PART XVI.

THE FISHERIES OF THE PACIFIC COAST.

By DAVID STARR JORDAN.

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PART XVI.

THE FISHERIES OF THE PACIFIC COAST.

A.—GENERAL STATISTICS.

214. EXTENT AND RELATIVE IMPORTANCE OF THE FISHERIES.

PRELIMINARY REMARKS.—The fisheries of the Pacific coast, like those of almost every part of the United States beyond the limits of New England, are still in a low degree of development. About 7,000 miles of the territory of the United States border upon the Pacific Ocean, and its northernmost arm, the Sea of Kamtchatka, but the income derived from the fisheries of this extensive tract is about $5,000,000 per annum less than the revenue which New England, with her 500 miles of coast line, draws from a similar source.

RELATIVE IMPORTANCE OF THE FISHERIES OF DIFFERENT PLACES.—The most important of the Pacific States and Territories, considering the amount of capital invested in the fisheries, is California, which is directly interested in the products of the water to the extent of nearly $1,140,000, and much of the capital which will be credited to Alaska and other places is really controlled by the citizens of that State. The California fisheries give much smaller returns, however, than those of either Oregon or Alaska.

The city of San Francisco is the metropolis of the Pacific fisheries, and almost all the products of every sort, which are not consumed locally, come hither for use or shipment.

RELATIVE IMPORTANCE OF THE FISHERIES FOR DIFFERENT SPECIES.—One of the leading fisheries of the region under consideration is that for salmon. The value of fish of this species taken in the Columbia River, where the fishery is most extensively prosecuted, is $2,728,602. The entire catch in 1880 was no less than 53,844,000 pounds, for which the fishermen received $1,054,027. Nearly 43,400,000 pounds were canned before being placed upon the market, and their worth was thus increased by $2,345,547, which, being added to the former amount gives them value in marketable condition of nearly $3,400,000 at first hands. It will be noticed that this amount is over one-third of the entire production of the west coast fisheries.

The marine salt industry, which is confined to the State of California, has products amounting to $302,000.

The returns from the whale fishery of California amount to $202,000. No whaling is done in Oregon or Washington Territory, and $500 worth of oil is the only contribution from the bulky cetacean towards the wealth of Alaska.

About $2,172,000 accrues from the fur-seal and other pinnigrades, with their neighbor, the sea-otter. The capital invested by the Alaska Commercial Company in this trade comprises nearly one-fifth of the entire amount dependent upon the fishery industries of the Pacific.

The statistics of the fisheries of the Pacific coast are detailed in the following statements:

Summary statement of persons employed.

Persons employed.	Number.
Fishermen	11,613
Shoremen	5,190
Total	16,803

Detailed statement of capital invested and apparatus employed.

Apparatus specified.	Number.	Value.
Vessels (5,463.42 tons)	50	$546,450
Boats	5,547	404,695
Other apparatus, including outfits		467,238
Cash capital and shore property		1,330,000
Total		2,748,383

Detailed statement of the quantities and values of the products.

Products specified.	Quantity.	Value to fishermen.
Sea-otter skins ... number	6,075	$603,750
Seal-skins ... do	155,718	1,540,912
Seal-flesh ... pounds	1,000,000	10,000
Whalebone ... do	61,000	122,000
Whale oil ... gallons	158,685	80,150
Fish ... pounds fresh	178,048,920	*a* 4,596,330
Crabs and other crustaceans ... pounds	2,500,000	66,358
Oysters and other mollusks		138,250
Marine salt ... pounds	60,400,000	302,000
Other products		*b* 25,000
Total		7,484,750

a Including enhancement in the value of salmon in process of canning, $2,345,547.

b Including fish oil, seal oil, seaweed, and eggs of sea-birds.

B.—CALIFORNIA AND ITS FISHERY INTERESTS.

215. STATISTICAL RECAPITULATION.

INTRODUCTORY REMARKS.—The fisheries of the California coast, which are to be considered in detail in the following pages, are summed up in the two tables given below. The first, which is the result of a combination of the county tables given further on, shows the coast fisheries, properly so called. They are carried on within a few miles of the shore by means of small vessels or boats too frail to face the dangers of the open sea. These are of diverse patterns, and the predominating types come from the central seats of antipodal civilizations. Side by side with the Chinese junk may be found the lateen-rigged sloop of the Mediterranean. The presence of boats of these kinds is explained by the fact, which will hereafter appear, that most of the fisher-folk are either Chinese or Europeans of the Romanic races. Italians and Portuguese are very numerous, and, if we may trust the etymology of the word, it is to the former nationality that the invention of the lateen sail, the *voile latine*, as the French plainly call it, must be credited. Those who man

these little crafts do not usually confine their operations to any particular species, but refuse nothing for which they are sure of finding a market, from the whale to the abalone.

The second table is the summation for the fisheries of the State in all their branches. It includes not only the result of the toil of the coast fishermen, but also the products of the river fisheries for salmon and the outcome of the voyages of the vessel fleets to the distant haunts of the codfish and the whale.

The salmon fishery is vigorously prosecuted in the waters of the three rivers, Sacramento, Eel, and Smith, and the products in 1880 had a value, to the fishermen, of over $180,000.

The cod is abundant in the Northern Pacific and many large vessels make annual expeditions in its quest. There are two fleets of cod-vessels, one of which fishes in the Okhotsk Sea and the other in the vicinity of the Shumagin Islands, a group at the eastern extremity of the Aleutian Archipelago. At the latter place a fishing station is established, and a vessel is kept constantly employed in carrying to San Francisco the catch of several vessels which remain in the vicinity throughout the season. Of the sixteen vessels engaged in the off-shore cod-fishery in 1880, ten fished in the Okhotsk Sea and five belonged to the Shumagin Island fleet. The other went no farther than the Cordell Banks, off the California coast. The catch amounted to nearly $200,000.

The whaling grounds in the Sea of Kamtchatka and the Arctic Ocean were visited by five vessels from the port of San Francisco. These vessels averaged 200 tons burden and had an aggregate value of $27,000. The products consisted of 116,550 gallons of oil, worth $59,440, and 61,000 pounds of whalebone, worth $122,000. Although its own fleet is quite small, San Francisco is the center of the whale fishery of the North Pacific. From this port are shipped to their destination the products of nearly every American vessel whaling in those waters; in its docks the battered hulk and broken spars, which witness the severity of northern tempests, are repaired; and by its merchants is furnished the outfit for each new cruise. Thus the position which the city occupies with regard to this fishery is much more important than the statistics would lead the reader to believe.

The seal business of the Alaska Commercial Company is omitted here, as it has been thought better to include it in the statistics of the fisheries of Alaska.

The following statements show in detail the extent of the coast fisheries of California:

Summary statement of persons employed.

Persons employed.	Number.
Fishermen	1,039

Detailed statement of capital invested and apparatus employed.

Apparatus specified.	Number.	Value.
Vessels and boats	294	$33,485
Other apparatus and outfit		32,340
Total capital invested		65,825

Detailed statement of the quantities and values of the products.

Products specified.	Quantity.	Value.
Food products.		
Fresh fish ..... pounds..	8,460,200	$349,171
Dried fish ..... do....	111,000	2,275
Shark fins ..... do....	6,000	300
Crawfish ..... do....	190,000	2,858
Shrimp and prawn ..... do....	1,250,000	62,500
Clams and mussels ..... number..	58,000	545
Abalone meats ..... pounds..	787,600	38,880
Other products.		
Sea otter skins ..... number..	75	3,750
Seal-skins ..... do....	2,000	10,000
Seal oil ..... gallons..	4,725	2,250
Whale oil ..... do....	47,135	20,210
Shark oil ..... do....	1,920	595
Abalone shells ..... pounds..	3,383,500	88,825
Seaweed ..... do....	277,000	170
Total	.....	582,329

The following statements show in detail the extent of the commercial fisheries of California:

Summary statement of persons employed.

Persons employed.	Number.
Fishermen	2,089
Shoremen	1,005
Total	3,094

Detailed statement of capital invested and apparatus employed.

Apparatus specified.	Number.	Value.
Vessels (5,246.80 tons)	49	$535,350
Boats	853	91,485
Other apparatus, including outfit	.....	205,840
Cash capital and shore property	.....	307,000
Total	.....	1,139,675

Detailed statement of the quantities and values of the products.

Products specified.	Quantity.	Value to fishermen.
Sea otter skins ..... number..	75	$3,750
Seal-skins ..... do....	2,000	10,000
Whalebone ..... pounds..	61,000	122,000
Whale oil ..... gallons..	153,685	79,650
Fish ..... pounds fresh..	24,577,920	*a*1,145,006
Crabs and other crustaceans ..... pounds..	2,500,000	66,358
Oysters and other mollusks	.....	128,250
Marine salt ..... pounds..	60,400,000	302,000
Other products	.....	*b*3,700
Total	.....	1,860,714

a Including enhancement in the value of salmon in process of canning, $394,045.
b Including fish oil, seal oil, seaweed, and eggs of sea-birds.

216. THE FISHERIES OF SAN DIEGO, LOS ANGELES, AND VENTURA COUNTIES.

SAN DIEGO COUNTY.—This county is in the extreme southern part of California. Its coast is conspicuous for bold headlands of sandstone, at the foot of which is a smooth beach extending fully half a mile into the sea. Beyond this is a stony area covered with kelp (*Macrocystis pyrifera*), stretching out irregularly about 5 miles.

All along the coast are numerous lagoons or bays of salt water, forming broad mouths to the streams entering the ocean. These bays have been washed out by the ocean and nearly, and in some cases wholly, filled up by the formation of sand-bars. One of these bays, that of San Diego, forms an excellent harbor. It is about 10 miles in length from north to south, and from 1 to 2 miles in width. Its entrance is on the north end, just south of Point Loma, and it is separated partially from the sea by a low, sandy peninsula, running in a northerly direction. San Diego Bay is shallow along its edges, deepening in the center. Between Point Loma, the termination of a rocky ridge north of San Diego, and the Point of Rocks 15 miles farther south, the coast line is concave. In the bay formed by this recess most of the outside fishing of the county is carried on.

There are no authentic accounts of the productiveness of the past fisheries of this county. There is no doubt that the number of fishes in San Diego Bay has been greatly reduced by the constant use of fine-meshed seines by the Chinamen. Large fishes of all species are becoming rare. This is especially noticeable in the case of the "bastard halibut" or flounder (*Paralichthys maculosus*). Large individuals of this species are now very seldom caught, but numbers from 2 to 6 inches long are daily taken and dried by the Chinamen. There is no reason to believe that the abundance of the outside fishes has been materially changed by fishing.

The fisheries carried on at San Diego ten years ago were more extensive than at the present time. The advent of the Chinese fishermen, who compose three-fourths of the total of fishermen in this county, and the non-construction of the Texas and Pacific Railroad to San Diego may be regarded as two causes of the decreased interest in the fisheries.

All the fishermen of this county, excepting four Americans and their employés, are Chinamen. Two Americans and assistants are employed in seal-hunting, the rest in gathering kelp, and, in their seasons, bonito and barracuda fishing. The bonito appears in August and disappears in November or December; the barracuda comes in April and leaves in October or November.

The modes of fishing peculiar to each race of fishermen are described elsewhere.

Pound, traps, weirs, and fyke-nets are not in use at San Diego, the poor state of the fish market not warranting the expenditure of much capital; nor are there any gill-nets in operation.

Statement showing the several species and amounts of each kind of fish taken in San Diego County during 1879.

Name.	Pounds.	Name.	Pounds.
Redfish	50,000	Mullet	600
Barracuda	32,000	Perch	1,500
Bonito	6,000	Bass	500
Albicore	500	Whitefish	2,000
Yellow-tail	300	Flounder	1,000
Jew-fish	1,000	Other "outside" species	600
Bluefish	1,500	Other "inside" species	1,500
Roncador	1,300	Total	113,200
Smelt	12,000		
Herring and Sardine	900		

Smelt, mullet, herring, roncadores, and flounders are taken by means of seines, and in all parts of the bay throughout the year. These fisheries are prosecuted chiefly by the Chinese. Redfish are caught with hook and line at a distance of one-half to 3 miles from the shore. Jig-fishing for bonito and barracuda, practiced by Americans only, is carried on during the summer and fall at one-half mile to 10 miles from shore.

All the fish, excepting smelt, mullet, and roncadores (which are sold fresh for home consumption), are salted and exported. The boats used were built in San Francisco, excepting some of the Chinese junks.

The whale fishery, once of importance, is now abandoned, Ballast Point having been taken possession of by the Government for the storehouses in connection with the fortification of Point Loma.

Oysters and clams occur, the former in small quantities, the latter, especially the "Razor Clam," in great abundance; and quantities of crawfish are taken by the Chinese fishermen.

The chase of the fur-seal is more extensive at San Diego than the fisheries proper. The result for 1879 was 2,000 skins, worth $10,000.

Great interest is taken by the Chinese in abalone fishing. The shells of the young of the species *Haliotis splendens* are treated with a solution of hydrochloric acid. The shells of the adult individuals of the same species and those of another species are ground down on stones by hand. Steam grinding, from the rapidity of motion, wears holes through the shells, unless the operator is extremely careful. The shells, when ground down, are varnished. During the first week of January, 1880, 10 tons of abalone shells were sold in San Francisco at $45 a ton. Their value is at times $75 a ton. From San Francisco they are shipped eastward for mantel ornaments. The meat of the abalone is salted and dried, and sold at 5 cents a pound in San Francisco. Thence much of it is shipped to China. The dried abalone is nearly half as heavy as the shell. The abalones taken in this and other southern counties of California are less eaten by worms than those taken farther north, therefore more valuable. The Americans do not eat the meat of abalones, but certain Indian tribes at some of their secular feasts consume large quantities of it. The abalone industry is combined with the redfish fishery by the Chinese.

Sea turtles are occasionally taken along the coast. Their capture is not sufficiently frequent to have established a market.

