintain shore stations in Alaska. Small fishing boats—launches, dories and sailing vessels—catch the cod on the inshore banks and land them at the stations where they are cleaned, split and salted down. The fishing is done by Indians and white Alaskans, who alternate cod and salmon fishing. The boats are owned by the companies. Dressing and salting are considered part of the work of the fishermen who divide themselves into dress gangs for performing this labor. Recently some of the fishing schooners have made a practice of taking crews to the stations to fish the island banks. The fish caught by the regular station crews are brought to Washington and California by special transporting sail and power vessels, by regular cargo steamers, and by fishing schooners that have not made capacity catches. Most of the stations are located on the Shumagin Islands. Some of them operate all year, some in the winter, and some in the summer only. The schooners operate in the spring and summer.

TABLE 3
ALASKA CODFISH LANDED IN CALIFORNIA^a

1863-1929

<i>Year</i>	<i>Number of fish</i>	<i>Year</i>	<i>Number of fish</i>
1863-----	7,100	1897-----	1,065,000
1864-----	54,500	1898-----	742,000
1865-----	225,000	1899-----	1,302,000
1866-----	724,000	1900-----	1,532,000
1867-----	943,400	1901-----	1,429,000
1868-----	580,000	1902-----	2,073,000
1869-----	1,032,000	1903-----	2,022,300
1870-----	1,467,000	1904-----	2,021,200
1871-----	926,000	1905-----	2,610,133
1872-----	305,500	1906-----	2,368,632
1873-----	563,000	1907-----	1,858,751
1874-----	369,000	1908-----	1,904,403
1875-----	362,000	1909-----	1,497,361
1876-----	844,000 ^b	1910-----	1,060,600
1877-----	857,000	1911-----	1,348,000
1878-----	1,129,000	1912-----	1,624,984
1879-----	1,499,000	1913-----	1,374,847
1880-----	1,203,000	1914-----	2,412,202
1881-----	1,061,000	1915-----	2,367,900
1882-----	1,241,000	1916-----	2,537,500
1883-----	1,720,000	1917-----	2,557,000
1884-----	1,622,000	1918-----	2,606,268 ^c
1885-----	1,374,000	1919-----	2,961,500 ^d
1886-----	1,183,000	1920-----	2,284,000 ^e
1887-----	1,126,000	1921-----	1,318,000
1888-----	1,046,000	1922-----	1,277,000
1889-----	816,000	1923-----	1,806,377
1890-----	1,138,000	1924-----	1,371,647
1891-----	1,220,000	1925-----	1,734,000
1892-----	1,312,000	1926-----	1,074,704
1893-----	1,216,000	1927-----	931,000
1894-----	894,000	1928-----	599,402
1895-----	939,000	1929-----	915,000
1896-----	728,000		

^a Data for 1863-1915, inclusive, from Cobb, John N., Pacific cod fisheries. U. S. Comm. Fish., Rept. [for 1915] Append. IV, 1917. Data for 1916-1929, inclusive, from Pacific Fisherman.

^b Including catches of shore stations which operated for the first time in 1876. Figures for following years include station fish brought to San Francisco.

^c Includes 728,000 fish landed by 4 Japanese vessels from Okhotsk Sea.

^d Includes 612,500 fish landed by 3 Japanese vessels from Okhotsk Sea.

^e Includes 92,000 fish landed by a Japanese ship from Okhotsk Sea.

TABLE 3
ALASKA CODFISH LANDED IN CALIFORNIA 1863-1929

Table 3 gives the total number of codfish brought into California from Pacific waters during the years 1863 to 1929, inclusive. From 1863 to 1875 all the fish were landed directly by fishing vessels. After the establishment of shore stations in Alaska a varying percentage of deliveries has consisted of fish from the stations. In 1918, 1919 and 1920 several Japanese fishing vessels seeking better markets brought their fares to San Francisco and Puget Sound. The table gives the number of fish landed. Roughly speaking 1000 dry-salted codfish weigh 3725 pounds. The fish average 12 pounds in the round. John N. Cobb gives the value of the 1,253,500 vessel-caught fish delivered in 1915 as \$165,462. The 915,000 fish brought to San Francisco in 1929 were valued at approximately \$225,000, according to C. E. Cocks of the Union Fish Company. These amounts do not include discharging

the vessel, repickling, or manufacturing the fish into the finished products.

Variations from year to year reflect market conditions more than fishing conditions. Sometimes a poor season is due to unusually stormy weather but, according to packers, enough fish can usually be obtained to fill orders. Most often a small catch is due to a curtailment of activity brought about by overproduction during the previous year and the consequently glutted market. Overproduction in Europe will make extensive operations unwise, as American products often have difficulty in competing with the resulting low-priced European fish. Economic conditions in the importing countries cause rises and drops in the catch. For instance a bad year for sugar in Cuba, one of the principal markets, causes a decline in demand and results in a lessening of fishing effort. Figure 39 shows that the general trend of total catch has been upward since the beginning of the fishery. The drop of the last decade was due in part to the post-war slump and in some measure to the increasing competition of canned fish.

Occasionally a transporting ship brings fish to San Francisco from the Alaska shore stations. During the last few years, some of the fishing schooners have fished from the Alaska stations and the transporting fleet has become a less important factor at San Francisco. The fishing schooners, having fished all spring and early summer, deliver their fish at San Francisco from late July to September. The salting plant of the Union Fish Company is located at Belvedere in Marin County across the bay from San Francisco. The Alaska Codfish Company formerly had a plant at Redwood City in San Mateo County where their ships delivered. The plant was destroyed by fire in July, 1929, so that at present the company is sharing the Belvedere plant with the Union Fish Company.

The schooners pull up to the wharf at the plant for unloading. The fish are taken off in cargo nets and dropped into tanks of bay water for a wash. They are taken out of the tanks, lightly salted, and placed in large permanent tanks containing 100 per cent brine solution. They will keep indefinitely in the brine tanks and are left there until needed.

The demand is greatest during the winter months, especially in export markets. Consequently, the plant is busiest during this season, although operative throughout the year. Many of the summer fishermen find employment at the plant during the fall and winter. When an order comes in, the necessary fish are removed from the brine and allowed to drain and dry. Fish that are to be sent to damp countries such as the West Indies or Central America must be dried very thoroughly as codfish readily absorb moisture which would cause them to spoil. During sunny weather, outdoor drying racks are used. At other times the fish are put on indoor racks and are dried by air that has been heated by a furnace. The warm air is drawn over the fish by a large suction fan.

There are something like forty styles of pack, ranging from the dried fish as they arrive from Alaska with only the heads, viscera and black skin removed—to the fancy filleted bricks and slices. Depending on the style of pack, varying amounts of skin and bones are removed and the fish are cut, pressed into shape, or filleted, and wrapped for shipping. Fish for local consumption or destined for countries with

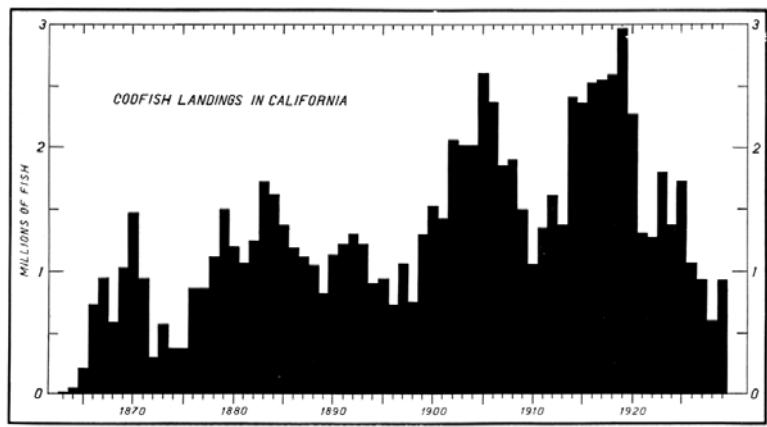


FIG. 39. Number of Alaska codfish delivered in California by years, 1863 to 1929, inclusive.

FIG. 39. *Number of Alaska codfish delivered in California by years, 1863 to 1929, inclusive*

a dry climate are packed in waxed paper and cardboard or wooden containers. The fish for export to damp localities are often packed in tin. The skins and bones are shipped to reduction plants to be converted into glue and fertilizer.

Pacific cod are shipped all over the world from San Francisco. The United States as far east as the Rocky Mountains is one of the largest markets. The West Indies, Mexico and Central America are important consumers. In addition many fish are shipped to the Hawaiian Islands, the East Indies and Asia. Pacific cod are also competing favorably with the Atlantic fish in the eastern states and Europe.

All communication between the Belvedere plant and San Francisco is by water, so that the codfish have not yet quite finished their long sea voyage, even those that are destined for local markets have seven of the two thousand miles yet to be traveled. The schooners deliver the fish directly to the plant. All the prepared fish is sent out from Belvedere by boat, to be distributed from San Francisco. The owners of the plant operate a boat that connects with the San Francisco ferry at nearby Tiburon. This boat takes out fish and brings mail and provisions for the workers. Salt is brought to the plant by boat from the salt works on the southern arm of San Francisco Bay.

Besides being of considerable economic importance, the Alaska cod fishery has its romantic side. Early California and Alaska history is replete with tales of shanghaied sailors and shipwrecked vessels, and the colorful waterfront characters who succeeded or failed in the codfish business helped to make San Francisco the picturesque city it was and is. The reader is referred to John N. Cobb's classic, "Pacific cod fisheries" (footnote 13), for a more detailed account of the fishery and its history.

14. CABRILLA

By LIONEL A. WALFORD

Since the winter of 1926-1927, there have been indications of a new Mexican fishery to augment our winter market supply, that for the large sea-basses of southern waters: the Mexican cabrilla and groupers. Although these fish are still of comparatively little importance in point of pounds landed, the newness of the fishery and the rapidly increasing catch makes the recording of the statistics notable at least historically if not intrinsically.

The cabrilla (*Epinephelus analogus*) and the groupers (members of the genus *Myceteroperca*) belong to the sea-bass family (Serranidae), and are near relatives of the black sea-bass and rock bass of California, and of the groupers, hinds and jewfishes of the Atlantic coast and the Gulf of Mexico. On the Pacific coast, with the exception of the California black sea-bass, none of the large sea-basses is found north of the Mexican boundary. While their distribution of course differs according to species, in general they occur from the coast of Mexico to at least as far south as Peru.

Although these fish have so far been reported entirely as cabrilla, the catch has really consisted of at least four different species. These may be readily separated by the casual observer into two types: the Mexican

cabrilla, a somewhat smaller, closely spotted form; and the groupers, considerably larger, plain-colored fish. The groupers, of which three different kinds have been observed in our markets, are difficult to distinguish, and until a systematic study has been made on these fish, it will be expedient to report them all under the same name.¹⁶

The yearly landings of these large sea-basses, since their first appearance in noticeable numbers in 1927, has not been great. (See fig. 40 and table on p. 55.) However, the increase in the yearly total catches, with the exception of the 1927-1928 landings, indicates the possibility of future importance of these fish among the winter and spring importations. One factor which has hindered development of the cabrilla and grouper fishery has been the hesitation on the part of buyers to meet a new name. However, there is no reason why this difficulty should not be overcome with proper introduction and advertisement of the names.

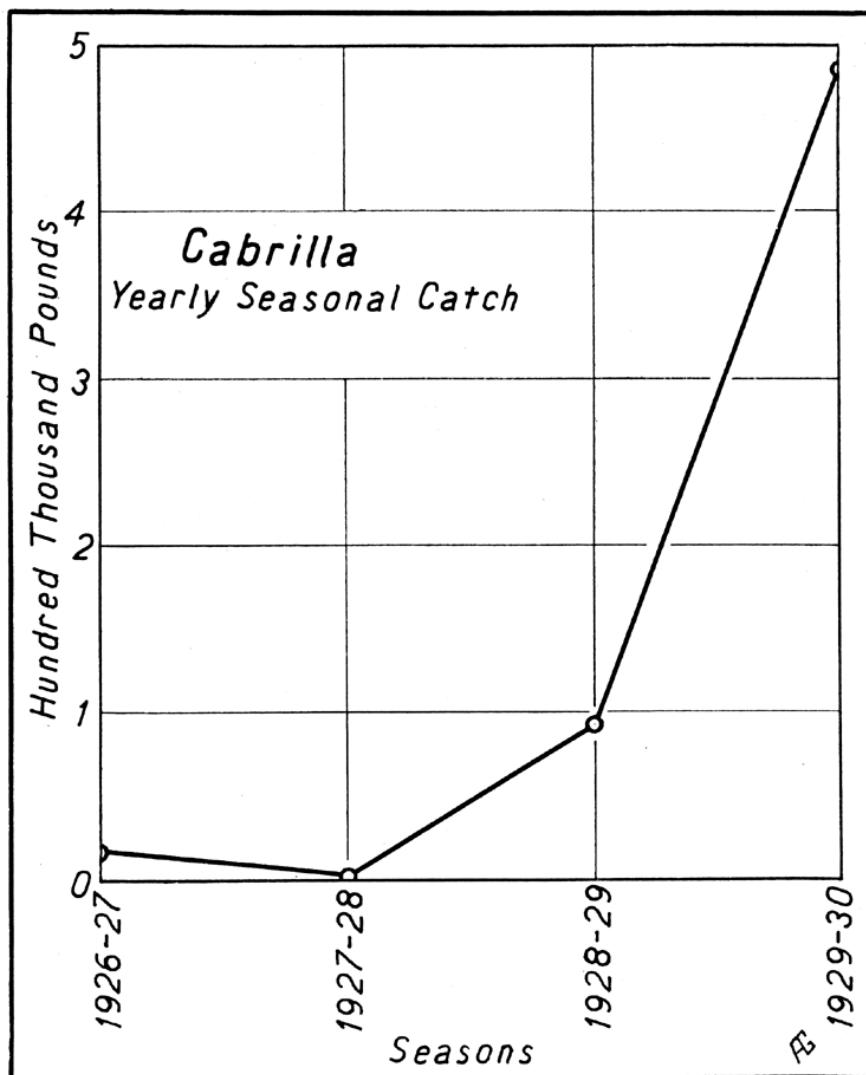


FIG. 40. The catch of cabrilla by seasons.

FIG. 40. The catch of cabrilla by seasons

Meanwhile, the cabrilla and groupers are not the only fish which are symptomatic of extensions of the field of our fishing efforts. The 1929-1930 season has introduced a large number of miscellaneous foreign fish to meet the demands of the increasing population and to supplement our own inadequate supply. We are approaching faster than ever the time when fishery accounting for us is to become a great international affair, rivaling that of the North Sea countries of Europe, and requiring the contributions of the scientists and economists of entire western America.

Commercial Fish Catch for 1929

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CABRILLA LANDINGS IN CALIFORNIA FROM 1927-1929

The cabrilla landings from the west coast of Mexico are grouped with the "Miscellaneous Fish" in the tables of the Appendix (see page 131), but are separated in the following table:

	January	February	March	April	May	June	July	August	September	October	November	December	Total
1927—													
West coast of Mexico to San Pedro													
West coast of Mexico to San Diego.....	5,898	5,125	275	5,350		75							16,223
Gulf of California to San Pedro.....													
1928—													
West coast of Mexico to San Pedro													
West coast of Mexico to San Diego.....				3,672	200								3,872
Gulf of California to San Pedro.....													
1929—													
West coast of Mexico to San Pedro.....	838	59	97			3,930				11,047	16,593	56,478	99,042
West coast of Mexico to San Diego.....		13,163	1,903	16,712	11,357	39,652			7,811	13,550	17,419	31,437	152,794
Gulf of California to San Pedro.....				230								3,950	3,695
													7,875

15. ABALONES¹⁷

By RICHARD S. CROKER

The abalone fishery was important in California even in the days before the white man came to settle. At present the amounts of abalone caught along the California coast compare favorably with those of our most desirable market fishes.

Although the subject of a large fishery, the abalone is not a fish. Like the clams, oysters, snails, and squids, it is a mollusk. The pursuit of any sea food is called fishing, so the abalone industry can well be called a fishery. The quotation of Webster's definition of the word abalone gives a concise description of the animal: "Abalone, a gastropod mollusk, of the sub-order Rhipidoglossa and genus *Haliotis*, having a shell of a flattened, oval, slightly spiral form, perforated with a row of apertures for the escape of the water from the gills, and covering the animal like a roof; an ear shell; a sea ear. It clings to the rocks with great tenacity with its broad, muscular foot. The shell is lined with mother-of-pearl, which is used in inlaying, button making, etc. The animal is used for food, especially among Oriental nations." The class Gastropoda includes several other common mollusks, among which are the snails that live on land as well as those that live in fresh and salt water. The limpets, turbans, chitons, and the beautiful nudibranchs or sea slugs are others that are related to the abalone.

The genus *Haliotis* is a widespread one. Members are found in various parts of the world along rocky coasts. The several American species are found only on the Pacific coast from Mexico to Alaska. Along this stretch of coast the abalone is of little importance north of California, mainly because the larger and more desirable species are found for the most part south of Oregon. The common names of most of the abalones are derived from the predominating color of the inside of the shells. The inner layer of the shells of all the species is pearly and multicolored. The three best known California species are the red abalone (*Haliotis rufescens*), the southern green abalone (*Haliotis fulgens*), and the black abalone (*Haliotis cracherodii*).¹⁸ The red form is found in central and northern California, being scarce south of Santa Barbara. The southern green abalone is found from the Farallon Islands to Lower California, but is seldom seen north of the Channel Islands. The black species is established along the California coast south of Point Arena. The corrugated (pink) abalone (*Haliotis corrugata*), a southern form, was once important commercially in southern California but intense fishing has reduced its numbers. In addition to the species mentioned, there are several other kinds found in California which are either too small or too scarce to warrant gathering by either commercial or sport fishermen. The red form is the abalone of commerce today. It is the largest species in California, attaining a length or diameter of about twelve inches.

All of the species of abalones are found below high tide mark on comparatively exposed rocks. Some forms frequent deep water and can be taken only by diving. Others may be gathered from rocks exposed by very low tides. The food of abalones consists of kelp, sea lettuce, eel grass, and diatoms; consequently rocks supporting a dense growth of marine vegetation are the most favorable locations from the mollusks' point of view. The black abalone, which feeds principally on diatoms, is found on relatively barren rocks.

The spawning season is from February fifteenth to April first, during which time the abalone is in poor condition. Red abalones spawn for the first time at an age of about six years when they are approximately four inches in diameter. About 100,000 eggs are deposited during the first year of spawning. Several million a year are liberated by a large abalone. The young are at first free-swimming, but soon settle on rocks, moving but little, and then very slowly for the remainder of their lives, which are said to be lengthy.

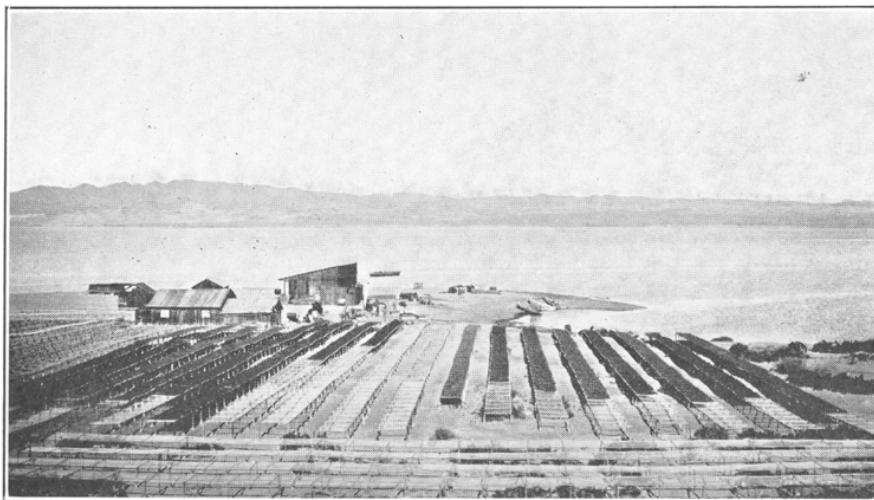


FIG. 41. Abalone camp at Turtle Bay, Lower California, Mexico. Photograph by Geo. Roger Chute, 1926.

FIG. 41. *Abalone camp at Turtle Bay, Lower California, Mexico. Photograph by Geo. Roger Chute, 1926*

Many plants and sessile animals attach themselves to the abalone's shell and live there as on rocks. Certain boring mollusks penetrate the shell to attack the animal within. In its attempts to ward off the invader the abalone adds more nacre to its inner shell of mother of pearl. Blister pearls are formed by this secretion. The young have many natural enemies, especially fish, that prey upon them before they settle down. After forming a shell, the abalone is reasonably safe from attack, but sometimes a starfish is able to insert its prehensile stomach between shell and rock, thus making a meal of a small or medium-sized abalone. The cabezone (*Scorpaenichthys marmoratus*) is credited with being able to pry loose and swallow small abalones, but most other fish leave them alone. A sudden influx of fresh water during spring freshets, or the shifting of sand is often fatal to large numbers of the mollusks. Possibly the worst enemy of the abalone is man, who has taken the animal for its flesh and its shell since prehistoric days.

15.1. HISTORY OF THE ABALONE FISHERY IN CALIFORNIA

Before the Spaniards came over uncharted seas and trackless deserts to discover California, the country literally swarmed with Indians. Scattered along the coast were several really large towns inhabited by fishermen and traders. After the establishment of the missions and ranchos the Indians rapidly disappeared from the country along the sea-shore until now there are very few of them, and those live mainly along the extreme northern coast of the State. From earliest times, the coastal Indians utilized the abalones that were so plentiful on every wave-swept rock. Early writers record the consumption of vast numbers of the shellfish at tribal feasts. Excavations in ancient shell mounds have disclosed quantities of abalone shells. Evidently prehistoric savages knew the fine qualities of abalone meat. To the Indians the shell was perhaps the most valuable part of the abalone. It was used entire or in pieces as ornaments, but it was as a barter medium or money that it had the greatest value to the coastal Indians. The shiny part of the shell was divided into pieces that varied in value according to their size and brilliancy. The pieces were perforated so they could be strung on thongs and reeds and worn as a necklace when not being used in barter.

To the Indians the abalone was known as *uhllo*; the shell money bore the same name. The Indians of the interior were strongly attracted by the luster of the *uhllo* and gave the coastal traders amazing bargains in exchange for the pretty shells. After the horses originally introduced by the Spaniards became established on the plains, the Indians of the interior sometimes traded on a basis of one horse for one piece of shell. *Uhllo* found its way into the country far to the east of California. Even after California was admitted into the Union as a State in 1850, the Indians continued to use *uhllo* as money—until there were not enough Indians left to give the shell money value.

Until the Chinese came to California during the gold rush days of the early fifties, the Indians were the only people to utilize the abalone to any extent. The descendants of the Spaniards and the immigrants from the United States would not eat the abalone, nor did the white people appreciate the shellfish as food for many years. The Chinese who settled near the coast were delighted to find the shellfish they had known as a delicacy in their homeland. At first they gathered abalones for their own use only but by about 1864 the Orientals had begun to dry the flesh as they had done in China. The dried meat was sent to the Orient where it met with a ready sale. The thoroughgoing Chinamen with their usual lack of foresight, set out to gather every available abalone on the coast of southern California. San Diego was the base of operations for many years. After denuding the rocks in the vicinity of this town, the Chinese did their best to gather all the abalones to be found in Lower California. They were so persistent that the Mexican government became alarmed and about 1880 established a consulate at San Diego for checking up on their activities and to see that the license fee of sixty dollars a year for each boat was paid. The rocks near San Pedro and those of the Channel Islands also suffered from the depredations of the Chinamen. Abalone camps were established on several of the islands.

The Chinese used only the meat and threw the shells away. Some white men saw the possibilities presented by the glittering shells and began the manufacture of shell ornaments and curios which commanded good prices in the eastern States. Once shown the way, the Chinamen were quick to adapt this new phase of the industry to their own uses. They shipped quantities of shells to China for use in inlay work. They never made finished articles from the shells but contented themselves with supplying the American craftsmen. By 1879 the value of the shells was about twice that of the meat. (See table 4.) The use of abalone shells for making mantel ornaments, paper cutters, picture frames, and other articles continued for many years. Lately

TABLE 4
COMMERCIAL LANDINGS OF ABALONES IN CALIFORNIA^a
1879-1888

	1879 ^b	
	Pounds	Value
Abalone meat	787,600	\$38,880
Abalone shells	3,383,500	88,825
Totals	4,171,100	\$127,705

	1888 ^c	
	Pounds	Value
Vessel Fisheries ^d	940,000	\$20,750
Shore fisheries	2,665,920	57,826
Totals	3,905,920	\$78,576

^a Including abalones brought in from Lower California, Mexico.

^b Jordan, David Starr. *Fisheries of Pacific coast. The fisheries and fishery industries of the United States.* Washington, sec. 2, pt. 16, 1887.

^c Collins, J. W. *Report on fisheries of Pacific coast of United States. U. S. Comm. Fish., Rept. (for 1888), 1892.*

^d Probably the fishery of Lower California, prosecuted by the Chinese in their junks sailing from San Diego.

TABLE 4
COMMERCIAL LANDINGS OF ABALONES IN CALIFORNIA 1879-1888

tastes have changed and these curios are not made in any quantities at present. As late as 1913 the manufacture of curios and the utilization of abalone pearls were an important part of the abalone industry. According to Edwards, the value in manufactured products of the 53.2 tons of black abalone shells shipped from the San Pedro-Long Beach area during the year ending in July, 1912, was \$93,100.19 Not long before the demand for abalone curios and jewelry decreased the California manufacturers of these articles had a law passed prohibiting the export of unfinished shells from the State. At present the shells are not used to any great extent. Some are sold to tourists and small amounts of abalone jewelry are still sold. Some fishing lures are made of the pearly shells. Bits of broken shells are used for pebble dash on buildings, but this practice is not so common as it was a number of years ago. Seaside resorts, principally older ones, often have walks and terraces lined with abalone shells as well as empty chianti bottles.

The drying and exportation of abalone meat continued until 1915, when a law was passed putting an end to this practice. The early Chinese, after seriously depleting the supply of abalones in southern California, gradually passed out of the picture. Their place was taken by the equally persistent Japanese, who operated along the rocky coast of Monterey and San Luis Obispo counties. One of the largest drying plants was at Cayucos in the latter county.

The method of preparing and preserving the dried abalone was described by Edwards¹⁹ (p. 8) as follows:

1. Gathered from the rocks by the divers.
2. Removed from the shell.
3. Salted for two or three days, in order to remove the pigmented mantle fringe and to preserve the meat.
4. Washed in tubs by means of wooden paddles.
5. Cooked for one-half hour in water almost at the boiling temperature. This is said to give the desired round shape to the meat.
6. Laid in trays and placed on frames in the sunshine. The abalone is dried four or five days or even longer, according to the temperature.
7. Cooked in water for the second time; about one hour.
8. Smoked in charcoal smoke from twelve to twenty-four hours.
9. Placed in boiling water for the third time; mainly for rinsing.
10. Dried upon the trays for six weeks.
11. A final cleansing bath in lukewarm water.
12. Shipped to market, having lost nine-tenths of the original weight.

The flesh lost about two-thirds of its weight in preparation, the dried meat weighing one-tenth the original weight of the whole shellfish. The dried meat is almost as unyielding as hard rubber and can be chewed like gum. The Orientals minced the tough material for soup stock.

