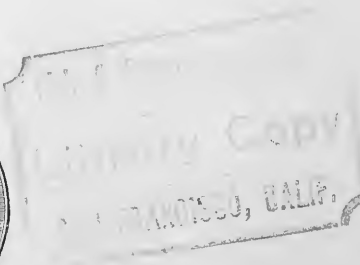


BIENNIAL REPORT
OF THE
COMMISSIONERS OF FISHERIES
OF THE
STATE OF CALIFORNIA,
FOR
1885-1886.

COMMISSIONERS.

R. H. BUCKINGHAM, Sacramento, President.
A. B. DIBBLE, Grass Valley, Secretary.
T. J. SHERWOOD, Marysville.



SACRAMENTO, CAL.
STATE OFFICE.....JAMES J. AYERS, SUPT. STATE PRINTING.
1886.



REPORT.

To his Excellency GEORGE STONEMAN, *Governor of California :*

The Commissioners of Fisheries for the State of California, appointed under an Act of the Legislature entitled "An Act to provide for the restoration and preservation of fish in the waters of the State," approved April 2, 1870, respectfully submit their ninth biennial report:

The Commissioners refer with much pleasure to the fact, that since their last biennial report, public interest has greatly increased, in regard to the fish industry of this commonwealth, and favorable to the adoption of measures and means for increased propagation, and more ample protection of the fish of the State. In nearly all of the States and Territories, their Legislatures have recognized the great importance of fish culture and protection, by the enactment of protective laws and liberal appropriations. Opposition to "Fish Commissions" has been disarmed, and increased energy on part of Commission and State has been demanded. Our citizens call for a larger supply of choice cheap and healthy fish food. This universal demand should be answered in fostering laws and generous appropriations.

Your Commissioners are pleased to report, that during the last two years— notwithstanding the heavy drain made upon our waters, by hordes of alien fishermen, using criminal methods, and for foreign deportation—the catch of most of the food fishes has been measurably satisfactory. During these, and a part of the preceding two years, it has been the aim of this Commission, to the extent of the power and means allowed it, to stay all vandal waste, and to drive from our waters all classes of fishermen, except those who respect our laws, the present interests of our citizens, and the future prosperity of our fast growing commonwealth.

The "patrol work" inaugurated by the present Commission (expensive as it has been and must be), was forced upon it by reason of the decrease of salmon and other species of fish, and as a means of protection and restoration.

SALMON.

It is a matter of serious regret that our choicest and most valued fish, the Quinnat salmon, is annually decreasing, and the supply for exportation and home consumption is diminishing. Unless salmon that now home in our waters are protected and fostered as a nucleus for increase, our rivers will become as barren of this most desired fish as is the Connecticut and other eastern rivers. The causes of impoverishment are various, and are well known. In our last biennial report we alluded to them at length, and expressed the opinion that the decrease would annually continue until at least some of the causes were removed, and until the efforts of the Commission, by its patrol work for protection and hatchery work for restoration, could be realized; and that restoration by means of replanting could not be appreciable sooner than four or more years after

the release of young salmon into our watercourses. The present Commission was informed that four millions of young salmon were released in the year 1881, from the United States salmon station on the McCloud, into the headwaters of the Sacramento River. If such was the fact, although five years have elapsed, that plant has not yet made a showing.

The salmon Spring run of the year 1885 was probably fifty per cent less than the early run of 1884. The Fall run—owing in part to the low stage of water—showed a falling off of about thirty per cent over that of the preceding year. During the present year the decrease has been marked and steady. The pack of 1885 diminished fully fifty per cent from that of the year 1884, and has decreased during the present year.

The Spring season of 1886 opened favorable for a good run. The river was high in December, and held well up into January. Notwithstanding promising conditions, but few fish were taken in December and January. February presented a slightly increased run over that of the same month in the preceding year. March and April presented the same result. The run up to the latter part of April seemed to be confined to the Sacramento River below Rio Vista. In latter part of April catches were reported from mouth to Sacramento City. In May the takes were notably small. June (always regarded as a favorable month for a good run), opened with a small increase, which lasted but a few days. During the last of this month few fish were taken, and the fishermen, in disappointment, housed their nets. The run below Rio Vista was quite good during the month of August, and during the close season, "between the thirtieth day of August and the first day of October," the run above Sacramento City, in the upper waters of the river and its tributaries, was the best of the year.

Our Commission will this year release from the State Salmon Hatchery at Hat Creek into Pit River—the main tributary of the Sacramento—about 1,200,000 young salmon, and in the year 1887 over 5,000,000.

Having reference to the run of former years, and to salmon eggs obtained for propagation, and also Rainbow Trout eggs, we present the following table:

LAND-LOCKED SALMON.

Our Commission, on the seventeenth day of March, 1884, received from Mr. Atkins, Deputy United States Fish Commissioner, shipped from Brockport, Maine, a box containing 30,000 eggs of this species. The eggs reached the State Trout Hatchery at Shebley's Station in good condition, and were hatched with a loss of only seven and one half per cent. They were mainly distributed in the following lakes:

Bigler.....	15,000
Donner.....	5,000
Webber.....	5,000

Some small plants were made by former Commissioners. The fish increased and thrived. Many large ones have been captured during the last and the present year. The Commissioners hope to be able during the coming year to make generous plants of this much valued fish in other favorable localities.

SHAD.

The Pacific Coast is amply stocked with this species of fish. The increase in California has been marvelous. Millions are annually hatched in the overflows or tule lakes. The supply equals, if it does not exceed, the demand. Whilst as an edible fish it may not rival its eastern relations,

in number and size it is victor. In the East a six-pounder is a very large specimen; here we take them that avoirdupois eight to ten pounds. It is estimated that more than a million of good sized shad have been taken from the waters of California during the present year.

We note here, for careful consideration, the fact that the yearly actual value of shad to the State is many times greater than all of the money that has been expended by the State "for the restoration and preservation of fish."

CARP.

Carp culture since May, 1877, at which time three hundred and forty-five were brought over from Germany to the United States, has been extensively and successfully prosecuted in nearly all the States of the American Union and in Her Majesty's Dominions. The progeny of the three hundred and forty-five has run into billions, and the increase continues. Carp has generally been received with great favor, and has in that respect more than equaled the demand for catfish. Carp were planted in California by favor of the United States Commission, December 19, 1879. Here they found congenial homes and favorable water, diet, and climatic conditions, and the family has become as large, if not larger, than that of any species of fresh water fish.

In 1872, on private account, eight carp of a choice variety were brought into this State from Hamburg, Germany. Their increase was prolific and widely distributed. Up to 1884 there was a strong desire among farmers and landholders to procure carp for stocking natural and artificial ponds and sloughs. Calls were covered with ample supplies, and private preserves, ponds, sloughs, swamps, still and sluggish waters, all over the State were filled with them. Since 1884 but few calls have been received. The supply is enormous—market value at times one and one half cents per pound.

CATFISH.

The seventy-four catfish imported from the Raritan River in 1874, have increased and multiplied and the increase distributed, until now, we believe there is no county in the State, from Del Norte to San Diego, that has not been supplied with a greater or less number of these fish. They are regularly sold in all the markets at the same prices as other abundant fish. They are admirably adapted to the sloughs and warm waters of the great valleys, and in them have so multiplied as to furnish a large supply of food. The aggregate value of this fish annually sold in the markets of San Francisco and Sacramento more than equals the appropriation annually made by the State for fish culture. Catfish are coming more into favor with citizens as food, and by a large class of consumers are preferred to the carp. The planting of these fish was regretted by many and approved by more. They have thriven wonderfully and need no protection. They cannot be exterminated.

STURGEON.

In our last biennial report we stated with regret that the catch of the year 1883, of this, one of the best and cheapest food fishes, had fallen short fully fifty per cent below the takes of the previous two or three years, and we attributed the cause to the indiscriminate and criminal slaughter made by Chinamen and other fishermen. Our river patrol has often raided the vandals and measurably stopped their murderous work, and we are permitted now to report, that during the last and present year, the increase

of sturgeon has been satisfactory, and great numbers of very large size have been taken, and that indications point to a heavy increase in the year 1887. The sturgeon is not only a cheap, but it is also a favored food with all classes of our citizens, and is well advertised in "bills of fare" as the "steak of sole."

PERCH.

The Sacramento perch is regarded by many who claim to be good judges, as the best flavored and most palatable fish found in the inland waters of California. The following excerpt, from page 405 of Section I, Natural History of Useful Aquatic Animals, published under the auspices of the United States Commission of Fish and Fisheries, relating to this delicious fish, does injustice to it and to its epicurean friends:

This species is known only by the name of "perch." * * * It has been thus far found only in the Sacramento and San Joaquin Rivers and tributaries. It is abundant in the lower parts of these rivers, large numbers being shipped to the market in San Francisco. It is there bought and consumed mainly by the Chinese, who value it highly, paying for it more than any other fish which they consume. Although it is an excellent pan-fish, very similar to the black bass, we have never seen any of them bought by Americans.

