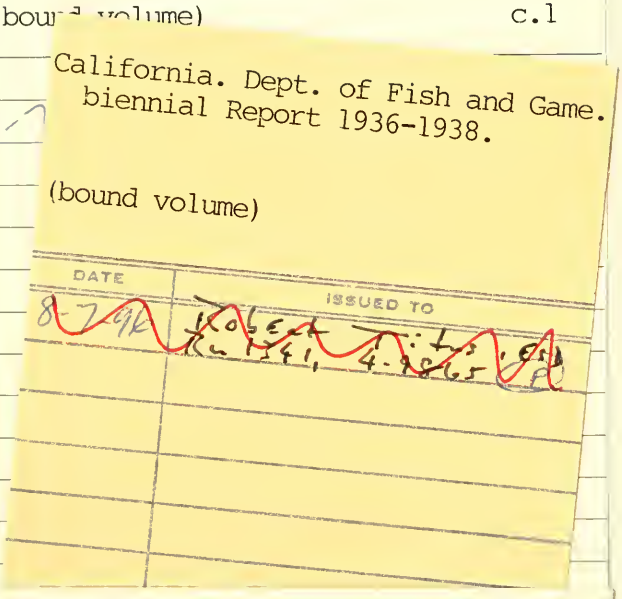

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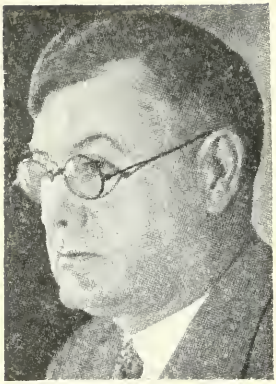
STATE OF CALIFORNIA

DEPARTMENT OF NATURAL RESOURCES

Division of Fish and Game

THIRTY-FIFTH BIENNIAL REPORT

For the Years 1936-1938



DR. E. C. MOORE, *President*

I. ZELLERBACH

NEWON G. BOOTH

RAYMOND GREY

HERBERT C. DAVIS

E. L. McKENZIE

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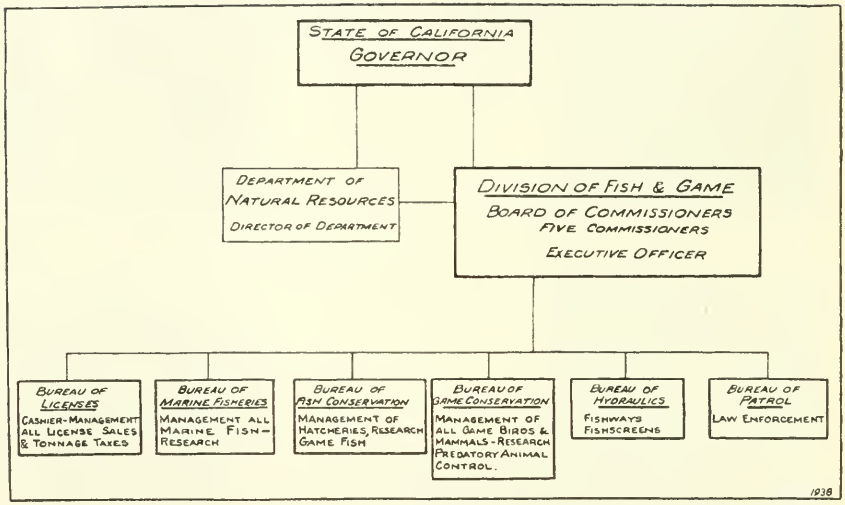

STATE OF CALIFORNIA
GOVERNOR
DEPARTMENT OF
NATURAL RESOURCES
DIRECTOR OF DEPARTMENT
DIVISION OF FISH & GAME
BOARD OF COMMISSIONERS
FIVE COMMISSIONERS
EXECUTIVE OFFICER
BUREAU OF LICENSES
CASHIER-MANAGEMENT ALL LICENSE SALES & TONNAGE TAXES
BUREAU OF MARINE FISHERIES
MANAGEMENT ALL MARINE FISH-RESEARCH
BUREAU OF FISH CONSERVATION
MANAGEMENT OF HATCHERIES, RESEARCH GAME FISH
BUREAU OF GAME CONSERVATION
MANAGEMENT OF ALL GAME BIRDS & MAMMALS-RESEARCH PREDATORY ANIMAL CONTROL.
BUREAU OF HYDRAULICS
FISHWAYS FISHSCREENS
BUREAU OF PATROL
LAW ENFORCEMENT
1938

In Memoriam

It is with much regret the Division reports the following deaths and retirements of members of its staff during the biennium and wishes at this time again to give recognition to the faithful and efficient service rendered by these men.

	Entered service	*Died*
E. W. Smalley	5/1/09	Aug. 9, 1936
Chas. Bouton	1/1/16	July 11, 1937
McPherson Lough	7/1/18	Nov. 9, 1937
		Retired
R. C. Marshall	9/9/24	July 15, 1936
J. E. Newsome	12/1/06	Aug. 2, 1936

LETTER OF TRANSMITTAL

September 1, 1938.

To His Excellency, Frank F. Merriam,
Governor, State of California,
Sacramento.

Sir: Complying with the provisions of section 32 of the Fish and Game Code, we respectfully submit the Thirty-fifth Biennial Report of the Fish and Game Commission, covering the period July 1, 1936, to June 30, 1938.

The report consists of a brief statement by the Fish and Game Commission, a report to us from the Executive Officer on the several major accomplishments of the Commission, together with a detailed report by the chiefs of the several bureaus covering the proceedings of these bureaus which go to make up the Division during the two year period. There are also submitted complete statistical summaries of the receipts and disbursements of the moneys in the fish and game preservation fund and also statistics on fish and game management.

We desire to express to you our appreciation for the help and sympathy that you have given to this Division. We also wish to thank the heads of the various State departments and members of the legislature for this cooperation.

Respectfully submitted.

E. C. Moore, President.
Newton G. Booth, Commissioner.
Raymond Grey, Commissioner.
E. L. McKenzie, Commissioner.
I. Zellerbach, Commissioner.

REPORT OF BOARD OF FISH AND GAME COMMISSIONERS TO THE GOVERNOR OF CALIFORNIA

During this biennial period, July 1, 1936, to June 30, 1938, your Board of Fish and Game Commissioners has devoted its attention to continuing its efforts to bring into full operation the six-point program for fish and game administration and management which your excellency outlined in 1934. For the details of this program and the specific points involved, we respectfully refer you to our report contained in the Thirty-fourth Biennial Report covering the period July 1, 1934, to June 30, 1936.

Your excellency is of course familiar with the fact that during the biennium the number of members of this Board was increased by the legislature from three men to five. The additional commissioners did not take office until close to the end of the biennium and therefore this report for the most part is a report of the Commission as it was constituted prior to the establishment of the five-member board.

The biennium just past and which is the subject of this report has been unusually successful from the standpoint of fish and game management because during this period the organization of the Division has had full opportunity to concentrate on the six-point program with all of the financial and personnel facilities at our command.

The results of the program speak readily for themselves and we refer you to the statistical reports included at the back of this report. You will see during this period the number of our people in California who have availed themselves of the opportunity to hunt and fish has materially increased. You will also see that the financial resources of the Commission have increased proportionately. We respectfully call your attention to the increased take of all sport fish and game, thus showing that in spite of the increase in the numbers of fishermen and hunters, the State has been able to maintain a supply of fish and game to meet reasonable demands.

We are glad to report that the increased take has not resulted in the depletion of any of the more popular species. In fact we believe that the story of the deer herds of California is indicative of the effectiveness of good management. The records show a continuous increase in the supply of deer available. Our annual census shows that the breeding stock has not only maintained its abundance but in some areas owing to our protection of females has increased to an extent where their numbers exceed the carrying capacity of the range, and in northeastern California have actually damaged the range through their abundance. In other sections of the State, no great damage has yet been done to the range, but they have become a burden upon the agricultural and livestock interests of our State.

This is a program that we feel needs specific attention and undoubtedly will require legislation which will enable the Fish and Game

Commission to reduce the size of the herds in these several areas to conform with the range carrying capacity and thereby relieve agriculture of the damage which it suffers. We believe that this report on the deer situation is applicable to most of our other species of both fish and game.

Our records indicate that in spite of the individual catch per man of trout having declined somewhat, the total catch has been maintained to a remarkable degree. We must never lose sight of the fact that the amount of fish we produce annually is dependent upon the amount of water and food in our lakes and streams and regardless of the demand we of course can not exceed our capacity to produce.

Waterfowl particularly have shown a remarkable recovery under careful management. While this particular species of game is migratory in nature and not solely a product of California, our State-owned and operated refuges have contributed much to the recovery of this game in numbers.

We regret to report to you that during the biennium we have suffered some very substantial losses in our hatcheries through food conditions which prevailed in the winter of 1937 and 1938. Cold Creek Hatchery located in Mendocino County was lost entirely. The Forest Home Hatchery in San Bernardino County, which was a large institution supplying all of southern California, was damaged beyond repair. The Commission is now studying locations for the replacement of both of these hatcheries.

We likewise regret to report that in spite of the diligent efforts of your Commission, through the failure to obtain adequate legislation we have failed to stop the overexploitation of several of our major commercial species, particularly the sardine and mackerel. However, we did obtain the cooperation of the canning interests in establishing a voluntary closed season on mackerel for several months during the spring of 1938, which was a definite step forward in the conservation of this species. The sardine must wait for its protection until such time as the people of the State by their vote at the polls give adequate laws to effect their conservation.

The four outstanding accomplishments which the Commission has concentrated upon for this biennium are:

1. The establishment of a definite fiscal policy.

2. The establishment of a policy and system for recruiting and training personnel in cooperation with the State Personnel Board.

3. The establishment of the California Junior Game Patrol which program is educational in its nature for the benefit of the young of California.

4. The establishment of an extensive system of predatory animal control which has laid the foundation for cooperation between the Fish and Game Commission and the agricultural interests of the State upon which we hope there may be built a farmer-sportsman relationship which can be extended to the production of game, the management of range and a satisfactory improvement in relationship between these two groups and utilization of the lands of the State for the benefit of both.

We respectfully refer to the Executive Officer's report for the details of all four of these major activities.

The Commission is very happy to report that the policy of complete cooperation between the Commission and the sportsmen and commercial industry whom they are called upon to manage was brought to a concrete realization during this biennium with the appointment by the sportsmen of the California Waterfowl Advisory Committee, which committee met with the Fish and Game Commission to assist and advise them on the waterfowl regulations which they would request from the United States Bureau of Biological Survey.

The California Sardine Advisory Committee was appointed by the industry to sit with the Commission to study and advise them on the individual problem of management of the sardine fishery and the proper allocations of tonnages to be used by the industry. Both of these committees were of great help to the Commission and demonstrated the soundness of the policy of cooperation and working together with these various interests.

The Fish and Game Commission is very grateful to you for having supported their efforts to carry out the splendid program which you announced and which we are happy to say has brought results and improvement in fish and game conditions to the State of California.

Respectfully submitted.

E. C. Moore, President.
Newton G. Booth, Commissioner.
Raymond Grey, Commissioner.
E. L. McKenzie, Commissioner.
I. Zellerbach, Commissioner.

REPORT OF THE EXECUTIVE OFFICER TO THE BOARD OF FISH AND GAME COMMISSIONERS

Your Executive Officer has endeavored during the biennium to perfect the organization and financial structure of the Division in accordance with your instructions to the end that the program of fish and game management outlined by you during the thirty-fourth biennium could be made effective and produce the most desirable results. The reports of the several bureaus of the Division cover in detail the management of that portion of the fish and game with which each was charged. I will not summarize these in my report as was the custom in the past, but rather devote my report to a number of specific matters which you charged me with perfecting, none of these being new as far as this biennium was concerned but all being matters designed to carry out more effectively the general program of fish and game management.

During the biennium, your Executive Officer has made several trips out of the State. The first one was to Grand Rapids, Michigan, in 1936 for the purpose of attending the annual meeting of the International Association of Fish and Game Commissioners and the American Fisheries Society. No trip was necessary to meet with the Western Association of Game and Fish Commissioners as this organization met in San Francisco, California, during this year. A trip was made during the year 1937 to attend the meeting of the Western Association of State Game and Fish Commissioners at Denver, Colorado, and proceeding from there to Mexico City to attend the meeting of the International Association of Fish and Game Commissioners and the American Fisheries Society. During 1938 your Executive Officer made one trip to Washington, D.C., at the request of the Secretary of State for the purpose of discussing with them the necessity and advisability of a fisheries treaty with the Republic of Mexico. During the summer of 1938 your Executive Officer attended a meeting of the International Association of Fish and Game Commissioners at Asheville, North Carolina. In the spring of 1938 your Executive Officer traveled to Portland, Oregon, where he met with the Chief of the United States Bureau of Biological Survey to discuss the future expenditures under the so-called Pittman-Robertson Act, known specifically as "An act to provide that the United States shall aid the states in wildlife-restoration projects, and for other purposes."

The 1937 session of the California Legislature increased the number of members of the Board of Fish and Game Commissioners from three men to five. At the opening of the biennium and before the enactment of this statute, the Fish and Game Commission was composed of Dr. E. C. Moore, President; A. T. Jergins, Commissioner, and I. Zellerbach, Commissioner. Toward the latter part of the biennium, Mr. Jergins resigned and the Governor of California appointed Mr. Raymond Grey, of Taft, Mr. Newton G. Booth of Harbin Springs and Mr. E. L. McKenzie, of Red Bluff, to fill the vacancy created by Mr. Jergins'

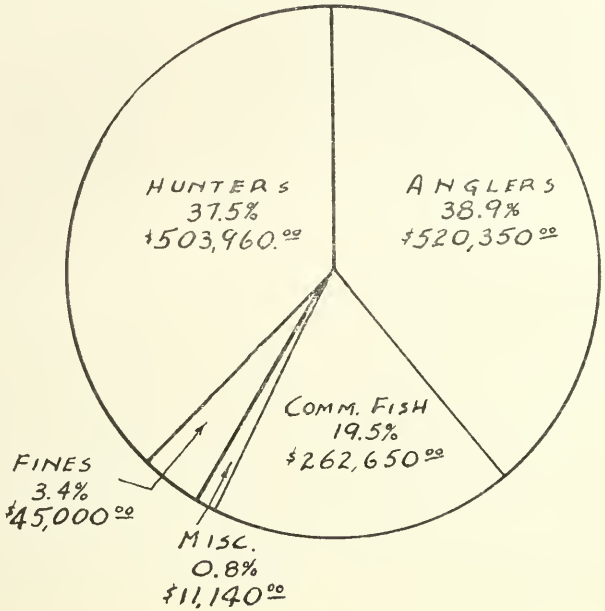
resignation and to fill the two additional positions created by the legislature. At the close of the biennium, therefore, the Board of Fish and Game Commissioners consisted of Dr. E. C. Moore, President, Newton G. Booth, Commissioner; Raymond Grey, Commissioner; E. L. McKenzie, Commissioner, and I. Zellerbach, Commissioner, and Herbert C. Davis as Executive Officer and Secretary to the Commission.

One of the matters which your honorable board placed in the hands of the Executive Officer for solution was that of adjusting the financial structure of the Division of Fish and Game to conform with the fiscal policy outlined by you during the thirty-fourth biennium, which policy consisted of making each activity of the Division self-supporting as far as possible, all money being returned to the fund from which it came. For example, all money received from hunting license sales was expended on the protection, propagation and administration of game; money received from sport fishing licenses to the preservation, propagation and planting of fish; and the money received from commercial fishing applied to the administration, propagation and preservation of commercial fish in accordance with the Fish and Game Code.

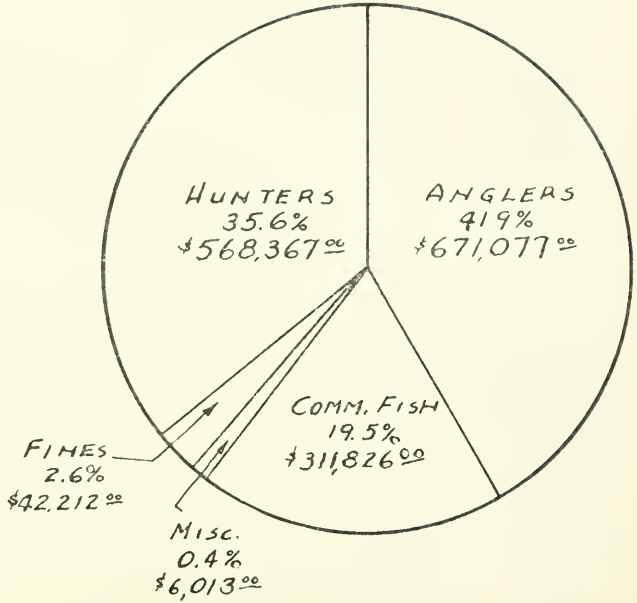
You asked that a further break down be made in this policy to the end that each species of fish and game should have assigned to it as far as possible that portion of the funds derived from hunting and fishing licenses which statistics of the Commission indicated was paid in by hunters and fishermen who hunted and fished for specific species. I am happy to report to you that this fiscal policy has to a large extent been placed in operation as far as conditions would permit. Complete fulfillment of the policy can only come with time as we had certain facilities for production which had to be carried on and adjusted gradually to meet the policy.

I am submitting herewith a series of charts which I believe more completely show the principals of your fiscal policy and the extent to which it has been put into effect. Each chart is self-explanatory and I will therefore not waste your time by attempting to describe them here. The charts are based on experience factors and you will note that they refer to the 91st and 92nd fiscal years which will be the years that compose the thirty-sixth biennial period. These charts were prepared at the time that the budget was written for submission to the Legislature when they convene in January, 1939.