LOS ANGELES COUNTY.—Los Angeles County lies directly to the north of San Diego County. Its coast is similar, except that headlands and bays are less numerous, and there is an increase in number of level sandy stretches with small lagoons. There is no harbor of any importance on the whole coast, the only one being at Wilmington, and little better than a narrow, muddy inlet. Most of the fishing is done at a great distance from shore, the most favorite ground being in the neighborhood of Santa Catalina, a mountainous island about 20 miles from the coast. This island is 22 miles long, and from a half mile to 6 miles wide, its length being parallel with the coast line. The water about Santa Catalina is very clear, and where the most fishing is done the water is from 10 to 20 feet deep. The bottom is rocky and in places covered with kelp. On these grounds gill-nets are the commonest means of capture. In the summer trolling for bonito, albicore, barracuda, yellow-tail, &c., is followed largely. In the winter the following species are taken: Media-luna, *Girella nigricans*, *Scorpæna guttata*, rockfish, and *Hypsypops rubicundus*. At this island are some resident fishermen who salt and dry their fish and ship them to San Francisco. One of these, with his associates, fishes with seines, the others with hook and line. There are perhaps ten fishermen, altogether, on the island. More men fish in summer than in winter.

The other fishing grounds, chief among which are San Pedro, Anchorage, and the Creek, are visited by fishermen from Newport, Anaheim Landing, Wilmington, Salinas Ranch, and Santa Monica. The most important of these is Wilmington. To this port belong four lateen-rigged boats, two or three skiffs, which go to the "creek," and three Chinese junks, aggregating 6 tons, which combine hook-and-line fishing with the gathering of abalones.

At Newport the only regular fishing is that prosecuted for the capture of the oil-shark, in which fishery men from Wilmington, Westminster, and elsewhere join.

At Anaheim Landing there are five persons employed by the Lighter Company; these fish when not otherwise occupied. They catch smelt, flounders, cabrilla, surf-fish, &c., which are peddled in the neighboring towns. In a lagoon near the landing, at a certain time of the year, oil-sharks are captured.

Statement showing the amounts in pounds, of the various species caught in Los Angeles County during 1879.

Name.	Pounds.	Name.	Pounds.
Barracuda	100,000	Bonito	40,000
Media-luna	75,000	Surf-fish	15,000
Smelt	75,000	Whitefish	8,000
Redfish	40,000	Flounders	10,000
Rockfish	15,000	Flying-fish	1,000
Cabrilla	20,000	Others	75,000
Roncador	30,000	Total catch	504,000

The men employed in the salt factories at Salinas Ranch engage in fishing when time permits. Their fish are peddled in Los Angeles. The hotels and residences at Santa Monica are supplied by semi-professional fishermen. They ship occasionally to Los Angeles. The tourists and winter visitors fish here with hook and line. There are at present no pounds or weirs in this county; one is reported to have been used at Wilmington some years ago.

The Italian and French boats owned in this county carry a large mainsail and a small foresail. There is a deck of rude construction in the forward part of the boat, upon which, in lieu of a live-box, are thrown the fish. The fishermen use gill-nets in the winter and seines in summer. There is so little demand for fish that the owners of the boats are ready at almost any time to charter their boat to an excursion party. In the winter, herring and sardines are taken near the shore.

The fishermen own eight gill-nets, about 300 feet long, with a 2-inch mesh. These nets are used chiefly in the winter, when the fish swim low. Two persons can easily manage a net. The average annual catch of each boat is 25,000 pounds of fish. Twelve seines are also in use, each 500 feet by 12 feet, of 1-inch and 1½-inch mesh. Three men manage a seine. They are used chiefly in summer.

Some oyster-beds, almost valueless, occur, and a few clams and scallops are to be found. There is no regular market for them.

A whale fishery formerly existed at Portuguese land, north of Wilmington; this fishery was abandoned some five years ago on account of the difficulty of obtaining water at that place.

Sea-lions abound along the coast and are a source of considerable annoyance to the fishermen in robbing the nets of fish. They are occasionally shot for their oil.

One man is engaged in fishing for crawfish; there is no regular market or price for his catch.

About 250 tons of abalone shells are sent to San Francisco by white men residing in this county, and 150 tons by the Chinese. They sell for about $45 a ton.

The oil shark fishery, which is confined to the lagoons, was at one time largely carried on in this county. Five years ago some 3,000 gallons of oil were made at Newport, and a large quantity at Anaheim Landing; the amount produced has lately fallen off very much. The oil is simply tried out and strained through coarse sacking.

The oil-shark (*Galeorhinus galeus*) enters the lagoon for reproductive purposes, and is taken with hook and line. Any small fish will do for bait. Large hooks are used in order to prevent small sharks and other fish from swallowing them.

The products of this fishery could be greatly increased by the use of seines, but the expense would also be increased, and lack of capital forbids the attempt.

These sharks average 4 to 4½ feet in length and weigh about 40 or 50 pounds each. They yield from two-thirds of a gallon to a gallon of oil. They breed in June, July, and August, runs taking place from May to August. In 1880 the run was a small one, only 170 having been taken at Anaheim Landing up to July 20. In 1879, 150 were taken at one haul of the seine. The fins of this shark alone are dried and sell for 12½ cents a pound.

VENTURA COUNTY.—The coast-line of Ventura County runs northeast and southeast, and consists of a narrow plain, somewhat sandy and bordered by high mountains. This county is separated from Los Angeles by the lofty ridge of the Sierra Santa Monica, which terminates in the rocky points of Duma and Conversion, and from Santa Barbara by a spur of the Santauez Range, which forms the headland of El Rincon. Through this county flows the Ventura River. This is the most southern river on the coast of California which is not alkaline at its mouth. Into no stream, therefore, to the south of this does the salmon enter. Brook trout are, however, found in the headwaters of the Los Angeles and San Luis Rey Rivers, and even in some streams in the San Jacinto Mountains, in San Diego County. There are but two coast towns in Ventura County—County—San Buenaventura and Hueneme. The fishing in each of these is unimportant.

In Hueneme there are no fishing boats and no fishermen. Occasionally some of the villagers catch a few fish from the wharf, simply to pass the time away. At Point Magu, 9 miles south of Hueneme, is a party of Chinamen, who combine the two labors of fishing and gardening. At this point is a considerable lagoon into which various sorts of fish enter. These are caught in seines. Some of the fish are peddled with the vegetables in Santa Paula, Hueneme, and San Buenaventura. The others are soaked in salt water, dried and shipped to San Francisco in the usual fashion. Near Hueneme is a lagoon from which salt is occasionally obtained.

There is now no fishing of any importance at San Buenaventura. Some few Chinese and Californians fish from the wharves, and two or three farmers at Laguna Ranch, near by, fish occasionally with a seine. The proceeds of these catches are bought up by an Italian, who sells or exchanges them for vegetables, &c. At this place there is but one professional fisherman, who has in his possession two gill-nets and one seine. The average price per pound which he receives for his fish is 6 cents, but, even at that figure, the market is very limited. There is no good market in this thinly-populated county, and the harbor is too exposed to south winds to make it a safe anchorage for small boats. Some crawfish are taken in lobster-pots and dip-nets. These crawfish are sold in Ventura for about 5 cents apiece.

Statement showing the number of fishermen, the amount of capital invested, and the quantities and values of the products of the fisheries of San Diego, Los Angeles, and Ventura Counties.

	San Diego County.	Los Angeles County.	Ventura County.	Total.
Number of fishermen	47	53	7	107
Capital.				
Vessels and boats:				
Number	22	13	2	37
Value	$9,100	$1,055	$300	$10,455
Value of other apparatus and outfit	$700	$950	$400	$2,050
Total capital invested	$9,800	$2,005	$700	$12,505
Products.				
Seal-skins:				
Number	2,000	.....	.....	2,000
Value	$10,000	.....	.....	$10,000
Fish:				
Pounds	113,200	504,000	36,000	653,200
Value	$3,396	$20,160	$1,080	$24,636
Shark-fins:				
Pounds	.....	2,000	.....	2,000
Value	.....	$100	.....	$100
Shark-oil				
Pounds	.....	1,000	.....	1,000
Value	.....	$310	.....	$310
Crawfish:				
Pounds	7,500	1,500	1,000	10,000
Value	$113	$25	$20	$158
Clams and mussels:				
Number	10,000	2,500	500	13,000
Value	$100	$25	$10	$135
Abalone meats:				
Pounds	280,000	160,000	20,000	460,000
Value	$14,000	$8,000	$1,000	$23,000
Abalone shells:				
Pounds	1,400,000	800,000	100,000	2,300,000
Value	$30,000	$18,000	$2,500	$50,500
Total value of products	$57,609	$46,620	$4,610	$108,839

217. THE FISHERIES OF SANTA BARBARA AND SAN LUIS OBISPO COUNTIES.

SANTA BARBARA COUNTY.—The land in Santa Barbara County consists of a rather fertile strip of coast, with a smooth, sandy, and, in some places, rocky beach, indented by few lagoons. On the north the county is bounded by the ragged Sierra Santa Ynez, which forms the rocky headlands of El Rincon on the east and Points Argueles and Concepcion on the west. At a distance of about 25 miles from the coast, and parallel with it, lie the rocky islands of Santa Rosa, Santa Cruz, and Anacapa, and behind these, San Nicolas, San Miguel, and Santa Barbara. At a distance of about half a mile from the shore begins a belt of kelp, which extends out perhaps a half mile farther. Between the shore and Anacapa is a small reef, which is a favorite place for trolling. The Santa Barbara Channel is remarkably well stocked with fish, and the fisheries at Santa Barbara might be very extensive if there were any market. But insignificant as the present fisheries are, the supply exceeds the demand since the decline of real estate speculations.

Santa Barbara is the most important fishing town in the county. Goleta and Carpenteria come

next in order of importance. There are a few small places in addition, where scarcely any fishing is done.

No stationary apparatus is used by the fishermen of Santa Barbara. There are about fifteen gill-nets, the greater number of them about 240 feet by 15 feet, having a 2-inch mesh. These are chiefly used in winter, when the fish stay in deep water. Among the fishermen belong three or four baskets of set lines, each with 146 hooks. They have six seines, averaging 300 feet by 12 feet, with a half-inch mesh. These are used chiefly from April to October. The best bait is crawfish flesh, and for the capture of crawfish bonito is preferred as bait; any flesh, fresh or salt, will do. Their own species makes a very good bait.

There are five small sail-boats at Santa Barbara. These are usually laid up from November until March, the winter fishing being done in smaller boats with gill-nets. In the summer they fish extensively for barracuda.

The fishing is usually carried on between Santa Barbara and Santa Cruz Island, about 25 miles from shore, and also along the shore from Carpenteria to Los Pueblos, at which point the hook-and-line fishing is said to be the best.

Carpenteria is a small farming village, 12 miles east of Santa Barbara. Its name is derived from the timber—liveoak—which was formerly very abundant there. The fisheries are of little importance. Occasionally a man fishes from the wharf or drags a seine on the beach.

Mr. A. McIntyre, of Carpenteria, is a ship's carpenter by trade, and is chiefly engaged in the building of fishing smacks. He does all the work himself, and in the past eight years has built two, besides an abalone boat, and is now at work on the third—a fishing boat of 4 tons burden. These boats are the Restless, built 1877, now belonging to the fishermen on Santa Catilina, worth $500 when new; the Virginia, built 1872, now gone to pieces, worth $1,000 when new; and the Rosita, engaged somewhere in the freight and abalone business. When such work offers, Mr. McIntyre builds houses; spending time, otherwise not engaged, in boat-building.

At Goleta, on the site of the former whale fishery, a little fishing is carried on with the seine.

The fish are taken in Santa Barbara County, (*a*) in winter, near shore, by seining; (*b*) in gill-nets, near shore; (*c*) by hook and line, in the kelp; (*d*) by gill-net, off the islands; (*e*) by trolling, in summer; (*f*) by hook and line from the wharf, in winter; (*g*) by hook and line, in summer; and (*h*) by seining, near shore, in summer. The fish caught by trolling in summer are chiefly barracuda, bonito, albicore, yellow-tail, jewfish, and sea-bass.

The following list shows the comparative importance of the several fisheries of this county:

	Pounds.
Santa Barbara	110,000
Santa Cruz Islands	50,000
Goleta	15,000
Guadaloupe	2,000
Lompoc	2,000
Carpenteria	1,000

And by species roughly as follows:

Ditrara jacksoni	15,000
Other surf-fish	20,000
Barracuda	42,000
Redfish	10,000
Bonito, albicore, &c	18,000
Smelt	8,000
Flounders	5,000
Rock-cod	3,000
Pompano, &c	10,000

The abalone fishing at Santa Barbara is important. This is discussed in the chapter on the Chinese fishermen. A few men at Santa Barbara hunt the sea-otter. It is not an extensive business. The hair-seal and sea-lion are very abundant on Anacapa and other adjacent islands. They are hunted only for their oil. Two or three species of eatable clams occur at Santa Barbara. The Californians, when hard pushed, eat these. No scallops or oysters are taken.

There are no factories of salt or fishing apparatus in this county.

Nearly all the crawfish sold in San Francisco come from Santa Barbara. About 90 tons are taken annually. A cannery for the purpose of canning crawfish was started at Santa Barbara in 1877. It failed because the managers did not understand their business thoroughly.

Fifty-one miles west of the town of Santa Barbara is Cajo Viejo, where is established the only whaling company in the county. One at Goleta in former years is now abandoned. The company at Cajo Viejo consists of twenty men in winter and eighteen in summer. Captain Anderson is the commander. From October, 1879, to February, 1880, this company captured twenty whales, yielding oil to the value of nearly $8,000. More details concerning this company will be found under the head of the whale fisheries. The fisheries of this county are of recent origin, probably not having been started earlier than 1872.

SAN LUIS OBISPO COUNTY.—The long rocky coast of this county, without islands and unbroken by bays, is not favorable for extensive fisheries. The distance from San Francisco, too, renders the shipment of fresh fish impracticable, and the local market is very limited.

At Port Harford, which is the port for San Luis Obispo, the principal town of the county, there is a fisherman who owns two skiffs and has a seine of 1-inch mesh, 300 feet long and 16 feet wide. His fish are sold in San Luis Obispo for about 6 cents a pound. The neighboring farmers are glad to exchange produce for fish for their own consumption. His summer catch exceeds his winter catch by 100 pounds. Still fishing and trolling is carried on in the summer by three of the whale fishermen in the San Luis Bay. On Pecho Rancho, 2 miles north of Port Harford, an abalone fishery is carried on by two men, and five miles farther north is another one of the same sort and size. At Port Harford also are eight persons engaged in catching and drying fish. The chief species taken by them is holeontus.