In our last report we complained of the scarcity of this species of fish, and attributed it in part to the covering of its spawn by sediment and to the drain upon the supply by Chinese and other fishermen, and we recommended the enactment of a law "to protect them from seine fishing for at least two years;" albeit there has been during the last two years a steady and gratifying increase in the catch of perch. During most of the time, and especially during the months of August, September, and October, our markets have been well supplied. The perch obtained from Tulare Lakes have sized well, and have been of most excellent quality. In 1885, Mr. Flockman caught and sold from Big Lake, in Yolo County, over thirty thousand pounds. Washington, Fisherman, and other small lakes are well stocked and have yielded a good harvest.

DACE.

But few of this species are now caught in the lower Sacramento River. This no doubt is owing in part to the fact that for several years past the waters of the river has been heavily charged with slickens or debris. This fish seeks clear water, and higher up the streams where the water is pure, they are caught in large numbers. The dace is a native of our rivers and waters. They are similar in shape to the pike, but different in color, being of a yellowish brown on the back and a dingy white on the sides and belly.

PIKE.

This fish has increased to a considerable extent in most of the waters of the State. During the last two years the increase has been about forty per cent, and promises to continue. They ascend the rivers higher than most other kinds of river fish and thus escape the fishermen's nets and snares. The run commences with the channel pike in the month of December, and with the bar or school pike in the month of March.

CHUBS.

The chub, a strictly inland water fish, was captured in great numbers until a few years ago, when they began to decrease so rapidly that it was

feared they would become extinct in the rivers. Within the last three years, however, there has been a marked increase, so much so, that they are to be found at most any time of the year in our interior markets. Our mountain lakes still hold them in great abundance, notwithstanding the fact that in some of the lakes (notably Webber), tons of dead ones have been beached, either destroyed by disease or by poisons. The chub is an excellent fresh water fish, the flavor is almost equal to that of the Sacramento River perch. The chief objection to it is that it is quite bony, yet the meat peels well. The river catch this year has been heavy and an ample future supply is assured.

TRUCKEE TROUT.

Two kinds of trout are found in the streams of the Truckee basin. The silver trout is the finest of the trout variety in California. They are beautifully marked, clipper built, gamy, and often pull the scales at twenty-five pounds. This most excellent food and sportive fish is taken in large numbers in Bigler, Donner, Webber, Independence, and other mountain lakes. Appreciating the value of this species of trout, our Commission has during its office-holding secured several hundred thousand silver trout eggs, which have been hatched at the Shebley station, and fairly distributed in the lakes and streams of the State.

The other kind is commonly known as the black trout. It is the opinion of many experienced fishermen that it should be classed as a land-locked salmon. They grow to a large size, often weighing from ten to fifteen pounds. They are excellent spawners and breeders. Large numbers come to our markets from the State of Nevada.

Our friends east of our State line are unwilling to lose their traffic in this kind of fish, and have barricaded their passage into California by placing impassable dams across the Truckee River. Whilst regretting the lack of good will and comity so manifested, our citizens are pleased to pay their neighbors royal prices in the way of tribute for this excellent table fish.

RAINBOW TROUT.

In the United States Commissioners Report, Section I, History of Aquatic Animals, page 475, mention is made of the Rainbow Trout as follows:

This species is generally known as the "brook trout," "mountain trout," "speckled trout," "golden trout," and other evanescent names are also sometimes applied to it. It does not reach a weight of more than five or six pounds, so far as we know, and most of them are fingerlings from four inches to a foot in length, etc."

In California the name "rainbow trout" (sometimes called the McCloud) is applied to what is regarded to be a distinct trout family, coarse-scaled and distinctively marked. Mr. Roosevelt—a most careful observer—says that "the distinction between the McCloud River and the mountain trout are quite apparent to the eye," and "there are some differences in their habits;" that the mountain trout does not grow to more than one half the size of the McCloud River trout, and that when cooked there is a marked superiority in favor of the mountain trout. Certain it is that but one kind of trout has been found in the ponds of the United States Fish Commission on the McCloud.

Rainbow trout are taken in great numbers in nearly all of the tributaries of the Sacramento River. They seek spawning grounds high up on

their favored streams, and in near proximity to the natural and impassable falls found near the headwaters of most mountain streams.

Other varieties, called "mountain trout," "brook trout," "speckled trout," etc., are found above these falls. The rainbow is neither a gamey nor a choice food fish. Entering, however, into family relations with other varieties, the hybrid is an improved get.

HARD-SHELL CLAMS.

These are found, not in large quantities however, in the Bay of San Francisco. A great many that are sold in the City of San Francisco are taken from the shoal waters in the neighborhood of Tomales. The catch amounts to about 100 boxes per day. They sell readily for \$1 per gallon. There are also several other kinds sold in small quantities of which no account is kept. The average amount of hard-shell clams consumed annually is 27,604 gallons.

SOFT-SHELL CLAMS.

During the last few years soft-shell clams have been taken in great quantities. The spawn is supposed to have been brought to this coast with the eastern oyster. They have covered the flats surrounding San Francisco Bay. The number taken by bushels cannot be obtained, as they are marketed in San Francisco by the box, each box holding about two gallons of solid meat. Two hundred and fifty boxes or 500 gallons are consumed daily, making the annual consumption 156,500 gallons.

SEA TURTLE.

There has been quite a trade during the past two years in this most valuable shell fish. The markets have been well supplied by coast fishermen of San Diego and Santa Barbara Counties.

TERRAPIN

Are taken in all of the inland lakes and rivers of central California. They are in good demand at all times and in consequence of consumption, show a slight decrease from former years.

HALIBUT.

This fine fish has increased to such a degree that they are found on sale at all times, in the markets. They are taken along the entire coast, from San Diego to the Oregon line.

FLOUNDERS

Are caught in great numbers in all the bays of the State. There has been no perceptible decrease in this species of fish.

TURBOT.

There never have been any large catches made in the waters of this State of this species of flounders. More, however, have been taken within the last few years than formerly. A small increase is clearly noticeable in the market supply.

SOLES

Have been taken in considerable quantities within the last few years, showing a healthy gain.

SALT WATER FISH.

The Commission has not been able to obtain an accurate account of the quantity of fish of all kinds taken below San Francisco, owing to the fact that fishermen in that section often act in the capacity of marketmen. A large amount of fish is consumed in the City of Los Angeles—not less than 400,000 pounds annually. It is estimated, by fishermen competent to judge, that the consumption in San Diego County annually is 150,000 pounds. These estimates do not include the thousands of pounds annually caught by fishing parties below the Bay of San Francisco. All together, from estimates and data obtained, 4,337,991 pounds have been taken during the present year—a decrease of twenty-five per cent from the catch of the year preceding.

Below is given the amount of salt water fish, received by wholesale dealers, during the fiscal year commencing August 1, 1885, and ending July 31, 1886. It includes rock cod, codfish, barretta, shad, barracuda, sea bass, tomcod, flounders, soles, smelt, halibut, turbot, pompino, king fish, herring, white bait, sardines, and sea trout:

A. Pardini, Clay Street Market, San Francisco, 714,100 pounds.
 A. Sylvester, Clay Street Market, San Francisco, 281,765 pounds.
 S. Paladina, Clay Street Market, San Francisco, 573,100 pounds.
 J. Tavolara, New Market, San Francisco, 117,520 pounds.
 Joseph Catania, New Market, San Francisco, 737,600 pounds.
 E. Antoni, wholesale dealer, San Francisco, 361,400 pounds.
 J. H. Kessing, Clay Street Market, San Francisco, 274,420 pounds.
 Sold in Chinese markets, of all kinds, about 300,700 pounds.

The following tabulated statement will serve to show the quantities of each species and the season of the year when most numerous:

SALT WATER FISH RECEIVED BY G. CAMILLONE, WHOLESALE FISH DEALER, CALIFORNIA STREET MARKET, SAN FRANCISCO, DURING THE LAST FISCAL YEAR, COMMENCING AUGUST 1, 1885, AND ENDING JULY 31, 1886.

<i>August, 1885.</i>	
Rock and codfish	13,310 pounds.
Shad	240 pounds.
Barracuda and bass	11,320 pounds.
Tomcod	920 pounds.
Flounder and sole	72,960 pounds.
Smelt	12,400 pounds.
Halibut	9,300 pounds.
Turbot	1,100 pounds.
Pompino	940 pounds.
Barretta	1,100 pounds.
Kingfish	2,140 pounds.
	125,730 pounds.
<i>September, 1885.</i>	
Rock and codfish	1,940 pounds.
Shad	40 pounds.
Barracuda	1,000 pounds.
Sea bass	16,100 pounds.
Tomcod and smelt	10,100 pounds.
Halibut	400 pounds.
Flounder and sole	6,000 pounds.
Turbot	600 pounds.
Pompino	740 pounds.
Barretta	12,100 pounds.
Kingfish	18,100 pounds.
Shad, small	6,700 pounds.
	74,420 pounds.