Estimated Income
89th Fiscal Year
$1,343,100.00

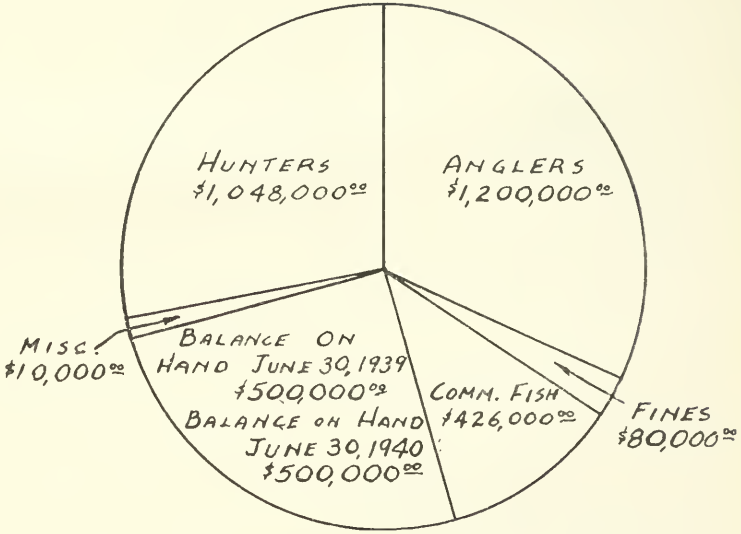


Actual Income
89th Fiscal Year
$1,599,495.00

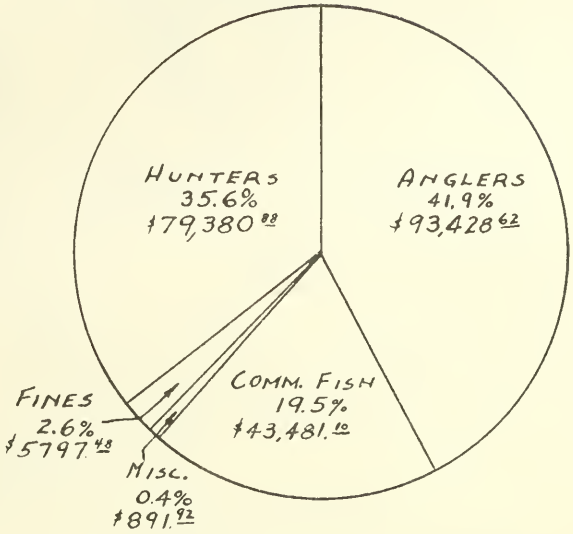


Estimated Income
91st & 92nd Fiscal Years
$2,764,000.00

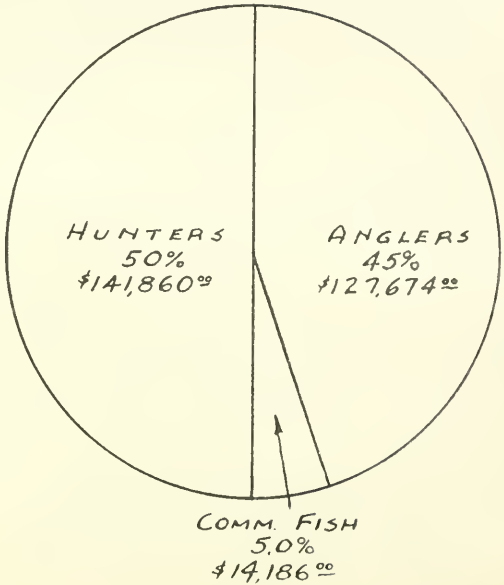
Estimated Available Funds
for Budget Purposes
91st & 92nd Fiscal Years
$3,764,000.00



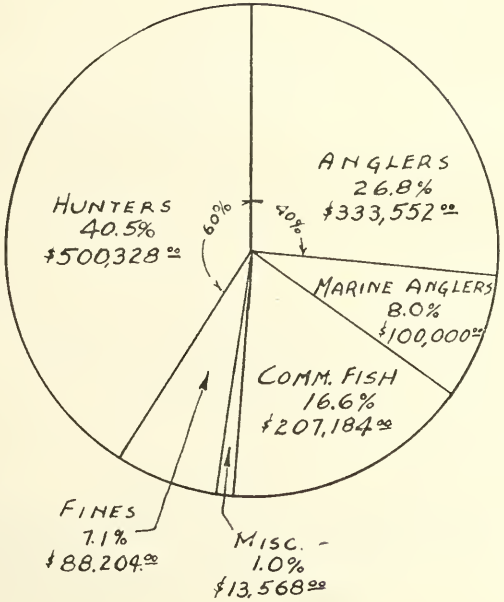
SOURCES OF MONEY
91ST & 92ND FISCAL YEARS
ADMINISTRATION
$222,980.00



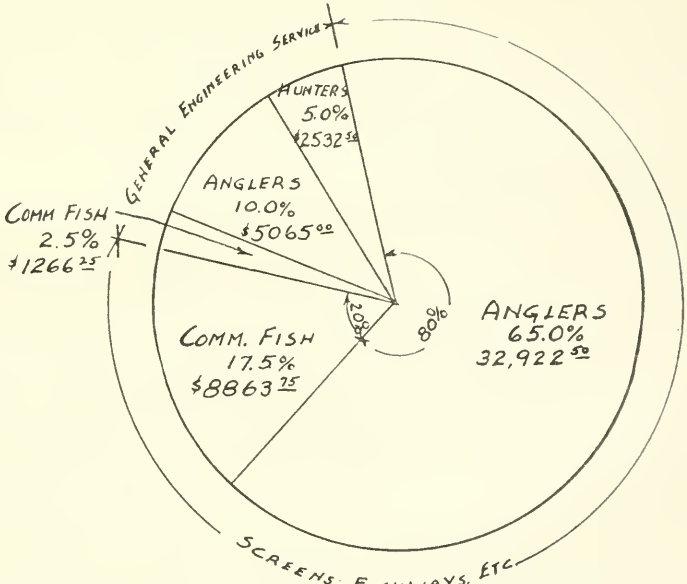
SOURCES OF MONEY
91ST & 92ND FISCAL YEARS
LICENSE BUREAU
$283,720.00



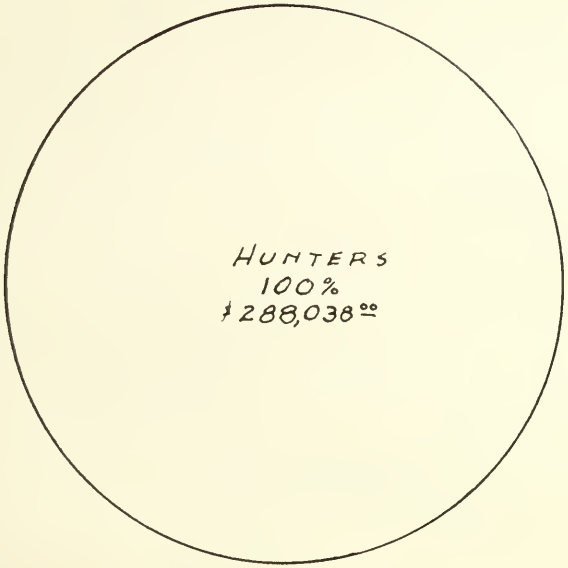
SOURCES OF MONEY
91ST & 92ND FISCAL YEARS
PATROL BUREAU
$1,242,836.00



SOURCES OF MONEY
91ST & 92ND FISCAL YEARS
HYDRAULICS BUREAU
$50,650.00

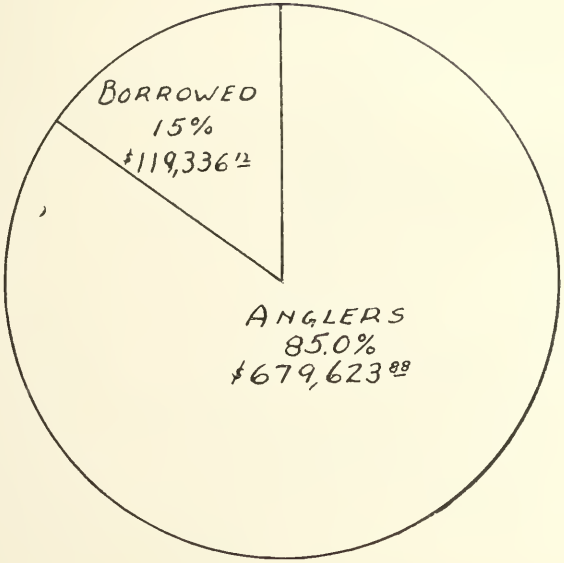


SOURCES OF MONEY
91st & 92nd FISCAL YEARS
BUREAU OF GAME CONSERVATION
$288,038.00

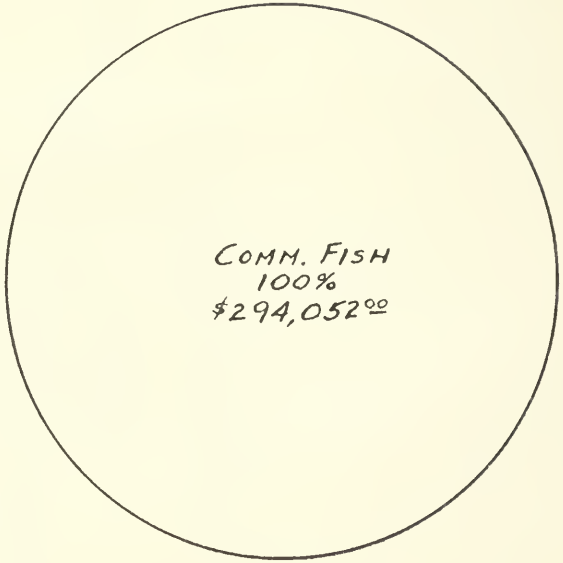


SOURCES OF MONEY
91st & 92nd FISCAL YEARS
BUREAU OF GAME FARMS
$144.000.00

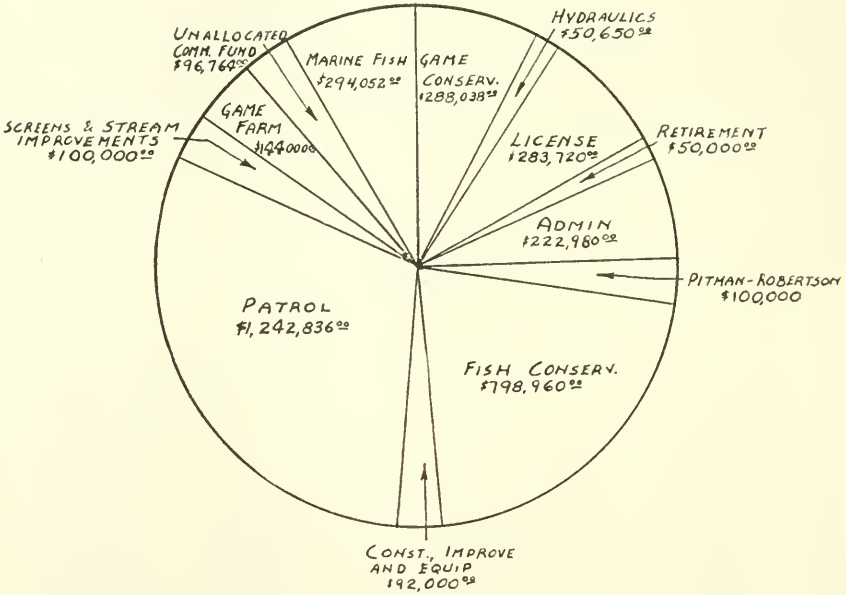
SOURCES OF MONEY
91ST & 92ND FISCAL YEARS
BUREAU OF FISH CONSERVATION
$798,960.00



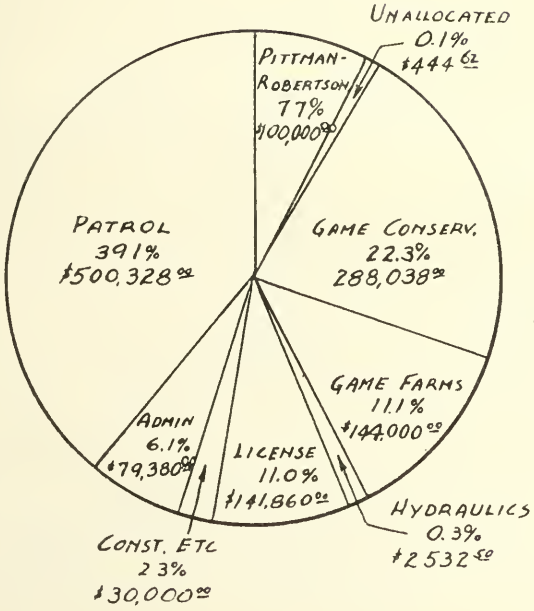
SOURCES OF MONEY
91ST & 92ND FISCAL YEARS
BUREAU OF MARINE FISHERIES
$294,052.00



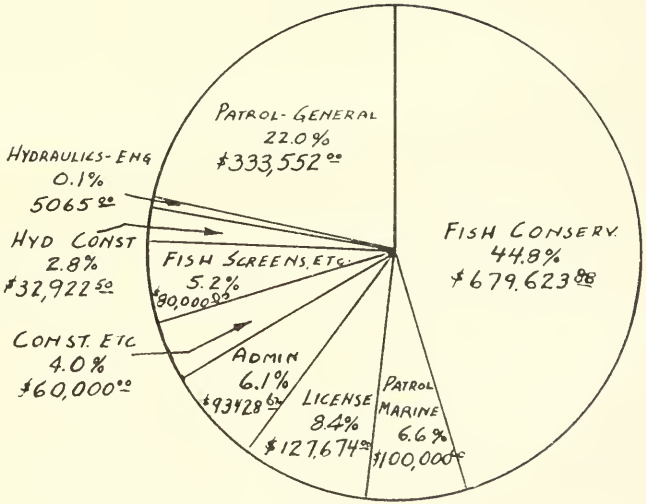
ESTIMATED BUDGET AS ALLOTTED TO VARIOUS FUNCTIONS - 91ST & 92ND FISCAL YEARS
$3,764,000.00



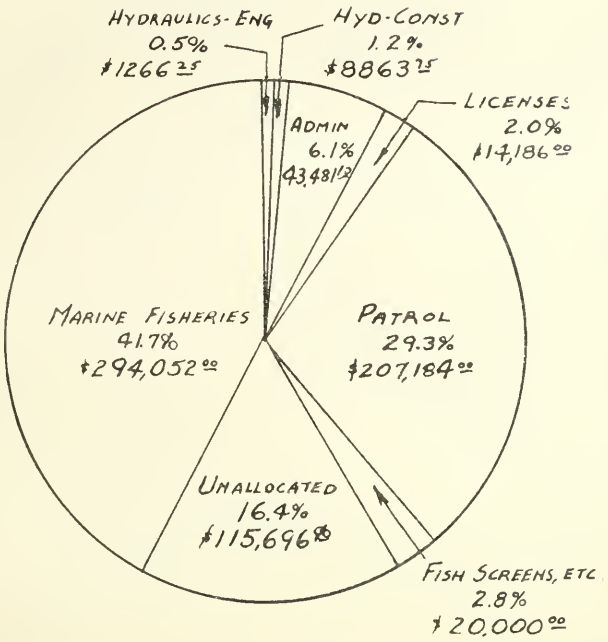
DISPOSITION OF HUNTING INCOME BY FUNCTIONS
91ST & 92ND FISCAL YEARS
$1,286,584.00



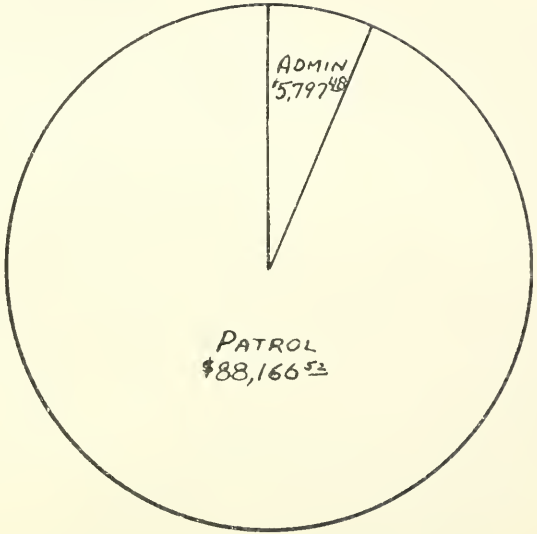
DISPOSITION OF ANGLING INCOME BY FUNCTIONS
91ST & 92ND FISCAL YEARS
$1,514,266.00



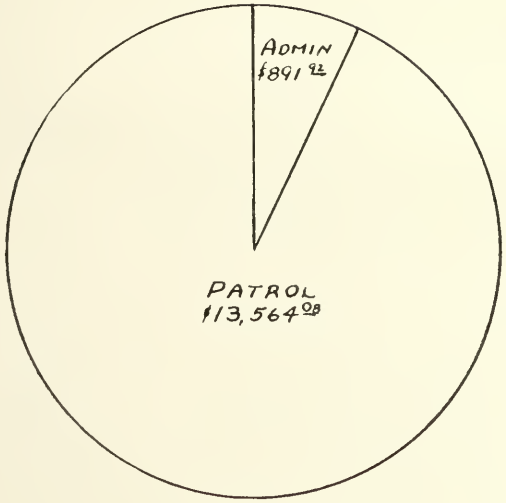
Disposition of Comm. Fish Income by Functions 91st & 92nd Fiscal Years $704,730.00



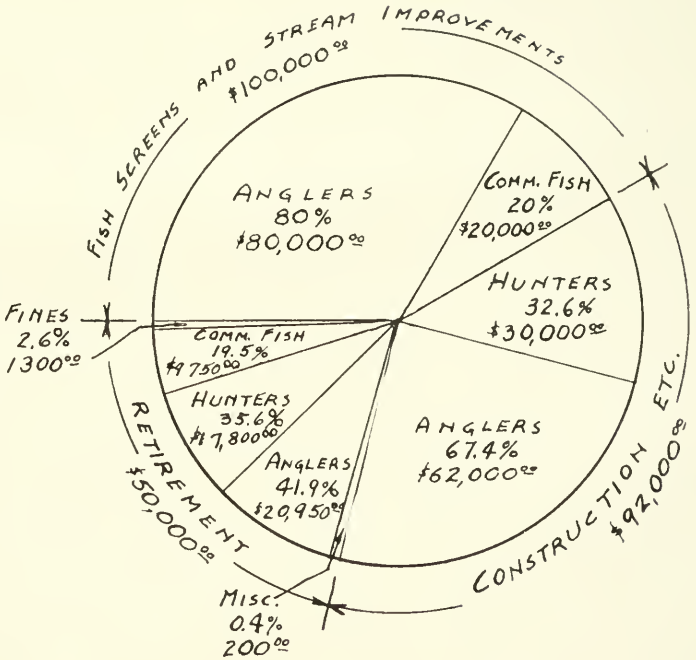
Disposition of Fines by Functions 91st & 92nd Fiscal Years $93,964.00



DISPOSITION OF MISCELLANEOUS INCOME BY FUNCTIONS
91ST & 92ND FISCAL YEARS
$14,456.00



SOURCES OF MONEY FOR SPECIAL ITEMS
91ST & 92ND FISCAL YEARS
$242,000.00



A second intricate problem which your honorable board directed the Executive Officer to perfect was a system of recruiting and personnel management to the end that the Fish and Game Commission might have at its command the best possible type of personnel, carefully trained and selected for the purpose of carrying out the fish and game management program essential to the welfare of the State.