At Moro is a shallow bay with a very narrow entrance. Into this bay mullet, flounders, smelt, and surf-fishes run in considerable numbers during the spring and summer. The seine and hook and line are then vigorously plied. There is a carp pond at Moro which has been very successful.

At Cayucos there is a little hook-and-line fishing. The same may be said of San Simeon.

The gathering of abalone shells is quite an important industry in this county. It is carried on chiefly at Port Harford, San Simeon, and Cayucos. The amount gathered—meat and shells—is seen in the following statement:

Place.	Shells.	Meats.
	Pounds.	*Pounds.*
San Simeon	12,840	10,650
Port Harford	7,638	4,000
Cayucos	3,000	1,000

There are two companies of whalers in San Luis Obispo County. One of these is at San Simeon, and is commanded by Captain Clark; the other is at Whaler's Point, about half a mile north of the landing at Port Harford, and is commanded by Captain Marshall.

The first mentioned consists of twenty men, most of whom are from the Azore Islands. They are hired by Captain Clark, who owns the entire outfit. This camp has been in existence since

1865. Their outfit consists of four whale-boats, two of which are worth $150 each, and the others $175 and $200 respectively. They also have two swivel guns, made in England, and worth, when new, $200 each, and two bomb guns, made in New Haven, and worth $50 each. Their bomb lances are made in Norway, and the harpoons are manufactured by G. W. Proctor, of San Mareo. The entire outfit is worth from $1,000 to $1,500.

The other camp, at Whaler's Point, consists of twenty-one men, all of whom, save one American, are from the Azores, as are the men at the other whaling station. They own three boats of New Bedford make. The other items of their outfit are identical with those of San Simeon, the whole being worth about $1,500. This company was established in 1868 or 1869. The men belonging to both companies are discharged in summer and a new set is hired in the fall. Since 1865 whales have been scarce and shy.

Table showing the catch of whales at San Simeon since 1865.

Year.	Number.	Year.	Number.
1865	25	1873	22
1866	23	1874	16
1867	24	1875	12
1868	25	1876	7
1869	20	1877	13
1870	23	1878	3
1871	22	1879	14
1872	21	1880	13

At Whaler's Point in 1878 eleven whales were taken; in 1879, nine. The season of 1880 began very poorly.

There was a whale fishery carried on at Point Surbut some years ago, but it is now abandoned.

Statement of the fisheries of San Luis Obispo and Santa Barbara Counties, showing the number of fishermen, the amount of capital invested, and the quantities and values of the products.

	San Luis Obispo County.	Santa Barbara County.	Total.
Number of fishermen	104	69	173
Capital.			
Vessels and boats:			
Number	12	5	17
Value	$1,230	$1,400	$2,630
Value of other apparatus and outfit	$3,000	$5,950	$8,950
Total capital invested	$4,230	$7,350	$11,580
Products.			
Sea-otter skins:			
Number	.....	75	75
Value	.....	$3,750	$3,750
Seal oil:			
Barrels	.....	150	150
Value	.....	$2,250	$2,250
Whale oil:			
Gallons	18,000	17,135	35,135
Value	$7,500	$7,710	$15,210
Fish:			
Pounds	84,000	180,000	264,000
Value	$2,520	$7,200	$9,720

Statement of the fisheries of San Luis Obispo and Santa Barbara counties—Continued.

	San Luis Obispo County.	Santa Barbara County.	Total.
Crawfish:			
Pounds	.....	180,000	180,000
Value	.....	$2,700	$2,700
Abalone meats:			
Pounds	15,600	100,000	115,600
Value	$780	$5,000	$5,780
Abalone shells:			
Pounds	23,500	50,000	73,500
Value	$575	$12,500	$13,075
Sea-weed:			
Pounds	237,000	.....	237,000
Value	$150	.....	$150
Total value of products	$11,525	$41,110	$52,635

218. THE FISHERIES OF MONTEREY, SANTA CRUZ, SANTA CLARA, AND SAN MATEO COUNTIES.

MONTEREY COUNTY.—The long coast of this county stretches southward and consists of a rocky neck, similar to the coast of San Luis Obispo. There are no towns along this stretch and no harbors. The coast is shut off from the interior by a high range of mountains (Sierra Santa Lucia), running parallel with and close to the sea. No profitable fishing is possible along this region. Farther north, however, these mountains terminate in the Point Carmelo, behind which the Carmelo River flows into the Carmelo Bay, whose coves form a harbor for whaling and fishing boats. North of this bay the range of hills forming the eastern watershed of the Rio Carmelo approaches the sea, ending in two points, Cypress and Pines, which separate the small bay of Carmelo from the much larger but very similar bay of Monterey. The lower end of Monterey Bay is, then, sheltered by the Point of Pines from southern and western storms, and makes a fair harbor. It is well situated for fishing and whaling. There is now a railroad from Monterey to San Francisco, a seven hours' journey. The catch of one day is sent to San Francisco the next day. Monterey is now, next to San Francisco, the most important salt-water fishing station in California.

There is no regular fishing done at Carmelo. In the river of that name a great many trout are taken and sold in Monterey at 12½ cents a pound. In the spring salmon ascend the river and are taken by the farmers. In the summer the water in the river is low and a bar is formed across its mouth, causing many young salmon to become land-locked. These are easily caught by the farmers and whalers at Carmelo.

At Pescadero is a colony of Chinese, who settled there twelve years ago. They have twelve boats, all home-manufactured, broad, flat, and clumsy. In the fall they salt and barrel quantities of anchovy, which are used for bait the next season. Most of this bait is furnished by the colony at Soquel.

At Punta Alones, a mile and a half west of Monterey, is another Chinese settlement, somewhat larger than that at Pescadero. Both men and women catch and dress the fish. This last is performed with a heavy, hatchet-like knife. This colony has been settled seventeen years. One of

the colony is an American citizen, and speaks English well. From 200 pounds to 800 pounds of fish are shipped daily to San Francisco. They consign their fish to the Clay-street dealers. Both of the colonies now considered dry an immense quantity of abalone meats and sell the shells. At certain seasons many tons of devil-fish, squids, and other *cephaloids*, etc., are thus prepared.

In 1873, fish were very abundant at Monterey, but the bay has been overfished, and there is a great decrease in the abundance of certain species, especially the flounder. Before the completion of the Monterey railroad, which has been referred to, the fish were shipped to some point whence they were sent by stage to Salinas and on by rail to San Francisco. The excessive handling and length of time requisite for transportation were the causes of many lots being spoiled.

There is a colony of Italians and another of Portuguese. The former has five sail-boats and three skiffs. They own two hundred pieces of seine, each 240 feet long. With some they catch smelt; with some, barracuda; and with others, salmon. They have twenty gill-nets and forty bunches of set-lines. In the gill-nets are chiefly caught rockfish, blue-cod, and rock-trout. With the set-lines the red rock is taken in deeper water. This mode of fishing is chiefly practiced by the Portuguese and Chinese.

The Portuguese colony have the same number of boats as that settled by Italians. Most of their fishing, as above suggested, is done with set-lines; hence the species most commonly taken by them is the red rockfish. The price per pound for this fish, cleaned, is 6 cents. Most of the others obtain only 3 and 4 cents per pound.

The common bait is the flesh of *Hypsurus caryi*, which is caught around the wharves in a dip-net baited with crushed crab.

At Moss Landing, two miles from Castroville, there are one or two fishermen with a boat. The fish caught are sold in Castroville or shipped to San Francisco.

Monthly shipments of fish to San Francisco from Monterey from February 1, 1879, *to February* 1, 1880.

Month.	Pounds.	Month.	Pounds.
February	18,075	October	6,011
March	23,388	November	31,450
April	18,659	December	31,600
May	17,852	January	7,904
June	17,416	Gross weight	264,831
July	36,873	Boxes, weight	44,135
August	26,303	Net weight	220,696
September	29,300		

These figures are from the books of Wells, Fargo & Co. The above total represents about one-fourth of the total catch for the county. Two-thirds are rockfish.

In Monterey County are two whaling companies—one at Carmelo, the other at Monterey. Captain Mariano commands the former. This company owns three boats. In 1879 they took one finback, three humpback, and three gray whales. There are a great many fine whales on this part of the coast, but the sea is so rough in winter that for months the men dare not venture out.

The company at Monterey is commanded by Captain Verissimo. It was started in 1855. In 1879 fourteen whales and two basking sharks were captured. Three boats belong to this company.

At Monterey various sorts of crabs are abundant. They are never shipped, and seldom eaten.

At the Point of Pines mussels abound on the rocks exposed to the sea. Five sacks were sent to San Francisco in 1879. At present they are not worth gathering.

Crawfish are not met with north of Point Concepcion.

SANTA CRUZ COUNTY.—This county lies along the north shore of the bay of Monterey. Its beach is, for the most part, sandy or shaly, and running parallel with and north of the beach are bluffs of considerable height; these in some places are extended as ledges or reefs under the sea. About the reefs most of the gill-net and hook-and-line fishing is done. There is no harbor along the coast of the county. During the prevalence of northerly winds or during calm weather, a landing may be made anywhere. During the southwest winds the surf is very heavy at all points and no one ventures out in small boats. In severe storms even steamers cannot land at Santa Cruz. There are three fishing towns on this coast—Santa Cruz, Soquel, and Aptos.

At Santa Cruz are five lateen-boats, two sloop-rigged boats, some skiffs and dories. Little fishing is done in winter by the fifteen fishermen located here. They take advantage, however, of smooth, and therefore favorable, intervals. In summer, great quantities of rockfish, sea bass, and barracuda are taken and shipped to San Francisco per Wells & Fargo's Express. The Santa Cruz market, important in summer, is also supplied. There is now an entire lack at this place of abalones, seaweed, and other similar products. Very little seining is done here. Surf-fish, barracuda, etc., are taken in gill-nets, and rockfish on set lines. In 1878, 102,733 pounds of fish were caught here, the largest catch being in September; none were taken in January, February, or March. The above number netted 85,611 pounds.

The amount of fishing done at Soquel is greater than at Santa Cruz. There are altogether about ten boats in use here. Most of the fishing is done with gill-nets, and the bulk of the catch consists of sea bass and barracuda. Sharks are very abundant here and many are taken for their oil, especially the two species *Galeorhinus* and *Alopias*. Two specimens of the great basking sharks, having become entangled in the dip-nets, were taken this year. A basking shark yields from 130 to 160 gallons of oil. Occasionally a man-eater (*Carcharodon*) is obtained. One taken a year or two ago contained a sea-lion weighing 100 pounds. Shad have become quite abundant on Soquel Reef, and most of those sent to the San Francisco market come from this place. The average profits of the fishermen are greater here than at any other place on the coast, except, perhaps, at Monterey. At Soquel there is one large gill-net, 450 feet long and 45 deep, with a 4-inch mesh.

In 1878, 61,045 pounds of fish were caught here, netting 50,871 pounds. The largest catch was in December; no fish were taken during January, February, and March.

At a point between Soquel and Aptos are about fifty fishermen. They ship their catch to San Francisco and San José, especially in summer. Fish not so shipped are dried and sent by steamer from Soquel to San Francisco.

In 1878, 80,818 pounds were caught at Aptos. These netted 67,349 pounds. The largest catch was in September; there were none taken in January, February, or March.

Thus it is seen that in 1878, 244,596 pounds were taken in Santa Cruz County, netting 233,831 pounds.

Statement of the number of pounds of fish shipped by rail and steamer from three fishing towns to San Francisco, by months, in 1879.

Month.	Santa Cruz.	Soquel.	Aptos.
	Pounds.	*Pounds.*	*Pounds.*
January	1, 366	2, 818	.....
February	4, 261	7, 031	.....
March	10, 572	11, 100	360
April	6, 500	6, 800	2, 000
May	10, 201	6, 251	1, 500
June	20, 000	20, 000	4, 000
July	21, 000	17, 000	8, 000
August	18, 500	15, 000	4, 000
September	12, 500	14, 000	6, 000
October	14, 000	22, 000	9, 000
November	12, 000	8, 000	7, 000
December	8, 500	3, 000	2, 540
Total by rail	139, 400	133, 000	44, 400
Total by steamer	40, 600	.....	.....
Total shipped	180, 000	133, 000	44, 400
By reduction:			
Net totals shipped	160, 000	110, 000	38, 000
Net totals consumed	70, 000	10, 000	112, 000
Total	230, 000	120, 000	150, 000

Grand total catch equals 500,000 pounds net.

SANTA CLARA COUNTY.—The short coast line of Santa Clara County consists entirely of a shallow mud-flat at the head of San Francisco Bay. At Mayfield, the only coast town, no fishing is done.

SAN MATEO COUNTY.—The fisheries of this county are very inconsiderable. The towns along the ocean—Pescadero, San Gregorio, Purissima, and Half Moon Bay—are all too small to offer any local market, and their means of communication with the interior are so imperfect that they cannot compete with Monterey and Santa Cruz in supplying the San Francisco markets. The towns along the bay shore are small, and the shore itself is unfavorable for fishing. In supplying the San Francisco markets they could not compete with fishermen living in San Francisco, who go down the bay in their boats and return when they have a load.

On the bay side of San Mateo County there is only one town which contains any fishermen. Here a company of seven Chinamen seine in the bay and salt and dry their fish for the Chinese market of San Francisco. Both San Mateo and Redwood City are principally supplied by fish peddlers from San Francisco, who sell along the road from San Francisco to San José. Nearly all of the bay shore of this county consists of a mud-flat, bare at low water; behind this flat lies a salt-marsh. This marsh renders fishing unfavorable to the local fishermen.

At Pescadero there is only one professional fisherman. He fishes with a gill-net at the mouth of Pescadero Creek. An attempt is being made here to stock ponds with native salmon and trout. These ponds are located 3 miles up the creek. They will also be stocked with carp. These are easier to raise and bring a good price, being preferred especially by the Germans. Tourists from San Francisco fish here for salmon in its season. The run of salmon up the creek is said to have been lessened, owing to the seals, 20 or 30 of which are often observed, in spawning season, to take up a position at the mouth of the stream, almost entirely preventing the salmon from running up. Those who escape alive, when caught bear marks of the seal's teeth.

At Purissima there are no professional fishermen, but a great deal of hook-and-line fishing for

salmon is done in Purissima Creek by tourists from San Francisco, and also by inhabitants of Half Moon Bay.