<i>October, 1885.</i>		
Rock and codfish	16,300 pounds.	
Shad	200 pounds.	
Smelt	1,100 pounds.	
Barracuda	900 pounds.	
Tomcod and king	2,900 pounds.	
Herring	100 pounds.	
Bass	14,000 pounds.	
		35,500 pounds.
<i>November, 1885.</i>		
Rock and cod	1,400 pounds.	
Shad	2,000 pounds.	
Smelt	2,000 pounds.	
Barracuda	9,000 pounds.	
Tomcod and king	1,900 pounds.	
Herring	9,000 pounds.	
Barretta	6,700 pounds.	
Flounder and sole	9,600 pounds.	
		40,600 pounds.
<i>December, 1885.</i>		
Rock and codfish	600 pounds.	
Shad	12,000 pounds.	
Smelt	900 pounds.	
Barracuda	800 pounds.	
Flounder and sole	14,000 pounds.	
Herring	24,000 pounds.	
Bass	100 pounds.	
Tomcod	1,000 pounds.	
Kingfish	600 pounds.	
		54,000 pounds.
<i>January, 1886.</i>		
Rock, codfish, and perch	1,243 pounds.	
Flounder and sole	390 pounds.	
Tomcod, kingfish, and smelt	460 pounds.	
Herring	2,490 pounds.	
		4,583 pounds.
Rock, codfish, and perch	3,490 pounds.	
Barracuda and halibut	960 pounds.	
Flounder and sole	790 pounds.	
Tomcod, smelt, and kingfish	1,160 pounds.	
		6,400 pounds.
Rockfish and perch	1,340 pounds.	
Herring	21,160 pounds.	
Flounder and sole	690 pounds.	
Halibut and barracuda	370 pounds.	
		23,560 pounds.
Rockfish, flounder, and cod	690 pounds.	
Herring	27,670 pounds.	
Barracuda	340 pounds.	
		28,700 pounds.
Rockfish and perch	4,670 pounds.	
Flounder and sole	3,460 pounds.	
Tomcod and smelt	1,390 pounds.	
Halibut	970 pounds.	
Herring	1,800 pounds.	
		23,490 pounds.
Rock, codfish, and perch	2,496 pounds.	
Flounder and sole	346 pounds.	
Herring	39,490 pounds.	
Tomcod and smelt	290 pounds.	
		42,622 pounds.
<i>February, 1886.</i>		
Rock, codfish, and perch	9,496 pounds.	
Barracuda	490 pounds.	
Flounder and sole	12,560 pounds.	
Tomcod	3,720 pounds.	
Smelt	9,200 pounds.	
Herring	84,300 pounds.	
Turbot	320 pounds.	
Pampino	90 pounds.	
Prawns	140 pounds.	
Halibut	320 pounds.	
		120,636 pounds.

<i>March, 1886.</i>		
Herring	3,420 pounds.	
Rock, codfish, and perch	11,630 pounds.	
Barracuda	760 pounds.	
Flounder and sole	19,620 pounds.	
Tomcod	49,340 pounds.	
Smelt	11,360 pounds.	
Halibut	1,390 pounds.	
Turbot	960 pounds.	
Pampino	1,390 pounds.	
Prawns	40 pounds.	
Kingfish	2,340 pounds.	
Barretta	1,190 pounds.	
Shad	12,920 pounds.	
		116,340 pounds.
<i>April, 1886.</i>		
Rock and codfish	24,670 pounds.	
Shad	19,390 pounds.	
Barracuda	340 pounds.	
Tomcod	3,140 pounds.	
Flounder and sole	22,390 pounds.	
Smelt	20,190 pounds.	
Halibut	290 pounds.	
Turbot	90 pounds.	
Pampino	40 pounds.	
Kingfish	2,940 pounds.	
		93,480 pounds.
<i>May, 1886.</i>		
Rock and codfish	17,340 pounds.	
Shad	9,600 pounds.	
Barracuda	4,390 pounds.	
Tomcod	6,460 pounds.	
Flounder and sole	29,400 pounds.	
Smelt	9,360 pounds.	
Halibut	1,490 pounds.	
Turbot	790 pounds.	
Pampino	390 pounds.	
Kingfish	1,340 pounds.	
Sea bass	940 pounds.	
		81,400 pounds.
<i>June, 1886.</i>		
Rock and codfish	2,950 pounds.	
Shad	360 pounds.	
Barracuda	290 pounds.	
Tomcod	970 pounds.	
Flounder and sole	9,340 pounds.	
Smelts	390 pounds.	
Halibut	190 pounds.	
Turbot	790 pounds.	
Pampino	85 pounds.	
Barretta	1,190 pounds.	
Kingfish	2,340 pounds.	
Smelt	420 pounds.	
Sea bass	10,000 pounds.	
		29,315 pounds.
<i>July, 1886.</i>		
Rock and codfish	12,420 pounds.	
Shad	140 pounds.	
Barracuda	90 pounds.	
Tomcod	310 pounds.	
Flounder and sole	6,160 pounds.	
Sea bass	32,490 pounds.	
Smelt	960 pounds.	
Halibut	690 pounds.	
Pampino	60 pounds.	
Barretta	12,740 pounds.	
Kingfish	1,410 pounds.	
Shad (small)	2,140 pounds.	
		71,610 pounds.

NETS AND SEINES.

During the year 1886 over three thousand men were engaged in salmon fishing. They used from fifty to sixty seines, and over nine hundred gill

nets. Greeks and Italians being a large class of the fishermen, use all kinds of nets and seines, and take most of the herring, smelt, flounder, tomcod, rock cod, sardines, barracuda, and sea bass. Chinese fishermen catch most of the shrimp, sturgeon, crabs, and clams.

CHINESE SPOLIATIONS.

We learn from the reports of the United States Treasury Department that our export trade with China for the year ending June 30, 1885, amounted to \$6,396,506. Evidently our importations are greatly in excess, probably as three is to one, over our exports. Be this as it may, California exportations bring no returns, except such trifling amounts as may be paid to shippers and carriers. The export trade from San Francisco is largely in the shape of dried and salted fish, and dried shrimps and shrimp shells. These are taken from our waters by Chinese using criminal methods, and in violation of our laws and as free of cost to them as if they were "to [our] the manor born." These shipments of *our* unmaturred fish in China are annually worth over \$3,000,000. Where comes in our compensation?

Deputy Fish Commissioner W. C. Jones, in letter of March 16, 1886, referring to the destruction of small fish by Chinamen, says: "I have seen on many occasions a vessel laden with shrimps and small fish all from one camp, the vessel carrying one hundred and twenty-five tons. I have visited some forty camps during the last two and a half years, and have heard of the location of many others on San Pablo and San Francisco Bays. To give you a better idea, I have arrested as high as five junks at a time, and in each of them would be at least one ton of small fish and shrimps in each junk every six hours or every tide. I made an effort last Fall to get something like an estimate of the number of Chinese engaged in the fish traffic—not including those directly engaged in San Francisco, but merely those catching fish and preparing them for shipment—and there are between fifteen hundred and two thousand. Five to six are required to manage one junk and attend to the drying beds. Their nets are made stationary and it requires about one hour to haul them and dump the catch in the boat; that leaves them about five hours to assort, spread them out, and take care of those sufficiently dried. On one occasion, last Summer, the boss Chinaman told me that the shrimp and fish in a junk was worth about twenty dollars when prepared for market. By the facts above stated, you can see that the matter has been underestimated."

In letter to one of our Representatives in Congress, dated March 9, 1886, our Commission, in hopes of obtaining Congressional relief, presented this grievance and stated that "the people of California most earnestly demand that a law shall be passed at the present session of Congress that will, in effect, prohibit the exportation of shrimp and young fish by Chinese to China. If such a law be passed our citizens will have (and they are entitled to have) the food of the waters for themselves, and a most destructive vandal occupation will cease. The oft-repeated and serious complaint that fish food is becoming scarce in California furnishes a powerful reason why the Chinese exhaustion should cease, and the cause of the complaint be removed."

The Commission received words of encouragement but nothing more. The Commission will use its police power to remedy the evil, and to enforce obedience to our fish laws.

PATROL AND PROTECTION.

The present Commissioners on coming into office were alarmed at the excessive decrease in the salmon take and at the small catch of some other varieties of fish. Ascertaining that the diminution was largely owing to violation of the fish laws of the State, by Chinese and others, the Commissioners determined to employ upon bays and rivers a strong and active patrol police. We were compelled to do this, or to permit the laws of the State to be violated and our waters and citizens robbed. The Commissioners also believed it to be a vain work to stock waters for the mere gain of vandals and foreign exportation. The patrol system was inaugurated in the Fall of 1883, and up to the present time has done much excellent work. Chief W. C. Jones in one of his reports favorably says of it, "The best evidence I have to offer in the interest of the good accomplished by the river patrol, is the small amount of violations now being committed of the existing fish laws. It is a well known fact that prior to the establishment of an efficient patrol on the rivers and bays, fishermen carried on their unlawful business without restraint."

As to the necessity and efficiency of the patrol, no better or more convincing statement is required than to refer to the number of arrests and convictions that have resulted from the first day of August, 1883, to October 1, 1884.