The State Personnel Board and the civil service laws of the State made it comparatively easy for us to perfect one of the outstanding recruiting and training systems for fish and game personnel in the United States. A system, by the way, which has attracted national attention and has been studied and complimented by many of the States in the Union.

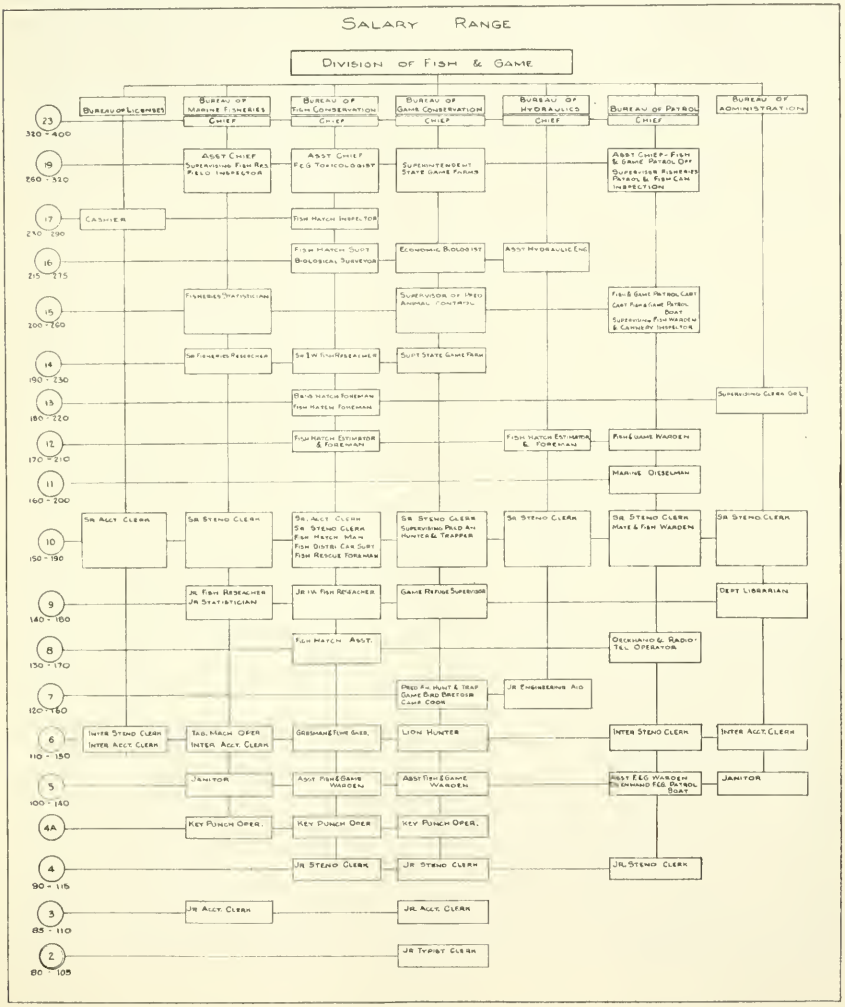
The procedure is comparatively simple. A recruiting grade entitled assistant fish and game warden with specifications broad enough to permit the use of this personnel in all functions of the Division was established. From this grade, a system of promotion was inaugurated making it possible for us to encourage college trained men of high type to enter this recruiting grade with an opportunity for a career as all positions between that of assistant fish and game warden and the chiefs of the various bureaus are filled by promotion from the grades below.

I submit herewith a chart showing all of the positions in the Division together with their salary ranges and a brief glance at this chart will indicate to you just how the personnel management program is worked out. Like the financial charts, this is self-explanatory and I will not attempt to go into detail in this report. *See Chart on page 25.*

May I point out, however, that there are two additional positions needed in order to make the system of promotion uniform and equitable without giving one branch of the service a greater degree of attraction to our recruits than another. The first of these positions is that of junior economic biologist in the Bureau of Game Conservation to fill the gap which you will notice there to provide a position comparable with that of junior fisheries researcher and junior inland water fisheries researcher, a recruiting grade to that of economic biologist which you will note is a higher position. In the Bureau of Patrol there should be established a position of fish and game warden, Grade I to fill the gap between assistant fish and game warden and fish and game warden. You will note that the maximum salary for assistant fish and game warden is $140 per month, whereas the minimum salary of warden is $170 per month. There should be an intermediate grade corresponding with that of supervising trapper and fish hatcheryman in other bureaus so that promotion may be uniform.

I think one of the most outstanding accomplishments during the biennium is the establishment and development of the California Junior Game Patrol. This has attracted wide attention in the State and much favorable comment. It is essentially an organization of young men of an average age of 15 to 16 who have been uniformed and officially recognized by the Fish and Game Commission. They are organized into units known as troops for the purpose of teaching them the principals of conservation, the art of fishing and hunting, the game laws of the State and reasons for them to the end that when these boys reach maturity they will be law abiding citizens having full appreciation of the principals of conservation and the necessity for it.

We believe that this training will in time eliminate much of the expense that the Fish and Game Commission carries in law enforcement work. We anticipate, and this is based on experience in other juvenile organizations, that it will not be necessary to employ officers to watch and protect the game from these men when they become the adult citizens of the State.



We are reprinting as a part of the report of the Bureau of Patrol an article which was published in California Fish and Game on the organization of the Junior Game Patrol. I respectfully refer you to this article for details of the organization.

The fourth matter which you directed the Executive Officer to perfect was an organization within the Bureau of Game Conservation to handle a greatly expanded program of predatory animal control. This has been done. The details of this work will be found in the

report of the Bureau of Game Conservation and I will therefore not report it in detail here.

In organizing this work and carrying it forward during the last two years, something has developed which was not foreseen. This something has turned out to be a spirit of harmony and cooperation between the Fish and Game Commission and the live stock interests of the State which heretofore had never existed. In fact, over a period of years a definite degree of animosity had developed between the Commission and the live stock group as each was definitely in competition with the other on the utilization of the range and the installation of our predatory animal control system has brought us together. This is so pronounced that the Fish and Game Commission has consistently during the last couple of years been paid many compliments by the cattlemen and the wool growers of the State in their various publications over the work that we have done.

Most important of all in my opinion is that this was the first step toward a farmer-sportsman agreement which could ultimately develop into the dual usage of much of the land that is now of no use to the Fish and Game Commission nor to the sportsmen for propagating and utilizing game birds and mammals. May I suggest that the Commission grasp this opportunity that has been offered to carry forward the cooperation that we have developed and expanded into these various other fields believing that by so doing we can not only avail ourselves of 10 or 15 per cent of additional range land for both birds and mammals for the use and benefit of the sportsmen, but also that this usage may be turned to some financial benefit to the landowner and agriculturist.

Your Executive Officer, together with the staff of the Division, respectfully submits for your consideration the possibility of gaining the consent of the people of the State of California through proper legislation to the establishment of a Fish and Game Commission on staggered terms for the sole purpose of maintaining and continuing in operation the splendid policies for fish and game management that you have laid down for us during the last four years. They are fundamentally sound. We have checked them against policies in operation in other States of the Union, we have results to show for them, and we believe that a continuous production of fish and game in California can be maintained under this program as it is one that is far reaching and anticipated conditions over a long period of years rather than just a day to day or year to year policy. As we, the employees of the Commission, see it, a smooth, continuous administration of these policies would be of the greatest benefit to the fish and game and the people of the State.

LIBRARY

We believe this period has been a satisfactory one. Although during the latter half thereof, we have been greatly handicapped by lack of adequate working space, and the difficulty in utilizing much of our material, we are glad to report progress in the circulation and service, especially that to our employees, the principal objectives toward which this library is constantly striving. We are quite unwilling, however, to estimate the library's usefulness by means of loans or attendance. Many of our assets are intangible and a great

portion of the librarian's time is spent in hunting references and giving other assistance.

The library, with its limited budget, depends to a large extent for its growth on its exchanges and gifts with and from other scientific and educational institutions. It is a pleasure to note that of the 483 bound volumes acquired during this period, 202 represent gifts. Likewise of the 140 periodicals regularly received, 102 are on the exchange or free basis.

The record of bound volumes at the end of this period number 2250, with a valuation of $8,004.48. Scientific and other pamphlets on record number 5657, with a value of $908.79. Of these 770 were received during this period.

Considerable binding of back issues of periodicals was continued under a WPA project, which unfortunately, due to a governmental ruling on one-man projects, was terminated April, 1938. A large amount of binding still remains to be done, and hundreds of pamphlets are yet to be accessioned and made available.

Through the listing of the library's periodical inventory with the San Francisco Special Libraries Association and embodying same in the publication "Union List of Periodicals," more people are learning that the Division's library has material not to be found elsewhere in this bay area, and consequently many requests are being made for reference to such material. Students of universities and schools continue to use our facilities.

We are grateful to the libraries of the California Academy of Sciences, University of California, United States Forest Service, and our own Terminal Island office for the kind assistance given in lending to us literature, which we already possess, however, but which is not easily available while in storage.

Your Executive Officer desires to express his sincere appreciation and that of the entire personnel of the Division for the firm, fair and kindly treatment and assistance that your honorable board has rendered us during this two-year period.

Respectfully submitted.

HERBERT C. DAVIS,
Executive Officer.

REPORT OF THE BUREAU OF FISH CONSERVATION

By A. C. Taft, Chief

The present biennium has been the most disastrous in the history of the Bureau as a result of heavy storms in December, 1937, and again in March, 1938, that caused unprecedented damage to hatcheries and egg taking stations. This type of damage was the most obvious but equally important was the actual loss of fish in the streams and the destruction of their food and cover.

This series of storms undoubtedly had serious effects on the fresh-water game fish of California. Practically all streams in the State reached higher stages than have been observed for many years past and in some instances were subjected to torrential flows that seriously altered the streams themselves. This erosion of the stream beds during the storm of December was most harmful to the fall spawning species such as the King salmon and the Loch Leven and Eastern Brook trout, as in many instances nests have been dug out and in others buried under many feet of gravel. The Steelhead runs which were very good this year were aided in reaching the spawning grounds by high and muddy water which made fishing very difficult. Reports on the north coast streams between San Francisco and Eureka indicated that a larger number of fish gained the upper reaches of the streams than have been seen for several years but the successful spawning of these fish is also dependent upon water conditions after the eggs are deposited.

In southern California the recent floods have had very severe effects on the streams and many of them have been changed so as to be scarcely recognizable. Such great amounts of gravel were moved that for many miles the old stream channels have been entirely obliterated. The trees that bordered the streams have been torn out and during the summer there will be less shade to keep the water cool and favorable for trout. In some places it will probably be found that a large portion of the water will flow through the loosened gravel and rocks that have been newly deposited and as a result, the surface flow will be small in amount and high in temperature.

In addition to the loss of fish that are native to the streams, the work of replacement through planting was made much more difficult through the severe damage done by the storms to hatcheries, egg taking stations and the young fish which were being reared in the hatcheries. The total damage was nearly $100,000 and included the complete destruction of two hatcheries and such serious damage to another that it could not be operated during 1938. Steelhead and Rainbow egg taking stations throughout the State were damaged to varying extents and some of them had to be replaced as many as three times.

The first great loss was the total destruction of the Cold Creek hatchery near Ukiah. This hatchery was situated at the junction of

Cold Creek and the Russian River and obtained its water supply from Cold Creek. On the evening of December 10th the water rose rapidly in the two streams and by 9.30 p.m. it was between three and four feet deep on the hatchery grounds. Shortly thereafter all buildings were swept away. This included the hatchery building with its connected living quarters and 52 troughs, a two car garage and woodshed, a four-room house and a tool house and storage shed. These buildings and the equipment therein were a total loss. The two pickup trucks at the station were taken to higher ground and thus saved but the three employees at the hatchery lost practically all of their personal effects. This hatchery was valued at $30,000.

Damage at other stations is summarized as follows, in order of importance:

Kings River Hatchery—5000 feet of pipe line destroyed, grounds and buildings damaged. All roads washed out and grounds littered with debris. The water rose above the level of the hatchery floor. The hatchery is still accessible only by temporary road as the roads and bridges have not yet been repaired. It was impossible to operate this hatchery as repairs could not be made in time for the 1938 season's work. Estimated cost of repairs $10,000.

Kaweah Hatchery—water system completely wrecked, hatchery shifted on its foundation and grounds damaged. Repair work was rushed at this hatchery and it operated during 1938. Cost of repairs was $4,000.

Burney Creek Hatchery—diversion dam destroyed and part of pipe line washed out, roads damaged. Temporary repairs were made and this hatchery was then put into operation. Estimated cost of complete repairs was $2,000.

Yosemite Hatchery—damage to pipe line. This hatchery operated on an auxiliary water supply and repairs were made to the pipe line at a cost of $500.

Mt. Tallac Hatchery—damage to buildings, rearing tanks, diversion dam and pipe line. Cost of repairs $500.

Yuba River Hatchery—damage to water system. Cost of repairs $300.

Madera Hatchery—damage to water system and roads. Estimated cost of repairs $500.

The following egg collecting stations were damaged: Snow Mountain, Klamathon, Shackleford Creek, Shasta River, Domingo Springs, Warner Creek, Chester, Hamilton Branch, Taylor Creek, Lake Eleanor, Kosk Creek and San Lorenzo. Cost of repairs $7,500.

As a result of the storm damage there was some curtailment in the number of fish produced. The areas served by the Cold Creek and Kings River hatcheries were taken care of as far as possible through other stations. The take of Rainbow eggs was reduced through the fact that two important stations in the Lake Almanor area, one on the Pit River and one at Lake Eleanor, were so badly damaged that they could not be repaired so as to operate during the 1938 season. The number of Rainbow eggs handled was increased as far as possible through purchases.

On March 2d an exceptionally heavy storm in southern California caused the nearly total destruction of the Forest Home Hatchery. This included the total loss of two dwelling houses, the garage and tool room, the food preparation house, two small storage buildings and an open shed which was used for storage of certain heavy equipment. As the culmination of a succession of heavy rain storms and a final series of cloudbursts Mill Creek, upon which the hatchery was situated, rose to such heights that it spread across the entire valley floor and moved great volumes of boulders and gravel. Even small streams such as Lost Man Creek just above the hatchery carried so heavy a load of gravel that it covered the grounds at the Torrey Resort to a depth of many feet.

The loss of the buildings and the destruction of the hatchery was a progressive affair and Mr. Clanton, the superintendent, and his crew apparently made every effort to protect the State property and save the hatchery, even at considerable risk to their own persons. There were five families resident on the property and the women and children were taken to Mr. Clanton's house early during the first day. It is very fortunate, indeed, that no lives were lost. While the men were working in an attempt to save the houses and protect the ponds, Mrs. Clanton removed most of the automotive equipment to the ground surrounding her house and to the highest point of land accessible on the Torrey property. It is probably due to her efforts that all of the trucks and other cars were saved.

The ponds were almost completely obliterated and in some places covered with many feet of heavy boulders and gravel. The hatchery building was damaged and the lower floor was also partly filled with boulders. Mr. Clanton's house was undamaged and served as a refuge for the crew after the other buildings had been destroyed. The bachelor quarters also remained undamaged but is not used as it is still in a dangerous situation due to the change in the creek bed which now flows through a portion of the hatchery grounds.

At the close of the biennium plans were being formulated for replacement of the Cold Creek and Forest Home hatcheries. Delay was unavoidable due to the difficulty of finding satisfactory sites in both of the areas to be served by the new hatcheries.

In southern California these requirements are particularly difficult to meet. In that area it has been the practice to rear approximately 400,000 fish each year to a catchable size before planting. In order to obtain satisfactory growth during the winter months a supply of spring water is essential. Since the old site in Mill Creek was so altered that it would be practically impossible to bring the spring water to a point where it could be used, an entirely new site is being sought.

The water supply at the Cold Creek Hatchery was very unsatisfactory due to pollution and a new site is also under consideration in that area. It is hoped that a large enough supply of water can be found so that the present Fort Seward Hatchery can be dismantled and its operations combined with the new hatchery. The Fort Seward Hatchery was located many years ago when the only transportation was by rail and it was designed to produce small fish for planting very early in the season. By July the water temperatures become extremely high and the flow becomes insufficient for satisfactory opera-

tion. Present day transportation by truck makes it more advantageous to have a hatchery situated with better access to the main highway.

As was indicated by Dr. J. O. Snyder, former chief of the bureau, in his last biennial report the new name, Bureau of Fish Conservation, indicates a wider responsibility than the sole production of fish for planting. This enlarged view of the activities of the bureau has brought an extension of certain types of work.

For a number of years it has become increasingly apparent that there was a serious gap between the production of fish in the hatcheries and the production of fish for the angler's creel. In the early days a large portion of the planting work was done by individuals or groups largely beyond the control or direction of the Division. In many instances the Division had no adequate records of where the fish went, or the results obtained. This condition was, in part, corrected by detailing the work of planting to the wardens but there still remained, however, a certain lack of coordination and the division of responsibility was unsatisfactory.

Starting in 1936 the planting work was designated as the responsibility of the Bureau of Fish Conservation. The men who had put in long months in rearing the fish were given an opportunity to see that the results of their work depended upon the care that was given in planting them. The practice of filling applications for fish from private individuals and groups was discontinued at the same time.

Direction of planting work was placed in the hands of a single individual of wide experience and under his direction the fish planting is done by the men at the hatcheries or by organized planting crews. Specialized equipment in the form of aerated tank trunks and pickups was obtained and the use of the railway fish cars was discontinued in 1937. Starting in 1938 most shipments of fish by pack train were accompanied by employees of the bureau in order to see that the fish were given proper care enroute and that they were delivered to the waters for which they had been allotted. Certain details of organization and technique still offer opportunity for improvement but the progress made during the last two years is very gratifying.

The work still suffers from the lack of knowledge as to what happens after the fish are planted. Even after the fish are delivered to the stream or lake it still remains largely a matter of chance whether the final results to be obtained will be satisfactory. To most sportsmen it seems that the size of the fish planted is the chief determining factor. Experience both in California and elsewhere has demonstrated that there can be many other reasons for the relative success in maintaining the productivity of a given body of water which either singly or cumulatively may be of equal importance.