In Gregorio Creek there are no professional fishermen, but some hook-and-line fishing is done at irregular seasons.

At Half Moon Bay are about ten men, who fish when they can find nothing else to do. They use hook and line and fish off the rocks.

The statistics regarding the fisheries of Monterey, Santa Cruz, and San Mateo Counties are given in the following table:

*Statement of the fisheries of Monterey, Santa Cruz, and San Mateo Counties * showing the number of fishermen, the amount of capital invested, and the quantities and values of the products.*

	Monterey County.	Santa Cruz County.	San Mateo County.	Total.
Number of fishermen	106	83	8	197
Capital.				
Vessels and boats:				
Number	44	39	3	86
Value	$2,000	$1,950	$150	$4,100
Value of other apparatus and outfit	$3,000	$1,000	$100	$4,100
Total capital invested	$5,000	$2,950	250	$8,200
Products.				
Fresh fish:				
Pounds	900,000	500,000	25,000	1,425,000
Value	$45,000	$25,000	$1,250	$71,250
Dried fish:				
Pounds	10,000	1,000	.....	11,000
Value	$250	$25	.....	$275
Shark fins:				
Pounds	.....	1,000	.....	1,000
Value	.....	$50	.....	$50
Shark oil:				
Gallons	300	600	.....	900
Value	$93	$186	.....	$279
Whale oil:				
Gallons	12,000	.....	.....	12,000
Value	$5,000	.....	.....	$5,000
Mussels:				
Number	5,000	.....	.....	5,000
Value	$10	.....	.....	$10
Abalone meats:				
Pounds	12,000	.....	.....	12,000
Value	$600	.....	.....	$600
Abalone shells:				
Pounds	60,000	.....	.....	60,000
Value	$1,500	.....	.....	$1,500
Seaweed:				
Pounds	40,000	.....	.....	40,000
Value	$20	.....	.....	$20
Total value of products	$52,473	$25,261	$1,250	$78,984

* The county of Santa Clara has no fisheries, *vide ante.*

219. THE FISHERIES OF SAN FRANCISCO COUNTY.

GENERAL STATEMENT.—Most of the fish, other than salmon and sturgeon, sold in the markets of San Francisco and neighboring cities are obtained by fishermen resident in the city of San Francisco. The salt, canned, or otherwise preserved fish used on the Pacific coast, except that consumed by the local markets or shipped directly from Astoria, pass through the hands of San Francisco firms. For fishing products generally, on the Pacific coast, the market of San Francisco is the only one of importance. Four principal modes of fishing are carried on here. (1) Ordinary fishing by means of seines, gill-nets, and hook and line in San Francisco Bay and along neighboring shores of Marin and San Mateo Counties, outside of the bay. The great majority of the San Francisco fishermen are engaged in this mode of fishing, but the profit is very small, as the bay has been almost depleted of fish. (2) The fishing with trawl-lines outside, chiefly in the neighborhood of the Farallones. This fishery is still profitable, although the fishermen go every year into deeper water, which shows that the more shallow bottoms have been overfished. The fish taken in this manner are chiefly the different species of red rockfish. (3) The "paranzella" fishing, at present the most productive of all, which is discussed below; and (4) the purse-net fishing for shrimp and small fish, pursued by the Chinese colonies.

Before presenting a discussion of each of these four modes of fishing, a short account of the boats engaged is given. Also will be added a general history of the San Francisco fishermen, each nationality having been treated separately elsewhere.

THE BOATS.—There are at present about eighty-five fishing boats in San Francisco; fifty-five are lateen-rigged boats of various sizes, but all are called large, as distinguished from small ones rigged with sprit-sails, and used only for hook-and-line fishing. The large boats pay $6 per month for wharf privileges; the small ones $1 per month, with the understanding that boats pay nothing when not working. There are about five or six large boats engaged in line fishing for rockfish. These prosecute no other fishery. During the summer, and when not too rough in winter also, they go to the Farallones. When they dare not venture so far, they fish along the coast or do nothing. The small boats never venture out so far, but in summer they often run north along the coast as far as Point Reyes, and on the south to Half Moon Bay. During the winter they rarely venture out of San Francisco Bay. Many of the boats suit their fishing to the time of the year. At present there are from twenty-five to thirty-five seines in use on the bay, most of these hauling on the Contra Costa and Alameda sides. The San Francisco fishermen constantly violate the State law concerning the size of mesh in their seines.

THE FISHERMEN.—The fishermen of San Francisco all live near the end of Vallejo street, about the Vallejo street wharf. The most of them are Italians, with some Slavonians, Greeks, Portuguese, and Spaniards. Scarcely any are Americans or of Germanic races. Few of them can read; two-thirds or more are unmarried and live in mean lodgings about the wharf and eat in the different chop-houses and other places of low grade in the neighborhood. This region has been the fishermen's quarter since about 1850; the population changing greatly each year, some shipping as seamen and others taking their places, and others leaving entirely the San Francisco fisheries. The present great depression is driving many away. Every spring a considerable number go to the Columbia River.

There are about 200 men in San Francisco who depend entirely on fishing for support, 300 or 400 others who live chiefly by fishing, and nearly 1,000 more who occasionally fish in the intervals of other jobs. About 200 fishermen own interest in the boats, the rest are hired by the trip, and are at other times waiting for a job. About 1,500 women and children are dependent on fishermen. The fishermen who have families rent rooms in the fishermen's quarter and cook for themselves.

The others board at the "Fisherman's Home," "Dalmazia Chop House," &c., paying 25 cents a meal, or $3 a week. There are many who cannot pay at all, and owe already from $20 to $150 to the coffee-house owners. The latter trust and charge accordingly. We are told that $3,000 is already due to the proprietor of the "Fisherman's Home" from fishermen whose earnings are insufficient to pay. Breakfast at the "Fisherman's Home" consists of an egg, biscuit, and wine or coffee, and is served on a long pine table unpainted.

BAY FISHING.—The fish taken in the bay are chiefly herring, surf-fish, brown rockfish, sturgeon, salmon, smelt, &c. For many years the bay has been systematically overfished with nets of such small mesh that probably the bay does not contain one-twentieth the number of fish that it did twenty years ago. One immediate result of this was that fish became scarcer in the markets of San Francisco, and the price rose accordingly. This rise has been neutralized by the bringing of fish in large quantities from Monterey and Tomales Bays, and by the inauguration of the trawl-line and "paranzella" fishing outside.

The wages now earned by the bay fishermen in San Francisco are pitifully small, very few of them earning more than the $3 per week necessary to pay their board bill. Boats which cost $400 a few years ago can now be bought for $150.

The fishermen lay most of the blame for the destruction of their business on the "paranzella" fishermen who catch and throw away great numbers of small fish, besides enough large ones to keep the markets well supplied. The small fish thrown away by these fishermen are, however, not the young of fishes on their way to enter and stock the bay, as the fishermen usually claim, but, for the most part, deep-water fishes of no economic value, which do not enter the bay.

ROCK-COD FISHING.—Six or eight lateen boats, of about 5 tons each, go out about the Farallones, Point Reyes, and elsewhere, fishing with trawl-lines for rockfish. Each boat has thirty to thirty-five bunches of these lines, of which number from five to thirty bunches are laid out at a time, each hook being baited. These are anchored to buoys.

The bait used is smelt or sardines. To prepare the smelt the head is cut off, the insides are all removed, including the dark peritoneum, the scales are all rubbed off, and the vertebral column taken out. Only the two boneless slices are considered suitable for bait. From 500 to 1,000 pounds of this bait are taken on each trip.

All the various red species are obtained in this way, *rosaceus*, *pinniger*, and *ruber* in the largest numbers. Flounders of different species, cultus cod, and also halibut are sometimes taken.

PARANZELLA FISHING.—Previous to 1876 fishermen working with seines for the San Francisco market made very good wages, occasionally running as high as $25 per night for each seine. In 1876 some of the fishermen secretly ordered a drag-net to be made, and took it out for trial without the other fishermen knowing it. The experiment was entirely successful, and the drag-nets have been used in San Francisco since. Their introduction naturally created quite a stir among the other fishermen, especially among those who had previously supplied the market with tom-cod and flounders. Threats were made to burn both drag-nets and the large boats which were used to pull them, and for several months it was necessary to keep watch over the "paranzellas." There is still a great deal of opposition to the use of these nets, fishermen complaining that by means of them so many young fishes, especially flounders, are destroyed that the fishing around San Francisco is thereby greatly injured. Fishermen tell me that they are in very general use along the shores of the Mediterranean. San Francisco is probably the only place where they have been introduced into this country.*

* "Paranzella diminutiva di Paranza. Paranza sono grosse barche, a vela latina, che a due trascinano in mare, assai lunge dalle coste, immense reti, per far grossa pesca." (Italian Dictionary.) The Spanish name for the same is *Parega*, but, although recognized, it is never used in San Francisco.

COMPANIES.—There are now two companies using these drag-nets. They used to work in opposition, but now form a sort of pool or partnership and divide the profits equally. Each company owns three boats, about five or six nets, and employs twelve or thirteen men, one of whom is constantly engaged selling the fish in the market. The stock is mostly owned by persons not themselves fishermen. It is seldom that the actual fishermen own any part of the stock. As it is, stock is divided in the most irregular manner, one man owning a net, another a boat, &c. Out of the gross profits are paid first the entire expenses, including provisions for the men and the wear of boats and nets. The remainder is divided into shares, one share to each boat, one to each actual fisherman, and a half share to each net actually in use. In the two companies, therefore, as there are six boats, two nets (in use), and twenty-five men, the net profits would be divided into thirty-two shares.

The men are mostly Italian, Greek, and Spanish. Like all other fishermen of these nationalities they are improvident, spending their money as soon as earned. But, although without money, they have plenty to eat, drink, and wear, and seem to have a good time. The captain of the boats is sometimes given one and a quarter shares.

BOATS AND NETS.—The boats are similar to those employed by Italians in other fishing, but larger. They are keeled, decked-over lateen, or, as some insist, "catalonia"-rigged, and from 6 to 9 tons burden. They are intended to be stanch enough to stand the rough winter weather outside the harbor. When new, the boats, with rigging and everything complete, cost from $700 to $1,000 each.

The nets are simply seines with short wings and very long bag. They vary from 15 to 25 fathoms in length, the bag being usually a little longer than the combined length of both wings. The wings have a mesh of about 1¼ inches; the mesh of the upper part and sides of the bag is about three-quarters of an inch, becoming larger towards the bottom. The lower side, which drags in the sand, is made of very coarse twine and has a mesh of from 2 to 4 inches. The bag has, above or on one side, a lengthwise slit of about 2 feet, this slit being knitted up while the net is dragged and afterwards opened for the fish to be scooped out. The lead and cork lines are so adjusted as to keep the net vertical in the water, with the lead line on the bottom. When being dragged the wings are 6 feet high; the bag about 8 feet high. The nets are worth from $250 to $300 each. The present value of each company's stock approximates $3,500.

FISHING GROUNDS.—For this kind of fishing it is necessary to have a smooth sandy bottom, with a convenient anchorage, affording sufficient protection from the prevalent winds. The only suitable grounds within reasonable distance of San Francisco are from Point Reyes 10 miles to the southeast. During the winter, when southerly gales may be expected, the anchoring-grounds are at Point Reyes, which affords sufficient protection from the storms. During the settled summer weather, when prevailing winds are from the northwest, a good anchorage is found near a group of small islands about 8 miles nearer San Francisco.

They fish every day but Saturday throughout the year. One boat of each company remains on the grounds all the time, and is manned by three men, or, in winter, sometimes four. The other two boats, with four men each, alternate in carrying the fish to market.

METHODS OF FISHING.—The boat that has carried the fish to market starts from San Francisco with the low tide the following morning, and reaches the anchorage sometime during the day. Nothing is done till early the next morning when, with the other boat of the same company, it proceeds to the fishing grounds. As soon as the morning breeze springs up, the net is set in the water and allowed to sink to the bottom in from 20 to 40 fathoms of water. Each boat takes a line,—but little sail is made at first,—and pulling obliquely away from each other they stretch the

net. They then go slowly ahead, letting out rope according to the strength of the breeze. When the net is well "set" on the bottom, full sail is made and the net dragged for 3 or 4 miles. The sail is then lowered and each boat pulls in one wing of the net, running the rope over a block temporarily rigged up in the stern of the boat. As soon as the bag is reached it is pulled up alongside of one boat, the slit in the bag is opened and the fish scooped out with a dip-net and ranged along the deck on each side. The marketable fish are then chosen out and sorted and the remainder thrown overboard. On Thursdays the net is dragged twice, to procure an extra supply for the Friday's market; on other days but once.

FISH CAUGHT.—Comparatively few of the fish are alive when taken from the bag, and probably none of those thrown overboard live. More than half the flounders caught are less than 8 inches in length and are thrown away. Most of these, however, are *Hippoglossoides exilis*, a small and nearly worthless species, and are adult fish. I saw very few flounders less than 6 inches long; in fact, there were but few of the very young of any species in the net.

The single catch I saw, I estimated roughly at 3 tons; their catches often far exceed this in weight. Fear of glutting the market is the only limit placed on the amount they take.

A rough estimate of the proportions in which the various kinds were caught would be: *Porichthys porosissimus*, one-third; flounders, one-third; tomcod and *Ophiodon*, one-sixth; small cottoids and chiroids, &c., one-sixth.

The drag-nets destroy and waste immense quantities of fish, doubtless amounting to several hundred tons per year. Comparatively few of these, however, are immature fish, and the greater part is composed of species unmarketable, either through small size or repulsive appearance. Their fishing cannot yet have interfered with the fishing carried on in the immediate vicinity of San Francisco, as their grounds are from 25 to 35 miles from the city. The reason that the other fishermen are so bitterly opposed to the use of these nets is that, by means of them, a few men can bring such quantities of fish to market as greatly to reduce the price, the drag-nets alone capturing more fish than all taken in the bay by other modes. The drag-nets however, do not interfere in the least with the trawl-line fishing for rockfish in deep water. Although considered as a temporary method, these nets do but little harm and have as yet probably not materially decreased the amount of fish in the vicinity of San Francisco, there is no doubt that, if continued long enough, they will do so. It is certainly the most wasteful method of fishing I know. The use of such nets should be discontinued altogether, or the nets required to be of such coarse mesh as to allow the small fish to pass through.