The Chinese had taken the black, corrugated and southern green abalones, principally from shallow water. The first Japanese followed the same practice for some time, but the most important of the later dry-abalone fisheries was based on the more northern red abalone. Most of them were taken by diving, as were the corrugated and southern green forms in later years.

For some years relatively small quantities of abalones were canned in California. (see table 5.) The canning of abalones commenced at Cayucos about 1905. This phase of the fishery never became very important and there is no canning of abalones at present. The last cannery to operate was located on Carmel Bay in Monterey County. It packed for the last time in 1928. The export of abalones from the State in any form had been prohibited so the foreign market was ruined. The recent rapid growth of the fresh abalone market had cut into the local trade so that the canned product had difficulty in finding a sale. There was nothing else to do, so the canneries closed down. The canned abalone found in California stores at present is packed in Lower California.

15.2. THE CALIFORNIA ABALONE FISHERY AS IT IS TODAY

The California abalone fishery of today, as far as large scale commercial operations are concerned, is confined to the waters off the coast between Pacific Grove and Point Buchon. Nearly all operations within this district are carried on between Point Lobos in Monterey County and Cayucos in San Luis Obispo County. The abalones are

landed at the town of Monterey. Non-commercial fishermen also gather abalones along this bit of coast. North of Monterey Bay practically all of the abalones taken are gathered by amateur fishermen and are used locally. The same conditions prevail south of Point Buchon. Below the international boundary line a commercial fishery of considerable proportions is conducted. This fishery is discussed in the chapter on the abalone industry of Lower California.

As far as non-professional fishermen are concerned, abalones can be gathered only during very low tides or from a skiff in calm, shallow water. The shellfish cling to the rocks with such tenacity that prying instruments are necessary to remove them. Automobile spring leaves and tire irons are often used. The shellfish can be found under rocks or in crevices by keen-eyed searchers. The method of catching them



FIG. 42. This pile of shells is the result of one morning's cleaning operations at one abalone market. Photograph by Richard S. Croker, Monterey, California, September 5, 1930.

FIG. 42. This pile of shells is the result of one morning's cleaning operations at one abalone market. Photograph by Richard S. Croker, Monterey, California, September 5, 1930

from a small boat is ingenious. By the use of a water-glass, the mollusks can be located more readily than merely by looking over the side. The water-glass is a small box with the bottom made of window glass. By setting the glass part just below the surface, the effects of ripples, sun glare, and shadows are lessened. When an abalone is seen, one of the men in the boat dislodges it with a long-handled gaff and it falls into a scoop net.

During the open season, at every real low tide, many hundreds of tourists and ranchers can be seen going over every accessible reef and ledge "with a fine-tooth comb." State and county authorities are hard-pressed to enforce the laws on limits and minimum size which are so easily broken by thoughtless people.

In the area of commercial fishing, no abalones taken between the shore and twenty feet beyond extreme low tide can be sold. Spearing

anywhere is prohibited. In view of these laws, shellfish for the market must of necessity be taken by diving. There is too much danger to divers and equipment in exploiting either very shallow water or depths of over a hundred feet, so commercial fishing is confined to a rather narrow strip right in the middle of the area of abundance. The greatest danger in operating in shallow water is the presence of strong swells and littoral currents that are apt to carry the boat ashore or drag the diver over sharp rocks, not only injuring him but cutting his compressed air line. Special and expensive equipment is required for working the hazardous depths below a hundred feet where visibility is poor and pressure is great.

TABLE 5
ABALONES FROM CALIFORNIA WATERS—COMMERCIAL LANDINGS AND AMOUNTS PACKED^a
1916-1929

Year	Pounds ^b	Cases ^c	Year	Pounds	Cases
1916.....	762,001	1923.....	1,555,134	2,237
1917.....	637,780	1924.....	2,241,812	2,928
1918.....	602,919	1,425	1925.....	2,352,861	2,954
1919.....	759,203	2,873	1926.....	2,060,770	2,256
1920.....	806,716	1,435	1927.....	2,816,530	1,656
1921.....	1,481,170	2,061	1928.....	2,066,243	295
1922.....	1,523,394	2,037	1929.....	3,438,858

^a Figures gathered by the Bureau of Commercial Fisheries, California Division of Fish and Game.

^b The weight given is total live weight in the shell. The State law provides that no abalone may be brought ashore unless alive and in the shell.

^c The pack is practically all of 48 one-pound cans to the case. Half-pound cases have been reduced to half cases to correspond. No data available for 1916 and 1917.

TABLE 5
ABALONES FROM CALIFORNIA WATERS—COMMERCIAL LANDINGS AND AMOUNTS PACKED
1916-1929

The following account of abalone fishing methods is from an article entitled "Abalones in California" by Paul Bonnot:²⁰ "The fishing crews which collect the abalones today are almost entirely Japanese. A boat from fifty to sixty-five feet in length is used as a base, having living quarters for the crew of five men. A smaller boat, containing the diving rig, a small stationary gas engine, pump and air tank, is towed by the larger boat. Having reached the desired place, the large boat is anchored a quarter of a mile off shore. The diver and three men embark in the smaller boat. This is manipulated by means of a long oar which is worked over a single upright wooden peg at the stern. By a sculling movement of this thin bladed oar, the boatman handles the boat perfectly, even working astern with apparently no change in the movements of the oar. The diver usually works in comparatively shallow water. He walks about and pries the abalones from the rocks with a short flat piece of iron. He carries a net bag into which he drops them, and when this is full, a signal on the line causes the line tender to draw it up on deck. The diver draws the bag back, coiling up the line in his left hand. The boat follows the diver about, in some places a rather hazardous business. The sea surges and breaks on the rocks, throwing the small boat about and sucking it in and out of narrow crevices. The diver draws good pay—and earns it. The boatmen get ordinary wages." "The abalones are sorted and measured as soon as they are dumped on deck. The desirable ones are piled in the hold. When a load has been collected, it is conveyed to the larger boat. Here, on the flat aft deck, wet sacking is laid down and the abalones stacked in a slanting position. As soon as the foot of one animal touches the shell of the next, it fastens to it, and the solid, flat cargo is thus arranged. When a load of 200 or 300 dozen abalones is on deck, the boat starts for Monterey. An element of time enters in, as the abalones must be landed alive. They keep well, however, and will last for four or five days."

"At the docks, the mollusks are unloaded and piled up on the floors of the fish houses, and the dressing crews are assembled. The abalone is removed from the shell with a flat, stiff, pointed piece of iron. An automobile spring leaf is an admirable tool. This is pushed up to the base of the muscle where it adheres to the shell, and the iron driven downward. The shells are thrown to one side and the abalones are thrown into a slatted box and washed. Several women then remove the viscera, trim the edges and wash the muscle carefully. The cleaned muscle is then put into a hand cutter, similar to the present day prepared meat slicers found in most butcher shops. This machine slices the abalone into round slices, half an inch thick. These are roughly sorted by size and are taken to the beating tables. There the slice of abalone is placed on a block of wood and beaten with a wooden mallet. Some skill seems to be required here, as a too heavy beating results in a pasty mass, and too light a one leaves portions as tough as leather. The finished product is packed in five and ten pound wooden boxes and either shipped at once or put in the ice box."

The abalone steaks are distributed from Monterey to all points within the State. At present the sliced meat is the only product obtained from the abalone since drying and canning have ceased. The shells are sold to tourists, thrown into the submarine gardens of glass bottom boat fame

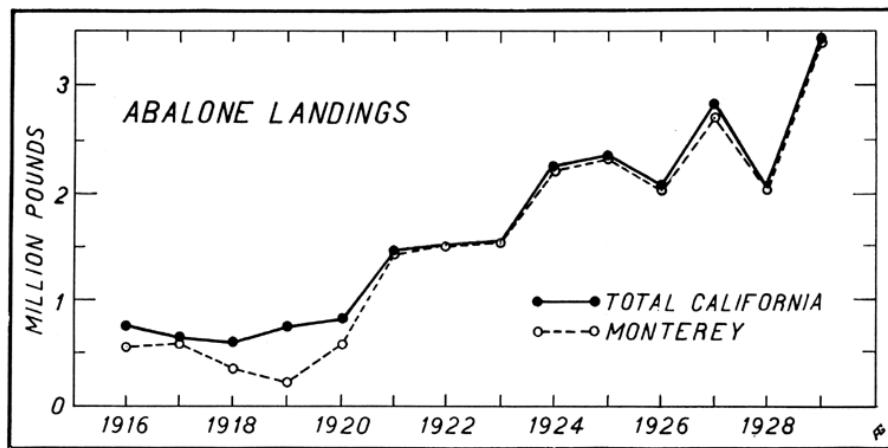


FIG. 43. Commercial deliveries of abalone from California waters. Live weight. Note that the majority of landings are made at Monterey.

FIG. 43. Commercial deliveries of abalone from California waters. Live weight. Note that the majority of landings are made at Monterey

for divers to recover for a consideration, or thrown away. The trade in manufactured articles has dwindled away to practically nothing. Some fishing lures are either made of or are inlaid with pieces of brilliant abalone shell.

A glance at either table 5 or figure 43 gives an idea of the proportions of the abalone industry of the State. Figure 43 also shows the importance of Monterey as compared with the rest of the State. The slump at Monterey from 1917 to 1920 was caused by the operation of a cannery at Cayucos, to which port many abalones were diverted. As more people have begun to appreciate the flavor of abalone meat, the market for this sea food has grown rapidly. In spite of the curtailment of cannery activities, the industry shows a healthy growth. In terms of dollars and cents the abalone is our most important mollusk. More pounds of squid are landed, but the value of this active mollusk is considerably less. The fishermen are paid \$2 a dozen for abalones in the shell. This price has held for the last seven years. The fillets are worth 45 cents a pound wholesale and 55 cents retail. As a tourist attraction the abalone is very important. More people seek the abalone

for pleasure and food than is realized. With the possible exception of the Pismo clam, which is more restricted as to range, the abalone is more attractive to sportsmen than any other shellfish.

15.3. THE PRESENT STATUS OF THE ABALONE

Since 1880 there have been many protests made against the exploitation of abalones by Oriental fishermen. But because the white people looked with scorn upon the lowly mollusk, protective legislation was slow in coming. As the Americans began to realize the value of the abalone, first because of its shell and later as food, more and more protests were made, and finally laws to conserve the shellfish were passed. The first, a law which was made by Mexico about 1880, was to some extent a conservation measure, but was perhaps intended as a means for making money. Later, county and State laws were passed, establishing restricted districts, outlining methods, imposing minimum size limits and maximum bag limits, and providing for a closed season during the spawning period. The passage of these laws, which was a gradual evolution, came too late to preserve the abalones of southern California in numbers sufficient to support a commercial fishery, but there are enough left to provide shellfish for amateur fishermen. Those remaining are protected to the fullest extent. The restrictive laws were drawn up in time to save the commercial fishery of central California so that abalones may be had by others than those who have the opportunity to gather their own. The supply in northern California has scarcely been tapped.

Conservation in its broadest meaning is the utilization of a natural resource to the fullest extent possible without endangering the source of supply. This end is the goal the California Division of Fish and Game has been striving for, and has achieved in the case of the abalone.²¹ It may safely be said that there is no danger of extinction of the abalone in California. The only thing to be regretted is that the awakening came so late and that protective laws were not enacted sooner.

It is the amateur fisherman who raises the loudest protests against depletion, but he who complains is most often the one who takes undersized abalones that have not yet spawned and who takes spawning ones during the closed season. It is he who so often gathers more than his limit or who uses the flesh for bait.²² The commercial fishermen dare not break the laws which limit them to deep water and require them to take shellfish that have had several seasons of spawning. The operations of the commercial fishermen have little effect on the supply the sportsmen draw upon, as their abalones come from deep water, mostly off an inaccessible shore, and must be a full inch longer than the minimum size for the noncommercial abalone.²³ Furthermore, there is an area beyond the divers' working depth in which seed abalones are plentiful. Most of the complaints regarding the administration of this natural resource come from people who are misinformed or who have not taken the trouble to make sure before they speak.

In general, the supply of abalones along the coast of the two Californias, assuming that present protective laws are enforced, is as follows:

Northern California: More than enough to furnish sport for amateur fishermen.

San Luis Obispo and Monterey counties: Sufficient for the prosecution of a considerable fishery, supplying the entire State.

Southern California: Enough for the use of the sportsmen who know how and where to collect them.

Lower California: Sufficient for the prosecution of an extensive commercial fishery, exporting to foreign countries.

Future as well as present supply is considered in the foregoing.

15.4. THE ABALONE INDUSTRY OF LOWER CALIFORNIA, MEXICO²⁴

If it were not for the abalone fishery of Lower (Baja) California, many an Oriental epicure would be forced to go without one of his favorite delicacies. The people of Asia have been using abalones for countless years in making soups and other dishes and they prize the flesh of this shellfish very highly. Their demand for the abalone has always been greater than the supply, so the discovery of the mollusk on the eastern coast of the Pacific was very important. Some of the Chinese who came to California in the gold rush days decided that digging gold and running laundries were not the only ways of earning a living. They began to exploit the shrimps of San Francisco Bay, the squid of Monterey Bay, and the abalones and fish along the coast and in the bays from San Francisco to Cerros Island. Nearly all they caught were dried and sent to the Oriental market. The Chinamen prospered and their fishery grew so that Chinese fish camps could be found at many points along the coast. With the ban on Chinese entry in effect, fishermen of other nationalities gradually took their place, until now the shrimp fishery is the only one in which Chinese have a place of importance. The State of California and the Mexican Territory of Lower California shared the dry abalone industry until the former prohibited the drying of abalone in 1915. Since then the burden of supplying the Oriental demand has fallen on Lower California.

The first abalones to be taken commercially in Mexico were gathered by Chinese fishermen who used San Diego as a base. Their operations in Mexican territory began at least as early as 1865. They sailed down the coast as far south as Cerros (Cedros) Island in their clumsy, home-made junks and collected the shellfish from rocks exposed at

low tide. Some of the abalones were carried back to San Diego to be dried, but those from more distant localities were prepared in temporary camps established near the fishing grounds. Most of the meat dried at the camps was taken directly to San Francisco for export to the Orient, and the remainder was shipped to San Francisco by way of San Diego. The product of the San Diego drying plants was taken by boat to San Francisco, from which port it was exported. Nearly all the shellfish came from the Coronado Islands and the mainland near the village of Ensenada, but the fishery extended to Cerros Island.

The Chinese were so persistent in their activities that by 1880 the Mexican government had become aware of the possibility that a valuable natural resource might be destroyed. At this time the first abalone legislation was passed. It provided for custom house entry at San Diego and imposed a license fee on all boats operating in Lower California. Fisheries writers about this time stated that the coast had



FIG. 44. Abalone drying racks at Bernstein Cannery, Cerros Island, Lower California, Mexico. Photograph by Geo. Roger Chute, 1926.

FIG. 44. *Abalone drying racks at Bernstein Cannery, Cerros Island, Lower California, Mexico. Photograph by Geo. Roger Chute, 1926*

been stripped of abalones. The more accessible rocks had most certainly been denuded of the shellfish, but more recent diving operations have shown that the early Chinese by no means took all the abalones. According to present day operators, the numbers of available abalones in the region around Ensenada and the Coronado Islands have become so diminished that commercial fishing in that district is no longer profitable. During the time diving activities are suspended in this region the abalones will have an excellent opportunity to repopulate the depleted rocks. The population of Lower California is so small that noncommercial abalone fishing is scarcely to be considered. In the more southern district where abalones are now taken commercially, there is said to be a decreasing yield per unit of effort from year to year. Nevertheless, no difficulty is encountered in supplying the demand for canned and dried abalone.

The protective laws correspond closely to those of California with the principal exception that abalones can be exported from Lower California because there is no local market. Size limits approximating

those in effect in California have been set. (See footnote 23, page 67.) There is a closed season extending from the sixteenth of December to the end of February. All diving machines must be registered, the owner paying a registration fee as well as a per annum assessment. For purposes of enforcement all diving machines must be sealed or taken to Ensenada during the closed season. To give protection to abalone canneries operating in Lower California, a law was passed in 1929, prohibiting the exportation of fresh abalone from Mexico. Before the passage of this law, considerable quantities of fresh abalone meat were sent to San Diego and San Pedro to be canned. (See table 6.) Dried abalone is subject to heavy exploit and export taxation, but canned abalone, like other products manufactured in Mexico, is exempt from all taxation.

In Mexico the abalone is known as "abulón." Several species inhabit the rocks and rocky bottom along the Pacific shores of Lower California. All of the more common California species of the genus *Haliots* are found, and, as in California there are a few species that are less abundant. The black abalone (*Haliotis cracherodii*) is common all along the coast, but is not taken commercially as the flesh is somewhat inferior to that of the other species in flavor, texture and color. The red abalone (*Haliotis rufescens*) is found on the Coronado Islands and near Ensenada, but is not now plentiful enough to be taken in any quantities. In the early days of the fishery it held a place of importance. From deep water comes the corrugated abalone (*Haliotis corrugata*) sometimes known as the pink abalone. Its flesh is said to be very watery and to lose considerable volume in drying, so it is not sought for very eagerly. The depth at which it is found discourages the divers, moreover. Perfect specimens of its shells are saved for export. The southern green abalone (*Haliotis fulgens*) is taken in shallow water. Its flesh is light in color and of excellent texture and flavor. Many of the shells are beautiful and worth saving for shipment abroad. The green form is perhaps the most important of the Mexican abalones. The so-called white abalone has the whitest and finest flesh of all, and although the shells are worthless, this variety, which is taken in rather deep water, is highly prized and takes first rank in price. As none of the shells are saved and brought to California where they could be identified, the systematic status of the white abalone is in question. It may be a variety of either the corrugated or the green species, or it may possibly be the threaded abalone (*Haliotis assimilis*). The description of the last named species agrees fairly closely with what can be learned of the white abalone.

The dry abalone industry of Lower California is controlled by Japanese at present. One of the two canneries is Japanese-owned, the other is controlled by Germans resident in Mexico. The present market in China, the most important consumer, is rather poor due to the unsettled conditions resulting from a series of civil wars, so the fishery is not exploited to the fullest extent. Fluctuations in the catch are due to market conditions rather than to abundance or scarcity of the shellfish.

Practically all of the dried and canned abalone meat is taken to San Diego or San Pedro (Los Angeles Harbor), held in bond and exported. A great deal of the dried meat goes to the Hawaiian and

Philippine islands, the East Indies and the Malay Peninsula, but China is the largest consumer. The canned product is exported to the Orient and in addition has a small market in North America. Most of the shells are sent by way of California to the eastern United States or Europe to be made into jewelry and ornaments, or exported to the Orient to be used in inlay work. The demand for abalone shells has fallen off markedly during the last few years and San Diego ware-houses contain hundreds of sacks of shells that have not found a market.

The California Division of Fish and Game keeps a record of every entry and export shipment of abalone meat and shells, because by law no California abalones may be exported or dried, and every bit of abalone exported or dried must be accounted for as coming from without the State. From these custom house entry records the figures for table 6, showing importations of abalone from Lower California, have been compiled. Considering that practically all of the abalone is taken directly from the fishing grounds to California, the table also represents the total abalone yield of Lower California waters.

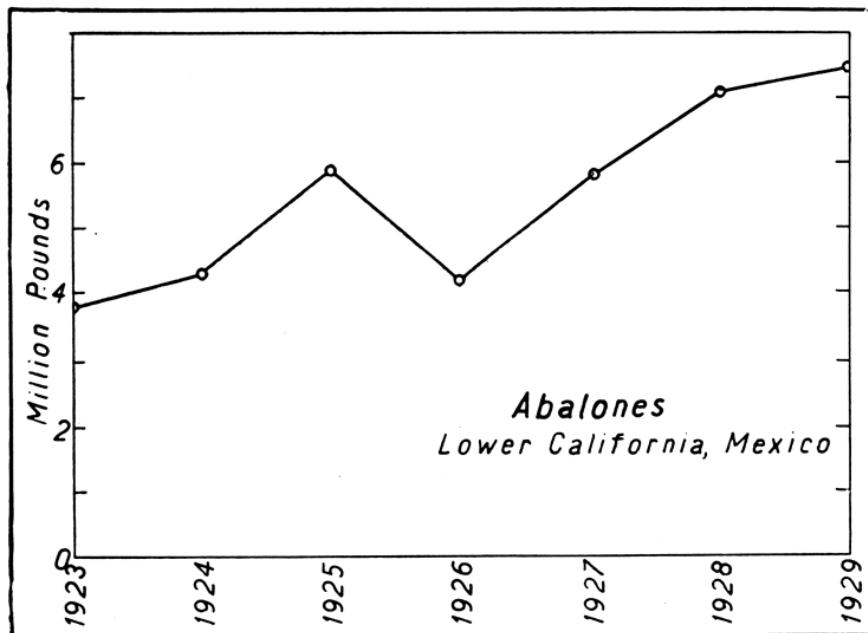


FIG. 45. Approximate live weight of abalones imported from Lower California, 1923–1929. (See footnote d to table 6 for method of computation.)

FIG. 45. Approximate live weight of abalones imported from Lower California, 1923–1929. (See footnote d to table 6 for method of computation.)

The area supporting the present fishery consists of the mainland and islands from San Geronimo Island south to San Hipolito Point. The region to the north of San Geronimo Island has been so badly depleted that no commercial fishing would be successful at present. About San Hipolito Point there are few abalones, and south of it there are practically none. During the poor weather of the winter, activities are carried on along the mainland coast between Turtle Bay and San Hipolito Point. Summer camps are established on the more northern islands. In July, 1930, the four camps and thirteen divers in Lower California were located at the following places:

San Geronimo Island
Cerros (Cedros) Island
Natividad Island

1 camp 2 divers
2 camps 6 divers
1 camp 5 divers

The diving boats, which are about twenty-nine feet in length and are equipped with six-horsepower air compressors and diving equipment, are taken to the fishing grounds by gasoline tow boats. The crew of a diving boat consists of one diver and four other men. For each diver there is one man ashore who cooks, tends camp and dries the abalones. All the men work on shares, the diver getting two, the others one share each of the profits. The men at the camps are all Japanese with the exception of fifteen Mexicans, including two divers. As the region where the camps are located is barren and not capable of supporting plants or live stock, all food must be brought down from California on the boats that carry the abalone to San Pedro and San Diego. There is

only one spring in the entire area so drinking water is also brought from California. The necessity for importing food and water cuts deeply into the profits to be made in the fishery.

TABLE 6
AMOUNTS OF ABALONE IMPORTED INTO CALIFORNIA FROM LOWER CALIFORNIA, MEXICO^a
1923-1929

	1923	1924	1925	1926	1927	1928	1929
San Diego:							
Dried meat, pounds	366,874	383,515	560,699	292,955	434,450	394,006	175,535
Fresh meat, pounds	500	38,111	105,600	29,823	3,300	70,908	
Shells, pounds	13,434	43,573	16,172	2,058	11,238	4,000	62,430
Canned meat, cases	781	909	211				512
Los Angeles:							
Dried meat, pounds	10,155	16,462			88,835	101,205	66,168
Fresh meat, pounds	22,739					52,000	149,452
Shells, pounds	33,500	16,525	2,000		18,394	73,734	82,002
Canned meat, cases	200	2,935	3,260	9,162	6,667	14,752	30,347
Totals:							
Dried meat, pounds	b398,611	399,977	560,699	292,955	523,285	495,211	241,703
Fresh meat, pounds	c23,239	38,111	105,600	29,823	3,300	122,908	149,452
Shells, pounds	46,934	60,098	18,172	2,058	29,632	77,734	144,432
Canned meat, cases	981	3,844	3,471	9,162	6,667	14,752	30,859
Approximate live weight ^d	3,812,000	4,321,000	5,911,000	4,173,000	5,772,000	7,155,000	7,496,000

^a From figures collected by the Bureau of Commercial Fisheries, California Division of Fish and Game. As the records were collected for law enforcement rather than for statistical use, round numbers were often used and occasionally closed accounts were not retained in the records, but everything has been done to make the records as complete as possible.

^b Including 21,582 pounds shipped direct from Lower California to San Francisco.

^c A great deal of the abalone meat imported for canning in California in 1923 was salted before entry. In other years it was all fresh.

^d Computed from importations of dried, fresh and canned meat, on a basis of dried meat equalling one-ninth live weight, fresh meat one-third live weight, and 38 cases of canned meat being packed from 2,000 pounds fresh meat.

TABLE 6
AMOUNTS OF ABALONE IMPORTED INTO CALIFORNIA FROM LOWER CALIFORNIA, MEXICO
1923-1929

TABLE 7

AVERAGE VALUE OF ABALONES FROM LOWER CALIFORNIA^a

	1923	1925	1927	1929
Dried meat, pound	\$0.05½	\$0.06½	\$0.11	\$0.12½
Fresh meat, pound	b0.05	0.05		0.05½
Shells, pound	0.01	0.03	0.04	0.05
Canned, case		7.00	6.08	6.11

^a This table shows the approximate average declared entry value of the various types of abalone products imported into California from Lower California, Mexico, for alternate years, 1923-1929. Compiled from U. S. Custom House consumption entries.

^b The salted meat imported in 1923 for canning was valued at \$0.10 per pound.

TABLE 7
AVERAGE VALUE OF ABALONES FROM LOWER CALIFORNIA

The divers work about ten hours a day, twelve or fifteen days a month, averaging about two and a half tons each of live abalones per working day. The divers, who are clad in regular diving suits with metal helmets and air hoses, sometimes work in very shallow water, with their heads above the surface, but the usual depth is around ten fathoms, with a maximum of fifteen. The abalones are pried off the rocks with iron bars and placed in a basket made of netting. The basket is hauled to the surface by the boat crew when the diver signals that it is full. The perfect shells are saved and the others thrown in the sea as the men clean the abalones. The drying racks are located in a sunny place near the camp. The method of drying is similar to that formerly employed in California. (See p. 62.) of the total live weight of the mollusk, about one-third is shell, one-third meat and one-third trimmings, intestines and water. Dried meat equals about a

third of the original fresh meat in weight. After the lengthy drying process is completed, the leathery meat and the perfect shells that have accumulated in the meantime are taken to San Diego or San Pedro by tender boats. The boats delivering to San Diego are, for the greater part, fishing craft that would otherwise be temporarily idle. Most of the abalone taken to San Pedro is the canned product. Nearly all the boats delivering to San Pedro are small coastwise steamers and motorships.

The Bernstein cannery on Cerros Island has been in operation for about ten years. The abalones for this plant are supplied by the Japanese companies that have control of all diving activities. The Ocean Industries cannery on Turtle Bay has been packing abalones on a large scale since March, 1930. The abalones for this cannery are taken by the Japanese divers working for the company. At present (July, 1930) 80 per cent of all the abalone taken is canned and 20 per cent dried. Actual as well as relative amounts of abalone canned in relation to that dried has shown a steady increase during the last few years. The canners average 36 to 39 cases of four dozen one-pound cans each to one ton (2000 pounds) of fresh abalone meat.

The main difficulty encountered by cannery operators in Lower California is the scarcity of fresh water. On Cerros Island there is a spring that produces a considerable quantity of water, but it is very poor water at best. This spring furnishes the water for the Bernstein cannery nearby, and at present the Turtle Bay plant draws upon it. The owners of the mainland cannery are now carrying on experiments with the evaporation of sea water, and a pipe line from a spring in the interior is in the course of construction. Were a better supply of good fresh water available, the canning of abalones and other fisheries products in Lower California would be a very important industry.