That branch of the police service under Chief Jones, arrested, and in nearly all cases, convicted, one hundred and seventy-five criminal offenders. From these, fines in the sum of \$2,000 were collected, and under the law, mostly distributed to informers and District Attorneys. In 1885-86, over six hundred were arrested and about four hundred and fifty convicted. During the present year, between April seventh and September eighteenth, Chief J. H. Harten arrested seventy. Many were convicted, fined, or in default of payment, jailed. Whilst these law violations and wrongs have been known to all, their magnitude has been realized by but few. The expense of this service, although it has been heavy, is a trifle in comparison with the beneficial results secured. The work should be kept up and strengthened.

MAINTAINING THE LAWS.

Having reference to public sentiment in favor of maintaining the laws, our Commission adopt, as applicable to our State, the views of the Commissioners of Fisheries of the State of New York, contained in report for the years 1883-1884, page 12:

Allusion has been made to the decided change in public sentiment in regard to the work of the Fishery Commissioners. It is beginning to dawn upon the minds of a great many, hitherto opponents, that every citizen has a direct pecuniary interest in the matter of fish culture and protection. The stronger and more widespread it becomes, the sooner the aims and objects of the Commission will be realized. If the people can be educated up to the standard of believing what, to every reflecting, intelligent mind is a self-evident proposition, namely: that every citizen has an indisputable right to share in the fish products of this State, and that those who infringe the protective laws are defrauding them of a portion, or, perhaps, the whole, of their rightful dividend, antagonism to legislative appropriation would speedily cease, and in its stead there would be a strong popular demand for the providing of all the money needed to perfect the operations already begun. They should be taught to regard the individual who kills an edible fish out of season or by illicit means, at any time as a public enemy. Why not? Either act is unlawful; hence, the man who perpetrates it is a violator of law, and as clearly entitled to punishment as an offender of any other class.

STEAM LAUNCH.

An Act of the Legislature to authorize the Board of Fish Commissioners to construct a steam launch to aid in carrying out the purpose of said Board, passed in March, 1885. The sum of \$4,000 was appropriated. In April, 1885, a contract was entered into with John W. Rock, Esq., of Sacramento, an experienced boat builder, for the construction of the steamer at the cost of \$4,000. The plans and specifications called for a boat forty-six feet long, twelve feet breadth of beam, and six feet depth of hold, with a boiler of the best American iron, six feet long, five feet in diameter, with return flues. The engine a ten by ten cylinder, propeller shaft three and one half inches in diameter, with a forty-six inch propeller. The boat was completed on the twentieth day of August, 1885, and immediately put into patrol service. The necessity for the craft was considered and passed upon by the Legislature, and the State is now the owner. The "Governor Stone-man" is staunch and swift (having made twenty miles in an hour and ten minutes) and has already done and will hereafter do most excellent protective and patrol work.

SHEBLEY HATCHERY.

This hatchery was established in May, 1883. During that year there were hatched and distributed over 95,000 trout. In the year 1884 about 250,000. In the year 1885 about 150,000. During this year, up to the present time, over 100,000. The output for 1887 should not be less than 300,000. The trout distribution from Chabot for the two years preceding 1883 amounted to only 87,000. The maintenance cost of the hatchery at Chabot (condemned in 1883) was \$250 per month; cost of the Shebley, \$100 per month.

STATE SALMON HATCHERY.

In March, 1885, the Legislature passed a bill, authorizing the Board of Fish Commissioners to erect and maintain a State Salmon Hatchery, and appropriating therefor the sum of \$10,000. Before entering upon the work of construction a majority of the Board personally examined the Little Sacramento River, McCloud, Pit, and Hat Creek, all tributaries of Sacramento River. On the twentieth day of April the Board selected a site, and secured ample domain and necessary water, timber, and other privileges. The station is upon Hat Creek, about two and one half miles above its junction with Pit River. The site is a most excellent and desirable one, for the following reasons: an assured supply of salmon spawn; abundance of pure, cold water; absolute security from freshets; convenient reservoir sites; excellence of seining grounds; abundance of timber; ample grades for water discharge; good public roads, etc.

The selection was also made from another and most important inducement. Pit River is only about one half a mile from the hatchery, and the spawn of both Hat Creek and Pit River (a noted salmon stream) can be readily handled and hatched in it. Work upon the building commenced in May last. Fred. White, Esq., of Sacramento, a skillful mechanic and builder, drafted the plan and superintended the construction. The building is 100 feet long, and 46 feet wide; framed and strongly tied; inclosed with planed rustic; well roofed, painted, and underpinned. The inside furnishing consists of four large water tanks, and eight tiers of boxes or flumes, set on proper grade, and made to receive seventy propagating baskets to the tier. Two more tiers can be added, when required. Two storage ponds, convenient to the hatchery, have been constructed—one,

40x40 feet; the other, 8x60 feet. The young samlets will be held in these reservoirs, until acquired size and strength will enable them to defend themselves against larger fish and common enemies. 6,000,000 to 8,000,000 young fry can be hatched annually. At the present writing we have in the hatchery about 1,200,000 that will be released in December.

The expense of running the United States Salmon Hatchery at McCloud, covering a period of five years preceding January, 1883, was \$53,000—(see Bulletin of the United States Fish Commissioners, page 202). The maintenance of the California State Salmon Hatchery should not exceed \$3,000 per annum. The State is now the owner of a large, commodious, well furnished hatchery, and will not hereafter be called upon to pay questionable bills, aggregating thousands of dollars, for the hatching and release of salmon.

CANNERIES.

On account of the small run, and decreased take of salmon, more than one half of the canneries that were operated in 1883-4 were closed in 1885 and 1886. The number of cases packed in 1885 was 90,000, as against 120,000 for 1883, and 200,000 for 1882. In 1882, nineteen canneries were in successful operation, whilst in 1885, only five or six were running.

The closing of ten or twelve packing establishments was not only a serious loss to proprietors, but also to the large force of men employed by them; several thousands thereby lost remunerative employment.

The prospect for the pack of 1887 is not encouraging. Most of the canneries will remain closed, and one third or more of the boats will be unused. The pack on the Columbia River also shows a heavy shortage, as appears from the following statement taken from an Oregon financial and trade report: "The legal limit of the canning season on the Columbia River closed last Saturday night, but the canneries have not made up their reports. In a general way, the pack in that river is estimated at from 400,000 to 450,000 cases. Possibly the actual returns will not vary much from 425,000 cases, which means a shortage of 100,000 cases, as compared with last year." The salmon season on the Columbia River runs from April first to August first.

DAMS AND FISH LADDERS.

Many complaints have been made to the Commissioners from all portions of the State, that owners of dams have neglected to comply with the law requiring the construction of fishways, so as to permit the free passage of fish. Many of the old dams now obstructing the rivers, were originally built to divert water for mining purposes. The mining use having ceased, the parties who erected long since abandoned them. Other parties have come into possession and now use them for irrigation, but disavow ownership and deny any obligation to furnish them with fish ladders. Others are owned by persons who still claim them, but who are not residents of the county in which they are situated, and others are owned by unknown parties. Such surrounding conditions render it difficult and expensive to serve the necessary papers, and to obtain the desired relief. Other dams are upon rivers close to natural falls, and the distance between is too limited to be of any serious injury. In such a case both or neither should be furnished with fishways. The owners of dams upon whom we have served notices have generally either put in fish ladders or promised so to do.

LAWS RECOMMENDED.

The close season for salmon should be enlarged. It is now "between the thirtieth day of August and the first day of October." It should be from the first day of August to the first day of October.

A law should be passed prohibiting the use of what is called the "Chinese shrimp or bag net." This net does more damage to the fish interest of the State than all other nets and traps combined.

A law should be passed prohibiting the use of Chinese sturgeon lines at any time, and making the penalty severe for its violation.

The Commission earnestly recommends legislative remedial action to prevent the destruction of fish by seals and sea lions.

And further recommend the repealing of the shad close season law.

And further recommend that the penalties for the violations of fish laws be made uniform, and that fines collected be allotted as follows: one half to the informer, one quarter to the prosecuting District Attorney of the county in which the action is tried, one quarter to the State Board of Fish Commissioners, to be paid to the Treasurer of the Board.

APPROPRIATION AND EXPENSES.

The sum of \$5,000 per year has heretofore been appropriated "for the restoration and preservation of the fish of the State." This sum was devoted by former Commissioners mostly in the securing and hatching of fish eggs, and in the distribution of young fish.

Extensively, as heretofore, the work of preservation and restoration has been kept up by the present Board. Since the coming in of the present Commission its work has been necessarily enlarged, and its expenses greatly increased. In August, 1883, a system of police patrol of the rivers and bays was established, and has been annually kept up, and should be continued. In March, 1885, a steam launch became an arm of the police service. The maintenance of the patrol, including the operative expenses of the steamer, has greatly increased the expenditures of the Commission, and the draft thereby occasioned upon the \$5,000 fund leaves but little of it for other important uses.

The efficient and successful management of the State Salmon Hatchery, since its construction in 1885, has devolved upon the Commission. We estimate that the cost of operating it will be about \$3,000 a year. This figure, in comparison with the annual expenditure of the United States Commission, of \$10,000 per year on the McCloud, we think is reasonable. In order to cover the cost of propagation and replenishment, the police service and steamer, two extensive hatcheries (a salmon and trout), the meetings of the Board, official work, traveling and incidental expenses, the sum of \$10,000 a year is required, and should be appropriated.