The men concerned with the rearing and planting of fish from the hatcheries have accumulated a great fund of practical information which forms the basis upon which most of the work is now done. Their work, however, leaves them little time for the more detailed study and accumulation of knowledge which would make further progress possible.

As a step toward the solution of this difficulty a new type of work was initiated by the Bureau and some others have been expanded. During the two preceding bienniums the Division has had a cooperative arrangement with the U. S. Bureau of Fisheries whereby an

organization was set up called the California Trout Investigations. Two experienced fisheries biologists were assigned by the federal bureau for work in California and two trained men were supplied by the Division. Much effective work has been accomplished by this group that will be of both immediate and future value to the Division. However, with the extension of various federal activities in California such as the Central Valleys project, the proposed debris dams on the Yuba and American rivers and the growing interest of the U. S. Forest Service in fish and game, increasing demands were made upon the U. S. Bureau of Fisheries for technical assistance and advice. It was, therefore, mutually decided by them and the Division that it would be best if the cooperative work could be carried on under a less formal arrangement.

There was an additional belief on the part of the Division that this type of work in the Bureau of Fish Conservation justified its being more firmly established through the employment of permanent personnel who would give increasingly valuable service through the accumulation of experience and work under the direct supervision of the Division.

Early in 1938, therefore, two senior fisheries biologists and one junior biologist were employed by the Bureau. These trained men, together with two others formerly employed in other work and one who had been assigned to the trout investigations, were assigned to carry on the survey and biological work.

As a basis for organizing their work the State was divided into seven districts. Biologists were then detailed for work in five of these in which the need for this type of work seemed most pressing. District 1, comprising the Central Valleys area below an elevation of 2500 feet, was placed in charge of Merrill Brown, who also has charge of the small mouth bass hatchery and fish rescue work, with headquarters at the new Central Valleys Hatchery. District 2, including the drainages of the upper Sacramento, the McCloud, Pit and Feather rivers, was assigned to J. H. Wales, with headquarters at the Mt. Shasta Hatchery. District 3, in turn, included the Yuba, American, Stanislaus, Tuolumne, Merced and Truckee drainages, in charge of Brian Curtis, with headquarters in Sacramento. District 4 includes all streams from the San Joaquin to the Kern, inclusive, and is to be covered by William Dill with headquarters in Fresno. In Sacramento we have been very fortunate in that the Sacramento Junior College has kindly consented to supply laboratory quarters and in Fresno arrangements have been made for similar facilities through the cordial cooperation of the Fresno State College. District 5 includes all of the coastal Steelhead and salmon streams and has been placed in charge of Leo Shapovalov, with headquarters at Stanford University. The university has cooperated to the fullest extent through furnishing laboratory quarters both for the Cooperative Trout Investigations and to other fisheries biologists in the employ of the Division.

It will be the first duty of these biologists to assemble and bring up to date the planting and stream survey records for their districts. In addition, they will immediately start work on a detailed study of certain problem waters in each area. During the present year, 1938, a thorough study is being made of the Eel, McCloud and Kern rivers and of the lakes in the Desolation Valley region. Since one of the

greatest present problems is the maintenance of suitable environment for fishes as a result of encroaching civilization they will be called upon to supply much of the necessary biological information for the Division's programs for pollution control and check dam, fish ladder and fish screen construction.

Furthermore, each man has been assigned a special project of statewide importance to be carried on over a period of years. These special projects include fish disease studies and their application to hatchery operation, analysis of sport catch statistics, study of the environmental relationship of trout and other fishes and the continuation of the Steelhead and salmon studies with emphasis on the completion of the Waddell Creek work.

The pollution control work which is growing of greater importance in fisheries work with the further development of the State is handled as a joint operation of this Bureau and the Bureau of Patrol. This detail is under the direction of Paul A. Shaw and a separate report is made upon it by him. Too great an emphasis can not be made on the importance of this work to fish conservation. Mr. Shaw has also rendered great service to the Bureau during the biennium in carrying on chemical work in connection with hatchery operations.

The following table indicates the hatchery units that were in operation or partial operation during the three years or portions thereof that are included within the biennium.

TABLE I—HATCHERIES

1936	*1937*	*1938*
Alpine	Alpine	Alpine
Basin Creek	Basin Creek	Basin Creek
Big Creek	Big Creek	Big Creek
Blackwood	Blackwood	Brookdale
Brookdale	Brookdale	Burney Creek
Burney Creek	Burney Creek	Central Valleys
Cold Creek	Central Valleys	Fall Creek
Domingo Springs	Cold Creek	Feather River
Fall Creek	Fall Creek	Fern Creek
Feather River	Feather River	Forest Home
Fern Creek	Fern Creek	Fort Seward
Forest Home	Forest Home	Hot Creek
Fort Seward	Fort Seward	Huntington Lake
Hot Creek	Hot Creek	Kaweah
Huntington Lake	Huntington Lake	Lake Almanor
Kaweah	Kaweah	Madera
Kings River	Kings River	Mt. Shasta
Lake Almanor	Lake Almanor	Mt. Shasta Experimental
Madera	Madera	Mt. Tallac
Mt. Shasta	Mt. Shasta	Mt. Whitney
Mt. Shasta Experimental	Mt. Shasta Experimental	Prairie Creek
Mt. Tallac	Mt. Tallac	Tahoe
Mt. Whitney	Mt. Whitney	Yosemite
Prairie Creek	Prairie Creek	Yuba River
Tahoe	Tahoe	Snow Mountain
Yosemite	Yosemite	
Yuba River	Yuba River	

The reduction in the number of hatcheries operated during 1938 was in large part the result of the storm damage previously recounted, one exception being the Blackwood Tanks. This plant consists of 12

rearing tanks housed in a frame building. It was originally planned to be used for the rearing of Steelhead transferred from the Tallac Hatchery. Experience over a period of several years has demonstrated that early summer temperatures in Blackwood Creek are too low to make it suitable for this purpose. It is, therefore, planned to move this station to a more suitable site in the near future.

In Table II is shown the various egg taking stations operated during the three seasons covered by the biennium and it will be noted that two new stations have been added, Carmen Lake, Mono County, and Pasadena Reservoir. Both of these stations were operated on a trial basis and it was found that a very satisfactory number of Eastern Brook eggs could be obtained at Carmen Lake. At Pasadena work was not successful due to extremely high water in the San Gabriel River. Since this reservoir is closed to fishing by the city of Pasadena, a further effort will be made to develop it as a source of Rainbow eggs for southern California.

TABLE II—EGG COLLECTING STATIONS

1936	*1937*	*1938*
Arrowhead Lake	Bear Lake	Bear Lake
Bear Lake	Beaver Creek	Blue Lake
Beaver Creek	Blue Lake	Bogus Creek
Blue Lake	Bogus Creek	Carmen Lake
Bogus Creek	Domingo Springs	Clear Creek
Cottonwood Lakes	Fall Creek	Cottonwood Lakes
Deep Creek	Forest Home	Deep Creek
Domingo Springs	Gull Lake	Fall Creek
Fall Creek	Hamilton Branch	Gull Lake
Forest Home	Hobart Creek Reservoir	June Lake
Friant Bass Ponds	Hornbrook	Hobart Creek Reservoir
Gull Lake	Hot Creek Ponds	Hornbrook
Hamilton Branch	June Lake	Hot Creek Ponds
Hornbrook	Klamathon	Klamathon
June Lake	Kosk Creek	Little Walker Lake
Klamathon	Lake Eleanor	Marlette Lake
Lake Eleanor	Little Walker Lake	Mt. Shasta Ponds
Little Walker Lake	Marlette Lake	Mt. Whitney Ponds
Marlette Lake	Mt. Shasta Ponds	Mud Creek
Mt. Shasta Ponds	Mt. Whitney Ponds	Prairie Creek
Mt. Whitney Ponds	Mud Creek	Rush Creek
Mud Creek	Prairie Creek	San Lorenzo River
Prairie Creek	Rush Creek	Scott Creek
Rush Creek	San Lorenzo River	Shackleford Creek
San Lorenzo River	Scott Creek	Shasta River
Scott Creek	Shackleford Creek	Snow Mountain
Shackleford Creek	Shasta Dam	Upper Truckee River
Shasta Dam	Snow Mountain	Warner Creek
Snow Mountain	Taylor Creek	Pasadena Reservoir
Taylor Creek	Upper Truckee River	
Upper Truckee River	Warner Creek	
Warner Creek		

All of the following stations were damaged by high water in 1938 and, with the exception of Lake Eleanor, no plans have as yet been made for replacing them: Lake Eleanor, Kosk Creek, Hamilton Branch, Domingo Springs. The Beaver Creek station in the Klamath area has also been abandoned due to the fact that the terms of the lease did not permit of satisfactory operation.

The Bureau is still in need of a larger supply of Rainbow eggs and definite steps have been taken to increase the number of this species reared and to reduce the number of Loch Leven. During the summer of 1937 thirty thousand Rainbow fingerlings were transferred from the Hot Creek ponds to Mt. Shasta and they have grown exceptionally well. These fish were derived from fall spawning stock and will undoubtedly make a valuable addition to the number of Rainbow eggs available in 1939. The supply of this species during the past two years has also been augmented by increased purchases from private dealers.

During 1937 the rebuilt Prairie Creek and Basin Creek hatcheries were put into full operation. The Central Valleys small mouth bass hatchery and fish rescue headquarters were put into partial operation. This station, although still under construction by the Works Progress Administration, at the end of the biennium operated at nearly full capacity. The small mouth bass produced are being planted in certain selected localities with a view to determining the possibility of establishing these fish.

The construction of the Central Valleys Hatchery has also made possible an expansion of the fish rescue work in the valley area. During 1937 four crews were operated and a total of 11,500,000 fish were obtained. During 1938 this work was further increased by the addition of two more crews. A detailed list of the fish saved during 1937 will be found in the statistical appendix.

One fish rescue crew was also used in the salvage of trout and salmon in Del Norte and Humboldt counties. It is hoped that it will be possible to extend the fish rescue work in the north coast area during the coming biennium.

REPORT OF THE BUREAU OF GAME CONSERVATION

By J. S. Hunter, Chief

The biennium for July 1, 1936-June 30, 1938, was particularly noteworthy for the unusual climatic conditions that prevailed throughout the State. The fall and early winter of 1936 was generally warm with scant rainfall. December turned cold and with copious rains well above normal. The early months of 1937 were particularly cold and at higher elevation the snowfall heavy. In the northeastern part of the State, the thermometer recorded the lowest temperature ever experienced reaching more than 40 degrees below zero. Excessive cold prevailed throughout the entire mountain areas.

The very low temperatures and heavy snowfall caused considerable loss of game. The antelope herd wintering in eastern Lassen and across the line in Nevada was severely hit. Survey of winter areas made from air and on the ground gave reason to believe that the loss may have been as high as 25 per cent. Mule deer had a hard time also, but suffered nowhere near as badly as antelope.

The fall of 1937 also opened warm and dry; especially so in the southern part of the State. November brought heavy rains in the north, but the south experienced the driest condition on record until unprecedented storms in the spring months. Temperatures were high, seldom reaching zero where previous winters 40 degrees below was not uncommon.

The abundant rainfall with good growing temperatures has resulted in the best feed conditions for many years. Many of the lakes and marsh areas in the high plateau sections that have been dry, or practically so, are now restored. Areas believed destroyed by overgrazing are now in good condition showing that the overgrazed condition was brought about probably as much from underwatering as from any other cause.

Tulare Lake at the end of June, 1938, had more than 200 square miles of surface, Buena Vista more than 50. Honey Lake filled to practically a maximum level and covered more than 100 square miles. Goose Lake is nearly three-fourths full. Even in the extreme dry portions of the State bordering Death Valley, the springs are unusually strong—enough flow to carry water a considerable distance from its source. All of these improved water conditions have brought about better game environment and if it is true that we are entering a cycle of normal or better than normal rainfall, we can look into the future with hope and optimism.

The waterfowl situation in California is by no means satisfactory to anyone. The policy of the Federal authorities in not fixing a definite date for the opening of the duck and goose season has resulted in much criticism by those still interested in hunting of waterfowl.

During the past seven years, the opening date has varied from October 20th to November 27th and this year October 15th. Only in the years 1932 and 1933 was the opening date the same—November 1st.

The first ducks from the north reach our State in late July and early August. In the Imperial the arrival date is usually the second week in August. It is decidedly to the advantage of the birds to have water conditions satisfactory on the only marsh areas left, the duck hunting grounds, when the birds arrive. As long as there is uncertainty as to the opening of the season; in fact, as to whether there will be any season at all, there will be irregularity in water conditions, most marshes will be dry. Rains can not be depended upon. Water in California must be bought or pumped. With the opening date in question, few landowners are willing to go to the expense of putting water on their land until well after the early flight has passed.

There is also dissatisfaction as to the 7 a.m. opening hour. With the sun rising approximately a minute later each day, there is so much daylight time between sunrise and 7 a.m. in October that the average duck hunter can not resist the temptation to shoot ahead of time. A violator of this provision of the law is particularly difficult to apprehend. The arresting officer must be in a most favorable spot if he is to swear to a complaint. The general result is criticism of the officer and a general disregard for the law by unattached shooters.

It can be definitely said that there has been an increase in the number of ducks in the past few years. This has been particularly so with nesting conditions during the last two seasons. More ducks nested in California during the spring of 1938 than for many years. California waterfowl refuges have certainly been a factor in increasing waterfowl. When these areas were set aside, there was scarcely an acre of open water where a duck could find security. Millions of birds have taken advantage of the refuge areas and have survived the barrage of duck shot. These are the birds that provide the future crop for the hunter.

Elk are still a problem in California. A few years ago, enthusiastic citizens in Owens Valley, believing that a herd of elk would be an added attraction, prevailed upon the National Park Service and our Commission to move the Yosemite herd of elk and others from the State Elk Refuge in Kern County to the Owens Valley. The new home proved entirely satisfactory to the elk and the numbers have increased. Now with the change in the agricultural policy of the Valley, many are wondering if the animals were so much of an asset. It will probably be necessary for some agency to construct a fence to prevent damage to cultivated crops.

The California elk on the Kern Refuge have had an average increase of 22 for the past two years. On this refuge, we had a rather strenuous time during high water conditions both in 1937 and 1938. By the construction of a levee around the adobe headquarter's house and the installation of pumps to take care of seepage water, we were able to save this house from destruction and comparatively little damage was done. It was also necessary to keep the elk from flooded areas. On account of the high water, feed conditions on this refuge have been particularly good and it has not been necessary to purchase feed.

GAME FARMS

During the past two years the production and distribution of game birds from our two games farms has been materially increased over previous bienniums.

The main factor in this increased production and distribution is further development of the holding pen program. At the close of the previous biennium we were serving 750 pens. During the present biennium this number was increased to 987. Many more clubs have become interested and constructed units of rearing pens in their locality.

Another factor in this increased production and distribution is the fact that several clubs that were operating holding pens have added brooding facilities as well. At both Fresno and Redding, where the Division of Fish and Game has units of 48 or more pens, 24 colony type electric brooders have been added to this equipment. In addition to the projects at Fresno and Redding, the Livermore, Dixon, Eureka, Petaluma, Cloverdale, Grass Valley and Lake County Wildlife Association added electric brooders to their equipment. These extra brooders gave us an additional output as we had the incubating capacity to supply this extra number of birds. Birds for these brooding units are hatched at our Game Farms and transported to the various units as day old chicks. With this added equipment, the production of the present biennium was increased from 64,573 to 81,934 birds of all kinds.

Another factor that has helped to increase the production of birds in the wild is the interest that various clubs have shown in providing closed areas into which birds from their holding pens are released. These closed areas provide a protected home where the birds may adjust themselves to their new environment and reproduce according to their own particular habits.

When a closed area is formed it is usually for a period of three years, and a planting of birds is made in this area each year. When a closed area is formed and receives a plant of birds each year, it will insure a sufficient number of birds to cause an overflow into adjoining properties where public shooting is permitted.

With a sufficient number of protected areas, with regular yearly plantings, a regular level of shooting is possible annually. In many cases the areas are closed for an indefinite period as it has been found advisable to continue them in order to keep the bird population of the closed area and adjoining territory at a sufficient level to warrant good shooting each season.

Still another means of using closed areas to improve shooting conditions has been experimented with in southern California during the past two years—the trapping of wild quail from refuges for the purpose of stocking depleted areas. It has long been our contention that quail may be reared more successfully under natural conditions than on the game farm, particularly when a proper balance of food, water and cover is maintained. In some States—New Mexico in particular—it has already been demonstrated that areas that have been depleted may be successfully repopulated with wild trapped birds. We see no reason why California should not make use of properly con-

trolled natural propagation to supplement the production of its game farms, particularly where native species are concerned.

A limited quail trapping program was carried on in the fall of 1937. Less than one thousand birds were trapped and reliberated in selected areas, all birds being banded with State bands so that it will be possible to follow their movements and get some idea concerning the percentage of kill during the open season. The trapping program will be prosecuted with the utmost vigor during the 1938 and 1939 seasons and we feel sure that by the end of the next biennium it will have become a permanent and valuable part of our game bird propagation set-up.

Believing that the experimental work on Chukar Partridges during the past five or six years justifies increased production and distribution, we have added more mating pens and increased the breeding stock several fold at both Game Farms.

Reports from various sections of the State where these birds have been liberated in the past five or six years seem to indicate that the birds are taking hold and multiplying well in the wild state. It is felt that this bird will fill a vacant niche in the upland game bird program of California.

These birds seem well suited for arid regions and for that reason there is justification for increased production and distribution of these fine game birds.

Due to the popularity of the bird with the average sportsmen, pressure is being continually brought to bear on the farms to produce more of these birds.

Shortly after the opening of the pheasant shooting season a few years ago, it became apparent to upland game bird shooters that a hunting dog was absolutely necessary for good field sport.

In the past three years the breeding of hunting dogs has become a real business. Activity along this line is best reflected in the number and quality of field trials held in various parts of the State. Believing that the use of hunting dogs is a real conservation measure we have, to some extent, advocated the breeding of dogs and holding of field trials. To this end, we have agreed to furnish and handle the birds for five major trials during the year. Two of these trials are held in the south and three in the northern part of the State. Each year the number of dogs participating in these field trials has increased.