The abalone fishery of Lower California appears to be a well-regulated business, depending upon a steady supply but governed by a fluctuating foreign market. It is restricted by what are considered well-advised laws that protect the natural resource upon which the business depends. In view of present and past conditions, the fishery may be expected to continue on the same scale as heretofore, giving employment to many men and providing Oriental epicures with tasty dishes.

16. CALIFORNIA'S FISHING BOAT CENSUS FOR 1929

BY GERALDINE CONNER

Among the earliest forms of governmental effort toward proper administration of the affairs of State was the taking of a census. As far back as 3050 B. C.,²⁵ the ruling powers found it necessary to count their subjects and the wealth of their lands in order to judge the strength and possibilities of their kingdoms. Usually such enumerations were made only when stress of circumstance demanded a check, such as in times of war to guard against destruction of the commonwealth. An audit at regular intervals is a more recent development,

the value of which can not be over-estimated. Uncle Sam counts the noses of his citizens once each ten years and asks pertinent questions concerning the welfare and possessions of each individual, family, organized unit or community. An analysis of these data gives an index to the progress or inertia of the nation at large or any section thereof. The very changes in the nature of the questions from census to census are indicative of the progress of the times.

Each year as a basis for properly administering to her fisheries, California counts her fishermen, registers each boat in her commercial fishing fleet, takes stock of all fishing gear in use, gathers complete statistics of the catch of the men and the equipment listed and follows up her marine products to their final disposition in fresh fish market, cannery, drying rack and reduction plant. An analysis of these data gives an insight into the condition of the fisheries and in guarding their welfare the frequency of the intervals at which the census is taken adds to its value.

We intend, here, to deal briefly with the 1929 census of California's fishing fleet, and particularly to show the number and length of the boats delivering fish to the more important fishing centers. Along the thousand miles of California's Pacific coast slope the fisheries are as varied as the climate. Therefore, the type and size of the fishing boats and gear in the various fishing localities will differ considerably. We will merely attempt to bring out the main differences in the fisheries up and down the coast in order to show what effect they have had in developing the length and unusual features in the boats, and also the effect upon the traffic of fishing craft from one fishing center to another.

Although the total catch figures for the State may show an increase in the amount of fish taken year by year, this is no indication that the supply upon which we are drawing is holding up under the strain. On closer examination of the catches which make up these totals we find that the figures include new species for which a market has been developed to meet new demands, and that the figures for many desirable varieties are falling off because they are no longer sought since they can not be taken in sufficient quantities to pay for the effort, while the catch figures for less desirable fishes are swelling to large proportions as they are substituted for those which are being depleted. A study of the boats and individual catches shows that the totals for many of the fishes of greatest demand are being kept up by larger boats built to travel great distances for the fish. The fishing fleet reflects these changes and even if we were unable to secure the total catch figures for the State or the catches of any individual species, a census of the commercial fishing craft together with a general knowledge of the fisheries over a period of time would give us evidence of the shifts from one type of fishing to another and would indicate either development or retrogression. With the boat census to use in conjunction with the catch figures even in a rough analysis we can usually put a finger on the species or the districts where there is danger of depletion or where special attention should be directed.

The most interesting phenomenon brought to light by the fishing boat registration for the past ten years has been the change in the type of motivation and in the size of boats most noticeable in the

districts where the fisheries have had a more rapid growth. It is but a few years since the gasoline motor-powered boats replaced the sail and steam-driven craft, thus speeding up the activities and expanding the cruising areas. At the present time the transition from gasoline to crude oil or diesel engines is taking place. This marks the introduction of a much more economical fuel and proves to be an especially welcome innovation just now when the necessity has arisen for larger boats and longer trips to the fishing grounds. It is possible that the high cost of gasoline would prove prohibitive and thus discourage or delay the exploitation of distant sources of supply. From 1920 to 1925 the number of power-driven boats rapidly increased, but from 1925 on, the increase became more noticeable in the size of the individual boat rather than in the number of boats, until in 1930, particularly in the south, there were fewer boats fishing but these were much larger in size.

These changes in the boats only too well reflect what is happening to the fisheries. As stated previously, although our total catch figures may remain high, the exhaustion of long-fished areas has made larger boats necessary to utilize distant banks while many of the smaller boats lie idle because of the unprofitable fishing close at hand. In some cases the changes have been due to a shift in demand from one species to another or they merely heralded the development of a new mechanical device adaptable to fishing operations. Occasionally a change in gear and method of capture was responsible.

As with the federal census of the population, it is necessary for the State to make changes in the queries in its boat census from time to time which are particularly indicative of a step in advance. For example, ten years ago the federal government had little reason to ask how many individuals owned radios. This question has its equivalent in California's boat registration for 1930, when the State became interested in knowing how many boats were equipped with electric refrigeration for the preservation of the catch. With long hauls to be made through semi-tropical climate to California canneries, refrigeration is vital. Within the past two years the tuna boats have gone as far south as Costa Rica, a few miles from the equator, and in 1930, catches made at the Galapagos Islands were delivered to California canneries. With the perfection of electric refrigeration, it was accepted as necessary equipment for the new boats and by 1929 it had been installed in most of the larger ones operating out of San Pedro and San Diego.

In the northern part of the State where commercial fishing has been carried on for a longer period and in greater bulk for the fresh fish markets, the changes have not been so marked in the number, size and type of boats. There has been a more constant effort in an area closer at hand. At San Francisco, the demand for sardines to supply the cannery at Pittsburg is such a recent development that its effect is not yet perceptible in the fishing fleet. At Monterey sardines have but recently supplanted salmon in importance, and until recently most of the sardine fishing has been done within the protection of the bay with gasoline launches which towed lighters for the necessary increased cargo space to carry the catch. In 1929 a sudden but not unlooked for shift

came with the decided increase in the use of purse seiners for sardines at Monterey.²⁶

The data presented in tables and charts represent only such boats as have actually fished and made deliveries at California ports during the

U. S. CUSTOM HOUSE NO.	HOME PORT	NAME OF BOAT	STATE OF CALIFORNIA DIVISION OF FISH AND GAME										
Date 19 Name of owner													
Address of owner		Street	(City)										
Name of captain or operator		Address											
Type of boat	Kind of engine	Cylinders	Horsepower	Fuel									
Length	feet	inches	Beam	feet	inches	Depth	feet	inches	Net tonnage				
If steam, sail or row boat, state here	In what waters is boat used?						Is boat equipped with cold storage apparatus?						
Space for fish storage below deck	Show if power girdles tons. or gear winch used				Value of boat and engine \$		Value of all nets, lines and gear used \$						
KIND OF FISHING ENGAGED IN DURING PAST YEAR (Show months)										MISCELLANEOUS GEAR AND LINES			
Number in Crew Including Operator	Number of Nets	Kind of Nets	Size Mesh	Fathoms Long	Mches Deep	Kind	No.	Length	No. of Hooks				
						Set lines							
						Troll lines							
						Fyke nets			Diameter Hoop				
						Crab net							
						Lobster trap							
CERTIFICATE ISSUED						Index <input type="checkbox"/>	Owner <input type="checkbox"/>						
						Tab'd <input type="checkbox"/>							

REVERSE SIDE

STATE OF CALIFORNIA
REGISTRATION OF FISHING BOATS OF THE STATE

Section 5 of the Act entitled "Record of Fishing Data," provides that every person owning or operating any fishing boat engaged in the vocation of fishing for profit in the waters of the State, or catching fish without the State and bringing them into the State, shall, on or before the first day of April of each calendar year, register such boat with the Division of Fish and Game. Failure to register any boat engaged in fishing, with the Division of Fish and Game on April 1st of each year, is a misdemeanor punishable by a fine of from \$100 to \$500 and imprisonment.

Write plainly Answer all questions and fill out card in full. DO NOT FOLD.

Owners of all power boats, and boats over sixteen feet in length with detachable motors, must register with and secure number from collector of U. S. Customs in their district.

List all nets and fishing gear used during past calendar year, giving the kind of net, size of mesh, length and depth.

Show by months the kind of fishing engaged in.

Give actual value of boats and all fishing gear used. The values given will not be used for taxation.

Mail this card to the Division of Fish and Game. Upon receipt of this card, certificate of registration will be mailed to the owner's address and must be posted or carried on the boat at all times.

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FIG. 46.

FIG. 46

year. The list of the boats delivering was taken from the "pink tickets" or receipts which the State law requires to be made covering every sale of fish. This list was checked against the fishing boat registration cards for the year to get the length of each boat, the home port, and the type of fuel used. In cases where the owner or captain had failed to register his boat, a check was made of the registrations for former years or the U. S. custom house records were consulted.²⁷

Above is given a replica of both sides of the card used in the State's registration of fishing boats. This will give an idea of the scope of the inquiry that is made and the brief statements on the reverse side give the highlights of the State law covering the matter. The actual size of the registration card is five by eight inches. The certificate of registration, which is also reproduced, is three by four inches. This certificate is retained by the fishermen and among other things it facilitates the reregistry of the boat in the event of a change in ownership.

Since 1918 when the present commercial fisheries statistical system of the State of California was inaugurated, the records of the catches of each boat for the entire State have been held in the permanent files.

REVERSE SIDE

DIVISION OF FISH AND GAME
of California

Date _____ 19 ____

THIS IS TO CERTIFY that the undersigned owner of Boat No. _____ has this date registered with the Division of Fish and Game for the year April 1, 19____, to March 31 of the following year.

Signed _____
Owner

In case of change of owners fill out reverse side of this card and return to Division of Fish and Game and a new certificate will be issued.

Boat Sold to _____

Address _____

Date _____

Signed _____

THIS CERTIFICATE MUST BE
CARRIED ON BOAT AT
ALL TIMES

FIG. 47.

of the California State Fisheries Laboratory at Terminal Island. The boat registration cards and the fishermen's license applications from 1920 to date are also kept in easily accessible form at the Laboratory. These records offer an endless source of information, ever increasing in value and interest.

There are many boats which will not enter into our census but which have their effect on California's fishing industry. In the far north, there is no doubt but that some of the Oregon and Washington salmon and halibut boats occasionally come below the California State line and return to their native states with fish caught in the waters off the coast of this State. The Alaska packers' fleet of vessels operate in the far north during the Alaska salmon season and return to San Francisco Bay for the winter months. These vessels occasionally bring cargoes of the canned salmon from Alaska to be distributed from San Francisco. There are also the Alaska codfish vessels which, at the end of each season, bring the cleaned and salted cod from the far north to

the codfish plant on San Francisco Bay where it receives its final processing and packing for sale. These vessels only enter the State's fishing boat registration occasionally, when, during the winter months, they are used as tenders to carry tuna from the local and Mexican fishing grounds to the canneries in southern California. The trans-Pacific freight and passenger liners from Japan which, in recent years, have brought large cargoes of frozen albacore from Japan and Hawaii to be packed in the canneries at San Pedro, are not recorded although the fish which they handle has a decided effect on the tuna cannery industry of the State. Small craft, used in clearing the inland lakes of carp, the pleasure barges and private yachts, which often make large catches of small fish or take a jewfish of several hundred pounds in weight in one trip, may turn their catch over to the fresh fish markets for sale, although the boats are not registered with the commercial fishing fleet.

In passing we can not overlook the fleet of motor trucks in southern California which play such an important role in the fishery activities. Practically all of the fish taken in the Gulf of Lower California, Mexico, is brought to the United States' markets overland by motor truck. Until recently the bulk of this fish was sold in California. It was transferred from the Mexican trucks at the border to well-iced or refrigerated trucks for the trip to San Diego and San Pedro. Lobsters and some fish are also brought to San Diego from the west coast of Lower California by truck. Occasionally the fish from many small outlying California coast towns are reported to us only by the poundage included in the truck loads hauled to the markets when the fish may have been taken by several skiffs.

16.1. 1929 CENSUS

During 1929 there were 1948 power boats delivering fish to California ports, 32 of which were not of California registry. These boats ranged

TABLE 8
NUMBER OF POWER BOATS DELIVERING FISH TO EACH CALIFORNIA FISHING DISTRICT DURING 1929

Place of registry	Northern Coast	Sacra-mento-San Joaquin River	San Fran-cisco	Monterey	San Pedro	San Diego	
Northern Coast.....	136	2	1	4			
Sacramento-San Joaquin River.....	2	222	28	12	5	2	
San Francisco.....	108	18	353	61	23	11	
Monterey.....	35	4	14	273	12	1	
San Pedro.....	2		1	36	696	173	
San Diego.....	1		1	2	94	236	
Oregon.....	11				1		
Washington.....	7			4	18		
Alaska.....				2	2		
Mexico.....						1	
District totals.....	302	246	399	394	851	422	
State total.....							a1,948
Percentage of locally owned boats in each district.....	45	90	88	69	83	56	

* To avoid duplication in arriving at State total only the local boats fishing in the area in which they were registered were included (figures in bold face type) in the State total. To this total of 1916 was added 32 boats from outside the State, each boat from outside being counted only once although it may have fished in several districts.

TABLE 8
NUMBER OF POWER BOATS DELIVERING FISH TO EACH CALIFORNIA FISHING DISTRICT DURING 1929

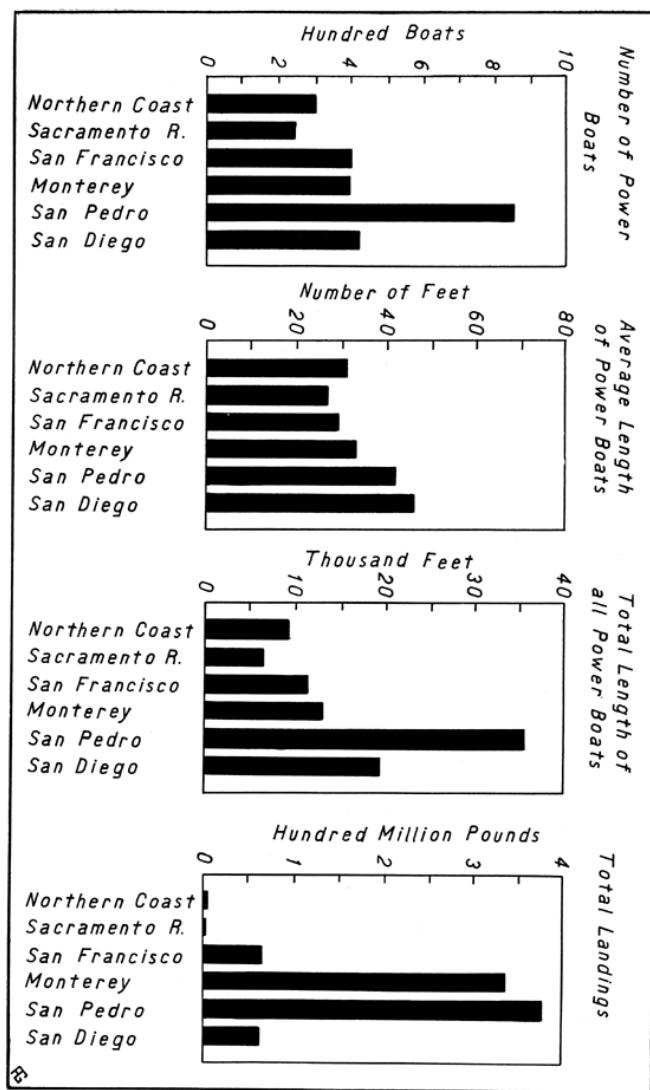


FIG. 48. District comparisons for 1929. (a) Number of boats contributing to the catch of each district. (b) Average length of boats delivering fish in each district. (c) Total length of all boats delivering fish in each district. (d) Total landings in pounds for each district.

FIG. 48. District comparisons for 1929. (a) Number of boats contributing to the catch of each district. (b) Average length of boats delivering fish in each district. (c) Total length of all boats delivering fish in each district. (d) Total landings in pounds for each district

from 16 to 167 feet in length. The bulk of them were powered with gasoline motors, about 20 per cent of the southern California boats had diesel or crude oil engines, while only 1 per cent of the boats from Monterey north were equipped with this type of engine. At San Francisco two of the old steam trawlers are still being used, demonstrating the old type of fuel for the larger boats in the sea fisheries, and a few picturesque Chinese junks remain on the bay, a faint echo of the past glories of the shrimp fishery. From the Sacramento River region, seven sail boats were recorded.

16.2. SKIFFS

A skiff, strictly speaking, is a special type of small boat propelled by oars and elbow grease. Because our records do not make a distinction between the various types of small boats which come into use in our commercial fisheries the word "skiff" will be used in a broad sense and interchangeably with rowboat and dory.

A skiff is a part of the general equipment of every launch of any size, but in addition there is a large number which fish independently. During 1929 there were 412 independent skiffs used consistently through the year or through a season for commercial fishing. About 35 per cent of the skiffs is recorded from the Klamath River where the salmon fishery is conducted almost entirely by skiff fishermen. In addition to these consistent skiff fishermen there were 935 "occasional" skiff fishermen recorded. These records cover the catches of from one to ten days during the year. In some cases the records may indicate individual skiffs but in other cases one skiff may be used by several different men, and since the skiffs are not named or numbered it is difficult to keep the records of an individual skiff together when the boat is used by several men. Of these "occasional" skiff records, 37 per cent are from the Klamath River where many of the rowboats are rented to tourists during the salmon runs, and because their catch is turned over to the cannery for packing (although for personal use only), the catches enter our commercial fisheries record. The total catch of these "occasional" skiffs is not sufficient to have any decided effect on the commercial fisheries catch figures, but in the river fisheries the take of the "consistent" skiff fishermen is of decided importance.

Of interest in connection with the fishing effort and gear but not of particular significance in the power boat census, is the record of 52 "consistent" and 45 "occasional" commercial clam diggers in the Pismo Beach area—that is, in San Luis Obispo, Santa Barbara and Ventura counties—during the year 1929.

16.3. DISTRICTS

Although there is some traffic of fishing boats up and down the coast, in 1929 there was less than usual, most boats being particularly equipped and suited to the fishing in one area, remained there throughout the year delivering their catch to the home ports or in the immediate vicinity. Naturally there was more interchange of boats between districts in which the fishing methods are similar and where no radical change of gear was necessary. The cannery system of contracting boats for the fishing season to insure a steady supply, the additional cost of gear which is ever becoming more specialized in each fishery and the hazards and lack of profit experienced in former years in

experimenting in unfamiliar areas has a tendency to keep the boats closer to home ports. However, there is some interchange of fishing effort. Table 1 shows the six fishing areas and the total number of boats which delivered fish in each, together with the place of registry for the boats. The accompanying chart (fig. 49) also shows the percentage of power boats of local registry which fished in each district. For the northern coast the percentage of local boats is lowest, 45 per cent, while 35 per cent or 108 boats from San Francisco Bay region delivered fish there during the year, going north for the salmon trolling. San Diego's percentage of local boats is also low, due chiefly to the fact that many of the San Pedro boats fishing in Mexican waters during the tuna season deliver their catches to the San Diego canneries or to San Diego barges anchored off shore. In the other four regions the fishing is done chiefly by locally owned boats.

TABLE 9
NUMBER OF INDEPENDENT SKIFFS AND MISCELLANEOUS CRAFT DELIVERING FISH DURING 1929

	Consistent	Occasional	Miscellaneous
Northern coast.....	187	428	
Sacramento-San Joaquin River.....	72	127	7 sail boats
San Francisco.....	27	24	5 Chinese junks
Monterey.....	36	64	
San Pedro.....	81	280	
San Diego.....	9	12	
State totals.....	412	935	

TABLE 9
NUMBER OF INDEPENDENT SKIFFS AND MISCELLANEOUS CRAFT DELIVERING FISH DURING
1929

There are certain natural groups into which the boats will fall in a consideration of the 1929 boat census based chiefly on the geographic locations of the main fishing centers. Due to the distinctive characteristics of the commercial fisheries in definite areas the State will be

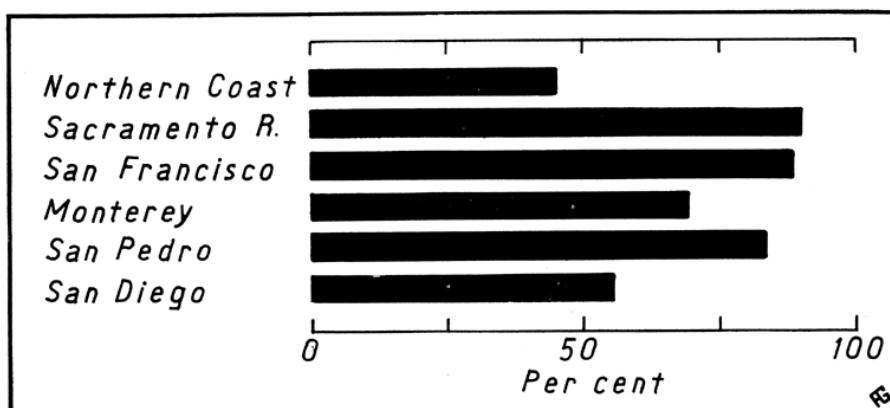


FIG. 49. Percentage of boats of local registry which delivered fish in each district during 1929.

FIG. 49. *Percentage of boats of local registry which delivered fish in each district during 1929 divided into six sections and the power boats for each region will be considered separately as follows:*

1. The northern coast which includes the Pacific slope of Del Norte, Humboldt, Mendocino and Sonoma counties and the inland waters of the Klamath, Smith and Eel rivers.
2. The Sacramento River district which includes Sacramento, San Joaquin, Solano, Yolo and Contra Costa counties, that is, the counties

of the delta region of the Sacramento-San Joaquin River system and along Suisun and San Pablo bays.

3. The San Francisco district, which embodies the counties surrounding the bay, San Francisco, San Mateo, Marin and Alameda, and includes the boats fishing in the ocean water off all but the last named.
4. The Monterey Bay district, which comprises the counties of Monterey and Santa Cruz.
5. The San Pedro district, which includes the coastal counties of San Luis Obispo, Santa Barbara, Ventura, Los Angeles and Orange.
6. San Diego district, which merely covers San Diego County.

16.3.1. The Northern Coast

Along the northern coast, the salmon fishery contributed approximately one-half of the total landings for the year. Ocean trolling for salmon is the chief occupation of the power boats while the river fishery

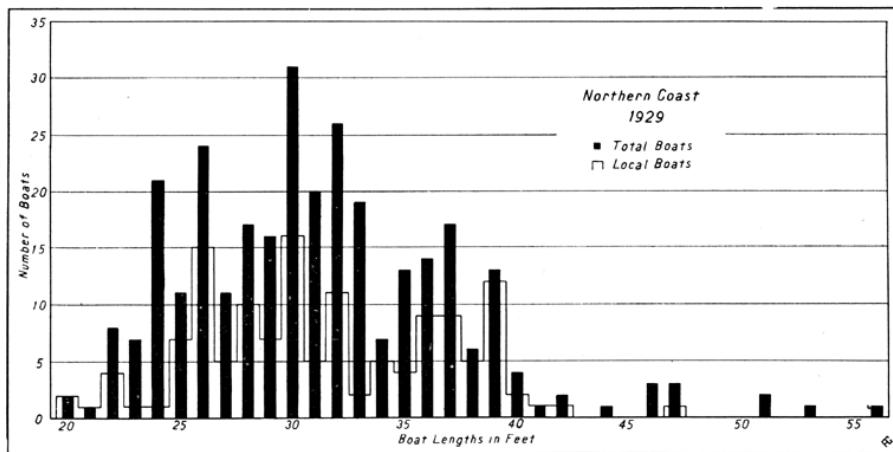


FIG. 50. Number and length of power boats delivering fish in the northern coast district during 1929. The black bars give the total number of boats of each length; the light bars show the number which gave northern coast towns as their home ports when registering.

FIG. 50. Number and length of power boats delivering fish in the northern coast district during 1929. The black bars give the total number of boats of each length; the light bars show the number which gave northern coast towns as their home ports when registering

is carried on almost exclusively by skiff fishermen, using gill nets. Northern halibut and sablefish are taken in considerable quantities, while among the mollusks and crustaceans, crabs alone are of importance. The boats in this section contributed approximately 5,309,000 pounds (see fig. 48) to the 1929 catch of fish for the State, and although this was only 0.6 per cent of the total poundage, the species taken command a high price in the market which somewhat offsets the apparent insignificance in weight, as compared with other sections of the State. Because of the isolation of the fishing ports, the rough coast and lack of accessible and safe anchorage, the fisheries along the northern coast have not developed with very great rapidity.

The 302 power boats which delivered fish to ports in this region during 1929, ranged in length from 20 to 56 feet (see fig. 50) the average length being 31 feet. (See fig. 48.) These boats were equipped with gasoline motors and the average crews consisted of one or two men. It is of interest to note that during 1929 less than half of the power boats landing fish in this area were of local registry.

Only 45 per cent (see table 8 and fig. 49) or 136 boats which participated in the fishing activities claimed northern coast towns as their home ports. Of the balance, 35 per cent were from the San Francisco Bay region and 11 per cent from Monterey. Undoubtedly this was due to the fact that boats from these places were equipped for salmon trolling and some with hoop nets for crabs. Only five boats from the balance of the State went north. From the States of Oregon and Washington, eleven and seven boats, respectively, came below the State



FIG. 51. Salmon fleet at anchor in Noyo Harbor, 1929 season. These boats are used for open ocean trolling. Only 45 per cent are locally owned. Many go north from San Francisco and Monterey for the salmon fishing. Photograph by Wonacott's Studio, Fort Bragg, 1929.

FIG. 51. Salmon fleet at anchor in Noyo Harbor, 1929 season. These boats are used for open ocean trolling. Only 45 per cent are locally owned. Many go north from San Francisco and Monterey for the salmon fishing. Photograph by Wonacott's Studio, Fort Bragg, 1929

line. Most of these were salmon trollers, a little larger than the average salmon boat of the northern California area, and four were still larger halibut boats, equipped with long line skates and modified halibut gear with which they took large quantities of halibut, sablefish and Pacific cultus.

The boats of northern registry did not go far afield during the year. Only seven are reported as having delivered fish to central California ports.

Eureka, in Humboldt County, is the largest port along this stretch of coast and the bulk of the fish and crabs for the fresh fish markets are landed there, where Humboldt Bay offers shelter for the fishing craft. Considerable quantities of salmon are handled at Fort Bragg at the mouth of the Noyo River and Shelter Cove, both in Mendocino County. Crescent City is the chief port in Del Norte County while Requa at the mouth of the Klamath River boasts a salmon cannery. There is also a salmon cannery at the town of Smith River on the river of that name.

The salmon fishery in the rivers in this northern territory supports the largest skiff fishery in the State. In the entire district there are 187 consistent and 428 occasional skiff fishermen, the majority of whom

are Indians. Eel River has been closed to commercial fishing since 1924. But the Klamath River, in spite of the very evident depletion in our salmon, supports in its commercial salmon fishery 80 per cent of the skiffs in the northern area and 35 per cent of the independent skiffs of the entire State. The entrance to the river is dangerously blocked by sand bars so that the power fishing boats do not risk an entry except on rare occasions and therefore the fishermen operating gill nets from skiffs have a monopoly on the river fishing, and the cannery at Requa is almost entirely dependent upon them for the supply. During the salmon runs, many tourists and sportsmen fish from skiffs. Catching more than is required for their immediate use, they take advantage of the facilities provided and have their salmon canned to send home. Because it is packed, the fish is recorded with the commercial catch and the record of the operations of the skiff enters the statistical reports. On the Klamath River alone there were 147 consistent or regular skiff fishermen and 350 occasional skiff fishermen during the year. The tourists and sportsmen enter the latter classification.