As soon as the "paranzellas" were introduced a large reduction took place in the price of such fish as they caught. Before their introduction tomcod sold, wholesale, for from 25 cents to 40 cents per pound, and they never reached a lower price than 8 cents per pound in the summer. *Parophrys vetulus* sometimes in the winter brought as high as 80 cents per pound, and in summer sold for from 10 cents to 15 cents per pound. Wholesale prices now never range higher in winter than 20 or 25 cents for *Parophrys*, and 8 or 10 cents for tomcod, and in summer, 4 cents per pound for the former and 3, 4, or 5 cents for the latter. Of course part of this is due to the same causes that have lowered the prices of all articles, but the greater part of the reduction was caused by the drag-nets. They have thus far been rather a blessing than otherwise to the people of San Francisco.

The following species were seen in the nets of the "paranzella" fishermen:

Hippoglossoides exilis.
Hippoglossoides jordani.
Parophrys vetulus.
Pleuronectes stellatus.
Psettichthys melanostictus.
Citharichthys sordidus.

Ophiodon elongatus.
Zaniolepis latipinnis.
Odontopyxis trispinosus.
Brachyopsis verrucosus.
Artedius megacephalus.
Artedius quadriseriatus.
Leptocottus armatus.
Hemilepidotus spinosus.
Porichthys porosissimus.
Microgadus proximus.
Lycodopsis paucidens.

CHINESE PURSE-NET FISHING.—The Chinese fishermen in San Francisco County devote their attention to catching shrimp by means of purse-nets. Some small fish (herring, tomcod, sculpins, &c.) are taken with the shrimp and afterwards salted and dried. The amount of all other fish taken excepting shrimp is, however, inconsiderable.

THE SHRIMP FISHERY.—The Chinese settlement at Bay View, in South San Francisco, consists of about twenty-four men, who, with one hundred seines and six junks in use, and five hauled up for repairs on shore, are engaged in catching shrimp, and incidentally some fish.

The seines are bag-shaped, deeper than wide, mostly about 10 by 25 feet, though some of them are larger. The mesh is 1 to 1¼ inches above, diminishing gradually to ¼ inch in the rear part or bag, which, as in all Chinese nets, is closed with a "puckering string." The boats are long, rather narrow and sharp, flat-bottomed, very thick-sided, and heavy, being built by the Chinese themselves out of redwood lumber. They range from 12 to 25 feet in length. The shrimp are, when caught, put into live-buckets made of basketware, with a covering of netting, also home-made. As elsewhere, the opening in the netting is closed by a sphincter or puckering string. These live shrimp are taken to the Vallejo-street market and sold at 5 cents per pound. Those unsold are brought back and put into boiling brine. They are then taken out and put on the ground to dry, being spread out and turned over with a sort of broom, with the broom part at an angle with the handle, like a hoe. The ground is denuded of grass, and made bare and smooth, like a croquet ground, for the purpose of drying the shrimp. When dry they are taken and crushed under large wooden pestles, and then put through a fanning mill, which separates the meat from the shells. The fanning-mill is constructed on precisely the same principle as the kind used for winnowing grain. The edible part goes where the grain should, and the thin shrimp-shells go off as chaff. The fanning-mill is built by the Chinese themselves, and is unpainted. This machine is about 8 feet long and five feet high. The pulverized meats are shipped to China or consumed in Chinatown. They are worth here 5 cents a pound. The shells are used for manure, most of them being shipped to China and sent far inland for use on the tea plantations. The shrimp shells are worth here about 25 cents per hundred weight.

Some fishes are taken in the shrimp-nets, the chief species being the catfish and the tomcod. The following species were noticed, all small individuals, excepting the sharks and rays, of which no use is made:

Leptocottus armatus.
Microgadus proximus.
Parophrys vetulus.
Pleuronectes stellatus.
Psettichthys melanostictus.
Cymatogaster aggregatus.
Stolephorus ringens.
Jelly-fish sp.
Heptranchias indicus.
Osmerus thaleichthys.
Myliobatis californicus.
Mustelus canis.
Uraptera binoculata.
Syngnathus griseolineatus.
Triacis semifasciatus.

These fishes are not taken to market, but are soaked in brine and spread on mats to dry in the sun. When dried they sell at less than 2 cents per pound, the *Leptocottus* being nearly all head. The catch on hand during my visit must have contained fully half a ton of these small fish.

Besides the fish, which are merely incidental, and the shrimp, the amount of which no estimate could be formed, many clams (*Mya* sp.?) and crabs are sent to the city market, and sold in the same way as the shrimp in the Vallejo-street market.

Another similar colony of ten Chinamen exists 2 miles farther south, and various others are farther up the bay, in San Mateo and Santa Clara Counties; still others in Marin and Contra Costa Counties. It is said that no diminution in the number of shrimp results from the continuous fishing, but the fishes are nearly exterminated in the bay.

Some prawn or large shrimp are prepared in Chinatown, and sold at 30 cents a pound, by removing the carapace and arranging them on two sticks of cane, which pass through the flesh, eight or ten on a string, arranged ladder fashion. Others are sold with the carapace and legs removed, simply as meats.

The total catch of shrimp and prawn is estimated at 30,000 pounds.

THE CRAB FISHERY.—The details of this fishery are discussed by Mr. Rathbun in another section of this report. The principal species marketed in San Francisco is the common crab (*Cancer magister*). Both the red crab (*C. productus*) and the rock crab (*C. antennarius*) are good for food, but the common crab, being the most abundant, is more largely taken. The yellow and purple shore crabs, which are of small size, are eaten only by the Chinese. The common crabs are caught along the sandy beaches on the San Francisco side of the bay, especially on the south side of the Golden Gate, between the city and the sea. They are taken in immense numbers in seines, together with many shoal-water species of fish, yet the supply seems to be undiminished. Three or four good-sized crabs sell in the market at retail for 25 cents. The annual sales are estimated at 300,000 by count, weighing on an average about one pound each, and netting the fishermen about $15,000. The large red rock crab of the Farralone Islands is sometimes marketed in San Francisco as a curiosity. These crabs were formerly sold as high as $10 each.

SAN FRANCISCO AS A MARKET.—A description of the markets of San Francisco will be found in another chapter.

A little more than half the total amount of fish brought into the San Francisco market comes from the counties of Monterey, Santa Cruz, Contra Costa, Solano, and Marin.

It is difficult to make an exact estimate, but it is probable that the total amount taken annually by fishermen living in San Francisco County does not vary far from 5,500,000 pounds.

THE SEA-TURTLE AND OTHER FISHERIES.—About 600 sea-turtles are annually brought up to San Francisco from Mexico on steamers, and occasionally on schooners. They average 175 pounds in weight apiece, and sell for about $4 each. One schooner in 1879 brought 190 sea-turtles. Part were peddled out, and the balance were sold to San Francisco dealers at 87½ cents each.

Frogs are collected by two or three Frenchmen in Marin, San Mateo, and Kern Counties, and sell for $1.75 to $4 a dozen.

The terrapins of the San Francisco market come principally from the San Joaquin Valley.

No satisfactory estimate of the abalone business can be made. Many coasting boats from San Francisco take in cargoes of them, and many men in various trades occasionally buy up a load on speculation.

There will be this year (1880) about twenty or thirty boats fishing for salmon in the bay, as soon as the season commences. Very little attention is paid to the law concerning the close season

for salmon. There can be no doubt that the law is constantly violated on the Sacramento and San Joaquin Rivers. The fish are caught and salted in large numbers. Behind the stalls in the San Francisco market salmon have been seen in process of being salted down in barrels. In 1862 and 1863 salmon often brought $1 a pound in the San Francisco market. At that time $5 was a small price for a salmon.

An exchange of food and clothing for sharks' fins is carried on by A. Crawford & Co., ship chandlers, Market street. They send their trading vessels to the Marquesas Islands. Thirty or forty cases are thus obtained in a year, 30 pounds to the case, and are sold at 20 cents a pound to Wung Chung Lung & Co., Sacramento street, near Dupont. Cleaned shark-fins from China are worth $2.25 a pound, and uncleaned from San Diego 30 cents a pound.

GATHERING THE EGGS OF SEA-BIRDS.—The Pacific Farralone Company own the Farralone Islands and owned them before the United States claimed them. The present company was formed in 1855, buying out another that was formed in 1852. The first had a charter for twenty years; in 1875 this was renewed for fifty years. Twenty years ago the supply of eggs (Murre eggs) exceeded the demand, although the demand was then very much larger than it is now, as chickens were at that date scarce, and these eggs had the whole market. From 30,000 to 40,000 dozen were sold annually in the flourishing time, but the demand has now fallen to about 10,000 dozen, and the supply does not exceed the demand.

The Murre never lays more than two eggs unless disturbed, in which case she continues laying one at a time until she has laid five or six. If not looked well after the gulls take them. These eggs have no fishy flavor when fresh, but do not bear keeping so well as hen eggs. They make good omelettes. When the secretary of the company (Goodmur) first went out to the islands in 1852 he gathered 1,000 dozen and sold them at $1 per dozen. In the early days of the company eggs sold at 75 cents per dozen. Now they sell at from 15 to 20 cents per dozen. At the What Cheer House, R. B. Woodward (one of the company) used in early times to use 9,000 dozen in the season. All the miners came to him, and he fed them on eggs in all styles. He had a contract for all the cracked eggs at half price, and when there was an unsold surplus the boys would sit up at night to crack them for him.

A DESCRIPTION OF THE SAN FRANCISCO FISHERIES AS THEY WERE IN 1875.—The history of the fisheries of California has been so short and full of changes that it is a matter of considerable interest to place on permanent record any accounts of their methods which may have been written in past years. The San Francisco Bulletin of January 12, 1875, contained a description of the fisheries of the city as they were at that time, which is here reproduced:

"There are engaged in the fish business of San Francisco at this time about one hundred boats, both large and small, although all of them are not constantly employed. Some of these boats are of about 3 tons burden, and are what is termed lateen-rigged. They are fast sailers and able to encounter quite a heavy sea. These, however, are used principally for deep-sea fishing outside the Heads, which we shall notice more fully further along. About thirty boats are engaged in the herring fishery in the bay. These boats are much smaller than those used outside, and are manned usually by two men. They are propelled through the water by oars, and carry about one-quarter the weight of the larger vessels. The herring season begins about the 1st of November and continues until the last of January. At the beginning of the season the price of herring is very high, ranging from $5 to $6 per box, the boxes holding about 80 pounds of fish. As the season advances the price declines until near the close, when the fish become very cheap. The price now is from $1 to $1.50 per box. The business is a very lucrative one while the season lasts, as the fishermen do not have far to go, and have no trouble in securing a boat-load of fish in a few hours.

"The manner of catching herring is simple. Each boat, manned by two men, though occasionally there are three in a boat, is rowed out into the deeper parts of the bay. The fishermen then cast their nets over into the water. These nets are about 240 feet long and 14 to 16 feet in width. On the upper side there are cork buoys at intervals of about 2 feet the entire length of the net, which serve to keep it floating. On the opposite side of the nets are pieces of lead, which serve to keep the net perpendicular. The herrings move in vast schools and run against the tide. When they meet the nets they experience no difficulty in running their heads through the meshes, but owing to the peculiar shape of the fish and the size of the meshes in the nets they can get no farther. To go back is equally impossible, as when they try this their gills expand. Struggle as he may, the fish is fast. After the tide has run against the nets for a certain length of time, they are hauled slowly into the boats, and in one net are frequently found enough fish to load a single craft. It is then rowed to the dock, and the fish, after being put into the boxes, are carried either to the wholesale fish market on Clay street, from whence they are distributed among the retailers, or are sold to the persons who are engaged in salting, drying, and smoking them.

"Besides the herring fishing in the bay, there are caught vast numbers of smelt, flounders, tomcod, sturgeon, shark, &c., all of which are generally relished for food, except the latter. Even the fins of the shark are eaten by Chinamen, before and after drying, and are by them esteemed a great delicacy—as much of a delicacy as a Chinaman would be to a shark. The sturgeon is unwittingly confounded with sea-bass by restaurant keepers, as many people can testify. The nationalities of those engaged in bay fishing are represented by Austrian, Italian, and Greek, of whom, perhaps, there are over one hundred constantly at work. They are a hardy, vigorous people, who despise fear, and are only perfectly at home when on the water.

"The larger boats spoken of are those engaged in deep-sea fishing, which is a very different thing from bay fishing. These boats do their work outside the Heads in the ocean, and sometimes they run as far down the coast as Santa Cruz. The boats are stanch crafts and can live in almost any sea, although they sometimes meet with a serious disaster, as we shall presently see. They are almost entirely decked over, so that they can come very near rolling over without shipping any water. On these there are from three to five men who fish with long, stout lines. These lines are from 300 to 500 feet in length. To each line is attached innumerable hooks, which are very strong. The hooks are placed about 2 feet apart, and to the end of the line is attached a heavy stone, which will sink it to the bottom. When the fishing ground is reached the boats are brought to, or, if possible, anchored, and the lines, after the hooks have all been baited, are thrown overboard. A large tin can is attached to the lines, and, when sealed tightly, serves as a good float. After a while the float will indicate to the fishermen that something is fast and the line is pulled into the boat; and it rarely happens that there is not from half a dozen to thirty or forty large fish on one line. After the fish have been unhooked the hooks are again baited and thrown overboard. When the day is good and everything is propitious, one boat's crew is kept very busy, as each one has half a dozen or more lines out at once. The fish caught outside are rock cod, California codfish, sometimes halibut, and a few other kinds.