Dog owners from Oregon, Washington and Idaho have participated in many of these trials, especially during the last two years. There is no question that the use of hunting dogs is a real conservation measure. Not only does the use of hunting dogs save time for the hunter, but they also more than pay for their upkeep by retrieving crippled birds that would otherwise be lost.

The following table shows the egg production and general distribution of birds for the biennium.

	Eggs laid	*Eggs distributed*	*Birds liberated*
Ring-necked Pheasant, Mongolian Pheasant and Reeves Pheasant	166,096	27,304	49,843
Partridges	25,797	-----	4,941
Quail	90,399	11,151	27,150

During the past two years the Los Serranos Game Farm has had to contend with a serious problem in the form of quail disease. The disease has been responsible for a high rate of mortality among both mature breeders and young birds and the annual production of quail has been greatly reduced in consequence. An investigation of the nature of the disease and possible means of control is being carried on in cooperation with the University of California and other agencies. The experimental vaccination of a number of birds during the 1938 season did not yield the expected results and it will be necessary to devise some more effective treatment if the large scale production of valley quail is to continue at Chino. Chukar partridges and other species of game birds reared at Chino have not been affected by this disease.

The California valley quail is not only subject to disease when confined on the game farm, and it has been demonstrated on several occasions that wild birds also suffer from maladies which are frequently responsible for the decimation of coveys over considerable areas. It is when we are faced with conditions of this kind that we realize how pitifully meager is the information that we have relative to disease among wild game species. The outbreak of quail disease at Chino brings home to us again the crying need for a disease research laboratory which will provide us with the knowledge that we must have if we are to successfully combat these epidemics.

August Bade, *Superintendent*,
Game Farms of California,
Yountville, California.

PREDATORY ANIMAL CONTROL

During the month of July, 1936, an entirely new principle was injected into the Division's Predatory Animal Control organization. Before entering into a detailed discussion of this new departure from the old scheme of things, however, it will be well to briefly summarize the history of the Division's Predatory Animal Control Program—exclusive of lion hunting—from the time of its inception up to the beginning of the present biennium.

Although this Division has been engaged in the control of mountain lions for many years, it was not until January, 1932, that an organized trapping campaign was launched for the purpose of controlling coyotes, bobcats, and other predators. At this time nine trappers were employed to control predatory species within the boundaries of State game refuges and in other game concentration areas. The staff of trappers was maintained at this level until June 30, 1933, when—due to the lack of funds—the number of men was reduced to four. Shortly after this, the addition of one more man was made possible and this group of five constituted the Division's entire trapping force up to July 1, 1936.

All of the trappers who were employed during these first few years were drafted from the ranks of experienced trappers who had learned their business trapping for fur and bounty in various parts of California. Not one of them had received any formal instruction in predatory animal control methods; their only training being that

which is acquired in the school of practical experience. They had varying degrees of ability and when it became necessary to reduce the number of men in 1933 the most efficient were, of course, retained. The group of five trappers who remained on the payroll represented the cream of this crop and became the firm foundation on which it was possible to begin the construction of a new predatory animal control organization.

It was at this time—July, 1936—that it became necessary to materially increase the Division's Predatory Animal Control activities —necessary, due to the fact that the Legislature had set aside the sum of $80,000 to be spent solely for the control of predators during the 87th and 88th fiscal years. It was at this same time that the Fish and Game Commission decided that the Division should have its own trappers rather than to rely on the selection of experienced men from the ranks of the commercial hunters. This departure from the established way of doing things has resulted in the development of a predatory animal control force of which the State of California may well be proud—and following is the manner in which it has been accomplished.

The first step in the development of this new organization was the division of the State into five predatory animal control districts: the northeastern California, the north coast, the southern Sierra, the south coast and the southern California districts. Each of the five men who comprised the predatory animal control force at this time was placed in charge of one of these districts and to each of these supervising trappers—as they are now called—was assigned a group of young men for training. These young men, most of them in their early twenties, were recruited from the ranks of the assistant fish and game wardens, the apprentice grade from which this Division draws most of its permanent personnel. Except in a few cases none of these men had received any training in predatory animal control methods prior to the time that he was assigned to this work.

This training program has continued for a period of two years and during that time a total of forty assistant wardens have been instructed in the art of trapping predatory animals. Most of them—contrary to expectations—have shown an extraordinary amount of aptitude for this work and have turned in very creditable records during their various terms of service. There has been, of course, considerable variation in the catches of the student trappers, but the man's catch record should by no means be the yardstick by which his ability is measured. A low or a high catch record is just as frequently a measure of the coyote or bobcat population as it is a measure of efficiency of the trapper. Following table gives the catch of coyotes, bobcats and other predators in each county of the State during each year of the biennium. It will be noted that the catch during the second year is far greater than that for the first year of operation of the new program. This remarkable increase is due, not only to the progressive increase in efficiency of the trapping force, but to the gradual improvement in equipment and in methods of instruction as well. Further, more men received training during the last half of the biennial period covered by this report.

During the year beginning July 1, 1936, and ending June 30, 1937, the average number of trappers employed was 12 men per month. These men ran a total of 67,960 miles of trap line and made

86,381 day sets—an average of 5661 miles of trapline and 7198 day sets per man. During this next year, ending June 30, 1938, an average of 19 men per month was employed, 137,696 miles of trap line were run and 179,406 day sets were made. The average miles of trap line per man was 7247. Each man made an average of 9442 day sets. Most of the trap lines set out by student trappers are run on foot which accounts for a low daily average length of trap line of less than twenty miles per day for student trappers.

PREDATORY ANIMAL CATCH BY COUNTIES

County	July 1, 1936, to June 30, 1937				July 1, 1937 to June 30, 1938				Total for biennium
	Coyote	Bobcat	Other predators	Total	Coyote	Bobcat	Other predators	Total	
Butte					26	15	190	231	231
El Dorado	12			12	15	3	13	31	43
Fresno					63	44	136	243	243
Glenn	10	19	13	42	24	35	5	64	106
Humboldt	42	93	42	177	9	142	64	215	392
Inyo	16		16	32	170	8	52	230	262
Kern	11	10		21	100	78	8	186	207
Lassen	45	5	25	75	51	4	7	62	137
Los Angeles					28	1	10	39	39
Mariposa	26	4		30	26	4	37	67	97
Merced					16	1	66	83	83
Modoc	4	2	2	8	47	3	11	61	69
Monterey	7	5	11	23	71	64	81	216	239
Napa					10	51	31	92	92
Plumas					3		1	4	4
Riverside	16	3	2	21	28	11	37	76	97
San Benito	245	77	90	412	23	7	19	49	461
San Bernardino	33	4	21	58	217	17	55	289	347
San Diego	39	7	66	112	185	57	126	368	480
San Luis Obispo	44	45	49	138					138
Santa Barbara					92	18	99	209	209
Santa Clara					47	23	39	109	109
Shasta					16	10	6	32	32
Siskiyou					107	28	51	186	186
Trinity	87	26		113			120	120	233
Tulare	267	104	18	389	215	116	97	428	817
Ventura	29	17	33	79					79
Totals	933	421	388	1,742	1,589	740	1,361	3,690	5,432

Coyote and bobcat catch by counties and other predators.

In March, 1938, another step was taken which will go still further in providing us with the type of predatory animal control organization that we have been striving to build. A promotional examination was given for the position of predatory animal hunter and trapper, open only to assistant wardens who had been trained under our supervision since July, 1936. More than half of the men who had had trap line experience applied for permission to take this examination and on July 1, 1938, the ten highest on the list were promoted to the new grade and sent out on permanent assignments. At the close of the next biennium we will—we are sure—be able to report that the records of these ten men have demonstrated to the satisfaction of everyone that "a college education is no bar to becoming a good trapper."

DEER STUDIES

The study of the Rocky Mountain mule deer was continued and in addition similar work was carried on in other parts of the State on California mule deer and southern mule deer. The problems studied

were the same as those relative to Rocky Mountain mule deer, namely; actual census work, information on numbers, sex ratio, condition of the deer herd, disease outbreaks and range conditions. Much definite and practical information has been gathered from these studies.

The southern California studies gave much information that the Division needed. Some of the more interesting facts determined were those relative to population per square mile, sex ratio, food conditions and migration.

In the Rocky Mountain mule deer region of northeastern California, the following tabulation covers a period of four years of fall and winter observation:

	Total deer	*Total bucks*	*Spike bucks*	*Does and fawns*	*Does*	*Fawns*	*Ratio bucks to does*	*Ratio bucks to fawns*	*Ratio does to fawns*
1933-34	9,263	1,449	143	7,814	5,690	2,124	1-3.9	1-1.4	2.6-1
1934-35	26,473	4,172	207	22,301	14,885	7,416	1-3.5	1-1.8	2-1
1935-36	8,928	1,353	125	7,575	5,361	2,214	1-3.9	1-1.6	2.4-1
1936-37	21,517	3,904	147	17,613	13,652	3,961	1-3.5	1-1.0	3.4-1
Four-year summary	66,181	10,918	622	55,303	39,588	15,715	1-3.62	1-1.44	2.52-1

It will be noted in the above tabulation that there was a total of 622 spike bucks. Most of these were observed in the Fall River-Burney Region and in eastern Siskiyou County where there has been considerable mixing between Columbian black-tailed deer and Rocky Mountain mule deer. Even when mixed and remixed many times, the yearling bucks with any black-tail blood generally are spikes rather than forked horns. Normally, about one full-blooded Rocky Mountain mule deer yearling buck out of fifty is a spike. About one out of ten is a three-pointer and very rarely a four-pointer.

1937 and 1938 were very good years producing an abundance of deer feed on the deer ranges of the State. The average growth on bitter brush or antelope brush *Purshia tridentata* in northeastern California during 1937 was about 2½ inches and slightly more in 1938. Other food plants made a good growth and provided an abundance of forage and browse.

The reduction or elimination of sheep and substitution of cattle on some parts of the mule deer range has augmented the carrying capacity of this range.

In southern California particular studies were made bordering the two refuges, 4-A in San Bernardino County and 4-B in Los Angeles and San Bernardino counties. California mule deer in areas adjacent to Refuge 4-A averaged about 6 per square mile and the same subspecies adjacent to Refuge 4-B averaged about 6.5 per square mile. Areas within Refuge 4-A averaged about 9.3 per square mile and in Refuge 4-B about 9.8 per square mile.

Two areas adjacent to Refuge 4-E in San Diego County averaged 5.3 southern mule deer per square mile and two areas within the same refuge averaged 5.8 per square mile.

One area adjacent to Refuge 4-G in Riverside County averaged 16.2 deer per square mile and in the refuge averaged 14.3.

An estimate of the total range of the six subspecies of deer commonly found in California has been made. There are 155,652 square

miles in the State of which 84,300 square miles or 54% can be classed as deer range, where these animals may be found in varying numbers. Of this about 46,000 square miles can be classed as good deer country supporting a population of about 7 deer per square mile on the average. About 20,000 square miles may be classed as fair deer territory with an average of about 3 deer per square mile, leaving about 18,000 square miles of poor deer range with an average of about 1 per square mile.

The approximate square miles of range for each of the six subspecies of deer in California are as follows:

Columbian black-tailed deer	44.5% or	43,500
California mule deer	23.2% or	22,500
Rocky Mountain mule deer	15.9% or	15,500
Southern mule deer	6.3% or	6,100
Inyo mule deer	5.4% or	5,250
Burro deer	4.7% or	4,600
		97,450

Of this total, there are about 13,150 square miles of overlapping ranges between adjoining subspecies. Thus we find that the total deer range is about 84,300 square miles.

The average counts per square mile on ranges of the different subspecies of deer have shown the following to be the approximate density:

Columbian black-tailed deer	4.3 per square mile
California mule deer	4.5 per square mile
Rocky Mountain mule deer	5.8 per square mile
Southern mule deer	2.6 per square mile
Inyo mule deer (partially estimated)	2.2 per square mile
Burro deer (estimated)	.2 per square mile

By multiplying the number of deer per square mile by the number of square miles in their range, we find the population of the various subspecies to be about as follows:

Columbian black-tailed deer	186,900
California mule deer	101,500
Rocky Mountain mule deer	90,000
Southern mule deer	16,000
Inyo mule deer	11,500
Burro deer	920
Approximate deer population the entire State	406,820

SAGE HENS

During the last two years the sage hen condition in the northeastern sagebrush plateau area has improved greatly. The population has doubled or possibly tripled due to good food and hatching conditions. The situation in eastern Lassen County can be expected to improve even more since a major part of the sheep range is now cattle range. The cattle are not as destructive to sage hen food or nest sites as are sheep; nor are the cattle brought into the sage hen range at such an early date in the spring as are the sheep.

In Mono and Inyo counties, the sage hen have also increased quite satisfactorily, due to better food and range conditions.

ANTELOPE

After having reached a peak of population in 1936, the antelope went into the winter of 1936-37 in only fair physical condition and were badly hit by snows, intense cold and lack of feed on their winter range in southeastern Lassen County and the western part of the State of Nevada bordering Lassen County.

On a survey made by air and horseback, the loss was concluded to be at least 25 per cent reducing the herd to an estimated 9,000 to 11,000 head. Most of the animals lost were old individuals. On parts of the winter range, the loss was better than five per square mile. The animals have been slow to recuperate from this loss. Although, the winter of 1937-38 had a heavy snowfall, there was no intense cold or great scarcity of feed on the winter range and they came through in much better condition. The fawn crop of 1938 was the best in ratio to does since 1935.

REPORT OF THE BUREAU OF PATROL

By E. L. Macaulay, Chief

The division of patrol activities into three districts mentioned in the thirty-fourth biennial report has been continued with satisfactory results. Two promotional examinations from the grade of assistant warden to fish and game warden have provided an increase in our patrol force of twenty wardens.

Our Marine Fisheries Patrol has been materially enlarged by the addition of four sea-going patrol boats for southern California waters, and a new boat has also been built for upper San Francisco Bay. All of our ocean-going boats have been equipped with radio telephone installations, providing an effective means of communication from shore to ship as well as between ships.

A separate pollution detail in the Bureau of Patrol has been set up and a detailed report by Paul A. Shaw, chemist in charge, is included herewith. A new activity, the Junior Game Patrol, was organized in 1936 to interest young people under 21 years of age in the principles of fish and game conservation. The Junior Game Patrol is supervised by Warden M. F. Joy, Jr., who has written the article describing the aims and purposes of this movement included in this report.

Conferences with all wardens in attendance were held at Sacramento in February, 1937, and April, 1938. These meetings are very beneficial, as they give our men an opportunity to become acquainted with fish and game problems in other portions of the State.

During the past biennium the following members of this department retired from active service:

R. C. Marshall on July 15, 1936;
Captain J. E. Newsome on August 2, 1936;

and the following passed away:

Captain E. W. Smalley on August 9, 1936;
Warden Charles Bouton on July 11, 1937;
Warden McPherson Lough on November 9, 1937.

After August 27, 1937, one-half of all fines collected for violations of the Fish and Game Code are paid into the county treasury of the county in which the defendant is tried, the other half going to the fish and game preservation fund. While this procedure has resulted in a reduced income from fines to the Fish and Game Commission, it has helped recompense the counties for the costs of prosecuting fish and game cases.

Patrol efficiency continues at a high standard. A recapitulation of arrests and convictions will be found in the appendix on page 91.

CALIFORNIA'S JUNIOR GAME PATROL

By M. F. Joy, Jr., Warden, Superintendent Junior Game Patrol

The Junior Game Patrol was first organized in 1936 by the Division of Fish and Game because of the need for educating society in the principles of conservation, so that the Division's work in the preservation of California's resources for the benefit of the public may not be in vain. The number of violations of the fish and game laws in California since 1926 has increased greatly, and it was apparent that a large proportion of the violators were young men between the ages of 21 and 30. The purpose of conservation is to assure the constant use of the resources and to leave a sufficient breeding stock, and the fish and game laws are therefore enacted by the people of the State to aid in the management and wise utilization of the resources. Hence, the Bureau of Patrol of the Division of Fish and Game is vested with the duties of enforcement of these laws. The Bureau's aim is to make the public realize the significance of the inestimable damage that can be done through carelessness and of their responsibility in preserving Nature's gifts for future generations, and it is not the Bureau's sole purpose to apprehend violators as so many are prone to believe. This is in keeping with the modern trend to prevent rather than punish. For example, since 1926, there have been 23,345 persons arrested and convicted for fish and game violations in this State, but many of these offenses could have been prevented. Fines for such violations amounted to nearly half a million dollars and the violators served some 70,000 days in jail, an aggregate of 191 years. Although it may be too late to educate the older people, we can do a great deal of good by teaching our youth the principles of conservation so they will not become violators.

A plan, originated and furthered by Mr. A. T. Jergins, Fish and Game Commissioner of California, was therefore initiated to educate our younger generation along these conservation lines, teaching them to appreciate and protect the wildlife, the perpetuation of which is in the hands of the public. Such was the origin of the Junior Game Patrol, which is making even more rapid strides than the Division of Fish and Game had anticipated. The sportsmen's organizations have aided materially in furthering this work by taking an active interest.

The Junior Patrol, under the direct supervision of the Division, is made up of troops, the members of which are boys of 10 to 21 years of age. Their membership is solicited throughout the schools, and the troops are locally sponsored by sportsmen's clubs, civic organizations or interested individuals. The sponsoring agency furnishes the required adult supervision, namely, troop leaders—one for each platoon consisting of 19 boys—and also special instructors whenever necessary. If the patrol leaders are adept in some particular phase of the program, such as natural history, specimen mounting, drilling, sport fishing, etc., their

knowledge will be of benefit to the troop. However, in any case the officers of the Division of Fish and Game are prepared to instruct in specialized conservation fields in addition to directing the general activities. The sponsor of the troop provides a meeting place, which is usually a civic hall, school or other convenient place.