SEALS AND SEA LIONS.

These aquatic animals are a serious detriment to the fish interests of the State. They sit at the entrance of the Golden Gate as royal toll gatherers, and take the lion's share of the schools of the finny tribe, as they pass from the broad Pacific into the Bay of San Francisco, preparatory to an ascent of our rivers. In the opinion of the Commission, they are great destroyers of the salmon. They appear to be more numerous at Seal Rock, and around the entrance of San Francisco Bay, than in former years, owing, no doubt, to the fact that the fishermen have driven them with their nets

from Suisun and San Pablo Bays. They not only guard the entrance of San Francisco Bay, but are found at the entrance of Monterey, Bolinas, Point Arena, Tomales, and Shoalwater Bays. This and former Commissions, and the public press, have repeatedly invoked legislative action to prevent the immense destruction of fish constantly going on and increasing by these worthless animals. It is highly important to our citizens to have the food of which they are so deprived, and in their behalf remedial legislation is again urgently demanded.

THE SACRAMENTO RIVER.

The Sacramento, the largest river in the State, runs from north to south through the counties of Modoc, Lassen, Shasta, Tehama, Butte, Colusa, Sutter, Yolo, Sacramento, and Solano, a distance of nearly five hundred miles. It has its origin from the springs and melting snows of the mountains, and, as it drains an immense area during protracted and heavy rains, it overflows its banks and floods a large area of lowlands along the lower part of its course. The river is a pure, clear stream above the mouth of the Feather, but below that point it is heavily charged with detritus from the mining districts, the streams flowing from which are tributary to the Feather. The water in the mountains is cold, while in the lower reaches during the Summer months it gets quite warm, reaching at times a temperature of eighty degrees.

COMPARATIVE TEMPERATURE OF THE RIVER.

Below is given the temperature of the water in the Sacramento River at Sacramento, taken at 4 o'clock p. m. daily, by Thomas Evans, day watchman of the Central Pacific Railroad, for the Fish Commission, from September 15, 1885, to September 15, 1886:

September 15, 1885.....	72 degrees.	October 17, 1885.....	62 degrees.
September 16, 1885.....	72 degrees.	October 18, 1885.....	63 degrees.
September 17, 1885.....	71 degrees.	October 19, 1885.....	63 degrees.
September 18, 1885.....	71 degrees.	October 20, 1885.....	62 degrees.
September 19, 1885.....	71 degrees.	October 21, 1885.....	61 degrees.
September 20, 1885.....	72 degrees.	October 22, 1885.....	61 degrees.
September 21, 1885.....	73 degrees.	October 23, 1885.....	61 degrees.
September 22, 1885.....	73 degrees.	October 24, 1885.....	61 degrees.
September 23, 1885.....	71 degrees.	October 25, 1885.....	61 degrees.
September 24, 1885.....	70 degrees.	October 26, 1885.....	61 degrees.
September 25, 1885.....	70 degrees.	October 27, 1885.....	61 degrees.
September 26, 1885.....	69 degrees.	October 28, 1885.....	61 degrees.
September 27, 1885.....	69 degrees.	October 29, 1885.....	61 degrees.
September 28, 1885.....	69 degrees.	October 30, 1885.....	61 degrees.
September 29, 1885.....	68 degrees.	October 31, 1885.....	61 degrees.
September 30, 1885.....	68 degrees.	November 1, 1885.....	60 degrees.
October 1, 1885.....	68 degrees.	November 2, 1885.....	59 degrees.
October 2, 1885.....	69 degrees.	November 3, 1885.....	58 degrees.
October 3, 1885.....	70 degrees.	November 4, 1885.....	56 degrees.
October 4, 1885.....	70 degrees.	November 5, 1885.....	55 degrees.
October 5, 1885.....	70 degrees.	November 6, 1885.....	54 degrees.
October 6, 1885.....	68 degrees.	November 7, 1885.....	54 degrees.
October 7, 1885.....	67 degrees.	November 8, 1885.....	56 degrees.
October 8, 1885.....	67 degrees.	November 9, 1885.....	54 degrees.
October 9, 1885.....	66 degrees.	November 10, 1885.....	53 degrees.
October 10, 1885.....	66 degrees.	November 11, 1885.....	52 degrees.
October 11, 1885.....	66 degrees.	November 12, 1885.....	52 degrees.
October 12, 1885.....	64 degrees.	November 13, 1885.....	51 degrees.
October 13, 1885.....	64 degrees.	November 14, 1885.....	51 degrees.
October 14, 1885.....	63 degrees.	November 15, 1885.....	51 degrees.
October 15, 1885.....	63 degrees.	November 16, 1885.....	51 degrees.
October 16, 1885.....	63 degrees.	November 17, 1885.....	52 degrees.

November 18, 1885	51 degrees.	February 2, 1886	48 degrees.
November 19, 1885	51 degrees.	February 3, 1886	49 degrees.
November 20, 1885	50 degrees.	February 4, 1886	50 degrees.
November 21, 1885	50 degrees.	February 5, 1886	50 degrees.
November 22, 1885	49 degrees.	February 6, 1886	50 degrees.
November 23, 1885	49 degrees.	February 7, 1886	50 degrees.
November 24, 1885	48 degrees.	February 8, 1886	50 degrees.
November 25, 1885	48 degrees.	February 9, 1886	51 degrees.
November 26, 1885	48 degrees.	February 10, 1886	51 degrees.
November 27, 1885	49 degrees.	February 11, 1886	52 degrees.
November 28, 1885	49 degrees.	February 12, 1886	53 degrees.
November 29, 1885	49 degrees.	February 13, 1886	51 degrees.
November 30, 1885	50 degrees.	February 14, 1886	51 degrees.
December 1, 1885	48 degrees.	February 15, 1886	50 degrees.
December 2, 1885	48 degrees.	February 16, 1886	50 degrees.
December 3, 1885	48 degrees.	February 17, 1886	50 degrees.
December 4, 1885	48 degrees.	February 18, 1886	51 degrees.
December 5, 1885	48 degrees.	February 19, 1886	51 degrees.
December 6, 1885	46 degrees.	February 20, 1886	51 degrees.
December 7, 1885	46 degrees.	February 21, 1886	52 degrees.
December 8, 1885	46 degrees.	February 22, 1886	51 degrees.
December 9, 1885	46 degrees.	February 23, 1886	51 degrees.
December 10, 1885	46 degrees.	February 24, 1886	53 degrees.
December 11, 1885	46 degrees.	February 25, 1886	53 degrees.
December 12, 1885	46 degrees.	February 26, 1886	51 degrees.
December 13, 1885	46 degrees.	February 27, 1886	50 degrees.
December 14, 1885	46 degrees.	February 28, 1886	50 degrees.
December 15, 1885	46 degrees.	March 1, 1886	49 degrees.
December 16, 1885	46 degrees.	March 2, 1886	48 degrees.
December 17, 1885	46 degrees.	March 3, 1886	48 degrees.
December 18, 1885	46 degrees.	March 4, 1886	48 degrees.
December 19, 1885	46 degrees.	March 5, 1886	48 degrees.
December 20, 1885	46 degrees.	March 6, 1886	48 degrees.
December 21, 1885	46 degrees.	March 7, 1886	48 degrees.
December 22, 1885	46 degrees.	March 8, 1886	49 degrees.
December 23, 1885	46 degrees.	March 9, 1886	49 degrees.
December 24, 1885	46 degrees.	March 10, 1886	48 degrees.
December 25, 1885	46 degrees.	March 11, 1886	49 degrees.
December 26, 1885	46 degrees.	March 12, 1886	50 degrees.
December 27, 1885	46 degrees.	March 13, 1886	50 degrees.
December 28, 1885	46 degrees.	March 14, 1886	48 degrees.
December 29, 1885	46 degrees.	March 15, 1886	50 degrees.
December 30, 1885	46 degrees.	March 16, 1886	50 degrees.
December 31, 1885	45 degrees.	March 17, 1886	48 degrees.
January 1, 1886	44 degrees.	March 18, 1886	48 degrees.
January 2, 1886	43 degrees.	March 19, 1886	49 degrees.
January 3, 1886	42 degrees.	March 20, 1886	50 degrees.
January 4, 1886	41 degrees.	March 21, 1886	51 degrees.
January 5, 1886	41 degrees.	March 22, 1886	53 degrees.
January 6, 1886	41 degrees.	March 23, 1886	53 degrees.
January 7, 1886	41 degrees.	March 24, 1886	54 degrees.
January 8, 1886	41 degrees.	March 25, 1886	54 degrees.
January 9, 1886	41 degrees.	March 26, 1886	55 degrees.
January 10, 1886	41 degrees.	March 27, 1886	55 degrees.
January 11, 1886	40 degrees.	March 28, 1886	55 degrees.
January 12, 1886	40 degrees.	March 29, 1886	55 degrees.
January 13, 1886	42 degrees.	March 30, 1886	55 degrees.
January 14, 1886	42 degrees.	March 31, 1886	55 degrees.
January 15, 1886	42 degrees.	April 1, 1886	54 degrees.
January 16, 1886	43 degrees.	April 2, 1886	54 degrees.
January 17, 1886	43 degrees.	April 3, 1886	54 degrees.
January 18, 1886	42 degrees.	April 4, 1886	55 degrees.
January 19, 1886	43 degrees.	April 5, 1886	55 degrees.
January 20, 1886	43 degrees.	April 6, 1886	54 degrees.
January 21, 1886	47 degrees.	April 7, 1886	55 degrees.
January 22, 1886	47 degrees.	April 8, 1886	54 degrees.
January 23, 1886	47 degrees.	April 9, 1886	53 degrees.
January 24, 1886	47 degrees.	April 10, 1886	53 degrees.
January 25, 1886	47 degrees.	April 11, 1886	50 degrees.
January 26, 1886	47 degrees.	April 12, 1886	50 degrees.
January 27, 1886	47 degrees.	April 13, 1886	50 degrees.
January 28, 1886	46 degrees.	April 14, 1886	50 degrees.
January 29, 1886	46 degrees.	April 16, 1886	50 degrees.
January 30, 1886	46 degrees.	April 15, 1886	50 degrees.
January 31, 1886	46 degrees.	April 17, 1886	50 degrees.
February 1, 1886	48 degrees.	April 18, 1886	51 degrees.