With the Klamath season closed on September sixth and the Smith River season opened on the first of that month, many of the skiffs and men from the Klamath River move to the Smith River for the salmon



FIG. 52. Klamath River commercial skiff fishermen washing their nets. The commercial fishing is all done at night and the pictures of the operations are therefore difficult to secure. Photograph by Dr. J. O. Snyder.

FIG. 52. Klamath River commercial skiff fishermen washing their nets. The commercial fishing is all done at night and the pictures of the operations are therefore difficult to secure. Photograph by Dr. J. O. Snyder

fish. The Smith River fishery is conducted chiefly by skiffs and gill nets, but a couple of seines are also used in this river. The fish that is not delivered to the cannery is trucked overland to Eureka for shipment to the fresh fish markets.

16.3.2. Sacramento River

Salmon, shad and striped bass are the inseparable triumvirate of the Sacramento and the San Joaquin River fishery. The fishing boats and gear are primarily designed for the taking of these three species. The



FIG. 53. Sacramento River fisherman, 26-foot boat used for salmon, shad and striped bass. Photograph by R. S. Croker, October, 1930.

FIG. 53. Sacramento River fisherman, 26-foot boat used for salmon, shad and striped bass. Photograph by R. S. Croker, October, 1930



FIG. 54. Sardine tender which carries fish taken in ocean off San Francisco and vicinity to the cannery at Pittsburg. It is a typical river and bay freight boat and is loaded at Sausalito on San Francisco Bay. Photograph by R. S. Croker, October, 1930.

FIG. 54. Sardine tender which carries fish taken in ocean off San Francisco and vicinity to the cannery at Pittsburg. It is a typical river and bay freight boat and is loaded at Sausalito on San Francisco Bay. Photograph by R. S. Croker, October, 1930

carp, catfish and miscellaneous river fishes are of but minor importance and have little influence on the size of the boats used in this fishery. Although the contribution of this district to the State total landings for 1929 was less than 0.3 per cent or in the neighborhood of 2,336,000 pounds, the three important species are high in price, and shad and striped bass have the distinction of being taken in commercial quantities in this river and the San Francisco Bay region only.

A sardine cannery at Pittsburg, although in the river region, is supplied entirely by fish taken in the ocean waters off the coast of San

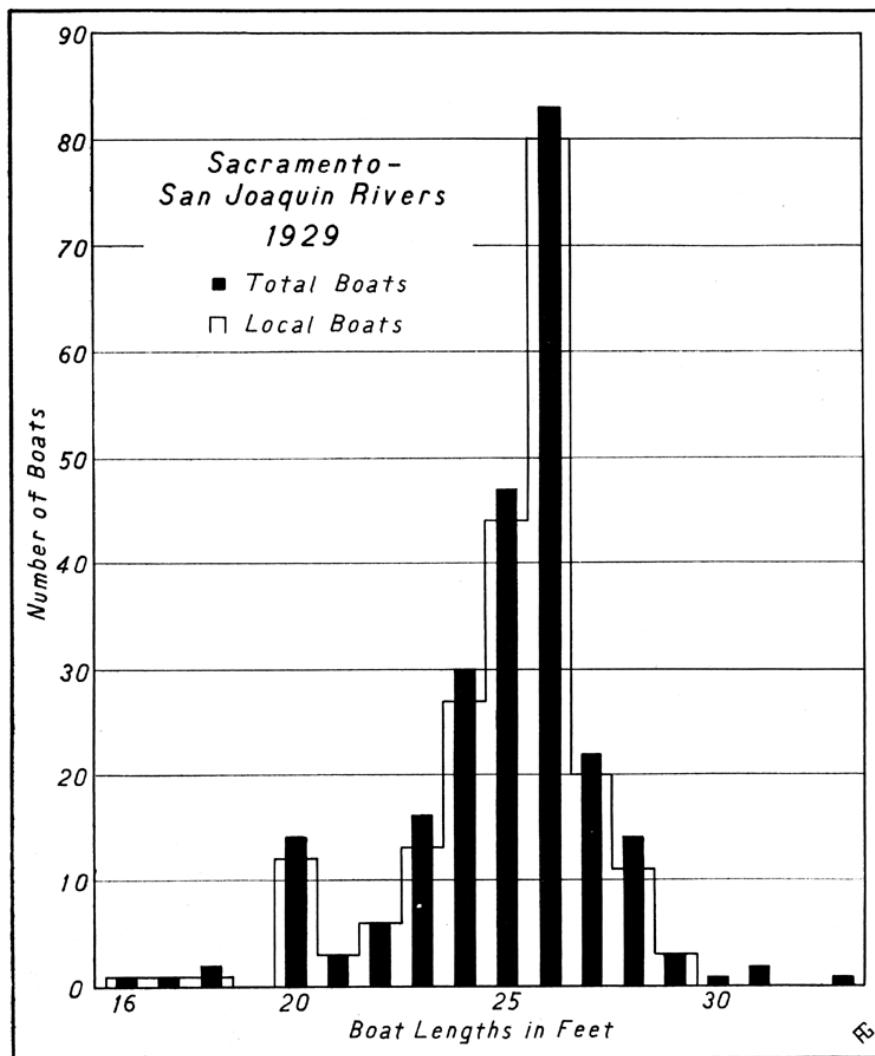


FIG. 55. Number and length of power boats delivering fish in the Sacramento-San Joaquin River area during 1929. The black bars represent the total number of boats; the white bars the boats which gave river and upper bay towns as their home ports when registering.

FIG. 55. *Number and length of power boats delivering fish in the Sacramento-San Joaquin River area during 1929. The black bars represent the total number of boats; the white bars the boats which gave river and upper bay towns as their home ports when registering*

Francisco and Marin counties. Therefore, the boats engaged in fishing for this river cannery can not be considered among the river boats, nor is their catch recorded with the river fishes. Power tenders in San Francisco Bay receive the sardines and transport the loads to the Pittsburg cannery.

During 1929, 246 power boats were recorded as having fished in the rivers and in Suisun and San Pablo bays. The length range of these boats was from 16 to 33 feet (see fig. 55); boats of 26-foot length were noticeably in the majority. This is the most localized fishing area



FIG. 56. San Francisco trawler. Used chiefly in taking flatfishes. Photograph by Geo. Roger Chute, 1929.

FIG. 56. San Francisco trawler. Used chiefly in taking flatfishes. Photograph by Geo. Roger Chute, 1929

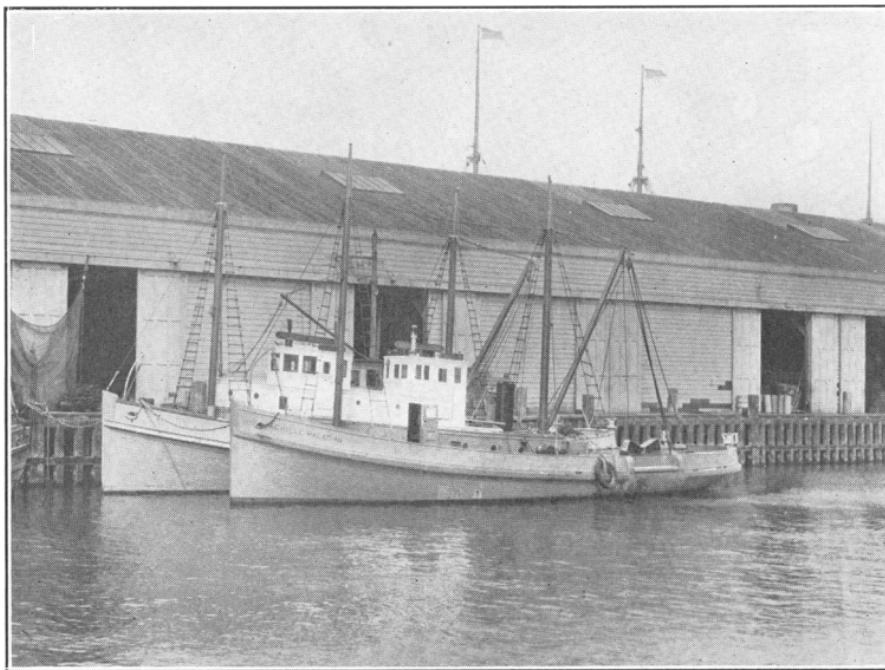


FIG. 57. San Francisco trawlers. These boats work in pairs dragging the trawl between them; usually but one of the boats delivers the catch to port. They are operated by diesel engines and are 67 and 73 feet long. Photograph by Geo. Roger Chute, 1929.

FIG. 57. San Francisco trawlers. These boats work in pairs dragging the trawl between them; usually but one of the boats delivers the catch to port. They are operated by diesel engines and are 67 and 73 feet long. Photograph by Geo. Roger Chute, 1929

in the State. Ninety per cent or 222 boats when registering gave river and upper bay towns as their home ports. Only 18 boats came up from San Francisco during the year and six boats from the balance of the State fished in the river in competition with the local craft; these were from the salmon regions, Monterey and the northern coast. During the year, very few left the river to try their luck elsewhere. Of the 49 boats that did leave, more than half of them merely went down to the neighboring San Francisco Bay while 12 fished at Monterey.

The typical Sacramento River fishing launch²⁸ is built low and broad of beam and offers little protection from the weather. A one-cylinder gasoline engine and a one- or two-man crew has prevailed since power boats appeared on the river. There being no urgent need for greater protection or for more seaworthy craft, and because of a lack of incentive for expansion of the fishing area, there have been fewer changes in the Sacramento River boats than in the boats of any other section.

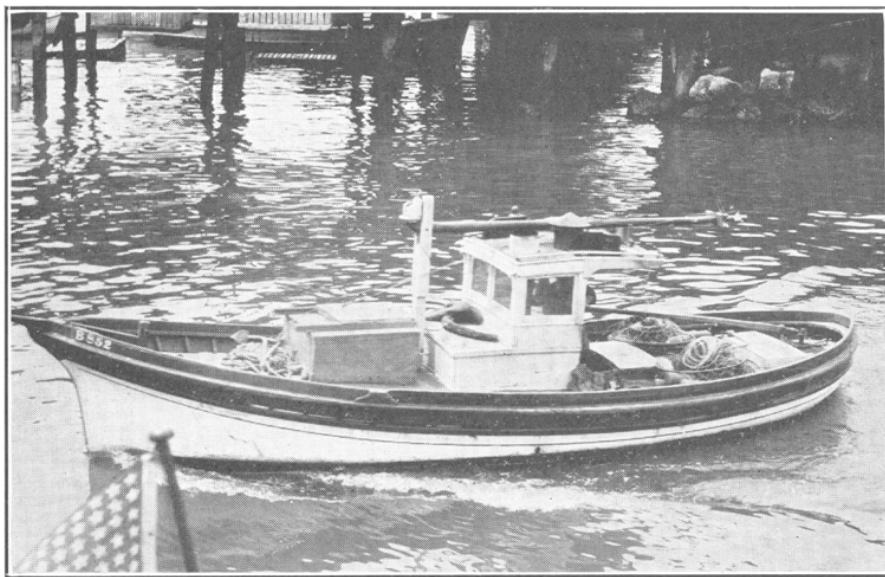


FIG. 58. San Francisco crab boat, 26 feet long. Note hoop nets in boat and crab live boxes in the background. Photograph by D. H. Fry, Jr., April, 1930.

FIG. 58. *San Francisco crab boat, 26 feet long. Note hoop nets in boat and crab live boxes in the background. Photograph by D. H. Fry, Jr., April, 1930*

of the State. In 1929 there were 7 sail boats registered with the river fishing fleet, apparently the only ones in the State actively continuing in service. There were 72 consistent and 127 occasional skiff fishermen whose catches were reported from the river district during the year. Most of the fishermen are Italians, while a few Greeks, Portuguese and Chinese own boats.

16.3.3. San Francisco Bay

San Francisco is primarily a fresh fish center and is important in that capacity despite the fact that sardines rank first in poundage, and that in 1929 it supplied less than 8 per cent of the total fish receipts for the State. The sardines which are caught by the San Francisco

fleet are delivered to the cannery up the river at Pittsburg. Further, as a center of dense population and the hub of rail and water transportation, much fresh fish from the northern coast and outlying towns is shipped in for distribution from there.

The flatfishes taken by the trawlers and the rockfishes taken by the long-line fishermen, constitute the major portion of the fresh fish catch.

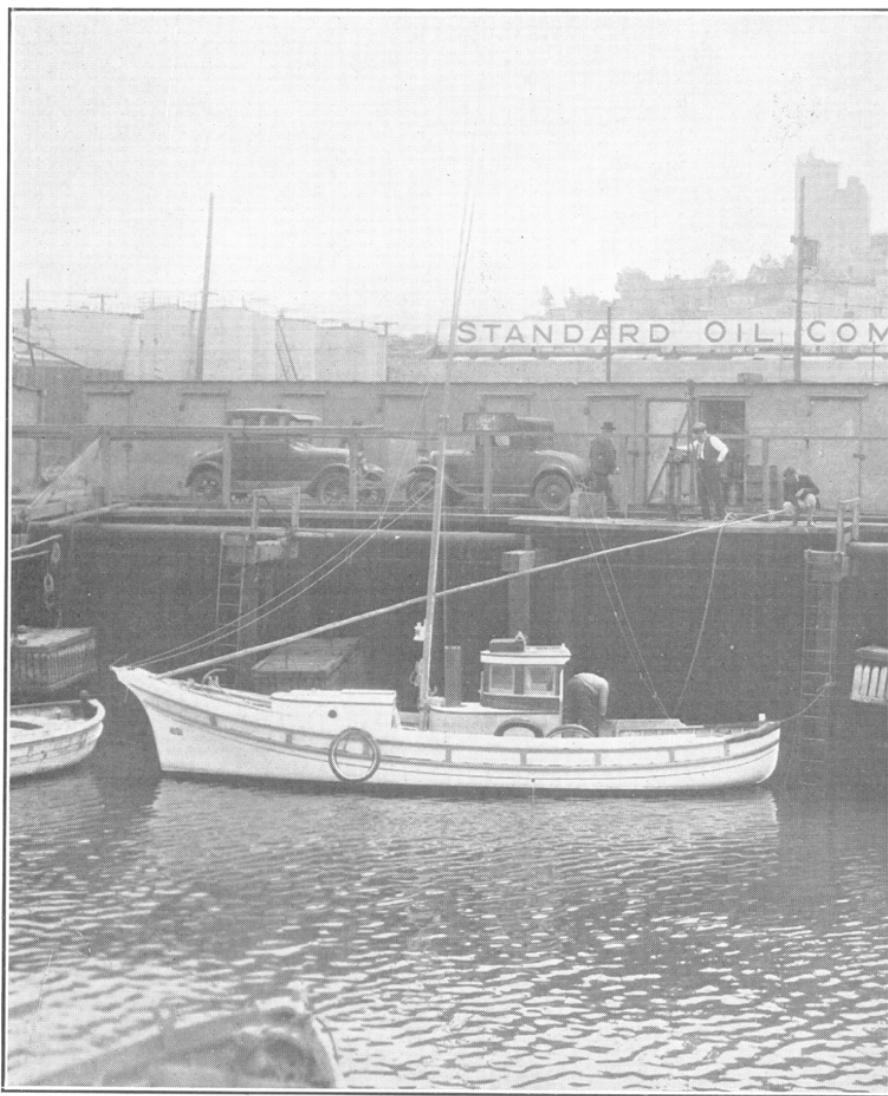


FIG. 59. San Francisco salmon troller, 33 feet long. This type of boat also fishes on the northern coast. Photograph by D. H. Fry, Jr., April, 1930.

FIG. 59. *San Francisco salmon troller, 33 feet long. This type of boat also fishes on the northern coast. Photograph by D. H. Fry, Jr., April, 1930*

From January to April there are large runs of spawning herring through the Golden Gate into the bay which are taken commercially. The bulk of the State's crab landings come from the vicinity of San Francisco. Of the 399 boats landing fish at San Francisco in 1929, approximately 225 of the owners were members of the Crab Fishermen's

Protective Union which acts as the wholesaler for the crab fishermen. The majority of the fishermen about San Francisco and vicinity are Italians.

The Sacramento-San Joaquin River district and San Francisco Bay are linked together not only geographically but because of the anadramous fishes common to both. However, in 1929, there was a surprisingly small amount of interchange of fishing boats between the two districts. Shad and striped bass are taken in the bay as well as in the river, although the San Francisco salmon catch is taken chiefly by the ocean trollers and may or may not be part of the same population that is caught in the bay on the way up the river.

In the San Francisco Bay region, 88 per cent, or 353 of the 399 boats registered as being locally owned, 28 came from the Sacramento River and 14 from Monterey to compete with the San Francisco fishermen, while only 3 are recorded from the balance of the State. Although so few boats from the outside entered into the fishing activities at San Francisco, the San Francisco boats showed a greater tendency toward mobility than did those of any other section of the State. We find about one-third of the 353 boats of San Francisco registry went to Eureka or fished in the northern coast area during the salmon runs and the crab season, while only 18 of them went up the nearby Sacramento River for the fishing. Sixty-one traveled to Monterey, 23 to San Pedro, and 11 to San Diego.

The San Francisco fishing boats had a range in length of from 16 to 73 feet. Although the greater number of boats were 24 feet long, 26 feet was the average for the fleet. (See fig. 48.) Gasoline engines predominated. The larger boats from 48 feet up were trawlers. These boats, working in pairs and pulling the deep nets between them, took the bulk of the flatfish landed. Most of the trawlers are equipped with diesel engines although two of the largest are still operated with steam engines. The sardine boats were scattered in the range from 24 to 52 feet. Nearly all the smaller boats turn to crab fishing during the open season since this crustacean brings a high price in the market. They turn to salmon trolling with the season and are converted into rock cod boats by a change of gear when convenient and fish rock cod.

The Chinese junks were built sometime before 1900 and were operated in connection with the Chinese bag nets for shrimps. They are still operated at the shrimp camps although more modern and less destructive gear is used for the most part.

Among the 27 consistent and 24 occasional skiff fishermen recorded, quite a number were from Tomales Bay.

16.3.4. Monterey Bay

From Monterey Bay south cannery fishes are the main object of pursuit. In 1929, 12 canneries²⁹ operated at Monterey, where sardines are of prime importance. In 1929 the commercial boats landed 49 per cent of the total sardine catch and 39.6 per cent of the total State landings of all fish. The increased use of purse seine boats is responsible for the very decided change which took place in the sardine fishing fleet during the year and is one of the outstanding items in the history of California's fisheries for the year.³⁰

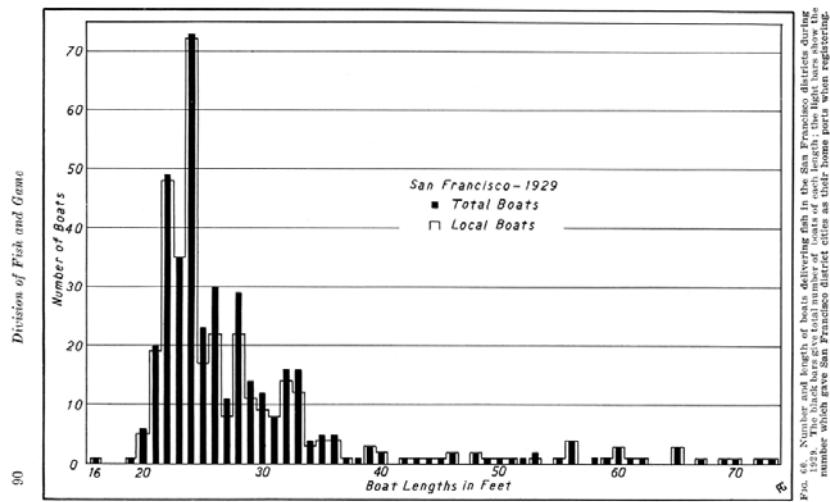


FIG. 60. Number and length of boats delivering fish in the San Francisco districts during 1929. The black bars give total number of boats of each length; the light bars show the number which gave San Francisco district cities as their home ports when registering

Fig. 60. Number and length of boats delivering fish in the San Francisco districts during 1929. The black bars give total number of boats of each length; the light bars show the number which gave San Francisco district cities as their home ports when registering.

Greater cargo capacity for sardines is necessary since they are taken in larger quantities than market varieties. Monterey was developed first as a salmon trolling center; the shift to sardines brought about the utilization of the small launches with cargo capacity augmented by a lighter or barge which is towed by the launch. This type of sardine equipment is peculiar to the Monterey fishery where the majority of the catches were made within the protection of the bay. It is important to keep the lighters in mind in considering the length of the Monterey power boats. With the length of the launches alone we do not get a true estimate of the carrying capacity. It is estimated that there were 57 lighters in use at Monterey during 1929 with an average length between 40 and 45 feet.

For about ten years prior to 1926 this type of sardine fishing boat prevailed and lampara nets were used to make the catch. During a



FIG. 61. Monterey lampara boat used in sardine fishing with ring net on the after-deck. The 50-ton lighter tied beside the launch is towed behind the power boat to carry the catch. This launch and lighter combination for sardine fishing is typical and peculiar to Monterey Bay. Photograph by J. B. Phillips, September, 1930.

FIG. 61. Monterey lampara boat used in sardine fishing with ring net on the after-deck. The 50-ton lighter tied beside the launch is towed behind the power boat to carry the catch. This launch and lighter combination for sardine fishing is typical and peculiar to Monterey Bay. Photograph by J. B. Phillips, September, 1930

fishermen's strike in 1926, one enterprising cannery introduced two purse seiners for sardine fishing. It was not until 1929 that more were added to the fleet, and by December of that year 28 were engaged in fishing for the sardine canneries at Monterey.

Outstanding among the other species taken at Monterey are the large quantities of squid, which are dried or canned for shipment to the Orient; and that delectable mollusk, the abalone, is taken commercially in deep water by divers working from skiffs and barges.

Santa Cruz, across Monterey Bay, is a fresh fish center. Flatfish, rockfish and crabs are of greatest consequence in the catch.

In 1929, 394 boats landed fish at Monterey and Santa Cruz; 69 per cent or 273 of these boats were owned by resident fishermen. Every other district in the State sent boats to fish in Monterey Bay and vicinity

(see table 8); San Francisco led with 61 boats, San Pedro next with 36, while from the balance of the State there were 18. Two boats from Alaska and 4 from the State of Washington added to the competition to be met by the local fleet. Monterey Bay in turn sent 35 boats to the northern coast, 14 to San Francisco and 4 to the Sacramento River to participate in the salmon and crab fisheries, while 12 went south to San Pedro and 1 to San Diego for the sardine and tuna fishing.

There was a wide range in length of the Monterey power boats themselves, from 16 to 79 feet, with 33 feet the average boat length for the year. There was a more even distribution of the length frequencies within the range than in any other district. And, there were three distinct types of boats which can easily be identified in the size distribution chart. (See fig. 63.) The greatest number of boats fell between



FIG. 62. Monterey rockfish boat with baskets into which the long lines are coiled and the hooks fastened when not in use. Photograph by R. S. Croker, 1929.

FIG. 62. *Monterey rockfish boat with baskets into which the long lines are coiled and the hooks fastened when not in use. Photograph by R. S. Croker, 1929*

20 and 33 feet in length; this group, however, did not contribute the largest quantities of fish to the local catch. They are the small salmon trollers, which with the depletion of the salmon have turned to fishing mackerel, rockfish, flatfish, crabs, etc., for the fresh fish markets. These are most typical of the type of boat which has been fishing at Monterey for some years past. The next distinct group ran between 35 and 55 feet long and were boats operated by the lampara and ring net fishermen for sardines. The large purse seiners which also fished for sardines completed the distribution and ranged from 59 to 79 feet. These boats stand out not only because of their size but also because they are equipped with diesel engines, while practically all of the smaller boats have gasoline motors. It is also interesting to note that only 3 of the 29 vessels over 59 feet in length are owned by local fishermen; many of

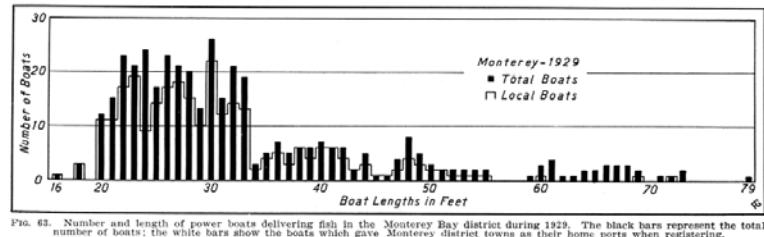


FIG. 63. Number and length of power boats delivering fish in the Monterey Bay district during 1929. The black bars represent the total number of boats; the white bars show the boats which gave Monterey district towns as their home ports when registering

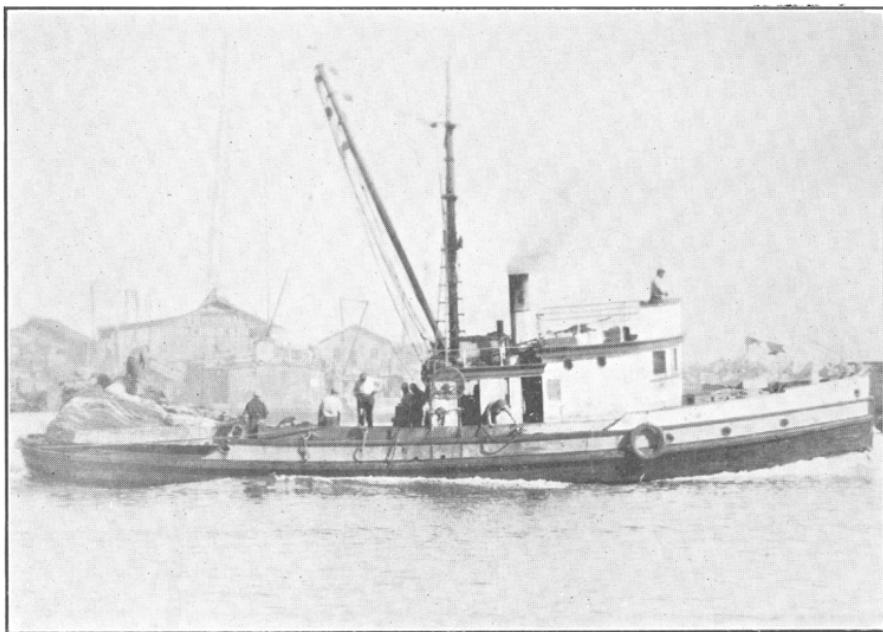


FIG. 64. Sardine purse seine boat, 65 feet long. Photograph by D. H. Fry, Jr., 1929.
FIG. 64. *Sardine purse seine boat, 65 feet long. Photograph by D. H. Fry, Jr., 1929*



FIG. 65. San Pedro sardine boat loaded to the danger point. This picture would add interest in a study of boat-load capacities since in this case it is loaded beyond capacity. In the event of rough weather part of this load would have to be dumped for the safety of the crew. Photograph by D. H. Fry, Jr., 1929.

FIG. 65. San Pedro sardine boat loaded to the danger point. This picture would add interest in a study of boat-load capacities since in this case it is loaded beyond capacity. In the event of rough weather part of this load would have to be dumped for the safety of the crew. Photograph by D. H. Fry, Jr., 1929

them are San Pedro boats and all of the boats from Washington and Alaska fall into this group.

During the year, there were 36 consistent skiff fishermen while 64 men used skiffs and fished occasionally. Italian fishermen predominate in the local crews.