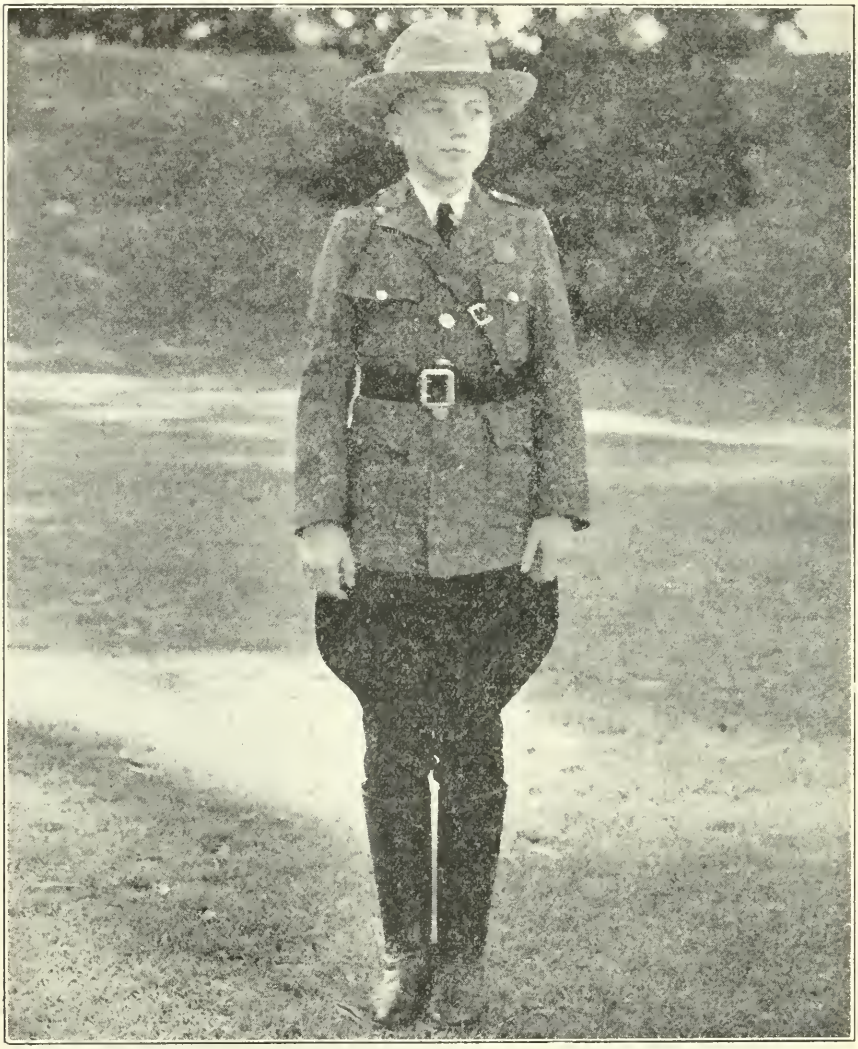


FIG. 40. A Ranger of the Junior Game Patrol. The uniform is modeled on that of the Canadian Northwest Mounted Police.

In organizing a troop, a group of boys is called together by the Division of Fish and Game and the purpose of the Junior Game Patrol is explained to them. The boys are given literature on fish and game laws and on natural history subjects, and are provided with applications for membership. Weekly meetings are held thereafter. After

four weeks of instructions on fish and game laws and the reasons for them, a preliminary examination is given. The successful boys take the oath of office and are given badges and credentials signed by the three California Fish and Game Commissioners and the Division's Executive Officer. Thus, they become Rangers of the Junior Game Patrol. Then they are ready to commence with the course of instructions, outlined below, which is made as interesting as possible. Field trips are an important feature, as it is only through actual contact

FIG. 41. The badge of the Junior Game Patrol.

with nature that the desired results can be secured. The course consists of the following activities:

Instructions in fish and game laws and the reasons for them.
Identification of birds, fish and other animals; mounting of specimens.
Drill work.
Fishing—fly and bait casting.
Making of flies and leaders, rewinding rods.
Hunting in field; dog training.
Hiking, camping, forest fire prevention.
Rifle and pistol shooting.
Trapping; predatory animal control.
Athletics.
Red Cross life saving.
Game management on the farm; restoration of cover for upland game; soil erosion.
Game bird raising.

The organization of the patrol is as follows:

Squad	
1 Corporal	1
3 Rangers	3
	4

1 Platoon	
4 Squads	16
2 Sergeants	2
1 Lieutenant	1
	19

2 Platoons
1 Captain

1 Company	
4 Platoons	64
8 Sergeants	8
4 Lieutenants	4
2 Captains	2
	78

1 Troop
Any number of companies
1 Major

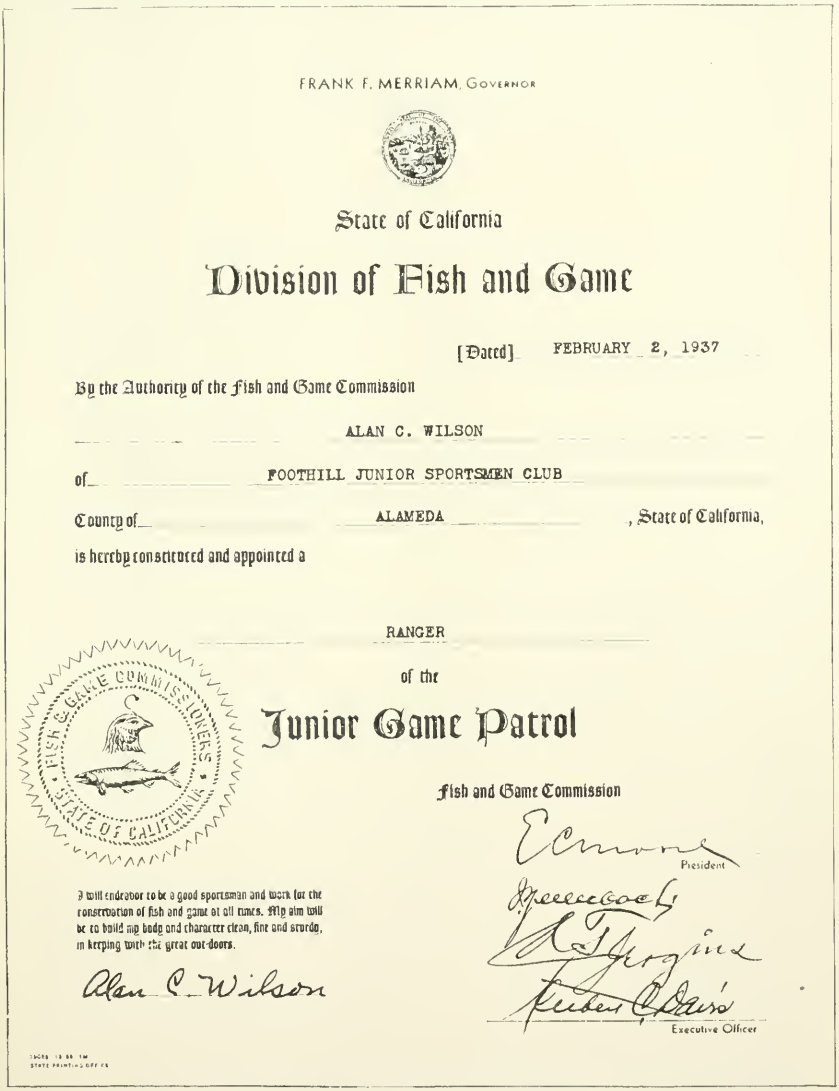
FIG. 42. The shoulder insignia of the Junior Game Patrol.

The Division of Fish and Game has designed uniforms (see Fig. 40) for these boys, and the cost is approximately $7.75 each. The sponsoring agency, if it so desires, may uniform the boys but the Division of Fish and Game recommends that the funds for their purchase be raised by the rangers themselves through social functions or other means. There never should be any financial obligation on the part of the individual member or his parents. In this way, the uniforms will be the property of the troop.

At the present time (June, 1937), there are approximately 250 members who have received their commissions. The average age of the boys is 15 years. Troops have been organized in San Francisco, Oakland, Tracy, Stockton, Napa and in Marin County, and sponsored by the following clubs:

Foothill Sportsmen's Club, Oakland.
San Francisco Rod and Gun Club, San Francisco.
Ingleside Sportsmen's Club, San Francisco.
Daly City Sportsmen's Club, San Francisco.
Tracy Wildlife Association, Tracy.
Napa Rod and Gun Club, Napa.
Marin Rod and Gun Club, San Rafael.

The rangers are not vested with any law enforcement authority and it is not the intention of the Division to grant it. Above all, they



FRANK F. MERRIAM, GOVERNOR

State of California

Division of Fish and Game

[Dated] FEBRUARY 2, 1937

By the Authority of the Fish and Game Commission

ALAN C. WILSON

of FOOTHILL JUNIOR SPORTSMEN CLUB

County of ALAMEDA, State of California,

is hereby constituted and appointed a

RANGER

of the

Junior Game Patrol

Fish and Game Commission

President

Executive Officer

I will endeavor to be a good sportsman and work for the conservation of fish and game at all times. My aim will be to build up body and character clean, fine and sturdy, in keeping with the great out-doors.

Alan C. Wilson

FIG. 43. A Ranger's commission in the Junior Game Patrol, signed by the three Fish and Game Commissioners and the Executive Officer of the Division of Fish and Game.

are not to work in the guise of "stool-pigeons." They are taught conservation practices, to appreciate and protect wildlife, to be aware of the beauties of nature, to be sportsmanlike, and in general to become better citizens for having become rangers. These boys can carry the knowledge thus gained to their homes and associates and so spread the conservation movement. They will understand that violating fish and game laws and the laws of the forest is not smart or clever, but a dishonorable crime against nature. We know this work is worthwhile but we need the public's cooperation and assistance in order to make this "conservation through education" undertaking a state-wide organization.

POLLUTION DETAIL

By Paul A. Shaw

In order to cope with increased sources of pollution and with public demand for the maintenance of cleaner waterways, the pollution detail was expanded during the biennium for a three- to an eight-man unit. The Division toxicologist is in charge with a senior warden handling enforcement. Three recently appointed wardens, two assistant wardens, and a laboratory man complete the assignment. Due to the rapid expansion of the work, it appears desirable to record this activity in considerable detail.

The problem of pollution control is fundamentally one of law enforcement and therefore a function of the Bureau of Patrol. However, the establishment of scientific facts and the application of proper engineering principles to the correction of existing conditions are equally important problems which necessitate the assignment of specially trained men for effective investigation and remedial action.

Preliminary investigation in response to complaints, or conditions observed on regular patrol, are reported in detail and followed up by any research or technical data necessary to ascertain the facts. Samples, pictures, statements of witnesses and other pertinent facts are also essential features of the investigation. Upon completing the evidence, notices of inspection may be issued indicating the violation and condition to be corrected.

The nature of the violation and the attitude of the offender determines the manner of procedure; the general policy being to secure a remedy through cooperative effort in so far as possible. Problems common to an industry are often approached through a group representative with the thought of establishing approved methods of practice relative to waste disposal. If suitable preventative measures have not been developed, the industry is urged to instigate research work and, in the event of active cooperation, time is granted to develop and install proper equipment rather than to force temporary methods that might prove unsatisfactory and costly. The staff of the pollution detail aids in such programs and in many instances are able to suggest proper procedures at a considerable saving to the industry. Cooperative programs of this type are in progress with the major oil companies, commercial fishing interests, the Canners' League, Wine Institute, Gold Producers of California and others.

Failure to accomplish the desired result through educational and cooperative effort necessitates active enforcement. However, immediate action is indicated when substances specifically prohibited by law are discharged or when the discharge of waste is known to be detrimental or causes visible damage to aquatic life. Even in such instances, the enforcement action may consist in notification to remedy the condition at once, for, in the final analysis, the goal is to secure correction

rather than court fines. Immediate prosecutions are confined to conditions resulting from negligence or wilful disregard of law and to substances which are widely known to be prohibitive through previous publicity and educational effort.

In both the technical studies and the enforcement activities the cooperation of various municipal, State and Federal agencies has been solicited and received. Valuable technical assistance has been received from the State Bureau of Sanitary Engineering, district sanitary engineers and the major oil companies. Federal agencies charged with the enforcement of similar pollution laws in navigable waters have rendered active assistance on law enforcement. Pollution patrol of harbor and beach areas by the U. S. Coast Guard, reports from customs officials and legal support of the War Department through their district engineers have all aided materially in pollution control. Evidence obtained by the pollution detail and Federal agencies is freely exchanged and may be utilized for prosecution by either one or both. In this connection it is understood that Federal fines imposed on pollution cases in California during the last three months alone will total over $37,000.

It is impossible to determine the expenditure of various enterprises to correct conditions found unsatisfactory by the pollution detail but the amount unquestionably totals several million dollars for the present biennium. Corrective measures include installations to screen, settle, filter, incinerate and impound in addition to chemical and biological treatment methods. In numerous instances these installations have resulted in the recovery of by-products producing added profit for the concern.

Particular emphasis has been given to the exclusion of substances causing visible pollution of State waters since items of this type are the most common source of complaint. Solids that blanket the bottom or produce gases during decomposition are extremely damaging to aquatic life. Invisible polluting agents such as acids, metals and organic substances in solution require more detailed technical study to determine sources and in general are more difficult to treat or exclude. Organic wastes are dangerous due to their ability to remove oxygen, producing lethal areas or complete barriers to fish migration. Many such conditions have been corrected and investigations to remedy others of a similar nature are in progress.

Beach, harbor, and general aquatic conditions in southern California have shown remarkable improvement during the biennium. In this area, where oil has been the largest contributor to pollution, improvements have been effected through cooperation at all the major oil fields and pollution from loading terminals and bilge pumping have been largely controlled through cooperation and enforcement. Improvement may also be noted through the reduction of garbage, citrus products, fish cannery waste and other refuse formerly discharged indiscriminately. In this connection, a rotary screen designed by one of the pollution detail to eliminate fish cannery solids has proven profitable to concerns installing the device.

Food and beverage industries, including canneries, sugar refineries, wineries, distilleries, dairy products, and meat plants have required active attention in many parts of the State. Programs to

eliminate solid or other prohibitive substances from such sources have been partially effected and are in progress at many other plants.

The rapid development of the mining industry has resulted in a major pollution problem. Quartz mills, dredgers and hydraulic operations all produce effluents that menace spawning areas, fish foods, recreational activities, domestic, industrial and agricultural water supplies and even navigation. Considerable progress has been made in providing permanent impounding of mill tailings and in the Trinity and Klamath area. The revision of section 482 through the Quinn bill has aided materially in maintaining river clarity for the period from July 1 to November 30. During the restricted season constant patrol has been maintained in cooperation with an engineer assigned by the Gold Producers of California.

Tailings from bucket and drag line dredges have been particularly difficult to control and due to their tendency to stay in suspension and remain muddy after settling and filtration, the pollution staff undertook research work which resulted in the development of a chemical method of clarification that can be installed and operated at small expense. Recent installations indicate that satisfactory clarification of the most refractory effluent can be obtained by this method.

Tunnel drainage from both active and abandoned mines, causes extensive damage to certain streams due to the presence of acid and metals dissolved from deposits of ore through the action of air and water. The gravest danger from this source occurs when large volumes of tunnel water are pumped out to dewater a tunnel preparatory to resuming operations at an abandoned shaft. In one such instance fish were killed for sixty miles downstream and immediate action was necessary to minimize further damage.

While it is not desired to emphasis court action, the record, as shown below, is indicative of the increased attention being given to pollution control.

POLLUTION CASES

Period	*Arrests*	*Fines imposed*
7/1/35-6/30/36	14	$550 00
7/1/36-6/30/37	46	2,210 00
7/1/37-6/30/38	64	6,305 00

Section 481 of the Fish and Game Code, on water pollution, is well worded and more recent interpretation of its provisions has permitted the control of various substances, obviously damaging to water resources, which had not been considered covered by this section previously. At the present time no changes in its provisions are recommended.

REPORT OF THE BUREAU OF MARINE FISHERIES

By N. B. Scofield, Chief

During the two past calendar years of 1936 and 1937 the commercial fisheries of California continued to lead all other States both in total production and in the value of its fishery products. The total landings of fish and shellfish by California fishermen amounted to 1,247,987,000 pounds in 1936 and 1,169,570,000 pounds in 1937, thus completing the fourth successive year in which the landings have exceeded the billion pound mark.

The combined total landings for the two years 1936 and 1937 amounted to 2,417,557,000 pounds, as compared with 2,339,959,000 pounds for the preceding two year period of 1934 and 1935, which in turn exceeded the two year period 1932 and 1933 by 105 per cent. The great expansion of the industry is therefore, at the present time, in its fifth year.

The value of the fishery products in either of the past two years exceeded $50,000,000. The fish packing and by-products plants, excluding the plants handling fresh fish and shellfish, have an investment value exceeding $10,000,000 and employ 10,000 persons. The number of commercial fishermen's licenses issued in the license year 1936-1937 (April 1 to March 31) was 6,986, while for the license year 1937-1938, 7,771 licenses were issued.

The value of commercial fishing boats is conservatively estimated at $33,000,000.

The details of the fish catch and fish pack for the calendar years of 1936 and 1937, and the special sardine report for the seasons 1936-1937 and 1937-1938 may be found in the appendix to this report or in Statistical Circular Nos. 11 and 12.

SARDINES

The sardine fishery of California within the last few years has developed into one of the major fisheries of the world. It is by far the largest fishery ever developed in North America. Its size as compared with the other fisheries of this State is shown in Figure 1 while its actual weight in pounds and its expansion during the past twelve seasons can be seen in the following table:

Sardine Catch Delivered to California Shore Plants and to Floating Plants Operating Off the California Coast in Tons

Season	*Shore plants*	*Floating plants*	*Total*
1927-28	181,176	-----	181,176
1928-29	252,433	-----	252,433
1929-30	322,600	-----	322,600
1930-31	172,001	10,200	182,201
1931-32	131,320	14,100	145,420
1932-33	190,166	55,890	246,056

FIG. 1. Total landings of fish (exclusive of mollusks, crustaceans, amphibia and reptiles), in California. Importations from Gulf of California, Hawaii, and Japan have been omitted.

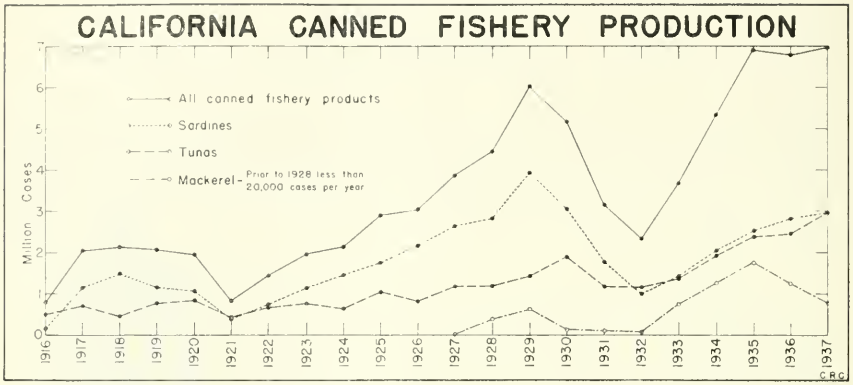


FIG. 2. "Tuna" includes Albacore, Bonito, Skipjack (Striped Tuna), Bluefin, Yellowfin, Tonno, Tuna Flakes and Tuna, unclassified.