April 19, 1886.....	52 degrees.	July 3, 1886.....	72 degrees.
April 20, 1886.....	54 degrees.	July 4, 1886.....	72 degrees.
April 21, 1886.....	55 degrees.	July 5, 1886.....	72 degrees.
April 22, 1886.....	56 degrees.	July 6, 1886.....	72 degrees.
April 23, 1886.....	56 degrees.	July 7, 1886.....	73 degrees.
April 24, 1886.....	58 degrees.	July 8, 1886.....	74 degrees.
April 25, 1886.....	59 degrees.	July 9, 1886.....	75 degrees.
April 26, 1886.....	59 degrees.	July 10, 1886.....	76 degrees.
April 27, 1886.....	59 degrees.	July 11, 1886.....	77 degrees.
April 28, 1886.....	58 degrees.	July 12, 1886.....	78 degrees.
April 29, 1886.....	58 degrees.	July 13, 1886.....	80 degrees.
April 30, 1886.....	58 degrees.	July 14, 1886.....	82 degrees.
May 1, 1886.....	59 degrees.	July 15, 1886.....	82 degrees.
May 2, 1886.....	58 degrees.	July 16, 1886.....	82 degrees.
May 3, 1886.....	56 degrees.	July 17, 1886.....	81 degrees.
May 4, 1886.....	56 degrees.	July 18, 1886.....	80 degrees.
May 5, 1886.....	56 degrees.	July 19, 1886.....	80 degrees.
May 6, 1886.....	57 degrees.	July 20, 1886.....	79 degrees.
May 7, 1886.....	58 degrees.	July 21, 1886.....	80 degrees.
May 8, 1886.....	58 degrees.	July 22, 1886.....	79 degrees.
May 9, 1886.....	58 degrees.	July 23, 1886.....	78 degrees.
May 10, 1886.....	58 degrees.	July 24, 1886.....	78 degrees.
May 11, 1886.....	58 degrees.	July 25, 1886.....	78 degrees.
May 12, 1886.....	58 degrees.	July 26, 1886.....	77 degrees.
May 13, 1886.....	59 degrees.	July 27, 1886.....	76 degrees.
May 14, 1886.....	60 degrees.	July 28, 1886.....	78 degrees.
May 15, 1886.....	62 degrees.	July 29, 1886.....	78 degrees.
May 16, 1886.....	64 degrees.	July 30, 1886.....	80 degrees.
May 17, 1886.....	65 degrees.	July 31, 1886.....	80 degrees.
May 18, 1886.....	65 degrees.	August 1, 1886.....	82 degrees.
May 19, 1886.....	63 degrees.	August 2, 1886.....	80 degrees.
May 20, 1886.....	62 degrees.	August 3, 1886.....	79 degrees.
May 21, 1886.....	62 degrees.	August 4, 1886.....	80 degrees.
May 22, 1886.....	63 degrees.	August 5, 1886.....	81 degrees.
May 23, 1886.....	62 degrees.	August 6, 1886.....	79 degrees.
May 24, 1886.....	62 degrees.	August 7, 1886.....	78 degrees.
May 25, 1886.....	63 degrees.	August 8, 1886.....	78 degrees.
May 26, 1886.....	63 degrees.	August 9, 1886.....	78 degrees.
May 27, 1886.....	63 degrees.	August 10, 1886.....	80 degrees.
May 28, 1886.....	63 degrees.	August 11, 1886.....	81 degrees.
May 29, 1886.....	63 degrees.	August 12, 1886.....	80 degrees.
May 30, 1886.....	63 degrees.	August 13, 1886.....	78 degrees.
May 31, 1886.....	64 degrees.	August 14, 1886.....	78 degrees.
June 1, 1886.....	65 degrees.	August 15, 1886.....	77 degrees.
June 2, 1886.....	65 degrees.	August 16, 1886.....	77 degrees.
June 3, 1886.....	66 degrees.	August 17, 1886.....	77 degrees.
June 4, 1886.....	66 degrees.	August 18, 1886.....	77 degrees.
June 5, 1886.....	67 degrees.	August 19, 1886.....	76 degrees.
June 6, 1886.....	69 degrees.	August 20, 1886.....	75 degrees.
June 7, 1886.....	70 degrees.	August 21, 1886.....	75 degrees.
June 8, 1886.....	70 degrees.	August 22, 1886.....	74 degrees.
June 9, 1886.....	70 degrees.	August 23, 1886.....	74 degrees.
June 10, 1886.....	68 degrees.	August 24, 1886.....	75 degrees.
June 11, 1886.....	68 degrees.	August 25, 1886.....	76 degrees.
June 12, 1886.....	68 degrees.	August 26, 1886.....	77 degrees.
June 13, 1886.....	67 degrees.	August 27, 1886.....	76 degrees.
June 14, 1886.....	69 degrees.	August 28, 1886.....	75 degrees.
June 15, 1886.....	70 degrees.	August 29, 1886.....	75 degrees.
June 16, 1886.....	70 degrees.	August 30, 1886.....	74 degrees.
June 17, 1886.....	70 degrees.	August 31, 1886.....	74 degrees.
June 18, 1886.....	70 degrees.	September 1, 1886.....	74 degrees.
June 19, 1886.....	70 degrees.	September 2, 1886.....	74 degrees.
June 20, 1886.....	72 degrees.	September 3, 1886.....	75 degrees.
June 21, 1886.....	73 degrees.	September 4, 1886.....	73 degrees.
June 22, 1886.....	73 degrees.	September 5, 1886.....	71 degrees.
June 23, 1886.....	74 degrees.	September 6, 1886.....	71 degrees.
June 24, 1886.....	74 degrees.	September 7, 1886.....	72 degrees.
June 25, 1886.....	74 degrees.	September 8, 1886.....	73 degrees.
June 26, 1886.....	72 degrees.	September 9, 1886.....	74 degrees.
June 27, 1886.....	71 degrees.	September 10, 1886.....	73 degrees.
June 28, 1886.....	71 degrees.	September 11, 1886.....	73 degrees.
June 29, 1886.....	72 degrees.	September 12, 1886.....	72 degrees.
June 30, 1886.....	72 degrees.	September 13, 1886.....	71 degrees.
July 1, 1886.....	72 degrees.	September 14, 1886.....	71 degrees.
July 2, 1886.....	72 degrees.	September 15, 1886.....	71 degrees.

THE AMERICAN RIVER.

The American is a shallow, muddy stream and empties into the Sacramento at Sacramento City. But few fish are found in the lower part of the stream. Trout are found in some of its branches above the mining districts—notably Silver Creek and the Rubicon. This river, prior to placer mining, was one of the best salmon streams in the State. Of late years no salmon have ascended it.

THE YUBA RIVER.

The Yuba is a branch of the Feather River. It is a shallow stream, except during the rainy season. Considerable mining is carried on in its bed and along its banks, and its water is muddy. Trout are found in its headwaters above the mining districts.

BEAR RIVER.

Bear has lost all claim to the name of river. Above the town of Wheatland it has lost its channel and volume as a Summer stream. It never was noted as a fish stream, although a few salmon and perch were taken from its waters in early days.

THE SAN JOAQUIN RIVER.

The San Joaquin, once a noted salmon stream; of late years few salmon have been taken in its waters. The principal cause of abandonment is the great number of dams upon its various branches, which are so constructed as not to allow the fish to reach their spawning grounds. Salmon and other varieties of fish are taken in considerable quantities near the mouth of the river. Most of the fishing in this stream is done below the city of Stockton.

THE TUOLUMNE RIVER.

The Tuolumne, a branch of the San Joaquin, at one time was one of the best salmon streams in the State. Salmon have not ascended the stream for some years.

THE STANISLAUS RIVER.

What has been said of the Tuolumne is true of the Stanislaus. Occasionally a salmon may be seen trying to get over one of its numerous dams.