16.3.5. San Pedro

Entirely different conditions prevail in the southern California fisheries, and fishing boats differ in accordance. Here we no longer have localized operations and the greatest source of supply within a few miles of the home port. Although quantities of desirable varieties are taken in the waters off the coast of southern California, the canneries and markets at San Pedro are dependent upon an area a hundred miles away for sardines, and the Pacific Ocean off the coast of the Latin-American countries as far south as the equator contributes most of the tuna landed. This requires boats capable of trips of from several days to three weeks duration, with carrying capacity for fuel, live bait, fresh water and supplies sufficient for the round trip. This is especially true of the boats going below the United States line since trade depots are few and far between along this coast.

Although sardines are delivered in largest amounts to the canneries, the tunas are of greatest value. The sardines, skipjack and yellowfin tuna fisheries have had more influence in developing the characteristics to be found in the boats of San Pedro's 1929 fishing fleet than other species. Since about 1925, the sardine boats have been largely purse seine type, as the fishery has moved to a considerable extent to the northern Channel Islands about one hundred miles away. At the time it was made this was a noticeable change in boat size in that fishery, even though many of the boats had formerly been used as market fishers and were not built especially for the sardine fishing. The tuna boats were small at first, built for and adapted to the albacore fishing. With the development of the yellowfin tuna and skipjack fishery for hundreds of miles to the south, boats of ever-increasing size have been built or equipped each year to fulfill the needs of this fishery.

During the World War, the fish canning industry in the south grew to large proportions in response to the call for the development of new sources of food supply. The fishing fleet increased in proportion. Sardines caught close at hand held the stage at first as the cannery fish of the south in competition with the European packs. Albacore, the white-meat tuna, next came into its own, and small jig boats were built. Many small boats came from the north to participate in the albacore fishery during the peak years for this species. The albacore failed, and the local bluefin tuna catch slackened off. Yellowfin tuna and skipjack were sought off the coast of Mexico to keep the canneries busy. First, the boats went to Turtle Bay and then on down to Cape San Lucas at the tip of the Lower California peninsula off the coast of Mexico and gradually farther south. The small boats were impractical for fishing in these distant grounds. It was necessary for a large tender or mother ship to accompany them, carrying supplies and returning with the combined catches of the smaller craft. Considerable time elapsed between the first catch made and the delivery of the tender-load to the canneries, resulting in considerable loss through spoilage. The solution for overcoming some of these difficulties

has been found in the building of larger boats, more seaworthy, equipped with speedy engines, large bait tanks or purse seine nets, fresh water tanks, fuel tanks and electric refrigeration for the cargo. The exorbitant tax which Mexico imposes on fish caught or transported within three miles of her coast line, has been a contributing factor in the development of ocean-going tuna cruisers.

In 1928 and 1929, there developed a new pack at San Pedro. Mackerel, formerly taken in moderate amounts for the fresh fish

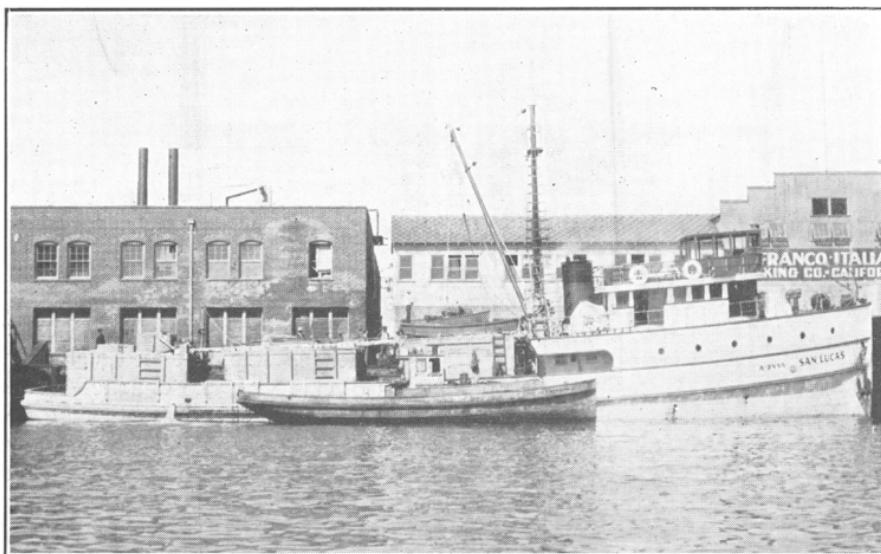


FIG. 66. Comparison in size of one of the 50-foot earlier tuna boats with a new 120-foot tuna cruiser or "ice" boat. Note the two large bait tanks and one pre-cooling tank on the deck of the larger boat. Photograph by R. S. Croker, 1930.

FIG. 66. Comparison in size of one of the 50-foot earlier tuna boats with a new 120-foot tuna cruiser or "ice" boat. Note the two large bait tanks and one pre-cooling tank on the deck of the larger boat. Photograph by R. S. Croker, 1930

market, was canned to compete with cheaper grades of salmon from Alaska and the north, and to keep the southern canneries busy during the off-seasons since it is an all-year fish. This fishery had one of the most astonishing rises in importance in recent history and although it did not require any unusual changes in the boats, it did bring back into use many of the little power boats which had been gradually discarded with the decline of the nearer and the development of the more distant fishing grounds.

The fresh market fishes delivered to the San Pedro and San Diego vicinities differ considerably from those in northern California. Barracuda is an important one and is caught chiefly by large boats, many of which fish off the west coast of Lower California, Mexico, as well as by jig boats and small ring netters. Such species as yellowtail, sheepshead and swordfish are strictly southern varieties, most of which are taken by the smaller craft.

In the northern end of this district at Santa Barbara there is a trawler fishery for flatfishes. At Hueneme, in Ventura County, a sardine cannery was opened during 1929. The main fishing center, the 13 canneries and one independent fish oil plant are located in the vicinity of Los Angeles Harbor at San Pedro, Terminal, Wilmington and Long Beach. Here most of the larger vessels deliver their catch.

Many boats fishing Mexican waters for the canneries in this district deliver the fish to barges or tenders and do not return to port with each boat-load. In the southern end of the district, at Newport and Balboa, in Orange County, there are quite a number of small power launches and large dories which fish for surf and deep water fishes for the fresh fish markets, and during 1928 and 1929 great quantities of mackerel were trucked to the canneries in Los Angeles County.

Outranking the other sections of the State in fishing area covered, varieties and pounds of fish landed and in the value of its fishery products, the San Pedro district had no difficulty in holding first place in 1929 in the number of boats engaged in its fishery. There were 851, double the number of power boats that operated out of any other district, delivering fish to San Pedro and vicinity during the year. Although, in comparing San Pedro's 851 participating boats and 44 per cent (approximately 376,998,000 pounds) of the total catch for



FIG. 67. San Pedro cannery mackerel-type boat 45 feet long. Photograph by D. H. Fry, Jr., March, 1930.

FIG. 67. *San Pedro cannery mackerel-type boat 45 feet long. Photograph by D. H. Fry, Jr., March, 1930*
the State with Monterey's 394 boats and 40 per cent of the total, it would appear than San Pedro boats had fallen below par in returns for capacity and effort; this is not the case. The Monterey poundage is made up chiefly of sardines which are caught within a short distance of the canneries and command but from \$8 to \$12 per ton. The San Pedro total, on the other hand, is made up not only of sardines but of mackerel caught close at hand, for which approximately \$30 a ton

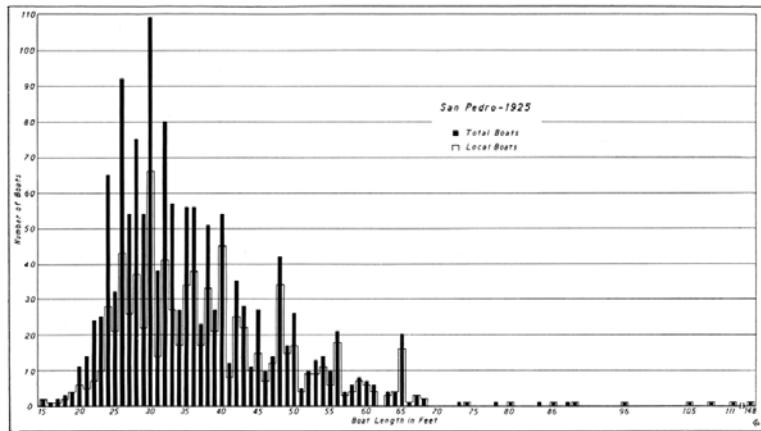


FIG. 68. Number and length of power boats delivering fish in the San Pedro district during 1925. The black bars represent the total number of boats; the white bars show the boats which gave San Pedro district towns as their home ports when registering. Note comparison in size of boats with similar graph for 1929.

FIG. 68. Number and length of power boats delivering fish in the San Pedro district during 1925. The black bars represent the total number of boats; the white bars show the boats which gave San Pedro district towns as their home ports when registering. Note comparison in size of boats with similar graph for 1929

was paid and of tunas which range from \$75 to \$300 a ton in price, the greater part of which is caught miles away from home ports.

The length range of the boats in the San Pedro fleet was from 15 to 167 feet. The average length for the year was 42 feet. The locally owned boats comprised 83 per cent (696 boats) of those operating, and 11 per cent, or 94 boats, contributing to the San Pedro landings were boats of San Diego registry. There would naturally be considerable interchange of San Pedro and San Diego boats. Similar in type and fishing for practically the same species and both exploiting the one fishing area, chiefly to the south of the international line, their activities are closely intermingled. Of the boats that delivered fish at San Diego during 1929, 41 per cent (173 boats) were of San Pedro registry. Smaller boats fishing in Mexican waters, long distances from the home port, deliver their catch to tenders which transport the fish to the canneries. There are also barges anchored off the coast of California to which the local catch is often delivered. Therefore, many of the San Diego boats whose catches are delivered to the San Pedro district canneries by the tenders or barges are counted with the boats contributing to the San Pedro district landings, in spite of the fact that the boats themselves never drop anchor at the neighboring port. Only 4 per cent of the boats fishing out of San Pedro were from California districts to the north, while 18 boats came down from the State of Washington, 2 from Alaska, and 1 from Oregon. These northerners from outside of the State are quite large and since larger boats are becoming more essential to the operations in the southern fisheries, which was not the case in former years, it is possible there will be increased competition from the far north during the winters of the future.

Aside from the 173 San Pedro boats which contributed to the San Diego catch, but 36 boats went to Monterey and only 3 farther north.

In charting the lengths of the boats which participated in the San Pedro fishery during 1929, we find five classifications into which they fall. From 20 feet to about 35 feet, where the greatest numbers are clustered in the chart (see fig. 69), we recognize the group of small boats which fish for the fresh fish markets; among these are the old albacore jig boats. These boats are all operated by gasoline motors. The few boats below 20 feet in length are dories and skiffs, which possibly attained the dignity of a power boat designation through the installation of an old automobile engine or outboard motor.

The next group, from 35 to 45 feet long, are the larger market boats which also fish for cannery mackerel. From 45 to 58 feet in length are the sardine boats which fish for the canneries and to which can be credited the bulk of the mackerel for the canneries. It is here that the diesel engines enter into consideration. Although most of the older boats in this length range still have gasoline engines, many have been replaced by diesel engines and most of the new boats have had the more economical black oil engines installed.

From 55 to 80 feet includes the purse seine type of boats. (See fig. 64.) These in the main are diesel engine boats. Many of the large ones use ring nets without the purse seine table, but most of them have the large revolving table on the after-deck which may be removed and the boat converted for bait tank fishing by replacing the

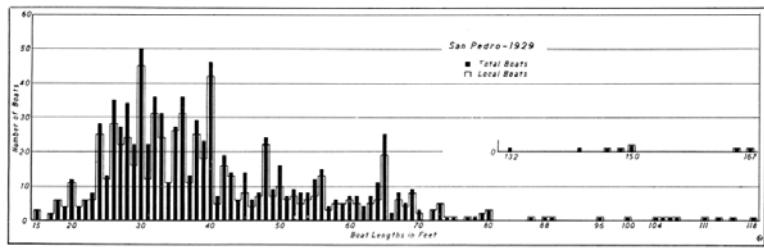


FIG. 69. Number and length of boats delivering fish in San Pedro district during 1929. Black bars give the total number of boats of each length; the light bars show the number which gave San Pedro as their home port.

FIG. 69. Number and length of boats delivering fish in San Pedro district during 1929. Black bars give the total number of boats of each length; the light bars show the number which gave San Pedro as their home port

table with a bait tank. This applies also to boats of less than 55-foot length. The convertible bait tank group runs from about 40 to 80 feet.

Above 80 feet in length we have a scattered conglomeration of craft up to 167 feet, including everything from the very newest type of specially built tuna cruiser to sailing vessels so antiquated that they have made their bow in the movies depicting early marine historical events. There are purse seiners, new high seas bait boats and converted subchasers. The latter were purchased from the Federal Government at the close of the war. They are long, narrow in beam, stand high out of the water, and are fast. Their unusual dimensions set them apart and make them appear unique when anchored with the low, broad-beamed regulation fishing boats. There are several old schooners

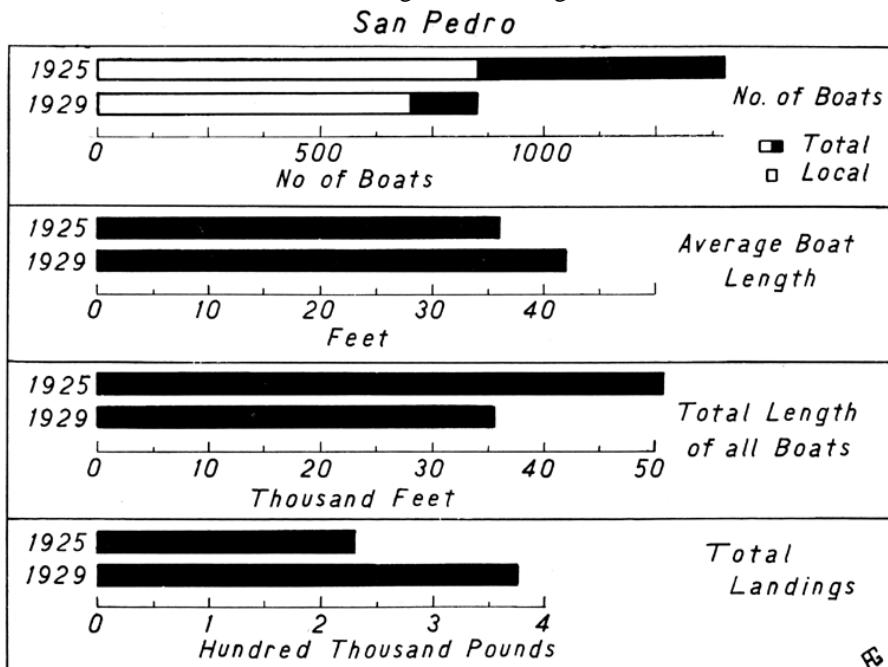


FIG. 70. Comparison of San Pedro boats and landings—1925 with 1929. (a) Number of boats delivering fish at San Pedro, giving total number and those of local registry only, for 1925 and 1929. (b) Average length of boats. (c) Total length of all boats delivering fish during year. (d) Total landings in pounds.

FIG. 70. Comparison of San Pedro boats and landings—1925 with 1929. (a) Number of boats delivering fish at San Pedro, giving total number and those of local registry only, for 1925 and 1929. (b) Average length of boats. (c) Total length of all boats delivering fish during year. (d) Total landings in pounds

which come from the far north where they have spent the summer in the Alaska salmon and cod fisheries. Some are converted vessels which carry bait tanks and because of their size and capacity are particularly successful in the high seas fishing.

Many of these larger boats are used as tenders a greater part of the time, although even the largest of them actively engage in fishing. Most of them are equipped with diesel engines. Others are operated by distillate engines, more economical than the gasoline engines and built before the perfected black oil type or diesel engines had been introduced. The large sailing vessels when used as tuna tenders are usually towed by a smaller power tug.

Japanese are in the majority among the fishermen who operate the fishing boats out of San Pedro and many of their wives and members

of their families are employed in the canneries. Among the fishermen and boat owners are many who claim Jugoslavia as their native country.

During 1929 there are recorded 81 consistent and 280 occasional skiff fishermen. A large number of these skiffs are at Newport and Balboa. Other skiff fishermen from cities and towns along this stretch of coast, from San Luis Obispo south, fish for the fresh fish markets or use the row boats as tenders for the lobster traps. In the Pismo region there are 52 consistent and 45 occasional clam diggers. Some of these men have skiffs but most of them merely have a clam rake and gunny sack. of the shellfish, Pismo clams come first in this district. For purposes of comparison, the lengths of the boats delivering fish to San Pedro in 1925 have been charted. (See fig. 68.) A general comparison of the number of boats fishing, the average length, the total lengths of all boats and the amount of fish caught in pounds for 1925 and 1929 have been graphed also. (See fig. 70.) It is interesting to note that there were fewer boats fishing in 1929, but the length range was very much greater for that year and that the tendency was decidedly toward larger boats. The 1925 chart shows plainly the clustering of boats of smaller sizes and also the great number of small length boats which came from other parts of the State to participate in San Pedro's fisheries, particularly for the albacore. At that time the boats were nearly all equipped with gasoline engines; fewer larger boats and tenders were needed since the fishing was closer to the home ports. Although the total length for all the boats was greater, their beam and hold capacity was less, and their equipment and method of fishing was not as effective as today, as is shown by the smaller amount of pounds taken by a greater number of boats. It is possible, however, that cannery limits on the catch may have held the catches down but this could not be entirely the reason for their having taken approximately 140,000,000 pounds less than the boats landed in 1929. Then, too, demand may not have been as great in the earlier years.

16.3.6. San Diego

Close to the Mexican border and dependent chiefly on the fishing area to the south, off the coast of Latin-American countries, San Diego is a tuna canning center. Six canneries and 2 fish meal plants operated during the year. Sardines are also packed; the San Diego canners specializing in a very small fish or "quarter-oil" as well as the "pound-oval" pack of sardines. Mackerel entered the ranks as a "cannery" fish at San Diego as well as at San Pedro in 1928 and 1929. of the total catch of fish for the State 7.4 per cent was landed at San Diego, and although 63,220,000 pounds does not seem great in comparison with the poundage at San Pedro and Monterey, the value of the tunas and lobsters bring it up to considerable importance. of the shellfish, lobsters are of premier importance here, there being a fair local catch as well as great quantities imported alive on tenders from Mexican lobster camps.

In keeping with the tuna fishery and distant fishing grounds, the fishing boats are large and well-equipped with many new diesel engine boats among them. In 1929 the catches of 422 boats were landed at San Diego. The boats ranged from 18 to 167 feet in length, with the average boat at 46 feet for the year, a higher average boat length than

for any other district in the State. Of these, 56 per cent were boats of local registry while 41 per cent were boats which claimed San Pedro as their home port. As we have stated in the discussion of the San Pedro district, there is naturally considerable exchange of fishing craft between San Pedro and San Diego. Due to the fact that many of the boats deliver their catches to tenders and barges and not to the ports, the catch is often landed at the neighboring port although the fishing boats themselves never go there. There were 173 San Pedro boats whose catches were delivered at San Diego. Of the other boats contributing to the San Diego landings 11 were from San Francisco and 3 from the balance of the State.

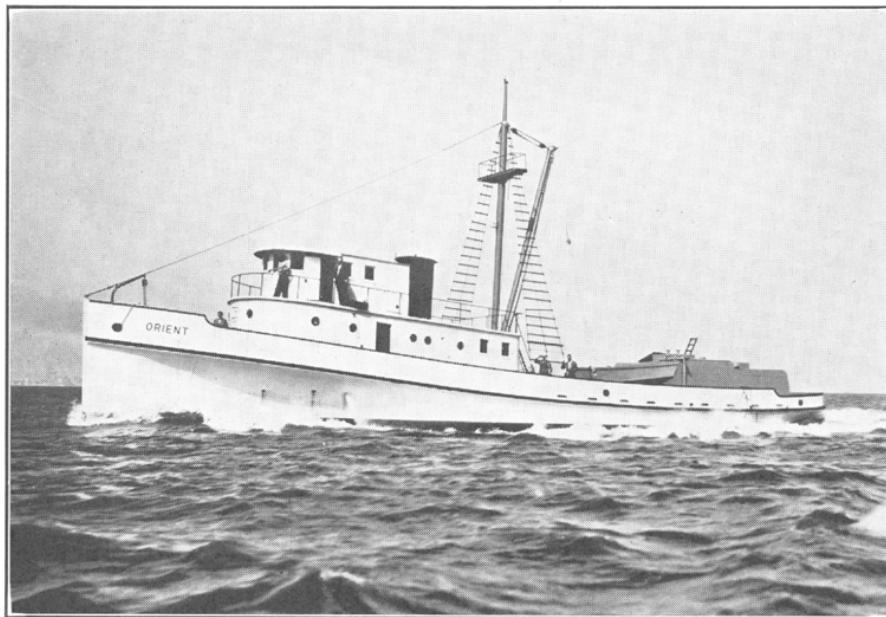


FIG. 71. The first tuna cruiser of steel construction, 112 feet, 6 inches long, 25-foot beam. Can carry 150 tons of iced fish. Fuel capacity for 3000 miles and 2500-gallon fresh water tanks. Deck bait tank can carry 54 tons, and 2 bait wells in the hold of 40-ton capacity each. 360-horsepower diesel engine. Accommodations for 14 people. Photograph compliments of the Los Angeles Shipbuilding Company, San Pedro.

FIG. 71. The first tuna cruiser of steel construction, 112 feet, 6 inches long, 25-foot beam. Can carry 150 tons of iced fish. Fuel capacity for 3000 miles and 2500-gallon fresh water tanks. Deck bait tank can carry 54 tons, and 2 bait wells in the hold of 40-ton capacity each. 360-horsepower diesel engine. Accommodations for 14 people. Photograph compliments of the Los Angeles Shipbuilding Company, San Pedro

In view of the close proximity of Mexico and the fact that the California canneries are so dependent upon the fishing off her coast, it is surprising to find that only one boat of Mexican registry delivered fish to ports in this State. This was an Ensenada lobster tender putting in at San Diego.

Aside from the 94 boats whose catches were delivered to San Pedro only 4 San Diego boats engaged in the fishing farther north.

In the pictogram of the lengths of the 1929 San Diego fishing fleet (see fig. 72), we find we can divide the boats into three distinct groups. From 20 to 58 feet, there are the fresh fish market boats, small bait boats, sardine and mackerel boats and the boats of the swordfishermen. These are gasoline launches, chiefly, with a few diesels among the larger ones. From 60 to 85 feet are the live-bait boats which occasionally use a ring net or are converted into a purse seiner by the

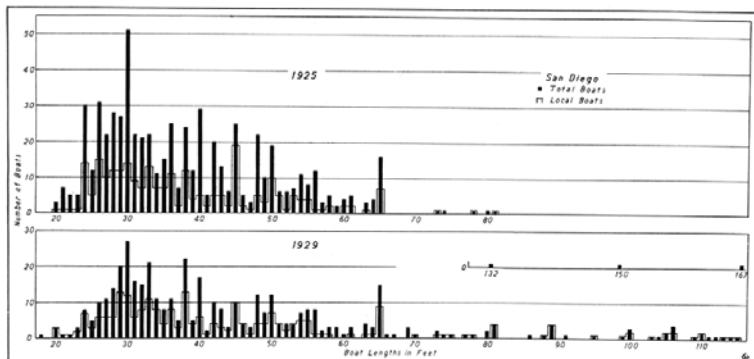


FIG. 72. Number and length of boats delivering fish in the San Diego district during 1925 and 1929. The black bars give the total number of boats of each length; the light bars show the number which gave San Diego as their home port when registering.

FIG. 72. *Number and length of boats delivering fish in the San Diego district during 1925 and 1929. The black bars give the total number of boats of each length; the light bars show the number which gave San Diego as their home port when registering*

installation of a turn-table and net in place of the bait tank. The high point at 65 feet indicates the popular length of many of the tuna boats. Diesel engines predominate in this group.

From 86 feet up are the large new tuna cruisers and many of the same large boats and tenders enter into the San Pedro fishery including

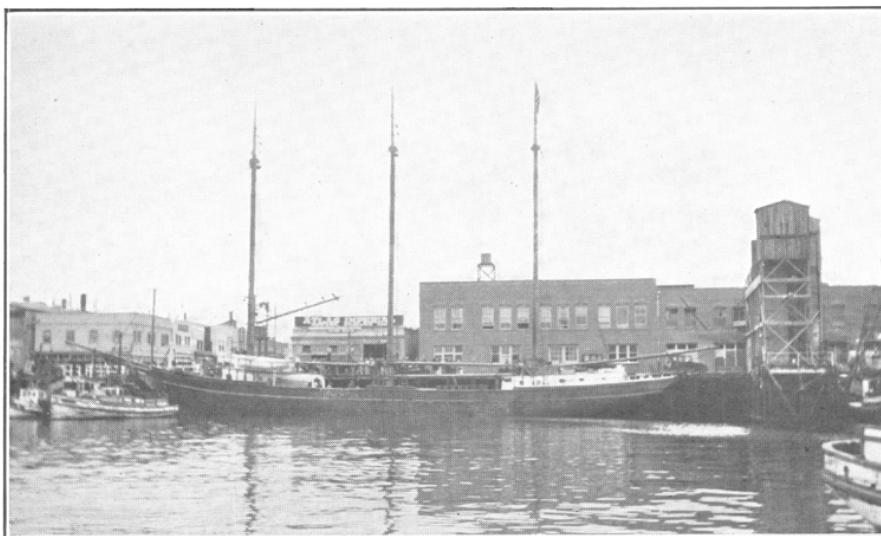
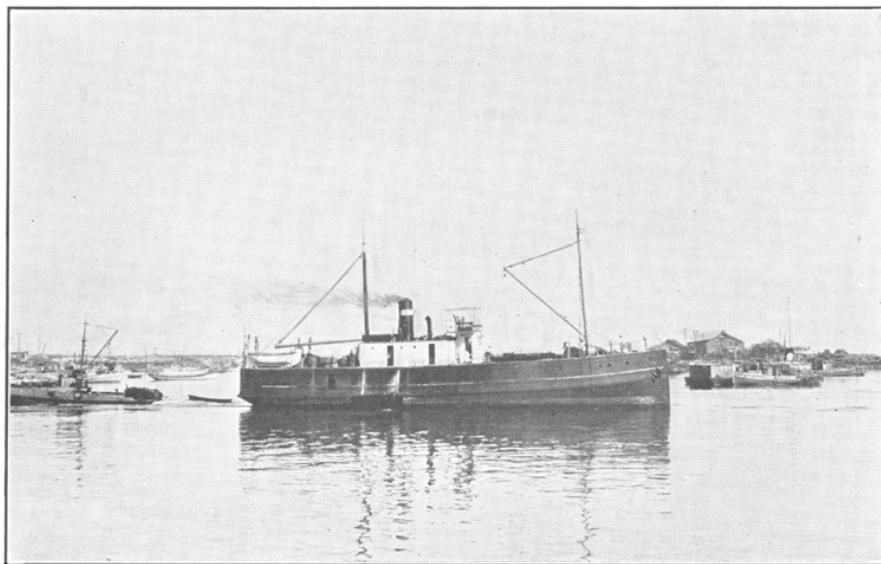


FIG. 73-74. Two types of tuna tenders, 111 feet and 150 feet long, respectively. These large vessels are used to convey the fish caught by the smaller craft in Mexican waters to the canneries in California. Photographs by R. S. Croker and D. H. Fry, Jr., 1929.