"These outside fishermen, as they are termed, are Greeks, Spaniards, and Italians. They, too, are hardy and venturesome, and will brave old ocean in his wrath when necessary, without the slightest fear. But one fatal calamity has taken place among these fishermen in the past year. The story of the affair is related by G. Copollo, the wharfinger, and is as follows: Last season one of these boats was out on the ocean near Point de Rey, when in the afternoon a sudden squall came on and the waves ran so high that one came aboard and nearly filled the boat with water. So much was she loaded and so near sinking did she come, that the three men who were in her had

all they could do to avoid being swept overboard. The wind blew hard and chilly and the poor fellows were nearly frozen, but they held on to the boat, hoping that succor would come from some source. When it was nearly dark one of the men bade his comrades good bye, and with a groan of despair sank out of sight beneath the waves. The other two held on through that dreary night, but early in the morning another one said to the survivor, 'I cannot hold on; I, too, must go.' In telling it the survivor said, 'I was lying on my breast across the bow and saw him as he sank away far down in the clear, deep waters.' He said also that soon after his last comrade disappeared the sun came up, and as the sea had gone down the warm rays beating on his back infused warmth and life in him so that he was enabled to cling fast. About 1 o'clock the schooner Haskell came along, picked him up, and brought himself and the boat into the harbor. A rather singular part of the story is, that after being at the dock for about one month, the same boat, with the same man and two others, went again outside to the same fishing ground, and about the same place where she was picked up when water-logged. The fishermen saw a schooner bottom-side up with five or six men clinging to the keel. They immediately went to the rescue and found that it was the Haskell, the identical schooner that had saved this boat and one of the men. She had been herself capsized in a squall. Her crew were saved by the very boat that had been saved by her. This tale will probably be recalled to mind by some of our readers.

"There is another kind of fishing that has attained considerable proportions recently that should be noticed, that is the shrimp and sturgeon fishing. A short time ago the shrimp fishing was carried on by white men exclusively. There were about fifteen boats manned by thirty men who made this a specialty. Then shrimps were sold in this city for from 7 to 10 cents per pound, and those who caught them made a good living at the business. Now, however, the entire business is in the hands of the Chinamen, of whom there are as many as fifteen hundred engaged in the trade. Their manner of catching them is simple and effective. The operations of the Chinamen extend all along the bay from Mare Island to Angel Island, wherever there is a flat or level beach. They stick long poles through the water and into the bottom, to which very fine nets are attached. These nets are so fine that they will retain the smallest minnow. They are spread when the tide is at ebb, and arranged with the lead-line on the bottom. When the tide comes in and the water flows against the net it will form in the center a huge bag and prevent anything from passing through. When the water is slack the Chinamen take up the net and empty all its contents into their baskets. In this manner they make a perfect trap, which, although it catches thousands of shrimp, also destroys a vast number of minnows which would otherwise in time grow up to a proper size for food. The shrimps are then taken ashore and laid on the beach, and the shells are beaten and broken off them with sticks and separated from the meat. The meat is dried in the sun and sold to Chinese consumers in this city or sent to the interior of the State or Nevada, or wherever there are any Chinamen. The bulk of the prepared shrimps is shipped to China in sacks. Many shrimps are also sold alive to the oyster houses in this city, who, after boiling them, have them set out as lunch for their customers to nibble at while their oysters are being prepared. The shells of the shrimps are preserved by the Chinamen, and after being put into sacks are also shipped to China, where they are extensively used as a fertilizer. Under the Chinese *régime* in shrimp-catching the price has fallen from 2 to 5 cents per pound. Each Chinaman pays to the owner of his fishing ground a tax or rent of from 50 cents to $1 per month for the privilege of working them. From 700 to 800 tons of shrimps and shells are caught every year in the bay, and the greater part is sent to the Celestial Empire.

"A great many Chinamen also catch sturgeon by means of a trap that is very destructive to this species of fish and many others. They will select a flat over which the water rushes when the

tide is flowing and will so arrange their nets that the lead-line will be 2 or 3 feet from the bottom. As the water rushes in the sturgeon comes with it and when the water is slack the line is loosened and sinks to the bottom. When the water recedes the fish cannot get out, and they are either gilled in the nets or are found gasping on the ground which has been left bare by the receding waters. The Chinaman cuts open the largest sturgeons that have been thus caught just back of the head, and with a hook made for the purpose pulls out the inside nerve of the fish's backbone. It resembles in appearance, when thus taken out, a piece of macaroni, nearly a yard in length. This is dried and is also shipped to China and is regarded by Chinese epicures as a rare tit-bit. In this manner also are destroyed thousands of small fish of all kinds, which will in time have a marked effect on the supply, unless the criminal waste be checked. The Fish Commissioners are intending to procure some legislation on the subject, which will probably be all that is needed.

"A tax is paid by all the bay and ocean fishermen to the State, and a wharfinger is employed by the State to give his exclusive attention to this branch of industry. The docks of the fishermen are at the foot of Clay street. As an article of food, the fish that come to our markets are next in importance to the meats, and the trade in them gives employment directly to thousands of industrious people. The fish should be preserved as much as possible and the business so regulated that a penalty may be promptly inflicted on the Chinaman or white man who shall wantonly destroy edible fish."

THE PREJUDICE AGAINST THE CHINESE FISHERMEN OF SAN FRANCISCO ON THE PART OF THOSE EMPLOYING EUROPEAN METHODS OF FISHING.—The Chinese methods of fishing are undoubtedly extremely destructive, and have occasioned much protest among the other fishermen of the region where they are employed, as well as a general feeling of alarm among observing persons interested in the future of the fisheries. In January, 1876, the Italian Fishermen's Union, of San Francisco, addressed an open letter to State Senator Nunan, on the subject of the destruction of fish by Chinese, in which the following presentments are made:

"The Chinese *modus operandi* is as follows: They set their traps (*mandraghe*) in many portions of the bays and rivers, the poles proving obstructive and dangerous to small-sized boats and schooners, and the nets being so fine and so numerous that fish even of the smallest size are caught. In this way the Chinese are destroying very rapidly these useful members of the finny tribe. These Chinese traps swing with the tide, and the Chinese leave them in position all the year round. The *modus operandi* of the Italians and other members of the Fishermen's Union, who are Spaniards, Greeks, Slavonians, and Maltese, is to throw their drag-nets into the water and leave them there only 5 or 6 minutes. The nets used by the Chinese fishermen are as tightly woven as a mosquito net, and retain all sizes of fish, even the spawn—none escaping. The nets used by the Italians and other fishermen in the union have the apertures fifteen times as large as those used by the Chinese fishermen. The fish caught by the Chinese—those which are too small to be eaten, or not of the quality worth preservation or to be sent to China—are cast upon the beach to perish, sometimes within a couple of yards of the sea. The fish caught by the Italians and others of the Fishermen's Union are all sold in our market. The Chinese are fishing night and day, and they catch all they can, regardless of season, place, size, damage, quality, or quantity. The Italian and others of the Fishermen's Union do quite the contrary. They only catch enough fish to supply our market day by day, and when said amount is obtained they give up their daily work. The Chinese fishermen catch continually the sturgeon in an enormous quantity, for the only purpose of taking away from the fish that nerve, which is like marrow and extends horizontally down the middle of the spine from the head to the tail, and which forms the one-twentieth part of the fish. The rest is thrown on shore to rot, or to be fed to poultry. This way of proceeding on the part of the Chinese

fishermen in regard to sturgeons, as well as their system of traps and tightly-woven nets, is nothing more nor less than wanton destruction. Already the young salmon, sturgeon, and trout are becoming scarce, and unless measures are speedily taken to suppress this wholesale destruction by the Chinese a scarcity of fish may be apprehended. The Chinese fishing companies are continually sending to China an average of $12,000 worth of dried fish and shrimps per month. The Italian and other union fishermen have been fishing on the California coasts, bays, and rivers for over a quarter of a century, never giving cause for a complaint about their trade. They have adopted the same system of fishing practiced in the Mediterranean Sea, which system, above all others, insures the non-destruction of small fish. The Italians and other union fishermen have no ill-feeling against the Chinese fishermen; neither do they fear their competition. All that they desire is a less destructive system of fishing on the part of the Chinese, and a law which will compel all the fishermen to adopt a similar system of fishing."*

STATISTICS OF FISH TRADE OF SAN FRANCISCO.—The following estimate of the amount of fish sold in San Francisco for the years 1879–'80 was made with great care by Mr. Garibaldi, bookkeeper for Pardini & Silvestra, fish dealers:

Varieties.	Amounts in pounds.	Amounts in tons.	Varieties.	Amounts in pounds.	Amounts in tons.
Salmon	3,640,000	1,820	Herring	2,700,000	1,350
Sturgeon	1,658,000	829	Young codfish	16,000	8
Sea-bass	1,440,000	720	Flounders	126,000	63
Codfish	252,000	126	Soles	188,000	94
Rockfish	626,000	313	Catfish	6,000	3
Barracuda	26,000	13	Shad	600	.....
Halibut	122,000	61	Trout	36,000	18
Perch	152,000	76	Skate	38,000	19
Smelt	568,000	284	Prawn	22,000	11
Tomcod	552,000	276	Shrimp	200,000	100

Salt salmon	barrels of 200 pounds	1,300
Salt salmon	half-barrels of 100 pounds	3,200
Smoked salmon	pounds	140,000
Salt herring	half-barrels of 100 pounds	2,100
Smoked herring	boxes	25,000
Smoked halibut	pounds	12,000
Suckers, chubs, and pike		80,000

Statement of the coast fisheries of San Francisco County, showing the number of fishermen, the amount of capital invested, and the quantities and values of the products.

	San Francisco County.		San Francisco County.
Number of fishermen	391	*Products*—Continued.	
Capital.		Shark-fins:	
Vessels and boats:		Pounds	3,000
Number	90	Value	$150
Value	$11,000	Shrimp and prawn:	
Value of other apparatus and outfit	$15,000	Pounds	250,000
Total capital invested	$26,000	Value	$12,500
Products.		Abalone meats:	
Fresh fish:		Pounds	190,000
Pounds	5,500,000	Value	$9,500
Value	$220,000	Abalone shells:	
Dried fish:		Pounds	950,000
Pounds	20,000	Value	$23,750
Value	$400	Total value of products	$266,300

* San Francisco Weekly Bulletin, January 6, 1878.

220. THE FISHERIES OF THE SEA-BORDERING COUNTIES BETWEEN SAN FRANCISCO AND THE NORTHERN BOUNDARY OF THE STATE.

ALAMEDA COUNTY.—This county lies along the east shore of the Bay of San Francisco. The shore is for the most part a mud-flat, bare at low tide, and no profitable fishing is there possible. The markets of the principal towns—Oakland, Alameda, &c.—are supplied from the wholesale markets in San Francisco. There have been Chinese fishing colonies in the neighborhood of Oakland,* but there are none now in the county, and the total catch of fishermen residing in the county will not exceed 2,000 pounds per year.

The salt works in Alameda County are the most extensive on the Pacific coast. They are discussed in another section of this report.

CONTRA COSTA AND SOLANO COUNTIES.—The counties of Contra Costa, on the south, and Solano, on the north, are separated by the Sacramento River. The fisheries of both counties are considerable, comprising most of the salmon fishing of the Sacramento, both for the canneries and for the city markets. Most of the sturgeon sent to the San Francisco market also come from this region. As most of the fishing of the lower Sacramento is done by fishermen who move from place to place and have no permanent residence in either county, it will be convenient to consider these two counties together.

Both fishing towns and fisheries of these two counties will be discussed under the head of the "Salmon fishery of the Sacramento River."

SONOMA COUNTY.—The coast of Sonoma County has no bays especially suitable for fishing, and there are, so far as we know, no persons who make their entire living by this means. At Fort Ross and at Duncan's Mills are several men who fish during the summer, and who occasionally send boxes of fresh fish by rail to the San Francisco market. In the fall, salmon run in Russian River and are taken in some numbers. The total annual catch of Sonoma County cannot exceed 10,000 pounds. In the interior of the county are many carp ponds, some of which have proven very profitable.

MARIN COUNTY.—The proximity of Marin County to San Francisco affords a steady market for its fisheries, which are, therefore, of considerable importance. Nearly all the fish taken are shipped directly to San Francisco. They are placed in long wooden boxes, head up. These boxes are a foot deep, and are capable of holding from 100 to 150 pounds of fish; the average capacity is 125 pounds. Over the fish are placed large wet cloths or sacks; the object of these is to keep the fish moist. The fish are shipped to dealers in the Clay-street market. They are sold on commission, either retail or to the smaller dealers in Oakland, San José, Alameda, or other markets. Most of the fish are taken in Tomales Bay, a long and narrow inlet extending lengthwise through the county. The fish taken in this bay are chiefly the different embiotocoids and the flounders and smelt, with some black rockfish.

In this county there are seven active fishing towns, San Rafael, San Pedro, Angel Island, Bolinas, Point Reyes, Marshall's, and Hamlet.

The fisheries of San Rafael, the largest town in the county, are of but little importance, the

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* HOW THE CHINAMEN FISH.—Nearly any day Chinese fishermen may be seen catching young smelt and herring in the old ferry slips at Alameda wharf. They have very fine square nets, through which the smallest minnows cannot escape, and at each corner of the net ropes are fastened and passed through pulleys on the wharf. The nets are dropped about every twenty minutes. When hauled up, the boat is pushed out under the trap in the center of the net, which is opened and the fish dumped into the boat. Thousands of young fish are caught daily, taken away, dried, and are then ready for Celestial consumers.—*Alameda Encinal, January,* 1870.

town being placed at the head of a very shallow, muddy bay, most of which is bare at low tide. The market of this place is supplied almost entirely by San Francisco.

At the town of San Quentin there are no fisheries, the market of that place, as also in part that of San Rafael, being supplied by three Italians, who fish on the Estrero, a mile or two southwest of San Quentin, with gill-nets and seines.

Along the coast, near Point San Pedro, are two colonies of fishermen, numbering in all about one hundred, who fish chiefly for shrimp. These shrimp are sent to San Francisco. A colony formerly located north of San Quentin, toward San Rafael, is now abandoned.

The following paragraph is taken from the San Francisco Weekly Bulletin, November 7, 1873:

"The business of fishing at Point San Pedro, Marin County, is entirely in the hands of Chinamen. About two hundred and twenty-five men are employed. The Marin Journal gives information, from which the following is taken: 'The land occupied by the fishermen is owned by McNear & Brother, and leased to Richard Bullis for $1,000 a year, and by him leased to the Chinamen for $3,000. From 10 to 15 acres are occupied, the shore line serving for houses, boat-building, shipping, &c., and the side hill for drying the fish and preparing them for market. Shrimps constitute the principal catch, and of these from 20 to 30 tons per week are taken. The shrimps are dried on the hillsides, threshed *à la Chinois*, to get off the hull, winnowed through a hand-mill, and sent to market. The fish sell for 8 to 14 cents per pound in the San Francisco market at wholesale, and the hulls are shipped to China and sold for manure, where they bring $20 per ton, affording a profit over all expenses of $5. It is said to be an excellent fertilizer. Other kinds of fish are taken in great quantities, as flounders, perch, &c., and some of which are used only for dressing soil. The stakes to which the fishers attach their nets extend out into the bay a mile or more. There are thirty-two houses on the beach, and more all the time building. Two boats are now on the ways, one 40 feet long and the other 30. Nine hundred cords of wood have been used this season, which they buy in Redwood City and ship themselves to their fishing grounds. Captain Bullis makes a weekly trip to San Francisco with a cargo, the law requiring a white captain on a 40-foot craft. Point San Pedro is reached from San Rafael by a hard, smooth road, which affords an exceedingly agreeable drive of a half hour's duration, presenting several charming views of the bay and many interesting landscapes. The road skirts along San Francisco Bay for some distance, then, turning northward, leads to the shore of San Pablo Bay.'"