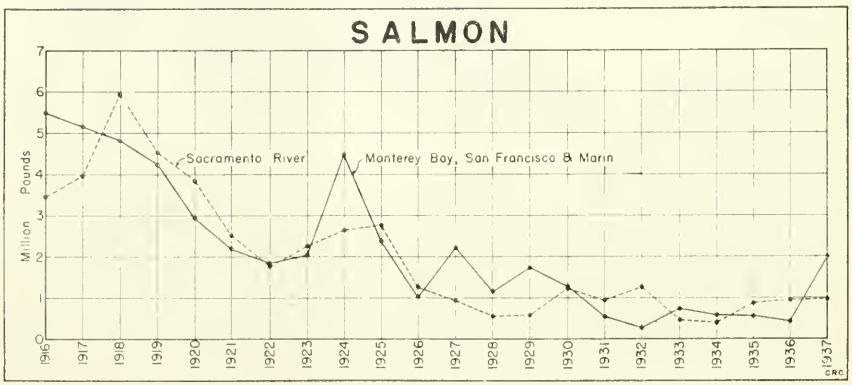


FIG. 3. This graph shows the decline of the King salmon fishery as shown by the Commercial catch in the river and in the adjacent ocean districts.

Season	Shore plants	Floating plants	Total
1933-34	313,842	77,132	390,974
1934-35	480,746	128,190	608,936
1935-36	407,166	158,754	565,920
1936-37	488,141	239,257	727,398
1937-38	345,834	74,334	420,168

The sardines are used for canning, for reduction into oil and fish meal and as bait for sport angling and for commercial fishing. The amount of sardines used for bait each year is not given in our records but it is estimated at 25,000,000 pounds. The amount of sardines used for canning and the number of cases produced during the past four seasons is shown in the following table:

Season	Amount received for canning	Cases 1-lb. oval cans	Equivalent cases in other size cans	Total
1934-35	138,109 tons	1,486,343	390,279	1,876,622
1935-36	237,537 tons	1,936,154	1,280,761	3,216,915
1936-37	212,278 tons	1,647,332	1,341,714	2,989,046
1937-38	160,928 tons	1,182,714	1,117,715	2,300,429

Due to the lack of adequate control over the fishery, a much larger amount of the sardines caught are used for reduction into oil and meal than is used for canning. The following table gives the amount of sardines used by shore plants in the past four seasons for reduction purposes, with the oil and meal produced from this amount and from the offal and overage discarded by canning plants. The table does not include the sardines used by floating reduction plants operating off-shore beyond the State's jurisdiction.

Season	Received for reduction	Oil produced	Meal
1934-35	342,339 tons	16,870,565 gal.	77,651 tons
1935-36	168,922 tons	13,200,692 gal.	59,904 tons
1936-37	274,272 tons	14,299,923 gal.	75,115 tons
1937-38	183,858 tons	9,175,277 gal.	52,981 tons

The great expansion of the fishery has been accompanied by unmistakable signs of depletion in the sardine population and it is imperative that the fishing intensity be brought under control and the present large production be reduced, if we are to avoid the ruin of the State's sardine supply. The expansion of this fishery has been brought about by an increase in the number of fishermen and by a greater increase in the number and efficiency of fishing boats and processing plants. Our repeated warnings that we are drawing too heavily on our sardine supply have failed to bring about legislative action until now we have an industry with an investment in men, boats and plants which can not be supported by the available supply of fish.

It is inevitable that fishermen and plant operators must stand a great loss in investment and occupation and that the State must struggle along with a fishery resource to a point far below what it was capable of producing if it had been wisely managed. As for the future, we will continue to have a sardine industry but it will of necessity be reduced in size and be restricted to canning and the production of high potency, vitamin fortified oil.

TUNA

The second largest of our fisheries is that of the tuna which is almost entirely a canning industry, only a very small per cent going to the fresh fish markets. Unlike the sardine industry which has what amounts to an unlimited market for the oil and meal products, the tuna industry must depend upon a market for its canned product.

At the time of our last report in 1936 there was an excellent and growing market for all of our canned fishery products which resulted in increased canning of tuna as well as of sardines and mackerel. In the year 1936 the industry produced close to two and one-half million cases of tuna which exceeded the previous high year of 1935 by about 150,000 cases. The expansion of the industry was accelerated by the building of more and large tuna fishing boats. Early in 1937 tuna were landed in such quantities that the pack exceeded the market requirements. In order to stabilize the market and prevent price cutting or a reduction in the price paid to fishermen, canning operations were curtailed by an agreement with fishermen to hold their boats in port for a time. In spite of this curtailment the pack for 1937 came very near reaching the three million case mark and the industry went into the 1938 season with a considerable carry-over of canned tuna. Again in this year, 1938, packing has been slowed down by holding the boats in port for two months, but this did not prevent a ruinous drop in the price of canned tuna.

As the supply of tuna is drawn from an extensive area reaching to the Equator and as the catch will be limited by the market demand for canned tuna, we are not greatly worried about the supply being depleted, although we are watching this very carefully.

Due to the expense of capturing tuna in far away waters, the canned product must bring a much higher price than canned sardines or mackerel, for example, which are taken by more economical methods and in waters near the canneries. The higher selling price of canned tuna restricts the catch to supplying a market which may not expand sufficiently to strain the tuna supply for some years to come. The tendency to over expand, especially in number and efficiency of fishing boats, exists in this fishery only to a less extent than with the other larger fisheries of the State. It is probable that cheaper methods of catching and canning tuna will be worked out. A good deal of experimenting with refrigeration methods on the boats is being carried on by fishermen and the canning companies so as to reduce the loss of tuna from spoilage or deterioration in the long haul from the tropics. The new fisheries research boat now building for this bureau will be equipped for carrying on refrigeration experiments on a commercial scale. Such experiments are designed to improve the quality of the fish and prevent what at present represents a serious loss to both fishermen and canners.

MACKEREL

Third in importance in the fisheries is that of the mackerel which is also our youngest fishery, being now in its eleventh year since the first important pack of canned mackerel in 1928. The reasons for the rapid development of this fishery were: a fair abundance of fish; a good demand for a moderately low-priced canned fish: and an abundance of purse seiners which could fish for mackerel when they were not

fishing for sardines. In 1935, only eight years after this fishery started to develop, fishermen brought to the canneries in southern California and at Monterey 146,427,000 pounds of mackerel. We were at that time quite worried for fear that this heavy catch would deplete the supply of fish. The fishery was yet so young and the investigations of the California State Fisheries Laboratory covered so few years, we were without knowledge as to how much the fishery could stand. However, we did recommend in our 1936 report that the Fish and Game Commission should be given the power by the legislature "to regulate or limit the catch, in order that a reasonable annual catch can be tried out and thus determine what the maximum production of the fishery should be without depletion of the supply." As the 1937 legislature was being importuned to grant similar powers to the Commission to save the sardine fishery from destruction, it was deemed advisable not to ask the legislature for too much at one time. Sardines being more important than mackerel at the time, no bill was pressed on behalf of mackerel. As it happened, no legislation was obtained for sardines, and it is doubtful if mackerel would have fared better.

In 1936 the mackerel catch dropped from the high mark of 146,427,000 pounds of the year before to 100,541,800 pounds and in 1937 dropped still further to 60,936,700 pounds. This falling off in the mackerel catch has been in spite of a continued good market, a higher price paid to fishermen and more boats engaged in the fishery. In other words, an increased fishing effort failed to hold the production at its former level. In the meantime the work of the California State Fisheries Laboratory has shown up other signs of depletion. Fishermen and canners have realized that the mackerel can not stand this heavy strain, and at the request of the Commission voluntarily agreed to observe a two-month's closed season in the spring of 1938, which was scrupulously observed by all.

I recommend again that power be given the Commission by the legislature to regulate or limit the catch of mackerel, as the best method of managing this fishery.

CONSERVATION

The marine fisheries of California which annually produce commercial fishery products valued at $50,000,000 and support a sport fishing industry of large proportions, have attained a place among the major industries of the State. Likewise, the fish along the coast of California upon which this great industry depends constitutes one of the State's most valuable resources.

It is amongst the duties of the Division to gain a sufficient knowledge of the fisheries to formulate fisheries management policies to safeguard the fisheries of the State and at the same time to get the most possible from the fishery resources, without reducing the breeding stock below the point where the fishery will produce a continuous and sustained yield.

The Division, through the Fish and Game Commission, can recommend measures for the management of the fisheries which the legislature may enact into law. So far very few regulatory powers have been given to the Commission. The Commission besides the authority to employ assistants to gain the information upon which to manage the fisheries, is charged with the duty of employing assistants to enforce

the laws as passed by the legislature and to carry out such regulatory powers as have been granted.

To facilitate this work, the Commission established the Bureau of Commercial Fisheries. Its title has recently been changed to Bureau of Marine Fisheries, and its field extended to include the marine sport fisheries.

The enforcement of the commercial fisheries laws which at one time was under the Bureau of Commercial Fisheries was transferred to the Bureau of Patrol and Law Enforcement, with the idea of greater efficiency and economy. Under this arrangement a special marine patrol has been established and toward which the Bureau of Marine Fisheries acts in an advisory capacity as it is considered necessary that the Marine Fisheries Bureau be in close touch with the enforcement of the fisheries measures.

The principal duties of the Bureau of Marine Fisheries are therefore concerned with fisheries research, with the object of getting sufficient knowledge for the proper management of the fisheries.

To carry out this work the Bureau from the time it was organized some twenty-five years ago began developing a fisheries research staff which has grown in numbers but this growth has not been more rapid than that of the fisheries themselves or the problems raised by their rapid development. A laboratory and statistical building have been built to accommodate this staff of workers. Ocean-going patrol boats have been built and these have been equipped for carrying on the necessary investigations at sea. A new vessel is now under construction which will be used mainly for fisheries research work.

The cost of the research work and the marine patrol and law enforcement, plus the Bureau's proportionate share of such other activities as administration, fish culture, pollution, fish screens and ladders, is entirely paid for from fees, licenses and fisheries taxes collected from the marine fishing industries. The total cost of this work is proportionately small as it amounts to less than one-half of one per cent of the annual value of the commercial fishery products.

The research program for the management of fisheries, to be effective, must be well planned and continuous. The research program which is being followed is set forth in the following report of the California State Fisheries Laboratory.

It is not enough that information be obtained upon which the fisheries may be managed so as to get from them the greatest sustained yield. This information must be used or it is effort largely wasted. This applies with equal weight to the management of game and the inland fisheries. Fish and game management has become a very important enterprise rather highly developed and much of it rather technical. Experience has shown that many of the problems of fish and game management are not best decided by a legislature. What is needed is a stable commission, free from political pressure and upheavals, endowed with sufficient regulatory powers to adopt and carry out those conservation measures which are based on technical investigations.

REPORT OF THE CALIFORNIA STATE FISHERIES LABORATORY

By W. L. Scofield, Supervisor

The California State Fisheries Laboratory, established in 1917, has followed continuously a well planned and consistent policy for the past twenty years. It is appropriate here to restate the policy with a brief resume of the program now in operation which is based upon it.

POLICY

The management policy of the Bureau of Marine Fisheries is that of conservation, which means the fullest possible utilization consistent with sustained yield. The goal sought in applying the policy is to harvest each year the largest crop possible without reducing the spawning stock for the future, which would thereby reduce future yields. The maximum continuous crop possible for any stock is about equal to the replacements spawned each season. The larger the breeding stock the more replacements spawned, so it is evident that the maximum continuous yield from a fishery is the annual increase from a full spawning stock in the sea.

FUNCTION OF THE RESEARCH LABORATORY

The California State Fisheries Laboratory is established for the purpose of supplying the administrative officers with the facts most needed in the management of the State's marine fisheries. In applying the above management policy, four types of information are necessary:

1. The present state of the supply of each species in order to know whether or not any regulation of a fishery is needed.
2. Knowledge of the species and the fishery to determine the kind and degree of regulatory measures needed.
3. Continuous observation of the fish supply to determine the effectiveness of regulations already in operation.
4. Complete knowledge of the annual crop harvested.

With adequate knowledge of (1) the stock in the ocean, (2) replacements surviving from spawnings, and (3) catch removed, it is possible to so regulate the annual catch that a balance between catch and replacements can be struck so as to maintain a full spawning stock to insure future yields continuously. This is maximum utilization consistent with sustained yield.

RESEARCH PROGRAM FOR ANY FISHERY

In any fishery, a research program designed to furnish the administrators with the necessary information would include:

1. Studies of the supply on hand.

2. Knowledge of the species and fishery.
3. Continuous observation of abundance.
4. Catch statistics.

In applying this program, a piece of information gained does not fit neatly into one of the four pigeonholes but usually applies to or is useful in an understanding of more than one of the categories outlined.

Studies of the supply approximate a census by picturing relative abundance from year to year by one or both of the following:

a. Return in catch per unit of fishing effort.
   Involves character, amount and intensity of fishing effort.
b. Departures from normal proportion of size or age classes in the fish population.

Studies of the species should determine:

a. One uniform population or more than one local race.
   Racial studies
   Migrations
      Tagging
      Sampling
b. Spawning.
   Season, areas, intensity
c. Growth rate.
   Age at sexual maturity
   Mortality rate
d. Abundance of each entering age class.

A plan for continuous observation of abundance depends upon the character of the fishery and knowledge of the species but is usually a simplification of methods developed in the studies of relative abundance.

Detailed catch statistics are basic in determining:

a. Crop harvested
b. Intensity of fishing effort
c. Population abundance
d. Balanced regulation of the fishery

Although catch statistics are mentioned last in the above outline, actually an adequate system for gathering accurate catch records, not only to show the total crop harvested but in sufficient detail to give return per unit of effort, is the first point of attack in the study of any fishery and for this reason the initiation of such a system was coincident with the establishment of the research laboratory.

PROBLEMS STUDIED

Such a research plan as outlined above requires several years of intensive preliminary study as well as continuous observation of the fishery, so obviously it could not be applied to all of the fisheries of

the State without the expenditure of more funds than are available. For that reason the research program of the laboratory gives first consideration to our four major fisheries:

1. Sardine
2. Mackerel
3. Tuna
4. Flatfishes

In addition to these four major problems, preliminary work is being conducted in several of our less prominent fisheries, for example:

1. Oyster culture
2. Striped bass
3. Salmon
4. Marine sport catch

Secondary consideration is given to a variety of special studies which usually are completed in a short time interval. These include the gathering of information about our lesser fisheries and general data desired by administrative officers and legislative committees. The diversity of such studies is illustrated by the titles of reports and articles published by the laboratory.

Sardine

Since the sardine fishery has been the major concern of our research program for years past, much of the preliminary work is already accomplished and is not being continued. Most of the work now being conducted is for the purpose of measuring changing abundance of age classes as well as variation in abundance of the whole sardine population. The sardine studies now being pursued may be briefly outlined as follows:

Supply

- Egg and larvae studies
  - Distribution and concentration
  - Yearly measures of abundance
- Immature fish
  - Distribution
  - Nursery grounds
  - Strength of each age class
  - Character and volume of the bait fishery
- Adolescent and adult fish
  - Analysis of proportion of size classes
  - Boat catch analysis and scouting time
  - Yield from different fishing areas
  - Intensity of fishing measured by tag returns

Life-history of the species

- Racial studies, especially vertebral counts on young fish

Migrations by
- Sampling bait and commercial catch in different areas
- Fish tagging

Spawning
- Areas
- Intensity
- Larval drift

Growth
- Size of maturity
- Duration within range of commercial sizes
- Rate of decline in abundance of each age class

The threatened collapse of this our most important fishery emphasizes the benefit of having at hand the accumulated knowledge of this fishery and accentuates the need for strict regulation of future catches based upon the accumulated research data.

Mackerel

The mackerel canning industry developed suddenly, late in 1928, and in less than ten years the signs of depletion of the mackerel supply had appeared. Biological studies have already yielded us much information as to age and size composition of the catch, spawning season, distribution, migrations and population replacements. The greatest need, from an administrative standpoint, is some approximation of the possible maximum sustained yield for this fishery and the present investigations therefore include:

1. Analysis of boat catches to show effect of each year's catch upon the supply.

2. Yield from each fishing area.

3. Estimates of amount of young fish replacements contributed by each area.

4. Age composition and mortality rate of year classes in the population.

5. Migrations. Tagging to show dependence of each area upon migrants from other regions.

6. Spawning. Extent and volume of eggs and larvae by areas.

7. Determination of the most feasible and effective method of regulating the fishery to check the present over-utilization.

Tuna

The tuna fishery, involving at least five species, is scattered over a fishing area extending southward to the Equator in which our boats make catches for delivery to California canneries. Yellowfin and skipjack account for most of the cannery supply and these two species are widely distributed whereas bluefin tuna are found locally off our own coast. Albacore and bonito are handled in smaller quantities.

The key question in greatest need of solution and upon which several other problems depend is whether we draw upon single migratory populations or upon several localized and separated groups in the

various fishing areas. The answer to this question will affect other biological work, such as studies of abundance, spawning and growth rate. Our tuna program therefore includes the following investigations:

Yellowfin tuna and skipjack

1. Measurements, counts and other morphological work on samples from different areas.
2. Tagging to determine migrations.
3. Collection of biological data for life-history studies.
4. Data to determine desirability of closed seasons and revision of existing size limits.
5. Complete field investigation of the effects of various factors in boat refrigeration of tuna.

Albacore, bonito and bluefin

1. Determine distribution and migrations.
2. Morphological studies for comparison with the species of Japan and Hawaii.
3. Life-history studies.

Bottom Fish

As yet we have very incomplete knowledge of the life-history of bottom fish (soles, flounders, sand dab, rockfishes, sablefish and Pacific cultus); yet an outstanding accomplishment in these fisheries has been the checking of the destructive fishing of small meshed trawl nets. This has been accomplished by demonstrations which have resulted in the adoption of modified nets of large mesh to allow escapement of small fish.