FIG. 73-74. Two types of tuna tenders, 111 feet and 150 feet long, respectively. These large vessels are used to convey the fish caught by the smaller craft in Mexican waters to the canneries in California. Photographs by R. S. Croker and D. H. Fry, Jr., 1929

the steamers and sailing vessels. The tenders carry quantities of lobsters and abalones as well as tuna. The lobsters are brought in live-boxes and kept alive by occasional dips into the ocean on the way, and

they are cooked upon arrival at San Diego. Most of the abalones are dried and enter under government bond for re-shipment to the Orient.

The nationality of the largest percentage of the fishermen is Japanese, though many Italians and Portuguese are also listed. Although many Mexican women are employed in the canneries, comparatively few Mexicans are engaged in fishing.

Skiffs are used in connection with the local lobster fishery but few independent rowboats fish in this district. There is quite an army of motor trucks which bring totuava from the Gulf of California, and lobsters and fresh fishery products from the west coast of Lower California to the markets at San Diego. Trucks also gather the rowboat

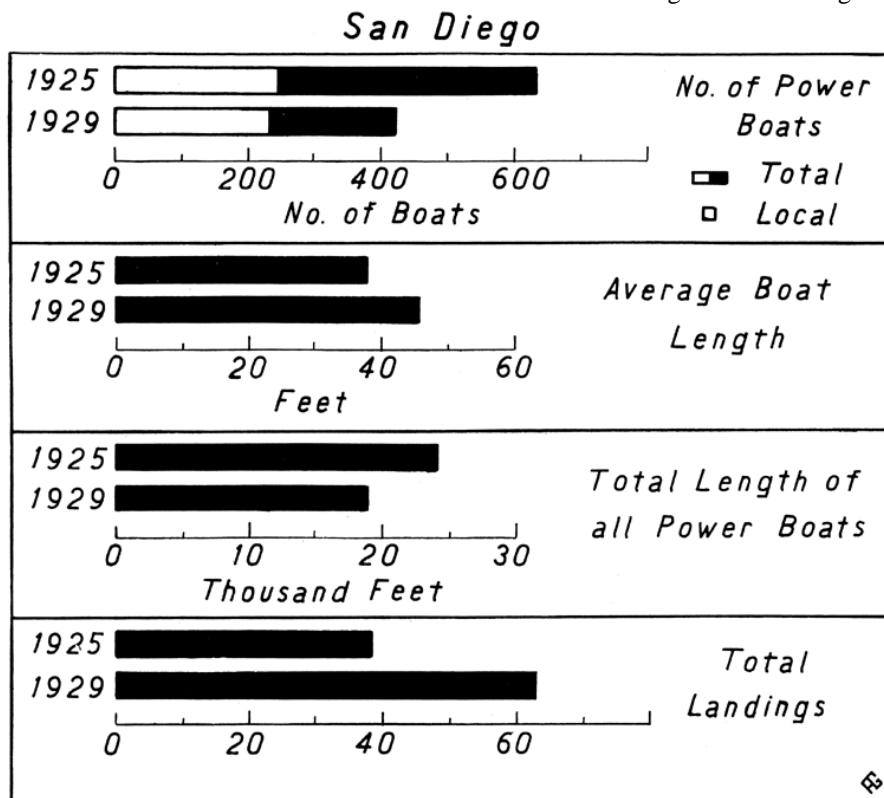


FIG. 75. Comparison of San Diego boats and landings—1925 with 1929. (a) Number of power boats delivering fish at San Pedro, giving total number and those of local registry only. (b) Average length of boats. (c) Total length of all boats delivering during year. (d) Total landings in pounds.

FIG. 75. Comparison of San Diego boats and landings—1925 with 1929. (a) Number of power boats delivering fish at San Pedro, giving total number and those of local registry only. (b) Average length of boats. (c) Total length of all boats delivering during year. (d) Total landings in pounds

catches along the coast towns, and the truck loads in many cases are reported rather than the skiff catches, but the quantities are not sufficient to be of great weight in an analysis of the total catch figures.

In the comparison of the boats contributing to the San Diego landings in 1925 with the fleet of 1929 (see fig. 75), it can readily be seen that fewer boats were fishing in the later year and especially is this noticeable among the smaller craft. Also, fewer boats came from other parts of the State to participate in San Diego's fishery. In 1925 the longest boat in use was 80 feet, while in 1929 they straggled out to over twice that length to one of 167 feet in length. The average length was 38 feet for 1925 against 46 for 1929. Although there were one-third less boats fishing and the combined length of all the boats for

1929 was less than in 1925, there was a 40 per cent increase in the number of pounds taken in 1929 over the earlier year.

16.4. SUMMARY

In a general consideration of the 1929 boat census in the various districts, we find the northern coast with the largest skiff fishery and the greatest percentage of power boats from other districts. The Sacramento-San Joaquin River district has the most localized fishery, the least in number and the shortest average length boats. San Francisco fishery is carried on by a high percentage of local boats but the San Francisco boats are more inclined to rove than those of any other section, engaging in State-wide fishing to a greater extent. At Monterey, there is a greater poundage landed for the number and size of the boats than at any other port; this is due to the lighters in the sardine fishery which increase the capacity of the boats but have not been included in a consideration of the length of the power boats. San Pedro has twice as many boats in her fishing fleet as any other district; the fishing area, poundage landed, value, boat length, and number of fishermen are greater than in any other section. It is dependent to a great extent on Latin-American fishing grounds for its tuna for the canneries. San Diego had the largest average boat length and the smallest skiff fishery for the year; here the bulk of the fish is brought from below the State line. In the State as a whole there were 1948 power boats operating in the commercial fisheries during the year, 412 "consistent" and 935 "occasional" skiffs reported fishing.

17. TABLES SHOWING MONTHLY CATCHES LANDED IN CALIFORNIA BY DISTRICTS FOR 1929

The following tables 10-22 were compiled from the records received through the medium of the "pink ticket" system of the Bureau of Commercial Fisheries of the Division of Fish and Game of California. There have been included the fish brought into California from the Gulf of California, the high seas off the coasts of Mexico and Central America, as well as tunas brought from Japan and Hawaii for the southern California canneries. Fishery products counted rather than weighed were converted into pounds by using the following factors:

Crabs, one dozen	24 pounds
Frogs, one dozen	4 pounds
Terrapins, one dozen	24 pounds
Eastern oysters, one hundred	22 pounds
Ecrevisse, one dozen	3 pounds

The point of origin has been shown for the species which are not taken entirely in local waters, and also the amounts imported from each fishing area.

TABLE 10
DEL NORTE AND HUMBOLDT COUNTIES, 1929
Pounds

Species	January	February	March	April	May	June	July	August	September	October	November	December	Total	<i>Commercial Fish Catch for 1929</i>
Cod.....	29	313	16,719	6,222	12,875	8,379	21,751	23,661	25,873	16,720	9,055	1,807	143,933	143,933
Flounder.....	3,711	3,170	1,274	1,111	5	5	5	5	5	5	5	5	5	5
Hallibut.....	42,286	121,232	58,032	50,784	44,300	63,476	70,036	110,373	66,840	17,305	651,656	651,656		
Herring.....	6,115	34,105	19,227	8,653	25	795	191	292	987	3,181	30,454	41,555	41,555	
Percy....	1,579	6,395	34,021	9,568	1,007	4,678	6,760	18,755	23,235	13,235	5,367	1,857	140,165	140,165
Rockfish.....	26,742	27,020	7,520	62,000	26,290	29,200	28,200	24,200	24,200	24,200	24,200	24,200	24,200	24,200
Sablefish.....	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
Salmon.....	2,200	2,200	2,200	2,200	2,200	2,200	2,200	2,200	2,200	2,200	2,200	2,200	2,200	2,200
Sand dab.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Sealings.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Seals.....	3,476	10,339	21,812	3,3565	6,236	3,138	4,748	2,508	8,431	3,131	264	8,726	94,014	94,014
Sole.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Whiting.....	749	11,058	42,887	41,008	15,295	14,992	7,157	4,056	1,184	1,184	1,184	1,184	1,184	1,184
Miscellaneous.....	13	246	5,432	23	4,150	7,038	2,837	1,707	1,569	1,569	1,569	1,569	1,569	1,569
Oysters.....	4,584	7,044	4,200	5,432	4,044	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000
Clam Mixed.....	1,066	1,971	1,469	1,320	224	25	1,242	1,483	898	898	1,032	1,032	1,032	1,032
Oysters Native.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Totals.....	21,639	150,578	292,561	226,111	417,269	189,413	471,299	658,903	513,828	263,855	199,087	55,019	3,348,763	3,348,763

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TABLE 10
DEL NORTE AND HUMBOLDT COUNTIES, 1929
Pounds

TABLE 11
MENDOCINO, SONOMA AND LAKE COUNTIES, 1929
Pounds

Species	January	February	March	April	May	June	July	August	September	October	November	December	Total	Division of Fish and Game
Catfish.....	7,948	12,165	12,646							598	4,691	4,232	2,210	45,340
Cod.....	2,644	20,443	20,280	24,038	9,600	4,299	10,073	12,311	15,363	21,718	25,211	22,383	219,817	
Flounder.....	6,140	5,670	0,270	3,720	6,630	650				280	4,592		2,350	38,562
Hake.....														12,000
Haddock.....		4,255	8,640	6,426	6,818	541	6,814	5,386	2,616	1,600	74			46,154
Herring.....						681								681
King.....						50								50
Percy.....	218				388	2,011								3,237
Rockfish.....	3,900	3,385	10,791	22,838	20,294	5,210	4,547	5,444	4,652	15,051	10,157	2,211	112,114	
Sablefish.....		972								4,600	4,890	996	3	9,053
Salmon.....						66,356	569,189	510,650	51,541					1,228,956
Seal-dab.....	8,150	4,580	2,470	2,000	1,880	500					1,040	2,470	3,540	21,000
Seal-base-White.....												126	107	231
Sole.....	33,130	27,560	20,650	20,410	17,693	2,730	20	38		6,490	21,590	11,830	162,441	
Whiting.....	130	260	2,102	2,716	8,828	8,000	3,460	2,000	200	1,020	1,020	4	300	30,000
Mollusca.....						55	1,168		350	20	678	631	209	5,054
Avalance.....					1,068	7,393								8,731
Crabs.....									45					45
Otopout.....		33	1,051	1,168	786	318		11			610	31		4,008
Totals.....	64,519	88,792	113,300	90,574	81,699	91,091	630,709	535,560	78,622	56,312	72,338	47,849		1,960,365

TABLE 11
MENDOCINO, SONOMA AND LAKE COUNTIES, 1929
Pounds

TABLE 12
MARIN COUNTY, 1929
Pounds

Species	January	February	March	April	May	June	July	August	September	October	November	December	Total	<i>Commercial Fish Catch for 1929</i>
Giltom					255			56				272	622	
Habot					8			35					312	
Herring	20,142	69,550			1,211			118		70			3,022	66,007
Poach	5,042	14,459			21,080	18,284		692					2,029	174,172
Rockfish	5,010	4,459											6,904	19,368
Sardine					75								55	
Sardine—White													53,267	
Smelt	3,339	3,823			6,215	3,565	2,047	1,376	1,015	8,903	30,313	12,953	615	31,219
Skippoo	10	10			30	15		226	347	444	12		12	1,135
Turbot	7	6											34	4,238
Whitewash	170	1			301	123	30						360	
Oysters	1,104	864											5,059	144,035
Shrimp	74,417	80,987	103,625	86,386	155,841	245,669	186,834	178,743	167,112	81,984	125,036	61,360	1,244,035	
Clam—Woolly	540	4,121	6,734	6,734	6,734	6,734	6,734	6,734	6,734	6,734	6,734	6,734	6,734	
Clam—Mixed	550	1,125	793	45	70	106								2,689
Clam—Softshell	8,702	1,779	8,133	8,550	6,168	6,516	3,021	1,759	4,507	4,090	4,517	4,994	66,722	
Oyster—Cultured	6,084	28,194	20,390	23,376	13,181	4,549	4,454	3,646	1,172	1,172	1,172	1,172	169,419	
Oyster—Native					7,532	6,336	8,566	14,391	13,354	5,702			203	54,084
Totals.....	352,957	205,947	173,416	152,093	192,340	271,148	214,285	210,981	224,838	105,759	147,896	172,915	2,424,575	

TABLE 12
MARIN COUNTY, 1929
Pounds

TABLE 13
SOLANO AND YOLO COUNTIES, 1929
Pounds

Species	January	February	March	April	May	June	July	August	September	October	November	December	Total
Carp.....	3,481	694	2,124	1,990	1,174	35	—	469	554	—	157	385	11,063
Catfish.....	—	—	1,624	1,379	1,488	—	—	289	221	350	421	376	6,148
Pike.....	46	44	1	—	—	—	—	11	12	30	307	376	371
Salmon.....	92	160	757	3,784	14,005	3,440	—	30,002	62,642	—	635	393	115,910
Shad.....	7	—	9	8	23	—	—	183	88	30	—	1,371	1,195
Shad—Buck.....	—	—	—	7,088	33,444	38,500	—	—	—	—	—	—	78,514
Shad—Hoe.....	—	—	—	5,595	50,337	88,063	—	—	—	—	—	—	140,110
Striped Bass.....	1,888	1,336	2,844	6,688	1,604	—	—	3,964	4,128	—	13,392	9,291	45,335
Sucker.....	4	—	—	—	—	—	—	—	—	—	—	—	4
Miscellaneous.....	28	20	35	—	—	10	—	—	17	—	—	—	110
Totals.....	5,546	2,254	20,096	97,650	144,724	3,475	—	34,055	67,675	350	16,202	11,747	404,654

TABLE 13
SOLANO AND YOLO COUNTIES, 1929
Pounds

TABLE 14
SACRAMENTO AND SAN JOAQUIN, 1929

Species	January	February	March	April	May	June	July	August	September	October	November	December	Total
Carp.....	6,405	2,848	4,212	3,297	2,401	641	150	874	2,790	1,951	3,867	4,737	34,173
Catfish.....	5,529	6,427	24,815	52,060	24,694	—	—	23,348	40,783	43,359	38,154	34,248	293,417
Flounder.....	—	—	14	182	50	—	—	—	—	—	—	—	146
Hardhead.....	16,338	9,619	—	—	—	—	20	—	—	6,510	12,021	10,852	55,410
Pike.....	153	59	41	227	84	—	—	65	18	—	—	286	933
Salmon.....	—	49	2,667	4,807	21,646	10,696	—	46,869	67,903	—	315	261	181,919
Shad.....	—	—	—	40	76	156	—	—	50	—	1,357	47	2,163
Shad—Buck.....	—	—	—	1,926	22,223	24,480	—	—	6	—	—	38	48,673
Shad—Hoe.....	—	—	—	1,994	34,722	47,756	—	—	32	—	—	—	84,504
Silverside.....	2,511	8,912	2,267	25	42,251	—	75	—	—	405	1,151	1,105	11,414
Striped Bass.....	10,058	10,009	10,433	21,184	—	—	—	3,971	943	—	32,313	41,144	172,396
Sucker.....	232	138	19	—	—	136	108	—	—	—	411	800	333
Miscellaneous.....	—	—	—	—	—	—	—	—	—	—	89	—	333
Totals.....	41,226	32,061	46,333	138,932	163,596	11,412	220	75,672	112,437	52,225	89,488	93,089	856,691

TABLE 14
SACRAMENTO AND SAN JOAQUIN, 1929
Pounds

TABLE 15
ALAMEDA AND CONTRA COSTA COUNTIES, 1929
Pounds

Species	January	February	March	April	May	June	July	August	September	October	November	December	Total	
Carp.....	1,254	654	3,476	5,473	4,019	1,150	254	5,453	1,568	795	1,219	25,915		
Codfish.....	2,532	1,014	14,733	27,255	20,157	413	125	20,410	21,553	23,820	161,334	588		
Flounder.....						109			4			104		
Greyfish.....												16,250		
Herring.....	2,700	10,250	1,450								1,000	61		
Perch.....												2,000		
Dab.....	493	260	348	344	73	18		44	12		181	343		
Rockfish.....												258		
Salmon.....	191	27	1,344	14,250	73,622		24,637			62,771	132,652		310,286	
Shad.....	29	103	1,344			12			1,369	165	1,359	1,905	4,777	
Shad—Buck.....									43	30			453,242	
Shad—Buck.....												660,144		
Smelt.....												968		
Spotted-tail												524		
Striped Bass.....	12,010	10,913	22,989	32,263	28,846			10	192			287,721		
Sucker.....									45,759	30,292		45,474	36,097	
Mossambicus.....											6	32	38	
Crab—Solepoll.....											30	470	168	
Clam—Solepoll.....	1,450	2,484	3,111	2,709	3,315	2,995	680	580	275	1,655	2,643	2,655	24,423	
Totals.....	25,561	26,321	76,217	536,267	761,819	29,379	934	133,310	188,610	1,635	70,243	98,798	1,949,119	

Commercial Fish Catch for 1929

TABLE 15
ALAMEDA AND CONTRA COSTA COUNTIES, 1929
Pounds

TABLE 16
SAN FRANCISCO AND SAN MATEO COUNTIES, 1929

Pounds

Species	January	February	March	April	May	June	July	August	September	October	November	December	Total	Division of Fish and Game		
Anchovy.....				706	12,689	35,705	54,420	60,669	39,680	16,350	15,649	1,440	219,575			
Catfish.....					44,062	15,657	16,774	18,117	40,759	118,464	76,371	33,176	38,571	572,635		
Clari.....														10		
Damselfish.....	39,981	77,978	20,410	22,641	90,631	38,442	11,115	42,352	103,515	7,040	33,981	1,280	474,020			
Grayfish.....	80,553	54,224	37,427	27,541	2,883	1,253	9,183	13,926	29,352	16,017	31,175	7,199	365,427			
Hake.....														13,223		
Hallibut.....														30,562		
Herring.....	182,869	115,540	126,356	13,000										483		
Kingfish.....	146,200	146,200												30,579		
Mackerel - Pacific.....														44,923		
Perch.....	238	32				500								32,346		
Pompano - California.....														35,985		
Rockfish.....	103,712	81,838	139,457	73,270	33,834	41,005	33,231	51,711	67,965	188,574	142,903	110,329	1,073,846			
Soldierfish.....	3,000	21,919	61,462	5,122	17,400	15,820	15,820	29,180	29,180	44,180	44,180	10,180	10,180	424		
Saintonge.....														538,718		
Sand dab.....														31,220		
Sardine.....	1,816	53,169	341		144,229	92,495	101,905	78,454	68,158	55,180	55,180	55,180	55,180	41,622,782		
Seabass - White.....														14,017		
Seabass - Yellowtail.....	2,291	45,020	21,460	1,150										230		
Seabream - White.....														50,448		
Shad.....														43,975		
Shad - Buck.....														15,720		
Shad - Roe.....														28,250		
Shark.....	40,367	44,854	43,056	44,200	20,300	16,762	18,485	11,552	17,724	14,447	14,447	14,447	14,447	1,090		
Smelt.....	169	11,500	16,349	16,833	8,902	6,069	4,194	6,810	6,741	7,782	4,053	1,833	92,094			
Sole.....	1,275,781	892,889	797,344	744,985	271,407	787,540	739,720	76,790	848,727	1,281,068	821,298	1,043,388	10,612,792			
Stargazer.....	952	1,045	1,099	20	1,131									419		
Tonocet.....														15,822		
Tuna.....														158		
Whitemail.....	16					2,051	31,473	11,907	8,264	1,560	530	1,196	1,613	903	64,946	
Murexidaceae.....	4,450	846	336	2,849	2,990	4,234	3,135	1,787	1,809	3,070	246,758	351,338	1,078,280	26,213		
Crab.....	34,620	247,000	64,520	53,020	123,000	133,000	133,000	133,000	133,000	133,000	133,000	133,000	133,000	1,500,713		
Shrimp.....	20,623	39,545	29,566	36,333	60,237	52,019	538,100	497,023	237,521	68,833	50,792	51,012	513	1,030	10,330	
Clam - Softshell.....	855	1,119	642	645		441	600	573	573	573	573	573	573	15	928	
Mussel.....						400	413									
Otopion.....														387	14,112	
Oyster - Common.....														51,000	50,920	
Oyster - Native.....														82,114	82,114	
Squid.....						445								1,012	3,680	
Totals.....	7,535,224	1,693,331	1,553,121	1,340,821	1,569,631	1,651,999	1,991,752	6,726,744	8,167,005	10,279,863	10,709,712	8,331,365	61,611,169		445	

TABLE 17
SANTA CRUZ COUNTY, 1929

Pounds

Species	January	February	March	April	May	June	July	August	September	October	November	December	Total
Barracuda.....													28
Bonito.....	51												827
Codfish.....	5,605	5,354	4,000	9,104	8,113	16,985	7,658	1,896	9,762	7,166	7,166	7,166	73,227
Flounder.....	42	7	38	21	106	20,500	4,752		1,932	391			22,114
Grayfish.....				125	1,125	125	813		200	4,875	3,659	10,413	
Hake.....				391	4,000	1,275	1,275			21	1,275	1,275	12,423
Haddock.....				19	180	208	90	250	384	45	43	4,726	6,345
Herring.....	375		74										375
Kingfish.....			7,446	3,850	2,275	8,738	8,230	1,887	469	7,327	3,368	45,348	
Mackerel—Pacific					11,244	19	18	933	30	8	34	7,313	1,660
Percy.....							2,158	1,956	212				16,000
Pompano—California					31								31
Rockfish.....	32,345	42,057	36,797	47,666	12,304	13,101	36,696	65,416	10,304	39,297	32,397	52,101	420,501
Soldierfish.....	20,000	41,000	22,000	22,000	22,000	10,251	10,251	10,251	52,044	20,000	14,000	14,000	140,500
Salmon.....					42,614	119,925	85,834	85,773	4,879	21			239,049
Sardine.....					5,300	7,874	14,847	3,000					37,776
Sardinella.....			12		60,300	17,404	50	892		9	333	470	558
Sealings.....	35	83			204				234				35,520
Dogfish—White					37	90	44	651	1,151	26,151	10,601	53	
Skate.....		375			500	250	1,375	750	14,604	11,611	1,125	135	4,500
Seaduck.....	87			4,000	35,600	8,411	17,166	18,399	14,604	2,211	1,211	165,393	
Seals.....	11,132		188	54,658	142,350	72,750	50,000			48,431	17,025	49,125	62
Tomcod.....													50
Whiting.....													50
Miscellaneous.....	1,325	59		691	838	250	500	5,604	131		135	9,415	
Crab.....	6,480	7,908	7,872	2,952	456	672							37,224
Clam—Pacific.....	3												3
Octopus.....	542	686		899	141	221		43	205		13	37	2,787
Squid.....													9,389
Totals.....	120,824	117,218	95,559	265,825	392,131	210,074	314,323	190,221	101,221	124,455	218,203	98,451	2,257,699

Commercial Fish Catches for 1929

TABLE 17
SANTA CRUZ COUNTY, 1929
Pounds

TABLE 18
MONTEREY COUNTY, 1929
Pounds

Species	January	February	March	April	May	June	July	August	September	October	November	December	Total	Division of Fish and Game
Anchovy	450		4,110	40,541	20,575	7,799	4,955	1,100		454			\$1,975	
Bonito													82	
Cod	32,409	11,254	10,884	6,552	4,861	3,546	1,246	3,815	5,305	29	63	21,087	126,661	
Flounder	114	16	11	12	14	14	22	22	21	4,999	20,076	10	126,186	
Grayfish	50,580		5	21,500	24,229	8,712	8,656			59	36		125,294	
Hake													341	
Haddock	4,523		500			232	230	96						
Kingfish	9,879	7,157	1,237	10,914	540	3,902	3,637	401	662	6,693	1,780		22,253	
Mackerel—Pacific	39,470	34,760	21,000	1,094	5,235	2,605	25,421	120,878	228,790	136,683	117,412	136,633	67,033	
Mackerel—Horn	86	101	1,369	1,094	2,353	1,964	242	99	9,247	16,512	16,512	1,028,150		
Porth	1,194	265	6,192	23,575	651		1,082		208	283	2,439	2,261	39,090	
Pompano—California						13	13						214	
Rockfish	109,992	119,208	86,541	102,397	66,396	63,427	31,553	101,703	112,856	138,894	143,045	93,096	1,220,348	
Salalid	9,193	3,465	3,193	3,193	1,061	1,061	1,061	1,061	192	3,369	7,544	3,356	26,019	
Salmon					10,883	138,312	318,308	147,048	183	192	192		113,000	
Sand dab	364	16	144	144	64	46	83	162	56	431	1,792	1,448	4,761	
Sardine	25,654	42,567,727	27,183,603	101,423	76,936	29,577	47,099	44,447,992	33,734,187	62,842,090	42,958,123	39,470,183	223,301,506	
Solefish	35			25	284	52								
Seabirds—Whole				692	24								29	
Skate	1,074	118	21,426	34,229	5,711	4,458	3,362	292	39				5,997	
Smelt	1,101	105	1,217	6,528	3,749	6,546	20,131	15,457	9,763	6,782	6,731	3,977	82,661	
Soles	18,474	12,553	14,497	11,200	27,340	24,848	24,848	2,060	8,115	2,306	4,644	766	134,566	
Whiting		59	1,723	222	5,744	22							7,999	
Miscellaneous	34,658	99,069	64,374	1,699	815	37	379	1,121	202	409	792	805	195,705	
Crab					21	21	21	21	21	21	21		72	
Ahalone	164,550		202,665	427,375	429,559	195,670	339,906	698,575	302,725	165,135	353,425	132,450	3,412,660	
Clam	711	971	1,091	1,504					618	573	1,270	1,612	9,255	
Clam—Softshell				360	5,782	8,552	11,532	8,243	11,548	9,412	4,810	3,167	10	
Ostopus	227	122	360										2,256	65,761
Oyster—Native					718	632	1,131		697				3,123	
Squid	26,131	27,953	29,279	336,649	890,328	1,898,128	1,694,270	203,441	183	4,014	24,788	4,563,166		
Totals	30,209,632	42,930,414	27,084,939	1,456,448	1,665,177	2,577,191	1,718,610	48,822,109	34,420,942	63,331,170	43,628,429	39,917,429	333,360,063	