COAST RIVERS AND CREEKS.

Smith River, in the county of Del Norte, with its north and south forks, makes a large stream. It has a regular run of salmon and is also well stocked with salmon and brook trout.

The next stream south of the Smith of any consequence is the Klamath. This is an excellent salmon stream, not fished, however, to any great extent. The time is close at hand when it will have its share of fishing camps and canneries.

Trinity River, owing to the debris from the placer mines in that section, does not amount to much as a fishing stream. The fish will not ascend a stream to spawning grounds through water heavily charged, as this is, with mining detritus.

Redwood Creek and Mad River are not much fished, notwithstanding the fact that salmon and trout abound in them.

Eel, one of the principal rivers running through Humboldt County, is a large stream and has many fishing camps upon its banks, in which large quantities of salmon are salted annually.

Mattole River and Casper Creek are comparatively small streams. They are well stocked with fish.

A great many salmon are taken in Little River and shipped to San Francisco, where they are known as coast salmon.

The same can be said of the Navarro River in Mendocino County.

Russian, the longest river running through Sonoma County, is a good fish stream. There are several camps upon its banks near its mouth, and vast quantities of fish are taken in its waters. Its best fish is the salmon, perch, pike, and chub.

San Lorenzo, Benito, and Soquel Creeks, are about the only streams of any consequence in Santa Cruz County. Several smaller streams empty into Monterey Bay. At times salmon run in them, but never in great quantities. These are the most southerly streams entered by salmon, being between latitude thirty-six degrees and thirty-seven degrees north, and are the lowest salmon streams on either the Atlantic or Pacific Coast.

In the rivers and creeks of Monterey, San Luis Obispo, Santa Barbara, Ventura, Los Angeles, and San Diego, no salmon enter to speak of, but salmon trout are taken in large quantities.

EXPENDITURES DURING THE THIRTY-SIXTH FISCAL YEAR.

<i>To Appropriation.</i>		
General Appropriation Bill, Stats. of California, 1883 (p. 76).....		\$5,000 00
<i>By Expenditures.</i>		
Warrant No. 537—To J. C. Frazier, salary and expenses.....	\$194 80	
To W. C. Jones, salary and expenses, July.....	240 00	
		\$434 80
Warrant No. 1839—To J. Shebley, cash and labor.....	\$168 10	
To E. Bosqui, engraving and printing.....	25 00	
To W. C. Jones, salary and expenses, August.....	600 00	
To R. H. Buckingham, traveling expenses, supplies, etc.....	144 65	
		937 75
Warrant No. 3088—To J. C. Frazier, salary and expenses, Sep- tember.....	\$247 95	
To W. C. Jones, salary September and Octo- ber.....	160 00	
To R. H. Buckingham, traveling expenses, supplies, etc.....	98 35	
		506 30
Warrant No. 3095—To A. B. Dibble, traveling expenses, sup- plies, etc.....		365 04
Warrant No. 3547—To W. C. Jones, salary November.....	\$80 00	
To J. C. Frazier, salary and expenses Oc- tober.....	101 75	
To W. E. Doan, clerical work.....	40 00	
To T. H. Wilhelm, meat.....	32 00	
		253 75
Warrant No. 4446—To Wm. Irelan, analysis of water.....	\$20 00	
To R. H. Buckingham, traveling and other expenses.....	65 78	
To W. C. Jones, salary December.....	80 00	
To Shaw & Son, 100,000 salmon eggs.....	65 00	
		230 78
Warrant No. 6279—To W. C. Jones, salary January.....	\$80 00	
To Jos. Shebley, labor, expressage, etc.....	211 86	
To A. B. Dibble, traveling expenses, sup- plies, etc.....	329 10	
		620 96
Warrant No. 8723—To J. Shebley, salary and expenses January.....	\$306 10	
To J. C. Frazier, salary and expenses De- cember.....	24 48	
To W. C. Jones, salary February.....	80 00	
To R. H. Buckingham, traveling expenses, supplies, etc.....	170 40	
To A. B. Dibble, traveling expenses, sup- plies, etc.....	189 25	
		770 23
Warrant No. 9595—To W. C. Jones, salary March and April.....	\$160 00	
To S. P. Maslin, clerical work.....	100 00	
To A. B. Dibble, traveling expenses, sup- plies, etc.....	160 60	
		420 60
Warrant No. 7—To R. H. Buckingham, traveling expenses, supplies, etc.....	\$51 95	
To H. Woodson, 100,000 trout eggs.....	195 75	
To Wells, Fargo & Co., expressage.....	29 75	
		277 45
Warrant No. 341—To W. C. Jones, salary June.....	80 00	
Warrant No. 352—To J. Shebley, traveling and expressage.....	46 60	
Warrant No. 353—To J. C. Frazier, salary December and ex- penses.....	\$240 90	
Less deficiency in appropriation.....	55 74	
		185 16
		5,000 00

EXPENDITURES

During the Thirty-seventh Fiscal Year, chargeable against the Appropriation for the Restoration and Preservation of Fish within the waters of the State.

To appropriation (General Appropriation Bill, Statutes California, 1885, page 85)		\$5,000 00
<i>By Expenditures.</i>		
Warrant No. 354—To A. & D. E. Matteson, laying cement pipe.....	\$41 50	
To Stevens & McKenny, 362,580 trout eggs.....	365 78	
To A. W. Coffin, freight on fish	65 00	
To J. Shebley, labor, etc.	100 00	
To Wm. Shebley, expressage, etc.	82 85	
To Wells, Fargo & Co., expressage	32 40	
		\$687 53
Warrant No. 737—To A. B. Dibble, traveling expenses, supplies, etc.		90 00
Warrant No. 796—To W. C. Jones, salary July and expenses, 1885.....		105 00
Warrant No. 1818—To R. H. Buckingham, traveling expenses, etc.		286 75
Warrant No. 1819—To W. C. Jones, salary August, etc., 1885 ..	\$300 00	
To Goodall, Perkins & Co., 500 gallons water ..	2 50	
To Holbrook, Merrill & Stetson, hardware ..	45 99	
		348 49
Warrant No. 2106—To Huntington, Hopkins & Co., hardware.....	\$51 19	
To J. N. Gill, provisions.....	26 36	
		77 57
Warrant No. 2108—To S. P. Maslin, clerical services		100 00
Warrant No. 2415—To Sherburn & Smith, crockery.....	\$21 00	
To E. Canberry, labor.....	5 00	
To Standard Oil Company, oil	4 88	
To E. N. Eager, survey of San Pablo Bay.....	40 00	
To W. Shebley, labor, etc.	90 63	
		161 51
Warrant No. 2761—To Marchutz & Cantrell, propeller		27 80
Warrant No. 3206—To R. H. Buckingham, traveling expenses, supplies, etc.	\$148 85	
To A. Caldero, board, etc.	5 00	
To R. E. Hansen, pilot	30 00	
To A. B. Dibble, traveling expenses, supplies, etc.	125 50	
To Black Diamond Mining Company, coal.....	35 30	
To W. C. Jones, provisions.....	31 85	
To W. H. Dewey & Co., provisions	106 18	
To pay-roll September and October, 1885.....	885 00	
		1,367 68
Warrant No. 4019—To W. C. Jones, provisions.....	\$22 60	
To Thos. Summers, engineer.....	27 00	
To Marchutz & Cantrell, propeller	67 00	
To E. M. Leitch, coal	42 25	
To Peter Johnson, hardware	15 70	
To W. H. Dewey & Co., provisions	108 14	
		282 69
Warrant No. 4214—To Huntington, Hopkins & Co., packing ..	\$5 67	
To Peter Torillo, labor	10 50	
To Black Diamond Mining Company, coal.....	13 45	
To W. C. Jones, traveling expenses.....	50 75	
To A. B. Dibble, traveling expenses, supplies, etc.	113 55	
To W. H. Dewey & Co., provisions	26 27	
To pay-roll, November.....	176 00	
		396 19
Warrant No. 5294—To Huntington, Hopkins & Co., oars.....	\$2 00	
To Root, Neilson & Co., machine work.....	4 10	
To John Cropper, labor, December.....	30 00	
To R. H. Buckingham, traveling expenses, supplies, etc.	89 30	
To S. P. Maslin, clerical work	38 00	
		163 40
Amount carried forward.....	\$4,103 61	\$5,000 00

EXPENDITURES—Continued.

Amount brought forward.....	\$4,103 61	\$5,000 00
Warrant No. 5580—To A. B. Dibble, traveling expenses, supplies, etc.....	114 70	
Warrant No. 5813—To W. C. Jones, salary December, etc.....	90 00	
Warrant No. 5814—To Wm. Shebley, salary September to December.....	\$390 00	
To John Cropper, salary January.....	30 00	
To A. B. Dibble, traveling expenses, supplies, etc.....	77 65	
To R. H. Buckingham, traveling expenses, supplies, etc.....	53 85	
	551 50	
Warrant No. 6442—To Sacramento Transfer Company, 3 tons coal.....	\$36 00	
To A. B. Dibble, traveling expenses, supplies, etc.....	71 80	
To pay-roll, February.....	71 50	
	\$179 30	
Less deficiency in appropriation.....	39 11	
	140 19	5,000 00

DEFICIENCIES

Incurred during the Thirty-sixth and Thirty-seventh Fiscal Years, chargeable against the Appropriation for the Restoration and Preservation of Fish within the waters of the State.