If the writer was anywhere near the truth in his estimate of the number of Chinese fishermen engaged at Point San Pedro, which may fairly be doubted, the extent of this fishery has undeniably decreased during the past seven years.

At Angel Island is a colony of about a dozen fishermen, who are engaged in shrimp-fishing. About Angel Island, Richardson's Island, and Saucelito the Italian fishermen from San Francisco haul their nets, but none of them, it is believed, make their home on the north shore of the bay.

The fisheries spoken of as being prosecuted at Point Reyes are, more strictly speaking, carried on all the way from Point Reyes to the Golden Gate and the Farralones, the fishermen rarely going ashore at Point Reyes. Between these points fishermen from San Francisco fish with sweep-nets and set-lines. Near the head of Drake's Bay also fishing is carried on by four men with seines and gill-nets. These catch about 50,000 pounds a year. Their catch is chiefly smelt.

At Marshall's are ten fishermen, and a mile farther south are ten more. These men, fishing principally at night, send their fish to the city on the morning train. The water here is very clear. They own altogether twelve boats, lateen-rigged, and averaging three-fourths of a ton register. The fisheries have been extensive on this (Tomales) bay since 1874. For six years previous to that date the fish were sent from Tomales Bay to San Francisco by way of Petaluma. Overfishing has

of late caused a great decrease in the abundance of the fish. In summer from 1,000 to 2,000 pounds of fish were daily shipped to Marshall's, the yearly average being 150,000 pounds.

The fisheries of Hamlet are carried on by three companies, chiefly Italians. There are altogether twelve men and six boats. The fish, of which 48 boxes a day have been shipped, are sent from Hamlet to San Francisco. A box holds about 120 pounds. When fish are plenty more are packed in a box.

Statement of monthly shipments of fish from Hamlet to San Francisco from April 1, 1879, to April 1, 1880.

Month.	Pounds.	Month.	Pounds.
April	8,640	November	12,000
May	7,200	December	9,600
June	5,760	January	8,640
July	9,600	February	5,160
August	17,400	March	7,200
September	21,600	Total	129,600
October	16,800		

About 90 sacks, or 7,200 pounds, of clams are shipped yearly to San Francisco from Hamlet. They are also peddled at Tomales at the rate of 50 cents a bucket.

It is to be noted, in connection with the following statement of yearly estimates for 1879, that the fish taken by boats from San Francisco are not included. It is certain that at least one-half of the fish taken by such boats are caught in the waters of Marin County.

Yearly estimate by towns for 1879.

Towns.	Pounds.	Towns.	Pounds.
San Rafael	10,000	Olema	500
San Quentin	75,000	Marshall's	150,000
Angel Island	30,000	Hamlet	129,600
Saucelito	10,000	Tomales	500
Bolinas	15,000	Total	470,600
Point Reyes	50,000		

In addition to this amount there is a large home consumption and waste of fish.

Whales occasionally come ashore at Point Reyes. Sea-lions are also abundant there, and occasionally parties from San Francisco kill them for their oil.

MENDOCINO COUNTY.—The coast of Mendocino County is rocky, without indentations or large streams. There are no fisheries of any importance anywhere within its borders, and probably no regular fishermen. The total annual catch cannot exceed 3,000 pounds.

At one time a man living at the light-house at Cape Mendocino owned a whale-boat, and in smooth weather went fishing for halibut on a reef that runs out from the cape. He sent them to Eureka to be retailed, and also shipped a few to San Francisco.

The opinion seems to obtain that there are plenty of halibut in that vicinity, but it is nearly always rough around the cape, and there is no good way of disposing of the fish when caught. It is not probable that any considerable fishing will ever be done for halibut in the vicinity of Humboldt Bay. Cape Mendocino is noted as a rough point. No fishing boat owned in Eureka could be sure of getting in and out of Humboldt Bay, because of the bar. The distance from San Francisco, about 230 miles, would render it unprofitable, in the present state of the market, for a schooner from that city to make trips to Cape Mendocino, load with fish, and return.

HUMBOLDT COUNTY.—The fisheries of Humboldt County are chiefly carried on in Humboldt Bay, about Eureka, and in Eel River. Three kinds of fish are principally taken, flounders, salmon, and sharks. Each of these industries may be taken up separately; that of the salmon, having place elsewhere, will not be described here.

Humboldt Bay is a land-locked harbor, with a narrow entrance, obstructed by a dangerous bar. Its foundation somewhat resembles that of San Diego Bay, being shut off from the open ocean by narrow sand-spits. At the beginning of the rainy season the small streams that empty into the bay pour out such quantities of fresh water as to render the entire bay brackish. Some fishermen think that this kills the fish, but there is no tangible evidence of its doing so.

The bay is evidently gradually filling up with deposits. It has now a series of mud-flats, some entirely bare, others partly so, at low water, with deep channels between them. The bottom is composed of sediment, there being no rocks excepting some ballast heaps, and on these rocks the fish are caught. The mud-flats and channels serve as spawning grounds for great numbers of flounders. This bay can be easily and rapidly exhausted of its fish, and had it a more ready market it soon would be. The history of the flounder fishing, dependent entirely on hook and line, sufficiently shows this. As it is, although the bay produces at certain seasons of the year great quantities of fish, it is lacking in variety. It is claimed that the fish are of poor quality (except the salmon), owing to the nature of the bottom.

Fishing in Humboldt Bay is good during only the fall and a portion of the winter, and in consequence there are but few resident professional fishermen. Two Americans working with a seine to supply the local market of Eureka, and during the flush season shipping to the San Francisco market, come under this head. About six or eight others living in the vicinity of Eureka fish during the salmon season and do little or nothing the remainder of the year. Probably an equal number have families and are semi-professionals, fishing during two months of the year. Quite a number of the inhabitants of Eureka fished at one time, and hold themselves in readiness to do so again should other business fail. There are but three Italian fishermen on the bay, the majority being Americans (including a few English, Irish, and Scotch). Often some of the Columbia River fishermen come here during the salmon season. Since 1857 and before, there has been a colony of Chinese fishing in the bay with nets. Last year their net was destroyed. Fishermen claim that they fished all the "sole" (*Paropkrys vetulus*) out of the bay. Most of their fish were dried in the usual way and sent to San Francisco.

Flounder-fishing begins about October. Humboldt Bay used to be the spawning grounds for immense numbers of the large flounder (*Pleuronectes stellatus*). The fish were so abundant as to completely line the bottoms of the deep channels between the mud-flats, and would bite at a hook with extreme voracity.

In 1874 the first experiment was made by a young American, who caught and shipped to San Francisco from Eureka a few flounders. The "paranzella" had not then appeared. These few flounders brought a high price, retailing from 30 cents to 35 cents a pound. Finding it highly remunerative he increased his operations, keeping the fish in live-boxes until the day on which the steamer sailed for San Francisco. As many as 2 and 3 tons were sent at a time. Before long not less than one hundred people were at this work, fishing day and night, their business causing quite an excitement in Eureka. Flounders soon became a drug on the market and their retail price diminished so much as to leave for the fishermen a profit of only 2 cents a pound, instead of 12 and even more, the profit per pound before so many entered into the fishery. Another cause of small profits to the many engaged in the work was that the steamer was often unable to cross

the bar for several days, in which case the fish were liable to spoil. When this happened they were thrown overboard, proving a dead loss to the fishermen. At the present time there are not more than fifteen or twenty men engaged in fishing for flounders during the best of the season. In the winter they bring from 5 to 10 cents a pound.

Some flounders are caught weighing 10 pounds. It is possible that, owing to the small number now caught, this species will hold its own, but it can never be so abundant as it once was.

Small numbers of other varieties of flounders, such as *Paropbrys* and *Citharichthys* are also caught, but *Pleuronectes stellatus* is the common flounder of Humboldt Bay.

The shovel-nosed shark (*Notorhynchus maculatus*), caught for its oil, was in the early days of Eureka, from 1858 to 1868, extensively caught in Humboldt Bay. This fish entered the bay at "bailing" season, about the middle of April, and remained until the end of August. At one time fifty or sixty men were engaged in the capture of the fish and the trying out of the oil from its liver. This oil, in the absence of coal (not then discovered), was used largely for illuminating purposes. Much was shipped to San Francisco, where it was used for oiling machinery and adulterating other oils. In one season a man made 700 gallons of oil, which he sold for the average price of $1.25 a gallon. These sharks are from 6 to 8 feet long and yield from 3 to 8 gallons of oil apiece. The females yield more oil than the males, and females with eggs yield more than at any other season.

The sharks can only be caught at highest tides, when they are taken with hook and line in the deep channels between the mud-flats, or they may be harpooned in shallow water. The best bait for sharks of this kind is salted seal. Seal meat is full of oil, which spreads out over the water's surface and attracts the shark's attention. They have been seen to follow a narrow streak of oil till they reached the line, when they instantly went down for the bait. It is thought that their sense of smell guides them.

There is now only one man engaged in this business on Humboldt Bay. He has made only 20 gallons this (1880) season. The oil is now worth only 75 cents a gallon and is used by lumber-mill owners around Eureka for lubricating-oil. No other sharks are caught here for oil. The species *Squalus acanthias* is absolutely unknown at Eureka, and *Rhinotriacis* and *Triacis*, besides being too small, furnish a very poor quality of oil.

DEL NORTE COUNTY.—In Del Norte County, California, there is no sea-fishery of any importance. There is a fall salmon fishery in Smith River, which is discussed in the chapter on the west coast salmon fishery. About 500 barrels of salmon are salted. The total annual catch of fish outside of the salmon fisheries does not exceed 3,000 pounds.

STATISTICAL RECAPITULATION.—The fisheries of the foregoing counties are fully detailed in the following table:

Statement of the fisheries of the sea-bordering counties between San Francisco and the northern boundary of the State, showing the number of fishermen, the amount of capital invested, and the quantities and values of the products.

	Alameda County.	Marin County.	Sonoma County.	Mendocino County.	Humboldt County.	Del Norte County.	Total.
Number of fishermen	2	150	3	1	10	2	168
Capital.							
Vessels and boats:							
Number		42			20	2	64
Values		$4,200			$1,000	$100	$5,300
Value of other apparatus and outfit	$20	$1,650	$50		$500	$20	$2,240
Total capital invested	$20	$5,850	$50		$1,500	$120	$7,540
Products.							
Fresh fish:							
Pounds	2,000	500,000	10,000	3,000	100,000	3,000	618,000
Value	$100	$20,000	$300	$75	$3,000	$90	$23,565
Dried fish:							
Pounds		80,000					80,000
Value		$1,600					$1,600
Shark oil:							
Gallons					20		20
Value					$6		$6
Shrimp and prawn:							
Pounds		1,000,000					1,000,000
Value		$50,000					$50,000
Clams:							
Number		40,000					40,000
Value		$400					$400
Total value of products	$100	$72,000	$300	$75	$3,006	$90	$75,571

C.—OREGON AND ITS FISHERY INTERESTS.

221. STATISTICAL RECAPITULATION.

Summary statement of persons employed.

Persons employed.	Number.
Fishermen	2,795
Shoremen	4,040
Total	6,835

Detailed statement of capital invested and apparatus employed.

Apparatus specified.	Number.	Value.
Boats	1,360	$246,600
Other apparatus, including outfit		245,750
Cash capital and shore property		639,000
Total		1,131,350

Detailed statement of the quantities and values of the products.

Products specified.	Quantity.	Value.
Salmon ..... Pounds fresh..	39, 500, 000	a $2, 766, 724
Seal oil ..... Gallons..	18, 000	4, 300
Other products	610, 000	10, 000
Total	.....	2, 781, 024

a Including enhancement in the value of salmon in process of canning, $1.911,422.

222. THE FISHERIES OF THE OREGON COAST.

GENERAL STATEMENT.—The fisheries of the coast counties of Oregon have as yet very little importance. The coast line is little indented by bays and is therefore in itself unfavorable for fishing. There is, moreover, no available market for any fish taken, except salted or canned salmon. The various tribes of Indians along the coast derive much of their support from fishing, but no statistics are obtainable. A single salmon cannery is now in operation in this region, at Rogue's River, and salmon are salted on some of the other streams. With these exceptions there is no systematic fishing anywhere on the coast of Oregon south of the Columbia River, the salmon fisheries of which are very important. These will be described in detail in the chapter on the "Salmon fishing and canning interests of the Pacific coast." The entire salmon catch of the coast, including that of Rogue's River, excluding the fish taken by the Indians, will not vary very far from 1,000,000 pounds. In the report of the river fisheries of the State will be found some items upon the bays and fisheries at mouths of rivers.

D.—WASHINGTON TERRITORY AND ITS FISHERY INTERESTS.

223. STATISTICAL RECAPITULATION OF THE COMMERCIAL FISHERIES.

Summary statement of persons employed.

Persons employed.	Number.
Fishermen	729
Shoremen	15
Total	744

Detailed statement of capital invested and apparatus employed.

Apparatus specified.	Number.	Value.
Vessels	7	$11, 100
Boats	334	6, 610
Other apparatus, including outfits	.....	8, 648
Cash capital and shore property	.....	4, 000
Total	.....	30, 358

Detailed statement of the quantities and values of the products.

Products specified.	Quantity.	Value.
Salmon.....Pounds fresh..	350,000	*a* $16,820
Other fish.....Pounds fresh..	5,357,000	93,140
Seal skins.....Number..	6,268	56,412
Seal and fish oil.....Gallons..	24,200	5,000
Oysters.....	.....	10,000
Total.....	.....	181,372

a Including enhancement of value in process of canning, $13,440.