TABLE 19
SAN LUIS OBISPO, SANTA BARBARA AND VENTURA COUNTIES, 1929

Species	Pounds												<i>Commercial Fish Catch for 1929</i>
	January	February	March	April	May	June	July	August	September	October	November	December	
Barracuda.....					383			1,216	1,550	501	13		3,793
Bonito.....					89	153	9		99	229	78		307
Culture.....										114	22		412
Frigate.....													24
Grayfish.....						185	3,482	5,557	410	715	834		11,829
Hake.....	2,316	17,284	20,042	12,581	11,646	23,161	35,305	24,807	16,517	24,459	20,201	28,201	218,752
Herring.....	246	47									20		225
Mackerel—Pomfret.....	326	138					24	150	370	3,040	1,217	1,068	828
Pompano.....	335		2,755	5,370				1,134	200				8,793
Rock Bass.....	489	1,820		45	765		21	531	215				4,690
Rockfish.....	14,729	11,752	16,151	11,195	7,775	7,560	9,030	8,315	2,724	3,290	3,113	3,099	98,259
Sabinefish.....													70
Sardine.....													3,115,130
Schilb.....													480
Sea-Bass—Black.....	20					225	181	153	122		23		1,401
Sea-Bass—White.....						3,022	4,841	8,311	8,416	2,716	4,314	6,000	30,178
Sherpa.....	612	190	100	880	790	1,030	1,267	1,057			664	4,457	10,174
Skate.....							155			453	740	305	1,653
Sole.....	5,657	5,568	6,874	10,393	5,589	5,888	1,202	1,074	5,941	5,858	315	470	42,797
Sole.....	18,725	10,100	10,386	17,177	12,796	12,371	11,149	8,916	10,230	15,883	8,250	10,315	142,888
Whitefish—Ocean.....	145					277					17		32
Yellowtail.....								58	19	16	69		162
Miscellaneous.....													50,152
Many Lobster.....	3,872		5,812							473	10,045	12,100	11,082
Ashumet.....	40		1,658	1,055	2,543	4,849	1,024			131	1,148	3,775	17,647
Clam—Pismo.....	9,318	9,673	9,461	7,343	7,916	9,077	13,048	11,507	6,423	6,274	5,844	5,037	100,251
Otopus.....								85					85
Totals.....	76,142	62,224	76,192	71,444	55,178	65,949	87,450	71,527	46,202	71,661	2,392,962	3,063,820	6,127,641

TABLE 19
SAN LUIS OBISPO, SANTA BARBARA AND VENTURA COUNTIES, 1929
Pounds

TABLE 20
LOS ANGELES COUNTY, 1929
Pounds

Species	January	February	March	April	May	June	July	August	September	October	November	December	Total	<i>Division of Fish and Game</i>	
Allacore—															
Local															
Hawaiian															
Japan	164,795	736,248	1,347,290	1,077,887	164,164	7,781	55,445	29,495	54,064	40,743	50	9,441	179,797		
Total, Allacore	164,795	736,248	1,347,290	1,077,887	164,164	7,781	55,445	29,495	54,064	40,743	50	9,441	179,797		
Anchovy	3,005	1,832	15,900	20,682	6,765	7,786	584,908	894,463	439,950	435,809	8,345	114,248	6,021,690		
Barracuda—															
Local															
West Coast of Mexico	15,026	93,891	178,292	266,629	855,716	433,009	269,256	261,217	175,751	113,828	46,571	72,743	2,883,259		
Total, Barracuda	15,026	93,891	178,292	266,629	855,716	433,009	269,256	261,217	175,751	113,828	46,571	72,743	2,883,259		
Bass, Breams—															
Local															
West Coast of Mexico	249,643	57,070	106,898	42,223	17,473	1,545	2,156	119,720	191,732	131,180	97,003	1,007,638			
Total, Bass, Breams	255,669	150,961	285,150	408,864	873,191	433,069	271,071	263,373	295,471	368,560	177,760	170,748	3,890,887		
Bonito—															
Local	509	355	5,410	609	23,861	35,745	44,156	150,101	46,637	19,724	784	3,779	340,621		
Total, Bonito	41,267	5,339	5,410	609	23,861	35,745	44,156	150,101	46,637	19,724	784	3,779	340,621		
Codfish—															
Local															
Gulf of Lower California	4,332	8,568	15,003	3,679	—	—	—	—	—	—	—	—	3,969	3,065	
Cobia	—	—	—	—	—	—	—	—	—	—	—	—	—	7,875	
Gulf of Lower California	4,332	8,568	15,003	3,679	—	—	—	—	—	—	—	—	3,969	3,065	
Cuttle—															
Eel	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Dolphin—															
Gulf	47	660	105	215	120	25	—	—	1,700	750	317	607	317	4,149	
Grampus	7,595	10,670	7,692	16,911	19,777	20,308	16,382	25,515	20,311	11,354	12,245	12,200	181,421		
Local	7,595	10,670	7,692	16,911	19,777	20,308	16,382	25,515	20,311	11,354	12,245	12,200	181,421		
West Coast of Mexico	33	—	—	—	—	—	—	—	—	—	—	—	33		
Total, Grampus	8,023	10,670	7,692	16,911	19,777	20,308	16,382	25,515	20,311	11,354	12,245	12,200	181,454		
Haddock—															
Local															
West Coast of Mexico	18,841	47,073	50,407	60,164	43,395	25,386	9,019	20,297	30,460	22,991	22,406	18,807	374,855		
Total, Haddock	18,841	47,073	50,407	60,164	43,395	25,386	9,019	20,297	30,460	22,991	22,406	18,807	374,855		
Hake—															
Kingfish	34,251	15,720	34,944	43,100	32,858	20,038	18,414	34,127	46,960	33,217	22,400	19,912	413,933		
Mackerel—Purifie	2,642,169	1,961,338	636,406	312,565	5,929,817	4,742,198	7,758,838	2,671,223	6,774,729	4,845,198	3,726,161	2,122,186	2,141,241	44,122,622	
Mackerel—Scomber	36,309	67,104	2,402	597	3,460	35,562	98,037	64,002	124,096	34,102	88,688	103,316	654,725		
Local	36,309	67,104	2,402	597	3,460	35,562	98,037	64,002	124,096	34,102	88,688	103,316	654,725		
West Coast of Mexico	—	4,908	—	—	—	353	182	110	—	1,687	472	3,004	10,591	653	
Total, West Coast of Mexico	36,309	72,102	2,402	597	3,460	35,562	98,037	64,002	125,773	34,102	86,160	105,320	665,881		
Gulf of Lower California—															
Horse Mackerel—															
Total, Horse Mackerel	36,309	72,102	2,402	597	3,460	35,562	98,037	64,002	125,773	34,102	86,160	105,320	665,881		

TABLE 20
LOS ANGELES COUNTY, 1929
Pounds

Commercial Fish Catches for 1929

119

Mullet— Local	505	645	3,291	170	4,611
West Coast of Mexico	3,239	7,266	8,353	799	14,028
Gulf of Lower California	349	349	1,362
Totals, Mullet	3,723	7,913	3,602	5,681	890	833	1,569	24,401
Pysch— Local	8,745	8,856	18,687	19,274	50	225	4,311	6,956	6,238	2,999	9,034	9,272
West Coast of Mexico	134	200	14	937	314	116	113	48	108	92,351	92,678
Totals, Pysch	6,759	8,856	18,687	19,274	50	225	4,311	6,956	6,238	2,999	9,034	9,272
Pompano—California	7	770	14	1,062	2,234	314	116	113	48	108	93,312	93,632
Pompano—Mexico
West Coast of Mexico	4,601	11,000	1,266	1,642	19,785
Rock Bass— Local	2,050	2,410	6,448	7,920	11,632	32,065	38,234	37,661	8,433	5,660	7,003	163,316
West Coast of Mexico	135	254	4,079	351	764	4,477	10,069	10,069
Totals, Rock Bass	2,185	2,664	6,448	7,920	11,632	36,084	38,234	38,423	8,433	5,660	7,003	173,376
Rockfish— Local	124,578	152,449	24,470	208,278	92,073	49,310	60,337	100,701	116,024	68,548	95,123	1,407
West Coast of Mexico	1,241	243	243	243	1,006
Totals, Rockfish	126,119	152,449	245,033	208,278	92,073	49,310	60,337	100,701	116,024	98,548	96,123	137,627
Sablefish	40	549	278	1,147	1,096	97	1,664	2,231	1,374	1,424	158	2,033
Sand dab— Local	15,214
Sardines— Local	46,283,965	48,401,453	61,280,463	21,147,663	10,084,453	11,950	3,218	21,249	55,142,663	54,702,453	278,646	278,646
Solefish— Local	1,376	3,855	8,611	7,514	10,733	7,676	6,037	3,989	4,837	3,463	3,245	15,072
Sea Bass—Black	3,564	1,704	3,783	1,358	369	3,236	4,746	7,300	7,450	2,224	8,527	4,163
Local	1,671	2,261	9,766	3,106	1,098	1,098	169	6,674	3,790	7,834	10,494	45,591
West Coast of Mexico	119	178	172
Totals, Black Sea Bass	5,243	3,965	13,551	4,679	569	3,236	5,844	7,469	14,175	6,014	16,180	14,657
Sea Bass—White	77,152	3,385	38,312	6,698	51,985	124,839	85,212	51,870	32,521	35,406	36,333	47,367
Local	2,524	4,011	3,894	4,194	11,655	54,211	5,938	46,932	17,663	63,398	15,813	26,171
West Coast of Mexico	247,556
Totals, White Sea Bass	79,676	7,396	42,136	10,892	63,480	179,047	91,150	92,362	50,134	68,804	50,168	73,338
Sheepshead— Local	38,783	30,605	23,082	19,796	9,849	312	1,657	23,337	27,380	14,704	20,539	244,514
West Coast of Mexico	119	120	1,763	59,575
Totals, Sheepshead	38,902	30,725	23,082	19,796	9,849	312	1,657	23,337	27,380	14,704	20,539	25,459
Sole— Local	2,777	3,860	2,933	572	642	30	1,213	1,298	1,700
Skippjack— Local
West Coast of Mexico	10,320	5,392	31,460	155,855	579,071	158,875	80,420	543,604	2,427,010	2,693,280	290,550	333,664
Costa Rica	9,400	6,791,701
Hawaii	1,763	9,402
Totals, Skipjack	19,320	5,392	31,460	205,357	579,071	158,875	80,420	629,099	4,395,893	4,338,561	861,091	333,664
												11,669,683

TABLE 20
LOS ANGELES COUNTY, 1929
Pounds

TABLE 20—LOS ANGELES COUNTY, 1929—Continued

Species	January	February	March	April	May	June	July	August	September	October	November	December	Total
Smelt—													
Local—	47,561	25,072	35,824	33,557	38,177	35,699	26,164	21,617	29,110	36,698	31,347	30,842	381,980
West Coast of Mexico—	175	122	270										367
Totals, Smelt—	47,738	25,194	35,994	33,567	38,177	35,699	26,164	21,617	29,110	36,698	31,347	30,842	382,547
Sole—													
Local—	1,618	1,276	1,717	118	1,179	52	983	16,197	27,046	8,224	5,868	1,771	66,048
West Coast of Mexico—							40	870					910
Totals, Sole—	1,618	1,276	1,717	118	1,179	52	983	16,197	27,046	8,224	5,868	1,771	66,058
Swordfish—													
Tuna—													
Gulf of Lower California—	108,570	122,748	187,211	164,524	44,012								
Tuna—Bluefin—													
Local—							61	2,989,257	1,782,752	407,409	457,471	78,003	242,619
West Coast of Mexico—													10,210
Totals, Bluefin Tuna—							61	2,989,257	1,782,752	407,409	457,471	78,003	242,619
Tuna—Yellowfin—													
Local—	210	34											150,330
West Coast of Mexico—	92,222	224,014	651,240	2,213,266	2,106,524	46,263	368,785	368,917	1,390,057	1,995,915	1,830,739	475,557	1,772,540
Costa Rica—													16,263
Totals, Yellowfin Tuna—	92,432	224,048	651,290	2,259,529	2,106,524	46,263	368,785	368,917	1,397,054	2,046,405	1,847,035	502,376	372,840
Whiting—Grens—													
Local—	7,047	7,667	11,627	13,575	6,162	2,900	1,352	3,610	2,902	16,341	26,800	10,321	110,462
West Coast of Mexico—	610		3,821										4,131
Totals, Ocean White-													
Yellowtail—													
Local—	884												
West Coast of Mexico—	4,479	6,322	32,241	589	2,803	122,577	1,583	40,773	136,579	584,429	186,034	93,771	36,352
Totals, Yellowtail—													
Micromesistius—													
Local—	5,973	4,215	5,385	4,758	17,559	14,668	8,749	9,657	5,774	3,470	5,571	8,581	64,312
West Coast of Mexico—	30	277	1,448										52,280
Totals, Micromesistius—													
Squid—													
Local—	2,841	4,274	5,612	6,168	17,559	18,598	8,749	9,657	5,774	14,517	22,164	69,167	186,000
West Coast of Mexico—	30,044	12,030	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	64,000
Climbing-Cockle—													
Octopus—													
Squid—													
Totals—	50,004,689	32,103,096	63,027,323	7,150,135	20,394,933	9,187,110	11,033,197	7,879,167	17,092,300	12,810,147	61,449,029	58,763,432	378,404,52

TABLE 20
LOS ANGELES COUNTY, 1929
Pounds

TABLE 21
ORANGE COUNTY, 1929
Pounds

Species	January	February	March	April	May	June	July	August	September	October	November	December	Total
Allscore										64			64
Anchovy										485			485
Barracuda	330		210	547	62,582	21,512	72,938	210	228	345		221	150,467
Bonito			9	1,353	1,621	2,133	1,830	360					7,809
Catfish			10	1,222									1,222
Flounder			14	277	44					16			16
Grayfish	71	13		31	2,295	45	2,295	154	47	3,115	3,851	84	8,716
Mackerel	1,928	7,633	6,035	5,584	1,262	49	2,295	50	50	20	270	243	26,750
Kingfish	430		124,118	140,655	456	205,763	151,849	39,888	365,19	691,365	806,560	20,635	2,791,365
Milkred—Horn	134,300		157,055	146,000	611,917	617						4,140	4,787
Mullet	133												133
Percy													15
Rock Bass	12,470	10,074	5,257	12,106	8,127	4,419	9,544	18,653	25,813	11,037	18,642	13,730	151,354
Rockfish	390	39	1,158	2,016	4,954	142	3,388	1,153	1,153	860	828	4,278	30,313
Sabine												59	59
Sand dab			26	138									724
Sardine													164
Selvipe	626	1,245	941	242	76	39	53		350	350	350		959
Sea bass—Black	322	700	1,046	1,046	3,872	4,335	8,597	1,008	1,437	10	110	23	3,364
Sea bass—White	2,380	2,380	4,008	1,046	1,046	1,046	1,046	1,046	1,046	2,716	2,716	1,872	13,407
Sherphead	26	94	12	532	122					1,422	1,918	3,160	5,542
Skinfish	223	284	246	8					90	400	170	356	1,090
Skipper												34	34
Smelt			34	10									36
Sole	247	792	1,020	746	54				157	163	25,228	10,385	35,720
Swordfish												473	303
Tuna—Bluefin		10	7										10
Tuna—Yellowfin													253
Whiting—Ocean	12												294
Yellowtail													2,324
Miscellaneous	415	63	108	353	167	318	69	170	508	446	600	183	2,572
Spiny Lobster	3,415	2,069				358	741	162		186	9,866	4,360	25,423
Oysters										5	117	117	238
Total	169,090	151,001	177,044	175,053	711,314	292,553	258,899	66,545	432,255	730,169	879,090	301,473	4,325,589

Commercial Fish Catches for 1929

TABLE 21
ORANGE COUNTY, 1929
Pounds

TABLE 22
SAN DIEGO AND IMPERIAL COUNTIES, 1929
Pounds

Species	January	February	March	April	May	June	July	August	September	October	November	December	Total	<i>Division of Fish and Game</i>
Albacore— Local West Coast of Mexico.....						89,073			120		45		89,165 45	
Totals, Albacore.....						89,073			120		45		89,240	
Barracuda— Local.....														
Totals, Barracuda.....	8,465	12,490	22,943	37,479	235,782	177,896	285,112	113,312	13,276	14,738	2,413	995	879,352	
Bass— Local.....	128	522	1,843	353	29,094	91,295	42,807	68,236	3,055	3,923	1,581	1,688	244,189	
Totals, Bass.....	728	1,835	1,155					4,140	3,196	18,952	7,884	6,626	44,554	
Bonito— Local.....	865	2,357	2,998	255	29,084	91,296	42,807	72,376	6,222	22,905	9,204	8,314	288,743	
Totals, Bonito.....													123	
Bluefish— Local.....	1,074		22,316	16,638	2,262	4,021	13,352	14,726	22,322	5,832	9,227	19,658	132,228	
Totals, Bluefish.....	9,387	24,210	33,559	14,392	1,349	2,569	4,019	2,116	151	1,051	474	11,725	165,082	
Totals, Halibut.....	16,656	37,577	35,914	17,161	40,506	22,550	46,552	29,031	48,742	34,979	10,790	16,675	357,150	
Herring— Kingfish— Local.....	145	170	81	59	84	75	26	596	24	149	1,443	284	3,146	
Totals, Kingfish— Mackerel— Local.....	275,603	274,456	302,580	102,812	1,648,756	1,855,357	1,494,525	364,831	13,565	55,640	1,481,960	1,151,255	9,021,118	
Totals, Pacific Mackerel— Local.....	4,888	454		2,287	4,940					178	992	253	1,409	
Totals, Mullet.....	4,881	454	450	2,544	9,220	6,199	5,380	6,109	1,993	65	563	205	25,773	
Pompano— Pompano—California— Pompano—Mexican— West Coast of Mexico.....				10	178	29		45	73				259	
	92		896	275	1,553							125	2,913	

TABLE 22
SAN DIEGO AND IMPERIAL COUNTIES, 1929
Pounds

Rock Bass—													
Local	2,125	2,669	1,427	640	15,257	31,584	26,511	12,099	6,481	5,609	8,042	1,584	114,019
West Coast of Mexico	16,197	8,408	4,714	110	4,222	180	100	2,334	404	1,371	1,078	37,199
Totals, Rock Bass...	16,322	11,068	6,141	750	19,480	31,764	26,511	12,199	8,835	6,073	9,413	2,662	151,218
Rock Bass—													
Local	136,533	128,519	201,169	198,987	164,391	121,833	114,359	112,745	43,096	55,865	60,669	78,454	1,414,924
West Coast of Mexico	3,559	18,661	1,690	1,111	602	1,571	2,193	31,192
Totals, Rockfish...	141,077	132,078	219,830	198,987	166,081	121,833	115,370	112,745	43,096	53,497	61,644	80,617	1,446,833
Sardine—	531,157	899,067	1,015,429	121,676	167,496	28,204	2,445	1,579	2,024	738,020	296,355	127,314	3,076,355
Sea Bass— Black—	3,424	2,424	4,044	1,104	1,104	1,104	1,104	1,104	1,104	1,104	1,104	1,104	25,515
Locally	12,407	9,078	2,297	934	4,225	21,502	8,218	4,983	4,933	10,280	10,703	6,642	100,839
West Coast of Mexico	10,653	12,510	38,532	22,061	13,248	5,245	13,027	3,899	18,553	34,275	11,160	10,454	190,227
Totals, Black Sea Bass...	22,855	21,588	41,129	22,995	17,023	30,837	21,540	8,494	23,491	44,555	21,863	17,120	294,066
Sea Bass—White—	1,650	1,090	82	6,728	25,794	43,943	27,455	12,660	15,402	32,012	1,565	2,565	172,277
Locally	10,653	5,431	6,016	6,974	9,105	21,259	29,333	89,154	94,708	43,108	27,742	15,217	239,120
West Coast of Mexico
Totals, White Sea Bass...	10,602	6,520	6,343	14,702	34,899	64,882	56,788	102,654	112,228	77,121	29,337	17,809	532,307
Sheephead—	6,650	1,090	82	99	136	278	534	40	3,060	1,182	8,095	5,145	26,589
Locally	791	3,509	209	160	160	160	160	160	3,589
West Coast of Mexico
Totals, Sheephead...	7,442	3,518	333	99	156	278	534	40	3,060	1,543	8,152	5,145	29,950
Skate—	2,220	773	249	373	287	450	62	233	4,652
Locally	450	23	23	23
West Coast of Mexico	2,225	778	249	373	287	450	256	233	4,656
Totals, Skate...	2,225	778	249	373	287	450	256	233	4,656
Skipjack—	335,455	40,318	328,383	215,490	621,445	586,211	325,265	1,244,735	1,354,201	632,669	1,343,394	2,166,539	3,222,636
Locally	794,152	2,626,719	2,530,450	12,173,833
West Coast of Mexico	335,455	40,318	328,383	215,490	621,445	586,211	325,265	2,008,902	3,976,999	7,933,069	1,845,394	2,166,539	15,397,469
Totals, Skipjack...	335,455	40,318	328,383	215,490	621,445	586,211	325,265	2,008,902	3,976,999	7,933,069	1,845,394	2,166,539	15,397,469
Smelt—	2,334	1,869	2,826	433	1,308	211	1,161	115	145	114	2,387	3,727	16,672
Locally	165	443	98	114	114	704
West Coast of Mexico	2,334	1,869	2,826	433	1,308	211	1,161	115	145	114	2,387	3,727	16,672
Totals, Smelt...	2,334	1,869	2,826	433	1,308	211	1,161	115	145	114	2,387	3,727	16,672
Sole—	2,354	1,864	2,098	765	102	131	134	9	35	8,162
Locally	170	170	170	170	170	170	170	170	170	170	170	170	170
West Coast of Mexico	2,354	1,864	2,098	765	102	131	134	9	35	8,162
Totals, Sole...	2,354	1,864	2,098	765	102	131	134	9	35	8,162
Swordfish—	170	170	170	170	170	170	170	170	170	170	170	170	170
Locally
West Coast of Mexico	170	170	170	170	170	170	170	170	170	170	170	170	170
Totals, Swordfish...	170	170	170	170	170	170	170	170	170	170	170	170	170

TABLE 22
SAN DIEGO AND IMPERIAL COUNTIES, 1929
Pounds

TABLE 22—Continued
SAN DIEGO AND IMPERIAL COUNTIES, 1921

Species	January	February	March	April	May	June	July	August	September	October	November	December	Total
Tuna—Bluefin— Local...						608,112	474,708	88,076	782				1,262,828
West Coast of Mexico...							38,900	268					40,227
Tuna—Bluefin Tuna— Local...						608,112	474,708	128,835	1,150				1,302,805
Tuna—Yellowfin— Local...							21	23,454	25,512	208			49,195
West Coast of Mexico...	1,070,973	1,167,500	939,806	1,071,921	1,074,902	1,174,896	887,769	3,811,917	3,715,571	2,554,229	2,691,142	26,857,705	
Total, Yellowfin Tuna— Whole Fish...	1,070,973	1,167,500	939,806	1,071,921	1,074,902	1,174,896	887,769	3,835,573	3,715,571	2,554,229	2,691,142	25,835,929	
Local...	11,332	7,427	11,715	15,320	7,336	5,751	1,472	3,230	2,763	3,573	614	5,454	76,227
West Coast of Mexico...	2,165	1,831	1,677	287							1,788	2,146	9,994
Totals, Ocean Whitefish— Local...	13,497	9,258	13,392	15,320	7,643	5,751	1,472	3,230	2,943	3,573	100	1,352	7,600
West Coast of Mexico...	190	1,815	1,077	23,664	8,561	46,323	20,151	469,011	94,476	65,738	5,599	595	742,202
Totals, Yellowtail— Local...	24,628	34,451	73,845	40,859	19,200	45,236	192,961	686,154	233,247	240,968	36,454	76,467	1,717,030
Micromesistius— Local...										86	100		88
West Coast of Mexico...	245	13,103	2,679	16,712	11,497	39,652			7,311	11,550	18,892	31,437	155,342
Totals, Micromesistius— Spiny Lobster...	245	13,103	2,678	16,712	11,497	39,652			7,307	11,632	18,992	31,437	155,340
Local...	15,187	12,943	2,678	16,712	11,497	39,652			22,403	41,512	28,025	123,970	
West Coast of Mexico...	235,272	206,459	227,656	114,048					11,389	98,047	146,267	1,034,908	
Totals, Spiny Lobster— Clam—Mixed— Turtle— Wet...	245,459	222,272	227,856	114,048					35,602	139,550	174,492	2,157,879	
Local...										85	85		88
West Coast of Mexico...												2,138	
Totals, Turtle...											88		2,216
Grand totals.....	2,748,903	2,889,822	3,271,807	2,581,207	4,609,086	5,412,997	4,183,264	7,152,563	7,854,733	7,771,907	7,918,410	6,880,297	63,220,175

*TABLE 22
SAN DIEGO AND IMPERIAL COUNTIES, 1929
Pounds*

18. TABLES SHOWING 1929 MONTHLY LANDINGS FOR THE STATE OF CALIFORNIA

The combined landings in all districts of the State are shown in the following table 23. As in the preceding tables these figures include importations, and the point of origin of the catches is shown as well as the total landings for each species where the catches are not made entirely off the coast of the State of California.