<i>Thirty-sixth Fiscal Year.</i>		
Warrant No. 353.....		\$55 74
To W. C. Jones, salary, May.....		80 00
<i>Thirty-seventh Fiscal Year.</i>		
Warrant No. 6442.....	\$39 10	
To R. H. Buckingham, traveling expenses, etc.....	80 00	
To J. Shebley, salary June, 1886.....	86 66	
To J. H. Hartin, expenses April, May, and June.....	294 50	
To A. B. Dibble, traveling expenses, supplies, etc.....	288 94	
		789 10
		\$924 84

EXPENDITURES

In the Erection and Maintenance of a State Salmon Hatchery, incurred during the Thirty-sixth Fiscal Year.

To appropriation (Statutes of California, 1885, page 31).....		\$10,000 00
<i>By Expenditures.</i>		
Warrant No. 9615—To R. H. Buckingham, traveling expenses selecting site for hatchery.....	\$447 55	
To A. B. Dibble, traveling expenses select- ing site	238 05	
		\$715 60
Warrant No. 9789—To T. C. Ten Eick, teaming	\$182 00	
To Murcken & Knoch, lumber	47 27	
To Hat Creek Mills, lumber.....	167 51	
To Florin Brothers, supplies	926 49	
To T. Millward, fish spear.....	2 50	
To J. L. Chadderdon, oil	15 00	
To Standard Oil Company, paints and oil ..	96 77	
To Sacramento Lumber Company, lum- ber.....	207 65	
To Sherburn & Smith, crockery, etc.....	252 85	
To Hall, Luhrs & Co., provisions.....	134 72	
To Charles Zeitler, hardware.....	397 25	
		2,360 01
Balance on hand July 1, 1885.....		6,924 39
		10,000 00

EXPENDITURES

In the Erection and Maintenance of a State Salmon Hatchery, incurred during the Thirty-seventh Fiscal Year.

<i>To Appropriation.</i>			
Balance on hand July 1, 1885.....	-----		\$6,924 39
<i>By Expenditures.</i>			
Warrant No. 8—To M. Knoch, supplies to hatchery.....	\$81 73		
To J. F. Bowman, supplies to hatchery.....	41 39		
To H. Schnittger, supplies to hatchery.....	31 65		
To F. L. White, supplies to hatchery.....	16 90		
To pay-roll, April and May.....	713 50		
		\$885 17	
Warrant No. 340—To F. L. White, supplies.....	\$37 50		
To Merchen & Knoch, supplies.....	10 55		
To H. Schnittger, supplies.....	18 50		
To Huntington, Hopkins & Co., seine net.....	63 75		
To Dennis & Fitzwater, supplies.....	43 35		
To labor pay-roll, June and July.....	518 83		
		692 48	
Warrant No. 355—To R. H. Buckingham, traveling expenses, supplies, etc.....	\$130 90		
To C. W. Pierce, teams and board.....	53 50		
To Bidwell Brothers, provisions.....	91 29		
		275 69	
Warrant No. 797—To Dennis & Fitzwater, provisions.....	\$88 66		
To A. B. Dibble, traveling and other expenses.....	397 90		
To labor pay-roll, July and August.....	500 00		
To H. Schnittger, supplies.....	15 70		
To Mureken & Knoch, supplies.....	11 99		
To F. L. White, supplies.....	24 58		
		1,039 60	
Warrant No. 1820—To Lion Insurance Company, insurance on hatchery.....	\$48 00		
To A. B. Dibble, traveling expenses, sup- plies, etc.....	208 65		
To F. L. White, freight and supplies.....	96 30		
To J. McArthur, supplies.....	17 68		
To H. Schnittger, supplies.....	16 86		
To Florin Brothers, lumber and supplies.....	41 80		
To Mureken & Knoch, supplies.....	44 17		
To Dennis & Fitzwater, supplies.....	87 53		
To pay-roll, August.....	514 00		
		1,074 98	
Warrant No. 2107—To Huntington, Hopkins & Co., pipes, etc.....	179 83		
Warrant No. 2416—To California Wire Works, wire cloth.....	400 05		
Warrant No. 2762—To Huntington, Hopkins & Co., hardware.....	\$60 83		
To Dennis & Fitzwater, provisions.....	55 92		
To J. Dungan, lumber.....	8 64		
To H. Schnittger, provisions.....	27 70		
To Mureken & Knoch, provisions.....	33 69		
To F. L. White, provisions.....	80 00		
To pay-roll, September.....	557 20		
		823 98	
Warrant No. 3202—To R. H. Buckingham, traveling expenses, supplies, etc.....	\$90 55		
To M. R. Rose, bridge bolts.....	11 87		
		102 42	
Warrant No. 3729—To Black Diamond Mining Company, coal.....	\$52 20		
To D. H. Woods, labor.....	150 00		
To Florin Brothers, supplies.....	8 00		
To S. T. Dibble, labor.....	38 33		
To Mureken & Knoch, supplies.....	16 34		
To Huntington, Hopkins & Co., hardware.....	2 52		
To pay-roll, October.....	374 33		
		641 72	
Amount carried forward.....	-----	\$6,115 92	\$6,924 39

EXPENDITURES—Continued.

Amount brought forward.....	\$6,115 92	\$6,924 39
Warrant No. 4020—To Dennis & Fitzwater, provisions.....	57 60	
Warrant No. 4213—To C. W. Pierce, teams and board.....	\$54 00	
To Mureken & Knoch, supplies.....	15 96	
To A. B. Dibble, traveling expenses, supplies, etc.....	156 00	
To Bidwell Brothers, supplies.....	92 62	
To pay-roll, November.....	120 00	
	438 58	
Warrant No. 5292—To Fall River Mills, lumber.....	\$8 98	
To Mureken & Knoch, supplies.....	77 80	
To Dennis & Fitzwater, supplies.....	31 75	
To pay-roll, December.....	103 25	
To S. P. Maslin, salary April to August.....	105 00	
	\$371 78	
Less deficiency.....	59 49	
	312 29	6,924 39

DEFICIENCY

Incurred during the Thirty-seventh Fiscal Year, chargeable to the Appropriation for the Construction and Maintenance of a State Salmon Hatchery.

Warrant No. 5292—To deficiency.....		\$59 49
Warrant No. 5815—To Bush & Johnson, freight.....	\$15 55	
To Dennis & Fitzwater, supplies.....	25 40	
To Mureken & Knoch, supplies.....	9 78	
To pay-roll, January.....	120 00	
	170 73	
Warrant No. 6439—To Huntington, Hopkins & Co., hardware.....	\$14 20	
To H. Schnittger, provisions.....	8 05	
To Dennis & Fitzwater, provisions.....	46 28	
To I. N. Gill, supplies.....	17 98	
To Mureken & Knoch, supplies.....	16 87	
To pay-roll, February.....	115 07	
	219 05	
Warrant No. 6834—To S. P. Maslin, salary January and February.....	60 00	
Warrant No. 7000—To Mureken & Knoch, supplies.....	\$81 67	
To pay-roll, March.....	151 40	
	160 07	
Warrant No. 7724—To S. P. Maslin, salary March and April.....	60 00	
To Dennis & Fitzwater, provisions.....	\$92 94	
To Mureken & Knoch, supplies.....	23 35	
To H. Schnittger, supplies.....	9 55	
To Florin Bros., lumber.....	20 46	
To S. P. Maslin, salary May and June.....	60 00	
To T. M. Buckingham, labor April, May, and June.....	120 00	
To W. R. Dibble, labor April, May, and June.....	120 00	
To W. O. Cropper, labor April, May, and June.....	120 00	
To John Cropper, labor April, May, and June.....	90 00	
	656 30	
Deficiency incurred in the erection and maintenance of a State Salmon Hatchery.....		\$1,385 64

EXPENDITURES INCURRED IN THE CONSTRUCTION OF A STEAM LAUNCH.

To appropriation (Statutes of California, 1885, page 124).....		\$4,000 00
Warrant No. 15—To J. W. Rock, first payment on contract.....	\$1,330 00	
Warrant No. 16—To J. W. Rock, second payment on contract	1,330 00	
Warrant No. 1492—To J. W. Rock, third payment on contract	1,340 00	
		4,000 00
To J. W. Rock, alteration made on steam launch.....		595 00

NOTE.—This deficiency of \$595 was authorized to be created by the State Board of Examiners September 4, 1885.

Respectfully submitted.

R. H. BUCKINGHAM,
A. B. DIBBLE,
T. J. SHERWOOD,
Commissioners of Fisheries.

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Dr. W. M. Hudson	Hartford.
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 Wm. M. Swerney Red Wing.
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PROVINCE OF MANITOBA AND NORTHWESTERN TERRITORY.	
Alexander McQueen, Inspector.....	Winnipeg, Manitoba.
S. Wilmot, Superintendent of Fish Culture.....	Newcastle, Ontario.