224. THE COAST FISHERIES OF WASHINGTON TERRITORY.

THE PRINCIPAL FISHERIES ENUMERATED.—The whole Puget Sound region is very abundantly supplied with fish, but for want of a market the fisheries are little developed and have as yet little commercial importance. The only species of special value are the halibut (*Hippoglossus vulgaris*), which abounds everywhere in the deeper waters and main channels, but chiefly about Cape Flattery; the five species of salmon (*Oncorhynchus chouicha*, *nerka*, *kisutch*, *gorbuscha*, and *keta*), which run up all the streams, large and small, in summer and fall, and which are taken in the salt water at all seasons; the dogfish (*Squalus acanthias*), which is largely sought for the oil obtained from the liver; the herring (*Clupea mirabilis*), and the eulachon (*Thaleichthys pacificus*), which is considered when fresh as the best pan-fish of the region. Besides these, are many species of *Chiroids*, *Pleuronectoids*, *Salmonoids*, *Scorpænoids*, &c., used as food, but no one species of any great value.

The fishermen are chiefly Indians, who fish for their own consumption and live in small colonies or "rancherias" scattered about the entire sound. Nearly all the sound Indians live by fishing. No record of their number can be obtained by us and no material for any sort of accurate estimate can well be had. A few Indians in the vicinity of the towns fish for the market and peddle their fish at low prices about the streets. Some also fish for the salmon canneries. There are also a few Chinese colonies, wholly similar to those south of San Francisco, where they salt and dry a considerable amount of fish. Around the larger towns (Victoria, Seattle, Port Townsend, Tacoma) are a few Italian or Dalmatian fishermen, and at Tacoma some Americans.

OLYMPIA.—No fishing is done at Olympia, the harbor being nearly bare at low water and lined with oysters. The shipment of these oysters to San Francisco is the only fishing industry of the town. The first shipment of these oysters was made two or three years ago, after the decline in quality and quantity of the Shoalwater Bay product. This matter is elsewhere discussed.

STEILACOOM.—No regular fishing is done here. Various Indian rancherias are scattered along, where the "Siwashes" fish for their own use. Fishermen from other places often come to Steilacoom during the salmon season.

NEW TACOMA.—This place is connected by rail with Portland, and the chief supply of the Portland market of all fishes except salmon and halibut comes from New Tacoma. At New Tacoma two young fishermen from Maine have established a fishing station and are making good wages. About 200 tons of fish have been taken by them and their employés during the past year. Most of these have been shipped to Portland, where they sell at 5½ cents per pound, the salmon, during the close season in the Columbia, somewhat higher.

In summer and fall a considerable number of salmon are taken and salted and sold in San Francisco and elsewhere at 6 to 8 cents a pound. After August 1, when salmon are no longer allowed to be taken in the Columbia, the sale of salmon, flounders, &c., from Puget Sound in Port-

land is quite profitable. The salmon do not enter the rivers in numbers at this part of Puget Sound until ready to spawn in September, when they move about the bay in schools and are readily netted while "searching for the river." Many of the salmon of the different species are then "dog-salmon," and as such not so readily sold. At first their flesh is red and not bad, and can be salted as well as that of the ordinary salmon; later it becomes poor and worthless, the fish often half rotten in life, and no use can be made of it. A cargo of salted dog-salmon was once sent to Honolulu with a disastrous effect on the reputation at the Sandwich Islands of the Puget Sound salmon.

In the fall a fyke-net is planted by Savels & Staples in Puyallup River. Most of their fishing is done with seines. Gill-nets, traps, &c., are not successful in these waters because of their clearness. Traps built of brush in a way similar to the pound-nets in the East have been built and still stand in Commencement Bay, but the salmon do not run into them and they have been abandoned.

The species mostly taken are *Oncorhynchus chouicha*, *Pleuronectes stellatus*, *Lepidopsetta bilineata*, *Parophrys vetulus*, and *Salvelinus malma*, which abounds in salt water and reaches a weight of 12 or 14 pounds; the largest seen by me weighed 11 pounds. *Salmo purpuratus*, also abundant in salt water, *Hypomesus pretiosus*, &c., as well as various sculpins, "eels," &c., which have no market value.

At Gig Harbor, 8 miles from Tacoma, are three Austrian fishermen, who have been there two years. Most of the fish obtained by them are salted, but some are shipped fresh to Portland.

The salmon and the orange rockfish (*Sebastichthys pinniger*) are the species mostly sought, the latter taken with hooks in deep water. Both salmon and rockfish are barreled and shipped to Portland, San Francisco, or elsewhere. Herring are also caught and smoked, but there is little profit in it. In the summer dog-fishing is followed to some extent, the oil being "tried out" of the livers in kettles. About 100 tons of fish are taken per year, exclusive of dogfish.

Opposite Gig Harbor is a Portuguese fisherman, with one or more assistants, who fishes chiefly for dogfish.

In various places about Gig Harbor, Quartermaster's Harbor, and Point Defiance are Indian dog-fishing camps. The oil is chiefly rendered in kettles.

Near Quartermaster's Harbor is a colony termed Kanakatown, where four or five Chinamen, a negro, and several Sandwich Islanders fish and dry or salt the product, occasionally selling in Tacoma or sending to San Francisco.

SEATTLE.—The local market at Seattle is of some importance. A company of three Italians fish with seines along the shore, obtaining young salmon, flounders, &c., which are sold in a stall in the town. A company of two or three Greeks fish in the same way, but are absent at the Columbia during the salmon season. Several Austrians fish with hook and line in the deeper waters of the bay, obtaining halibut, black bass (*Sebastichthys melanops*), horse-mackerel (*Anoplopoma*), merluch' (*Merlucius*), pollack (*Pollachius*), tomcod, &c. Many Indians in the neighborhood bring in, almost daily, boat-loads of salmon-trout (*Salvelinus*), young salmon, and the various flounders, &c.

Much fishing is done by men and boys from the wharves, *Anoplopoma* and small flounders, especially *Hippoglossoides elassodon*, being the principal species taken.

There are no fishing boats at Seattle, except small skiffs. The amount of fish taken yearly must be about 300,000 pounds.

PORT BLAKELEY.—The salmon cannery of Jackson & Myers, formerly at Muchilteo, is now

located at Port Blakeley, on the west side of Admiralty Inlet, opposite Seattle. Its business is described under the head "Salmon fisheries of Washington Territory."

PORT MADISON.—A colony of about fifteen Chinamen are engaged in drying fish near Port Madison. Besides fishing themselves, they purchase large quantities from the Indians. They prepare the fish in the ordinary way, soaking them for two or three days in weak brine; then drying them on racks in the open air. They put up perch (*Damalichthys*) and different species of flounders, mostly *Parophrys vetulus*, *Lepidopsetta bilineata*, and *Pleuronichthys cœnosus*. Flounders are valued most highly by the Chinese. The different species of *Embiotocidæ* are dried principally for the use of the Chinese working in the mines. Chinese do not like salmon.

Both Chinese and Indians at Port Madison fish with coarse-meshed nets, and *throw back fish under six inches in length.*

A herring fishery, owned by Mr. J. P. Hammond, is in operation during the winter season from about November 1 to March 1. During the last season they worked but one fine-meshed seine, 450 feet long, ¾-inch mesh. Thirteen white men of various nationalities were employed, at wages of $25 to $30 per month. The herring are most abundant in February and March, when they come into the bay to spawn. They are in best condition from November to January, becoming poor and comparatively worthless as soon as they begin to spawn. The herring run into the bay in large numbers for shelter from heavy storms. The fishery has been at Port Madison since 1870. The business is constantly increasing, but there are as many or more fish than at first.

During the herring season they catch from 1 to 1,000 barrels at a haul. The herring are either smoked and dried or used for oil. The smoked fish are put up in boxes of about five dozen each, and mostly sent to San Francisco, where they are sold for 30 to 35 cents per box.

To make oil, the fish are steamed in wooden boxes and afterwards pressed. One barrel of fish produces about 1½ gallons of oil, which is worth from 35 to 45 cents per gallon. The oil is used for rough purposes—for greasing skins in tanneries, and at log camps.

During the last season (1879–'80) there were put up 2,500 boxes of smoked herring and 5,700 gallons of oil; in 1877 and 1878, 5,000 boxes and 17,000 gallons.

UTSALADDY, SAN JUAN, AND OTHER SETTLEMENTS.—At various places in the northeast part of the sound the Indians fish for salmon and dogfish, and occasionally Italians and Chinamen engage in the same business.

MUCKILTEO.—The cannery of Jackson & Myers, formerly at this point, has been removed to near Seattle. The salmon were formerly abundant here, but have now grown scarce. It has been thought that the offal from the cannery drives them away. The salmon were netted in schools in salt water by the Indians.

The species canned are the female "haddo" (*O. gorbuscha*) and the silver salmon (*O. kisutch*). The first run is in July, when the haddos appear, at first males and females similar, but afterwards the males grow dark, red, humpbacked, and hook-billed, and are rejected. They weigh but 5 or 6 pounds, and are very slimy after being taken out of water.

The silver salmon here rarely weighs over 22 pounds, the average not more than 6 or 8. In alternate years the run of haddos is very small or nothing. At other times it is extremely large.

PORT GAMBLE AND PORT LUDLOW.—At these points the only fishing done is that of Chinamen and boys from the wharves, and of the neighboring Siwash Indians. In this region considerable dog-fishing is done by the Indians, the oil being mostly rendered by putting the livers into wooden troughs and throwing in hot stones, finally pouring off the oil from the scraps.

PORT TOWNSEND.—Three Italians fish at Port Townsend for halibut and dogfish. They have

a boat (Italian) of about 1 ton burden. The fish taken are either shipped directly to San Francisco or else salted. Some of them are sold in the town, and occasionally some shipped to Portland.

NEW DUNGENESS.—Some scattering fishing for salmon, dog-fish, &c., is done at this point, and a good deal of fishing is done by Indians on the way toward Cape Flattery.

NEAH BAY.—At this point there is a considerable reservation of Indians who do nothing but fishing and sealing. The fur-seal fisheries of Cape Flattery are of considerable importance, and are elsewhere discussed by Judge Swan.

Halibut fishing is here an important industry, several hundred pounds being brought in every day. Most of the halibut are taken just outside of the Straits of Fuca on a halibut bank, some 12 miles west-northwest of Neah Bay. The halibut are taken with large hooks made of an iron or bone spike, firmly bound to wood. They are taken for the whole length of the Straits of Fuca, but most abundantly near the sea, and in the main channels as far as Seattle and San Juan at least.

Many rockfish (*S. nigrocinctus, melanops, nebulosus, ruber*) are taken, also immense cultus-cod (*Ophiodon*), and occasionally a true cod (*Gadus morrhua*).

Near Neah Bay was formerly a cannery, which has now suspended. It canned the halibut and the hoopid salmon (*Oncorhynchus kisutch*), as well as young or suitable salmon of other species. The hooped salmon is fat and excellent. The canned halibut cannot compete with canned salmon, the boiled flesh being white and flavorless, and therefore unattractive, while the expense of manufacture is not much less than that of canned salmon.

QUINNAULT.—In the Quinnault River a small salmon runs, said to be very fat and of superior quality. This is probably *O. nerka*.

GRAY'S HARBOR.—No regular fishing. A salmon cannery was formerly located here, but it is no longer in operation.

SHOALWATER BAY.—No fishermen are located here, and no fishing is done. The oyster interest has been elsewhere discussed. It is said that the bay is growing up to sea wrack, to the injury of the oysters.

VICTORIA.—Some ten fishermen, chiefly Italian, are engaged in fishing at Victoria. They fish with hook and line, taking halibut, rock-cod (*S. ruber, S. maliger*), dogfish, and ground shark (*Somniosus*).

The halibut is mostly bought by an American and shipped fresh on the steamers Idaho and Dakota to the San Francisco market. The chief supply of halibut at San Francisco comes from Victoria. Formerly a schooner belonging at Astoria was engaged in transporting halibut from Cape Flattery and the west coast of Vancouver's Island to San Francisco, but the attempt was abandoned after one season. Combinations among the Italian fish dealers in San Francisco are discouraging to shippers, as often the price of large consignments will be brought down to figures unreasonably low on perishable fish.

Other fishermen use the seine and bring in tomcod (*Microgadus*) and various flounders, especially *Parophrys vetulus* and *Pleuronectes stellatus*. Many herring are also taken.

A large part of the supply of the Victoria market comes from Fraser's River. In their season (May) the eulachon (*Thaleichthys pacificus*) is the best pan-fish in this region. They run up the lower Fraser in enormous numbers, and every fish feeds on them. Even the sturgeons gorge themselves upon them.

The "sucheye" salmon (*Oncorhynchus nerka*) is shipped to Victoria in large numbers, and a less quantity of the sawkwey (*O. chouicha*) and sturgeon (*A. transmontanus*) also find a ready sale at low prices. The green sturgeon (*A. medirostris*) is never eaten.

E.—ALASKA AND ITS FISHERY INTERESTS.

BY DR. TARLETON H. BEAN.

225. STATISTICAL RECAPITULATION.

Summary statement of persons employed.

Persons employed.	Number.
Fishermen	6,000
Shoremen	130
Total	6,130

Detailed statement of capital invested and apparatus employed.

Apparatus specified.	Number.	Value.
Boats	3,000	$60,000
Other apparatus, including outfits		7,000
Cash capital and shore property		380,000
Total capital		447,000

Detailed statement of the quantities and values of the products.

Products specified.	Quantity.	Value.
Salmon (fresh) ... pounds.	2,654,000	a $39,640
Other fish (fresh) ... do.	105,000,000	525,000
Sea-otter skins ... number.	6,000	600,000
Seal skins ... do.	147,450	1,474,500
Seal flesh ... pounds.	1,000,000	10,000
Seal and fish oil ... gallons.	120,000	12,000
Whale oil ... do.	5,000	500
Total		2,661,640

a Including enhancement in the value of salmon in process of canning, $26,640.

226. THE FISHERIES OF ALASKA.

The shore fisheries of Alaska are fully discussed in Section III of this report. The cod fishery carried on at the Shumagin Islands, the fur-seal industry of the Pribylov Islands, and also the whale and walrus fisheries, are discussed in Section V.