TABLE 23
STATE OF CALIFORNIA, 1929
Pounds

Species	January	February	March	April	May	June	July	August	September	October	November	December	Total	Division of Fish and Game
Allbees—														
Local.....														
Hail.....														
Japan.....														
West Coast of Mexico.....	164,796	230,248	1,347,250	1,077,887	164,164									
Totals, Allbees.....	164,796	230,248	1,347,250	1,077,887	164,164									
Anthony.....	5,455	1,532	16,925	40,220										
Bairns.....														
Loc.....														
West Coast of Mexico.....	15,356	95,310	180,627	416,059	1,157,518	632,877	627,576	376,605	198,878	143,790	166,655	128,188	1,260,711	
Totals, Bairns.....	15,356	95,310	180,627	416,059	1,157,518	632,877	627,576	376,605	198,878	143,790	166,655	128,188	1,260,711	
Boulin, Barneufa.....	264,494	163,460	308,303	406,900	1,161,943	637,371	637,235	412,789	384,344	372,917	215,967	202,927	5,238,610	
Local.....	688	877	7,262	864	54,478									
West Coast of Mexico.....	45,604	7,174	1,155					1,270						
Totals, Boulin.....	42,092	8,651	8,417	864	54,478									
Cabejita.....														
Gulf of Lower California.....														
Car.....														
Cabejita.....	11,115	14,489	9,811	16,221	12,211	3,853	404	6,055	6,912	7,651	10,649	8,652	7,875	
Gulf of Lower California.....	15,959	19,607	53,588	80,694	46,549									
Cultus.....	5,312	8,568	13,033	3,679	51,811	28,732	80,181	88,350	159,126	121,098	100,688	87,369	1,167,120	
Ed.....	80,016	114,688	148,567	10							317		327	
Flounder.....														
Loc.....	31,031	86,861	28,999	34,277	97,678	40,274	42,106	47,299	105,270	9,180	45,941	11,138	380,629	
West Coast of Mexico.....														125
Totals, Flounder.....	31,031	86,861	28,999	34,277	97,678	40,274	42,106	47,299	105,270	9,180	45,941	11,138	380,629	
Grayfish.....	130,293	66,881	67,549	72,557	34,441	59,974	71,440	27,531	61,258	106,366			580,752	
Local.....	25													
West Coast of Mexico.....	57,523	143,278	252,018	174,274	123,773	109,993	130,311	141,969	158,988	118,406	76,318	61,650	1,562,051	
Totals, Grayfish.....	64,599	158,065	254,373	177,143	171,933	122,974	186,929	183,064	237,109	132,859	86,034	66,903	1,853,197	

TABLE 23
STATE OF CALIFORNIA, 1929
Pounds

Commercial Fish Catch for 1929

Ba-Sand...	56,338	5,619											
Herring...	367,487	220,072	191,262	10,540	681								
Kingfish...													
Local...	44,805	31,013	41,469	59,598	45,468	30,410	32,797	20,399	20,272	42,893	36,809	50,280	476,444
West Coast of Mexico...													51
Total, Kingfish...	44,805	31,013	41,469	59,598	45,468	30,410	32,797	20,399	20,272	42,893	36,809	50,280	476,444
Mackerel—Puffies...	5,087,750	2,447,070	1,167,888	371,612	8,215,832	6,861,359	9,461,463	3,204,221	7,388,657	5,742,034	6,147,155	3,672,311	37,073,852
Local...													1,408
West Coast of Mexico...													
Total, Pacific Mackerel...	5,057,750	2,447,070	1,167,888	371,612	8,215,832	6,861,359	9,461,463	3,204,221	7,388,657	5,743,109	6,148,155	3,672,764	37,075,357
Mackerel—Horse...	36,425	67,295	3,831	1,693	5,812	28,143	68,580	64,908	131,333	50,717	93,556	101,995	698,290
Local...													
Gulf of Lower California...													
West Coast of Mexico...													
Total, Horse Mackerel...	36,425	72,295	4,171	2,056	5,995	28,533	85,580	64,908	131,029	30,717	94,028	101,000	709,446
Mullet—...	956	645	450	5,548	4,459	6,109	3,380	6,109	1,993	95	503	205	30,519
Local...													1,962
Gulf of Lower California...													5,742
West Coast of Mexico...													34,075
Total, Horse Mackerel...	956	645	450	5,548	4,459	6,109	3,380	6,109	1,993	95	503	205	30,519
Pike...	8,747	8,367	4,652	8,225	10,116	6,159	5,580	6,109	1,993	95	1,226	5,947	66,556
Perch...	19,893	21,998	68,719	86,886	1,614	2,834	19,559	18,503	14,910	13,438	22,809	19,302	310,516
Local...													678
West Coast of Mexico...													
Total, Perch...	19,877	21,998	68,719	86,886	1,614	2,834	19,559	18,503	14,910	13,438	22,809	19,302	310,516
Pike—California...	697	394	571	157	18	140	36	36	16	209	758	3,264	2,749
Pompano—Mexican...	7	270	47	273	1,277	477	116	132	16		100	100	100
Rock Bass—...	4,603	11,000	2,132	1,917	1,555								1,351
Local...													22,648
West Coast of Mexico...													
Total, Rock Bass...	17,131	18,964	13,312	20,709	55,781	68,629	74,821	68,628	40,727	23,239	33,087	21,346	435,277
Rockfish...	14,573	8,662	4,714	110	4,225	4,239	351	364	464	1,271	5,552	4,255	47,256
Local...													
West Coast of Mexico...													
Total, Rockfish...	31,466	25,626	18,26	20,813	40,004	72,888	73,172	69,692	43,081	25,708	35,055	26,901	482,506
Solefish...	579,521	559,141	776,743	676,731	404,419	312,370	308,560	468,351	381,684	550,657	497,814	654,320	6,001,434
Local...													2,552
West Coast of Mexico...													
Total, Solefish...	580,304	560,520	795,759	676,731	404,419	312,370	310,072	468,351	381,684	551,125	497,814	654,320	6,001,434
Salmon...	131,172	69,896	135,500	108,325	114,302	108,969	85,127	111,250	140,265	218,617	376,277	42,141	1,428,408
Steelhead...	196	505	4,099	176,311	661,614	698,087	1,342,813	1,206,176	802,563	88,831	2,039	1,130	5,044,871
Salmonid...	700	131	58,711	68,628	100,371	100,371	100,371	100,371	100,371	54,190	68,628	100,371	5,044,871
Sardines...	\$1,700,453	91,906,120	89,516,774	2,448,330	10,418,311	276,927	276,931	49,508,514	40,109,255	71,569,694	109,930,809	103,715,274	651,771,904
Sculpin...	9,036	11,127	11,635	12,588	11,088	7,813	6,454	6,689	6,116	4,240	4,117	17,179	108,993

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TABLE 23
STATE OF CALIFORNIA, 1929
Pounds

TABLE 23—Continued
STATE OF CALIFORNIA, 1929
Pounds

Species	January	February	March	April	May	June	July	August	September	October	November	December	Total	Division of Fish and Game
Sea-Bass—Black—														
Local	16,215	11,543	6,558	4,578	5,062	29,380	14,859	12,067	13,950	15,366	21,881	12,680	164,093	123
State	12,105	14,771	48,058	35,147	13,348	5,945	14,135	4,668	35,333	38,065	19,613	30,578	240,118	
West Coast of Mexico														
Total, Black Sea Bass	28,329	26,313	54,590	29,920	18,310	34,695	25,994	16,115	39,183	53,431	40,947	33,658	404,396	
Sea-Bass—White—														
Local	88,313	7,475	43,531	14,527	53,065	177,092	132,043	82,817	100,047	109,419	54,097	52,000	653,550	
State	12,550	9,442	9,820	10,168	20,000	75,430	33,271	129,349	112,360	41,537	41,388	69,679		
West Coast of Mexico														
Total, White Sea Bass	99,573	16,920	53,111	26,692	104,263	235,332	168,316	217,262	221,416	212,022	95,044	94,288	1,562,212	
Shad—Buck	36	103	143	29,308	191			1,605	235		3,047	3,148	30,054	
Shad—Bull			24,245	27,158				49	60		35		61,426	
Sheepshead			15	311,508	381,481								312,650	
Local	41,072	31,979	21,281	21,300	10,917	1,610	3,459	23,604	30,849	16,057	38,648	36,801	284,594	
State										190			3,828	
West Coast of Mexico	910	2,420	266											
Total, Sheepshead	45,982	34,467	23,207	21,300	10,917	1,610	3,458	23,604	30,849	16,217	38,711	36,801	288,422	
Slate-Tails, Local	51,595	52,399	45,058	69,392	58,290	26,103	30,184	30,775	25,967	15,769	21,266	17,048	417,753	
West Coast of Mexico										224			354	
Total, Slate-Tails	51,595	32,396	45,058	69,392	58,290	26,102	30,184	20,715	25,967	15,769	21,266	17,048	427,390	
Skipjack—														
Local														
Costa Rica														
Hawaii														
West Coast of Mexico	345,775	45,799	379,843	411,415	1,200,516	739,086	405,625	1,037,432	3,290,041	2,805,016	568,688	8,800	8,800	
Total, Skipjack	345,775	45,799	379,843	411,415	1,200,516	739,086	405,625	1,037,432	3,290,041	2,805,016	568,688	8,800	8,800	
Smelt—														
Local														
West Coast of Mexico	61,406	58,388	84,179	104,394	90,935	63,650	76,433	65,349	95,150	82,410	72,043	56,769	912,730	1,271
Total, Smelt	61,581	58,510	84,449	104,394	90,935	63,650	76,506	66,394	95,246	82,410	72,043	56,769	914,001	
Sole—														
Local														
West Coast of Mexico	1,330,046	867,263	854,552	857,495	974,125	884,732	852,745	855,494	857,748	1,316,109	925,773	1,091,659	11,705,851	910
Total, Sole	1,330,046	867,263	854,552	857,495	974,125	884,732	852,745	855,494	857,748	1,316,109	925,773	1,091,659	11,705,851	
Striped Bass	20,119	27,285	38,554	66,300	76,837					61,225	38,129		1,114,738	
Sucker	256	138	19							89,610	106,000	106,000	528,981	842

Commercial Fish Catches for 1929												
Swordfish—												
Local.....	170				615	2,059	127,141	143,580	156,598	105,794	112,823	41,145
West Coast of Mexico.....												1,504 774
Total, Swordfish.....	170				615	2,059	127,141	143,580	156,598	105,794	112,823	41,145
Tuna—					552	1,945	4,069	25	1,151	4,571	70	1,594
Tuna—												414
Gulf of Lower California.....	108,570	122,748	187,211	164,524	44,012							1,725
Tuna—												15,594
Local.....							61	3,684,369	2,237,459	696,304	458,278	29,068
West Coast of Mexico.....												242,610 58,194
Total, Bonita Tuna.....							61	3,684,369	2,237,460	746,514	458,646	29,068
Tuna, Yellowfin—												242,610 58,194
Local.....	210	44										7,526,557
Gulf.....												159,444
West Coast of Mexico.....	1,169,193	1,301,820	1,561,076	3,783,087	45,203							4,294
Total, Yellowfin Tuna.....	1,169,403	1,301,864	1,561,076	3,831,359	3,680,886	1,743,681	1,216,677	4,702,008	5,170,485	3,182,668	4,290,973	3,303,963 37,109,217
Turbot—					132	6	15	216	347	507	12	34
Whitetail—					11,902	45,240	54,925	55,847	38,607	21,341	0,016	1,223
Whitefish—												2,424
Local.....	18,556	15,694	22,349	28,893	13,518	8,936	2,924	6,830	5,767	20,114	27,414	16,203 2,145
West Coast of Mexico.....	2,775	1,851	2,165	297								1,738
Total, Ocean Whitefish—												187,609
Yellowtail—												14,125
Local.....	21,331	16,925	26,547	28,895	13,505	8,936	2,924	6,830	5,767	20,114	29,152	18,249 20,175
West Coast of Mexico.....	29,117	38,809	102,292	20,000	130,516	3,369	267,613	358,522	725,300	370,381	115,926	112,274 2,353,519
Total, Yellowtail.....	30,191	40,774	104,360	44,233	170,000	32,093	234,623	492,151	814,307	442,230	133,767	123,825 3,075,264
Mullet—					47,379	55,545	71,284	10,526	21,673	19,702	18,937	27,145
Local.....					1,653	13,222	1,905	18,132	11,497	43,382		7,311
West Coast of Mexico.....												10,301 322,603
Total, Mullet.....					49,032	108,767	74,157	28,678	33,170	63,284	18,557	27,145
Cusk—					55,048	59,257	59,126	41,267	142,571	147,161	147,271	34,729 44,035
Shark—					55,049	120,532	132,341	122,718	216,668	297,679	544,034	678,768 404,633
Spiny Lobster—					50,231	32,733	76					150,817 175,829
Local.....					233,272	209,429	227,656	114,048				116,999 3,064,748
West Coast of Mexico.....												32,171 1,034,908
Total, Spiny Lobster.....					275,410	242,182	227,732	114,048				315,228 396,764
Abalone—					104,640	204,623	429,456	431,456	200,519	341,574	699,798	500,735
Local.....							79,014	265,250	69,003	35,060		
West Coast of Mexico.....												163,356 448,354
Total, Abalone.....					164,640	204,623	508,450	704,766	268,519	378,014	699,798	500,735
												165,356 354,375
												104,228 3,887,212

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TABLE 23
STATE OF CALIFORNIA, 1929
Pounds

TABLE 23—Continued
STATE OF CALIFORNIA, 1929
Pounds

Species	January	February	March	April	May	June	July	August	September	October	November	December	Total
Clam—Cockle.....	5,220	6,332	6,675	6,163	8,818	4,620	4,616	3,590	615	1,880	7,970	8,857	63,495
Clam—Mixed.....	1,116	2,259	1,352	1,565	1,660	1,347	1,347	1,347	1,347	1,347	1,347	1,347	12,488
Clam—Pismo.....	10,134	10,129	11,457	8,747	7,016	9,077	11,048	11,037	7,041	6,847	7,114	6,657	109,744
Clam—Softshell.....	11,007	13,383	11,896	9,896	10,012	9,969	4,377	2,686	5,606	7,877	7,675	6,922	101,460
Mussel.....	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	12,000
Oyster—Common.....	369	1,653	4,440	9,560	10,353	13,531	11,192	13,221	10,359	8,795	3,678	2,706	87,123
Oyster—Eastern.....	45,104	28,894	20,089	21,871	29,384	18,044	23,431	34,841	51,725	56,634	62,042	437,245	610,000
Oyster—Native.....	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	12,000
Seal.....	29,421	75,034	67,580	536,549	\$16,162	1,898,128	1,004,276	203,441	185	4,014	24,788	4,660,572
Turtle—Local.....										58	58	58	2,158
West Coast of Mexico.....										973	973	973	2,216
Totals, Turtle.....										1,183	975	58	
Totals.....	91,539,683	100,433,169	98,037,983	14,258,570	31,355,898	19,982,791	21,270,912	69,558,240	69,260,768	95,599,828	127,756,645	117,836,244	857,261,031

Division of Fish and Game

TABLE 23
STATE OF CALIFORNIA, 1929
Pounds

TABLE 24
FISH LANDED IN CALIFORNIA FROM SOUTH OF THE INTERNATIONAL BOUNDARY LINE BETWEEN THE UNITED STATES AND MEXICO, 1929
(This includes both high seas fish caught off the coast of Mexico and the catch made in the territorial waters of Mexico)
Pounds

Species	January	February	March	April	May	June	July	August	September	October	November	December	Total
Albacore										45			45
Barracuda	261,159	68,155	127,030	60,831	24,023	4,494	9,559	36,774	150,471	243,071	166,025	125,155	1,307,111
Bonito	42,004	7,714	1,153				1,370	560,705	1,420,121	189,709	50,269	41,132	2,324,658
Flounder													125
Grayfish		33											33
Hallibut	7,307	13,287	2,355	2,769	46,090	19,081	50,409	41,033	58,221	34,333	10,316	5,133	291,146
Herring													
Mackerel—Pacific													
Mackerel—Horse													
Mullet	7,811	4,998	240										
Pred. ¹	14			3,200	3,887	5,662							
Pompano—Mexican	4,000				1,417	1,333							
Rock Bass	14,322	8,662	4,714	110	4,223	4,359	351	864	2,354	464	1,271	5,555	47,259
Rockfish	3,783	3,559	10,026				1,111			602	1,571	2,193	31,535
Sea Bass—Black	3,457	18,442	4,920	20,147	1,694	5,245	14,261	4,696	25,233	38,006	17,633	24,141	140,720
Sea Bass—White	12,559	8,442	9,820	10,158	20,600	75,450	35,271	129,546	112,369	108,506	41,557	605,676	605,676
Shorthead	910	2,429	266							190	63		3,829
Silverside													2,254
Skipjack	345,725	45,790	379,843	411,415	1,209,516	739,086	405,625	1,207,761	5,047,506	4,425,780	2,135,934	2,520,203	18,955,534
Sole	173	122	270						40	870			910
Solefish													
Swordfish													774
Tuna—Bluefin	1,169,195	1,391,520	1,361,078	3,785,057	3,680,886	1,743,081	1,216,672	4,702,000	5,170,453	5,183,668	4,290,975	3,303,563	37,199,217
Tuna—Yellowfin		2,775											56,125
Whiting—Oceans													2,234,129
Yellowtail	3,910	38,939	163,119	20,000	133,297	3,869	207,613	333,522	725,300	370,281	125,626	112,154	1,142,152
Miscellaneous	1,453	13,222	2,963	18,152	11,497	43,882			7,511	24,597	35,492	92,021	256,030
Sting Lutefish	225,572	206,429	227,454	54,614	70,014	265,380	60,000	33,060		13,284	39,047	146,270	1,000,334
Ashby													448,334
Turtle													2,158
Totals.....	2,138,623	1,852,067	2,501,223	4,523,465	5,410,226	2,709,622	1,977,474	7,187,715	12,773,221	10,633,353	6,980,500	6,434,122	65,113,411

(This includes only the fish caught in the Gulf of Lower California)

Commercial Fish Catches for 1929

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TABLE 24

FISH LANDED IN CALIFORNIA FROM SOUTH OF THE INTERNATIONAL BOUNDARY LINE BETWEEN THE UNITED STATES AND MEXICO, 1929 (This includes both high seas fish caught off the coast of Mexico and the catch made in the territorial waters of Mexico)
Pounds

Species	January	February	March	April	May	June	July	August	September	October	November	December	Total
Calella	5,532	8,568	13,033	239							3,969	3,615	7,875
Codfish											10,530	1,180	43,532
Mackerel—Horse												655	
Mullet												162	
Sea Bass—Black	108,570	122,748	187,211	164,324	44,012						829		175
Totava											79,133	** 151,245	859,446
Totals.....	113,002	131,316	300,593	169,751	44,194	110					94,446	158,123	912,435

TABLE 25
VALUE OF CALIFORNIA'S COMMERCIAL FISH CATCH, 1929

(Table by Carl B. Tendick, Agent, United States Bureau of Fisheries)

Species	Northern District	San Francisco District	Monterey District	San Pedro District			San Diego District			Total	Division of Fish and Game	
				Off California			Off Mexico					
						Total			Total			
Albacore.....				\$26,979	209,507	\$155,007	424,514	113,340	\$7	\$13,387	\$40,366	
Barracuda.....			\$3	45	11,053	78,669	90,449	71,816	33,727	105,563	\$30,080	
Bonito.....								6,386	1,248		72,090	
Cod, salted.....	\$4,867	\$96,222									82,510	
Cod, dry salted.....			82,510								45,121	
Cod, fresh.....	13,452	20,512	11,880								154,432	
Hake—California.....				5,726	93,513	5,095	98,606	16,639	55,461		88,425	
Hake—Northern.....	83,398	5,005									87,628	
Mackerel.....				31,078	205,814		205,814	110,713	43	110,761	307,408	
Rockfish.....	9,227	40,056	73,955		95,441	130	95,311	79,263	1,333	80,631	33,000	
Solefish.....	19,202	44,966	14,781		198						309,467	
Salmon.....	232,728	142,958	123,781								56,165	
Sand dab.....	885	47,616	3,051								3,457,200	
Sardine.....	210,927	1,207,757	1,524,000		1,500,000	1,500,000	25,719				3,573,200	
Sea Bass—White.....	1	8,074	4,317		92,786	23,814	116,680	22,263	41,537	64,100	193,072	
Seal.....			81,307								31,507	
Skate.....				208,879	247,886		456,765	120,176	494,830		624,000	
Smelt.....	0,089	9,937	13,474		26,227	51	26,378	1,456	79	1,335	1,090,521	
Sole.....	0,576	49,820	2,822		2,822	5	2,822	1,186	1	1,186	57,412	
Striped Bass.....			79,185								42,471	
Swordfish.....				64,276			64,276	63,177	102	62,345	79,183	
Tuna, Blue.....				410,510		715	411,200	70,000	2,446	80,141	693,662	
Tuna, Yellowfin.....				9,516	634,655	644,301	3,266	1,552,909	1,556,165	2,200,366		
Yellowtail.....				53,407	53,242	449	32,000	2,441	41	41,341	294,008	
Mackerel.....	14,521	67,510	17,983		102,497	15,108	117,605	20,134	25,433	45,587		
Totals.....	\$432,805	\$1,246,842	\$2,119,167	\$3,600,056	\$1,226,622	\$4,906,679	\$684,190	\$2,232,427	\$2,916,626	\$11,742,200		
Skatefish.....		\$5,783	\$154,345	\$1,334							\$163,442	
Crayfish.....											45,822	
Shrimps.....											278,399	
Spiny Lobster.....												

TABLE 25
VALUE OF CALIFORNIA'S COMMERCIAL FISH CATCH, 1929
(Table by Carl B. Tendick, Agent, United States Bureau of Fisheries)

Abaalone.....	202	44	136,495	2,562	2,562	120,348	76,337
Squid.....	1,074	40,410	72,818	8,495	4,670	60,588	
Molluscanous.....			8,495	10,454	10,454		
Totals.....	\$7,159	\$240,601	\$220,538	\$83,112	\$83,112	\$188,555	\$209,148
Whale products.....		368,697					368,697
Grand total.....	\$460,054	\$1,956,160	\$2,339,705	\$3,763,168	\$1,226,623	\$4,989,791	\$708,792
							\$2,415,982
							\$3,124,774
							\$12,870,484

Yearly Values, 1926-1929

1926.....	\$474,890	\$1,548,858	\$1,283,407	\$2,510,243	\$818,020	\$3,128,293	\$787,190	\$681,837	\$1,466,057	\$7,904,345
1927.....	453,728	2,013,410	1,352,768	2,677,150	1,410,740	4,038,290	478,190	1,620,795	2,114,795	10,885,200
1928.....	251,794	1,356,160	1,129,404	2,677,150	1,410,740	4,038,290	628,668	1,620,795	2,114,795	10,233,643
1929.....	460,054	1,956,160	2,339,705	3,763,168	1,226,623	4,989,791	708,792	2,415,982	3,124,774	12,870,484

Commercial Fish Catches for 1929

CALIFORNIA DIVISION OF FISH AND GAME FISH BULLETINS

- * No. 1. Report on Fish Conditions. 1913; 48 pp., 3 figs. Contains:
The Abalone Industry in California. By Charles Lincoln Edwards.
The Towing of Salmon and Steelhead Fry from Sacramento to the Sea in a "Live Car." By N. B. Scofield.
The Problem of the Spiny Lobster. By Bennet M. Allen.
Investigation of the Clams of California. By Harold Heath.
Investigation of the Life History of the Edible Crab (*Cancer magister*). By F. W. Weymouth.
A General Report on a Quinnat Salmon Investigation Carried on During the Spring and Summer of 1911. By N. B. Scofield.
Trout and Black Bass Planting and Transplanting in the San Joaquin and Southern Sierra Districts. By A. D. Ferguson.
- * No. 2. The Scientific Investigation of Marine Fisheries as Related to the Work of the Fish and Game Commission in Southern California. By Will F. Thompson. 1919; 27 pp., 4 figs.
- * No. 3. The Spawning of the Grunion (*Leuresthes tenuis*). By Will F. Thompson, assisted by Julia Bell Thompson. July 15, 1919; 29 pp. 9 figs.
- No. 4. The Edible Clams, Mussels and Scallops of California. By Frank W. Weymouth. Jan. 10, 1921; 74 pp., 19 pls., 26 figs.
- * No. 5. A Key to the Families of Marine Fishes of the West Coast. By Edwin C. Starks. March 3, 1921; 16 pp., 4 figs.
- * No. 6. A History of California Shore Whaling. By Edwin C. Starks. October, 1922; 38 pp., 22 figs.
- * No. 7. The Life History and Growth of the Pismo Clam. By Frank W. Weymouth. 1923; 120 pp., 15 figs., 18 graphs.
- * No. 8. Racial and Seasonal Variation in the Pacific Herring, California Sardine and California Anchovy. By Carl L. Hubbs. February, 1925; 23 pp., 4 pls.
- * No. 9. Preliminary Investigation of the Purse Seine Industry of Southern California. By Tage Skogsberg. 1925; 95 pp., 23 figs.
- * No. 10. The Life History of *Leuresthes tenuis*, an Atherine Fish with Tide Controlled Spawning Habits. By Frances N. Clark. October, 1925; 51 pp., 6 graphs, 7 pls.
- No. 11. The California Sardine. By the Staff of the California State Fisheries Laboratory. 1926; 221 pp., 74 figs.
I. Thompson, Will F. The California Sardine and the Study of the Available Supply.
II. Sette, Oscar Elton. Sampling the California Sardine: A Study of the Adequacy of Various Systems at Monterey.
III. Higgins, Elmer H. A Study of Fluctuations in the Sardine Fishery at San Pedro.
IV. Thompson, Will F. Errors in the Method of Sampling Used in the Study of the California Sardine.
V. Scofield, W. L. The Sardine at Monterey: Dominant Size Classes and their Progression, 1919-1923.
- No. 12. The Weight-Length Relationship of the California Sardine (*Sardina caerulea*) at San Pedro. By Frances N. Clark. 1928; 58 pp., 11 figs.
- No. 13. The Seasonal Average Length Trends at Monterey of the California Sardine (*Sardina caerulea*). By Carroll B. Andrews. 1928; 13 pp., 6 figs.
- No. 14. Report on the Seals and Sea Lions of California. By Paul Bonnot. 1928; 61 pp., 38 figs.
- No. 15. The Commercial Fish Catch of California for the years 1926 and 1927. By the Bureau of Commerical Fisheries. 1929; 94 pp., 52 figs.
- No. 16. The Life-History of the California Jack Smelt, *Atherinopsis californiensis*. By Frances N. Clark. 1929; 22 pp., 12 figs.
- No. 17. Sacramento-San Joaquin Salmon (*Oncorhynchus tschawytscha*) Fishery of California. By G. H. Clark. 1929; 73 pp., 32 figs.
- No. 18. The Pismo Clam: Further Studies of its Life-History and Depletion. By William C. Herrington. 1930; 67 pp., 16 figs.
- No. 19. Sardine Fishing Methods at Monterey, California. By W. L. Scofield, 1929; 61 pp., 27 figs.

* No. 20. The Commercial Fish Catch of California for the Year 1928. By the Staff of the Bureau of Commerical Fisheries. 1930; 109 pp., 62 figs.

No. 21. Analysis of Boat Catches of White Sea Bass (*Cynoscion nobilis*) at San Pedro, California. By S. S. Whitehead. 1930; 26., 20 figs.

No. 22. A Bibliography of the Tunas. By Genevieve Corwin. 1930; 103 pp.

No. 23. Success of the Purse Seine Boat in the Sardine Fishery at Monterey, California (1929–1930 Fishing Season). By J. B. Phillips. 1930; 28 pp.

No. 24. An Analysis of the Catch Statistics of the Striped Bass (*Roccus lineatus*) Fishery of California. By J. A. Craig. 1930; 41 pp., 22 figs.

No. 25. Fishing Areas Along the California Coast for the Sardine (*Sardina caerulea*). By the California State Fisheries Laboratory. 1930; 44 pp., 25 figs.

No. 26. Seasonal Changes in the Daily Average Length of the California Sardine (*Sardina caerulea*). By Frances N. Clark. 1930; 20 pp., 11 figs.

No. 27. The Ring Net, Half Ring Net, or Purse Lampara in the Fisheries of California. By Donald H. Fry, Jr. 1930; 65 pp., 28 figs.

No. 28. Handbook of Common Commercial and Game Fishes of California. By Lionel A. Walford. 1931; 183 pp., 137 figs.

No. 29. The Striped Bass of California (*Roccus lineatus*). By Eugene C. Scofield. 1931; 82 pp., 46 figs.

No. 30. The Commercial Fish Catch of California for the Year 1929. By the Staff of the Bureau of Commercial Fisheries. 1931; 133 pp., 75 figs.

These bulletins are offered free of charge to interested persons and in exchange for the publications of other bodies engaged in marine research. Address: California State Fisheries Laboratory, Terminal Island, California.

1 Jordan and Hubbs (Carnegie Mus., Mem., vol. 10, p. 210, 1925) separated the California mackerel from the Japanese, making the former *Pneumatophorus diego*. However, according to G. S. Myers, the differing characters intergrade and the subspecific *Pneumatophorus japonicus diego* should be used.

2 Some scientists claim that this name is incorrect and should be *Octopus apollyon*, but for the purposes of this work the more familiar form has been used.

3 The name *Octopus* is claimed by some scientists to be the correct generic name, but for the purposes of this work the more familiar form has been used.

4 Clark, G. H. Halibut. In The commercial fish catch of California for the year 1928. Calif. Div. Fish Game, Fish Bull. no. 20, p. 55, 1930.

5 These compilations are intended to cover only the fisheries prosecuted by California fishermen, although they do include insignificant amounts landed by Oregon fishermen in northern California. Imports from Japan, the Hawaiian Islands, Gulf of California, and abalones from Lower California, Mexico, are not included. These data have been compiled chiefly from records collected by the Bureau of Commercial Fisheries of the Division of Fish and Game of California.

6 The United States Bureau of Fisheries for analysis and comparative purposes divides the State into five geographic districts as follows: The northern district, including Del Norte, Humboldt, Mendocino, Sonoma and Lake counties; the San Francisco district, including Marin, San Francisco, San Mateo, Alameda, Contra Costa, Solano, Yolo, Sacramento and San Joaquin counties; the Monterey district, including Monterey and Santa Cruz counties; the San Pedro district, including San Luis Obispo, Santa Barbara, Ventura, Los Angeles and Orange counties; and the San Diego district which includes San Diego and Imperial counties. The statistics of the fisheries south of an extension of the international boundary are compiled separately and included with the figures for the district in which they are landed.