Work is being continued to determine, for the population of each species, the point in intensity of fishing which will give the maximum sustained yield as well as the greatest economic return. The investigations consist of:

1. Analysis of fishing intensity to measure changes in abundance.
2. Determination of age, growth rate and fecundities.
3. Extent of intermingling between geographical regions.
4. Measures of natural mortality rates and the effect of fishing upon these rates.

Salmon

Our salmon runs have been reduced to a small fraction of their former magnitude by the long continued operation of overfishing, reduced spawning area resulting from power and irrigation development, and destruction of seaward migrants in irrigation ditches. The immediate administrative problem is to build back the runs, chiefly by catch limitation, so that the breeding stock can be increased.

Investigations of the past have provided a great deal of the life-history knowledge, such as growth rate, age and the parent stream

theory, so that recent work has attempted to supply a basis for yield management for both king and silver salmon as follows:

1. Volume of present runs in each stream.

2. Contributions of each stream to the ocean catch.

3. Relation of existing and proposed stream obstructions to spawning areas.

4. Measurement of escapement at present and desirable for the future, leading toward maximum sustained yield for each stream.

Striped Bass

Past work has supplied most of the needed biological knowledge, with three minor exceptions noted below. The problem now is to manage the fishery so as to maintain the present high recreational value. The investigative program is therefore planned as follows:

1. Further development of our sport catch records so as to measure changes in abundance.

2. Basis for regulation to maintain a high population level.

3. More complete knowledge of

   a. Food habits

   b. Migrations

   c. Spawning areas and intensity

Oysters

Unlike most of our other fisheries, the need here is to develop the industry in this State so the program for oysters is the collection of essential biological information to aid in the establishment and maintenance of beds for the native, eastern and Japanese oysters. The work involves:

1. Determinations of salinity, temperatures and pH, spat counts and examination of gravid oysters to aid the industry when setting out spat collectors.

2. Experiments with more efficient methods of spat collection.

3. Experimentation in establishment of a spawning stock of Japanese oysters in this State.

The oyster work has centered at Humboldt Bay, due to the assistance rendered by Humboldt County, with some work conducted at Elkhorn Slough and Drakes Estero.

Marine Sport Catch

The catch by marine anglers has grown to such magnitude that it must be considered in population studies and management policy. Several years ago preliminary data were gathered to try out a system of recording this catch and fairly comprehensive figures have been collected for the last three years, but the system should be extended and improved and in some instances supplemented by more detailed records as checks. The present program includes:

1. Collection and analysis of marine sport catch statistics as a measure of population and fishing intensity.

2. Comparison of commercial and sport catches for certain species as an aid to measuring effectiveness of present or needed legislation.

3. Preliminary records of salmon, shad and striped bass catches in river and bay areas.

Statistics

Detailed statistics are the basis for the study and management of our fisheries. In order to facilitate tabulation and to make available the details of our fisheries data, the records since 1931 have been handled by the system of punched cards. Monthly reports are prepared for each of eight geographical regions of the State, showing species, pounds, boat, dealer, price, locality of catch and point of delivery segregated by:

1. Species.
2. Daily and monthly catch of each individual fishing boat.
3. Pounds of each species handled by each dealer.
4. Species and weights landed in each city.

In addition a cross-reference index is maintained for all fishing vessels and the yearly records of boat registrations have been tabulated. Other records, such as commercial fishing licenses issued, are systematically filed at the laboratory.

The above activities have been organized into routine procedure but in addition, most valuable assistance to the research and administrative work has been rendered by a variety of special reports made up to meet a specific need, and the wealth of detailed information made available by these special reports has justified the punched card system for handling mass data.

The following examples illustrate the wide range of information made available by these special reports:

1. Sardine boat catches for analysis of fishing effort.
2. Mackerel catches by type of boat for past years.
3. Tuna catches by boat type for each of the five species for past and current years.
4. Bottom fish trawl catches from 1924 to date to show species of flatfish and incidental catches of other species.
5. Rockfish catches and incidental species for selected areas.
6. Water area yield tables for the most important species.
7. Tabulations of marine sport catches by party boats, charter boats, barges and from piers.

Since equipment and trained personnel were available, the statistical department has been charged with the compilation and reporting of:

1. Hunting license applications and records of game kill.
2. Angling license applications and records of freshwater angling catches.
3. Deer kill in the State.

4. U. S. Forest Service biological data on deer killed in the national forests of the State.

PUBLICATIONS

Progress and final reports are prepared on practically all work done at the laboratory. Occasionally, typewritten reports are made to the administrative officers but in most cases results are published for distribution to the public. Reports are printed as bulletins or in the form of special articles in:

1. Fish Bulletins
2. California Fish and Game (quarterly magazine)
3. California Conservationist
4. Trade journals or biological bulletins

During the past biennium, five Fish Bulletins have been issued as follows:

No. 47. Interseasonal and intraseasonal changes in size of the California sardine *(Sardinops caerulea)*. By Frances N. Clark. 28 pp. 1936.

No. 48. Fishing localities for the California sardine, *Sardinops caerulea*, 1928-1936. By Frances N. Clark. 11 pp. 1937.

No. 49. The commercial fish catch of California for the year 1935. By the Bureau of Commercial Fisheries. 170 pp. 1937.

No. 50. Sizes of California sardines caught in the different areas of the the Monterey and San Pedro regions. By J. B. Phillips. 31 pp. 1937.

No. 51. The high seas tuna fishery of California. By H. C. Godsil. 41 pp. 1938.

Articles and notes contributed by the laboratory staff for publication in "California Fish and Game" and other periodicals are:

California Fish and Game

Bonnot, Paul

California sea lion census for 1936. vol. 23, pp. 108-112, 1937.
Report of the oyster investigation at Humboldt Bay for 1935. vol. 22, pp. 284-293, 1936.
Report on the California oyster industry for 1936. vol. 23, pp. 163-173, 1937.
Report on the California oyster industry for 1937. vol. 24, pp. 191-195, 1938.
Setting and survival of spat of the Olympia oyster, *Ostrea lurida*, on upper and lower horizontal surfaces. vol. 23, pp. 224-228, 1937.

Bonnot, Paul, and Phillips, J. B.

Red water, its cause and occurrences. vol. 24, pp. 55-59, 1938.

Clark, Frances N.

Further notes on the jumbo squid, *Dosidicus gigas*. vol. 23, pp. 246-247, 1937.
Grunion in southern California. vol. 24, pp. 49-54, 1938.
Small sardines taken off Oregon. vol. 24, p. 71, 1938.
Snake eel, *Ophichthus triserialis*, taken off San Pedro. vol. 23, p. 246, 1937.
Yield per area of the California sardine fishing grounds, 1935-1937. vol. 23, pp. 307-309, 1937.

Clark, Frances N., and Croker, Richard S.

Has the closed area increased the Pismo clam population? vol. 23, no. 2, pp. 161-162, 1937.
The Pismo clam in 1935. vol. 22, no. 3, pp. 249-250, 1936.

American Fisheries Society. Transactions

How California is measuring the angler's catch. By Richard S. Croker. vol. 66 (1936), pp. 301-305, 1937.

California Conservationist. (Department of Natural Resources, Sacramento)

The staff has contributed articles and notes to this monthly magazine. In addition, excerpts from "California Fish and Game" and "Fish Bulletins" have been published in the "Conservationist."

Pacific Fisherman. (Seattle)

Sardine tagging in California. By John F. Janssen, Jr. vol. 35, no. 7, June, p. 43, 1937.

LIBRARY

The library occupies an important niche in the fisheries research work of the Laboratory. Its collection of literature on marine biological subjects, especially fish and fisheries, is not only of use to the purely scientific person but also to the man engaged in commercial enterprises. The number of people consulting the library is increasing constantly. Perhaps in some cases it is the result of present economic conditions which press men to investigate other fields of occupation with a view of entering them if feasible.

Two methods of increasing the use of the library have been initiated. A list of the literature received during each month is compiled and distributed to the employees of the Division stationed away from headquarters. In this way they are informed of the current publications which are made available to them. The list is also supplied to those not in the employ of the Division who have requested copies. This was begun in 1937. A circulating library for the use of the employees, especially the wardens, was started in 1938 and is meeting with success in that it reaches those who have no adequate means of securing books otherwise.

During the biennial period, 7037 pamphlets and 197 books were added, making a total of 31,365 pamphlets and 2102 bound volumes in the library (June 30, 1938). In 1937, the library was enlarged to take care of the increased number of volumes, accumulated over a period of about twenty years, and additional shelving units were secured. The library now occupies practically the entire upper floor of the Laboratory building.

PUBLIC TALKS

Members of the research staff, when called upon, give talks on marine fisheries before nature clubs, service organizations and scientific societies. During the biennium 75 such talks, including five radio talks, were given by staff members.

ASSISTANCE BY THE BUREAU OF PATROL AND LAW ENFORCEMENT

The successful operation of our statistical system has depended upon the field work of law enforcement officers of the Division of Fish and Game, and the gathering of much of our biological data has been possible only through the whole-hearted cooperation of these same officers. We are most deeply indebted to the men of the Marine Patrol Detail, who have given us assistance far beyond the requirements of mere cooperation and have cheerfully made our needs a part of their own work.

WORKS PROGRESS ADMINISTRATION PROJECTS

During the biennium two WPA projects operated at Terminal Island. One, now completed, was the erection of a 38x54 foot two-story building, renovation of the biological and office buildings and improvement of the grounds including grading, planting, sidewalks and flagpole. The other is the continuation of a clerical and statistical project begun several years ago in the early days of SERA, and we gratefully acknowledge the very material aid given us by this federal agency.

REPORT OF THE BUREAU OF HYDRAULICS

By John Spencer, Chief

This past biennium has been a most active one for this Bureau. Work has materially increased, due to a number of factors and a slight increase in personnel has been necessary.

The Bureau does considerable engineering work for other bureaus, such as surveys, plans and estimates in connection with hatchery water supplies, examination of proposed new sites, and other examinations; designs and investigations for the patrol and game conservation, and such other work as can be done to better advantage by this Bureau. On July 1, 1936, one of the personnel of this Bureau was assigned to the work going forward on the Central Valley Hatchery and so continued until its completion.

The work on fishways has gone forward and a number of new ones have been installed and placed in operation. Installations in place have been checked, and wherever necessary arrangements have been made for repairs or improvements.

The exceptional high waters throughout the State in 1937-1938 took out several dams and some of these will probably not be rebuilt. In addition, it has been possible to effect the removal of a number of other dams that have become obsolete. The removal of these dams very materially improves stream conditions for migrating fish.

On the South Fork of the Eel River is a dam maintained by the Benbow Company which has received considerable attention from the public and conservationists. Much of this adverse criticism had its origin during the early period of construction and use of this dam, and unfortunately, the first concrete fishway was taken out by high waters, due to the poor foundation work by the owners. A temporary fishway was installed and fish, except for a slight delay, passed this barrier. This was replaced by a reinforced concrete structure which has functioned satisfactorily.

In addition, there has been built a second fishway on the opposite side of the dam, and just recently a slight addition has been made with the hope that this fishway will be more effective, though it is doubtful if it can ever be classed as an entirely satisfactory one, as water regulations may not be had and its location is not in the general line of fish movement.

In years past the Fish Conservation Bureau has counted fish at the original fishway, and plans provide for a more elaborate count in the fall of 1938. The information thus obtained will without doubt give considerable data as to the kind and number of fish moving up beyond this barrier.

Every effort is expended to have fishways repaired or improved, or new ones installed on dams where required, without resorting to law. In two cases, however, it was necessary to invoke court action. One of

these was decided in favor of the Commission and the obstruction removed. The other case is still pending.

Of the many adverse conditions affecting fish life in this State the greatest undoubtedly is the passing of fish into the water diversions and their ultimate destruction. This could in a very great measure be prevented by the installation of proper fish screens at or near the headworks of these diversions. This is a phase of the Commission's activities which has been before it for forty years, though accomplishment has been limited as there has been an aversion by the water users to the installation of necessary fish protection.

From 1933, to August, 1937, the fish screen law provided that the cost of installation of fish screens be divided equally between the Commission and the owners, the latter being responsible for the operation and maintenance. The serious defect in this bill, however, was that one-half the cost was to be advanced to the owner by the Commission and there was no provision made whereby the Commission could supervise or protect itself against poor or inefficient construction, with the result that practically nothing was accomplished while this law was in effect. The need for fish screen installation was recognized and it appeared for a time that Federal aid would be received, but this did not materialize and finally the writer entered into a cooperative arrangement with the supervisors of the United States Forest Service in seven of the forests. The Forest Service was to furnish labor and transportation from the CCC camps, and this Commission would furnish design and materials. Under this arrangement sixty-seven diversions were selected by the forest supervisors for fish screen installations and the material for such construction has been on the ground for some time. Some screens have been installed, but due to a decreasing personnel of the CCC camps, extremely heavy fire prevention work, and other causes, progress has not been as rapid as hoped for under this plan. I have been assured by the forest supervisors that they will continue on this work until the screen installations have been effected. This cooperative arrangement has more significance than just the number of fish screens installed, as it directed attention to the need of fish screens and was of general educational value. I desire to express my appreciation for the cooperation and consideration received from the personnel of the United States Forest Service.

In 1937 the legislature rewrote the fish screen law, and in brief, the Commission may now install a fish screen on a water diversion where it is required and bill the owner for one-half the cost; provided, that such installation may be made only after the Commission and the owner have arrived at an agreement as to type, size, location, time of construction, and cost, and failing to agree, the matter is referred to the Chief of the Division of Water Resources, whose decision is final and conclusive. This procedure may consume four months. In addition, an agreement must also be arrived at as to operation and maintenance cost, and failing of agreement the matter is referred to the Director of Finance for his final and conclusive decision. One-half of the cost of operation and maintenance is borne by the Commission, the bills being rendered by the owner of the diversion, with no check provided as to the correctness of the charge.

The exception to this law is that where the water is used for the generation of electric energy the owner of the diversion pays the entire cost of fish screen installation, operation and maintenance.

It appeared that this law was unsatisfactory and unworkable, and the Commission adopted a policy whereby it would replace ineffective screens heretofore installed. This was permitted under a section of the fish screen law.

In December, 1937, I was authorized to proceed under this policy, and on March 1, 1938, a crew started work in Siskiyou County. This work is proceeding at the present time with one crew, and probably best results will be obtained by confining the activities of this crew in one section until the diversions in that section are screened and then move to another location. This will avoid excessive travel and will without doubt actually save more fish, as if one diversion is protected and another is not on the same stream, the loss in the unprotected diversion will without question be greater than that experienced up to this time. Additional funds could be used to advantage to expedite this work.

The two main types of fish screens being installed are a rotary screen, operating counter-currentwise and propelled by a water power wheel; and the other, a parallel steel bar screen with a cleaning attachment operated by a water power wheel. All screens installed are placed within concrete structures and all are of substantial construction and hence will last for many years, requiring the minimum of operation and maintenance expense. Experience to date shows these screens require inspection only at rare intervals.

With respect to fish screens, there is pending a court action which it is hoped will be determined before the next legislative session, as the decision in this case will unquestionably have an important bearing on any future fish screen legislation. Briefly, the history of this case is that the Commission ordered the Pacific Gas and Electric Company to install a fish screen on the outlet of its Fuller Lake, in Nevada County, and thus prevent fish from entering the penstock line to a power house. Under the law the company would have been required to bear the entire cost of installation, as this water is used for the generation of electricity. Extended negotiations were carried on but no satisfactory agreement was reached, and on October 7, 1937, the company filed an injunction proceeding in the Sacramento superior court in an effort to restrain the Commission from enforcing its order requiring a screen on the outlet from this lake. This matter was heard and the superior court found for the company. I understand that an appeal is to be taken by the Attorney General of the State on this matter.

The Bureau of Reclamation of the Department of the Interior is operating within this State in the construction of the Central Valleys project. In the northern part of the State the Shasta Dam is being constructed, and near Fresno the Friant Dam is in process. Connecting canals and other features will have a very material effect on fish life. Under consideration at the present time is the required fish protection for the Contra Costa Canal, which will take water out of Rock Slough, above Antioch. The maximum capacity of this canal is about 350 second feet. Fish protection has been accepted in principle, but the

location, type, and other matters in connection with the protection have not as yet been determined. It is hope that a satisfactory arrangement will be arrived at.

The Bureau of Reclamation is also constructing the Boca Dam on the Little Truckee River in Nevada County, the impounded waters to be used in the State of Nevada. The fish protection for the outlet on this dam has been arranged for and construction is in progress.

The work of the Bureau of Hydraulics is such that it affects individuals and companies using water throughout the State. Practically all people recognize the importance of the State's waters and the users jealously guard their rights. No structure placed in a diversion may interfere with the flow of water or hinder the use thereof. Much of the trouble that this Commission has had in the past with respect to fishways and fish screens has been brought on by lack of understanding as to the water user's viewpoint and needs. Beginning with the writer's first employment with this Commission every effort has been made to bring about a better understanding between the water user and the Commission. It is felt that such improved relations may best be realized by having the responsibilities in connection with the Bureau work rest entirely in the chief in order that a well-defined policy may be carried out; and this will also reflect in more economical operations.

It is to be hoped that the conservationists concerned in the protection of fish life will interest and educate themselves in fishway and fish screen matters, so that they in turn and with understanding will realize the problems of the water users and this Commission and assist in the consummation of better relations.

There is also a need for a more reasonable fish screen law, and it appears that there is a realization that the sportsmen through their agency, the Commission, will necessarily absorb in part, if not entirely, the installation costs—with certain reservations as to special users of water—and the responsibility for operation and maintenance, which will be materially less with good original construction resting upon the owner and the water user.

REPORT OF THE BUREAU OF LICENSES

By H. R. Dunbar, Chief

In the report submitted by this bureau for the biennium of 1934-36, statements were given showing the trend of the increase and decrease of the fish and game revenue over a period of eight years. The income for the fiscal year ending June 30, 1937, amounted to $1,650,995.58, an increase of $213,298.12. The greater portion of this increase was made up from license sales.

The 1936 series of angling licenses brought in an income of $608,-815.50, the largest sale of angling licenses in the history of the division up to that time.

Hunting licenses and deer tag sales also showed a substantial increase. To take care of this large sale of licenses, the division had the law amended providing for license distribution so that now all licenses are distributed direct to the various license agencies. Approximately 3000 agencies are established throughout the State where angling, hunting, and deer tag licenses may be obtained by the sportsmen. It is the plan of this bureau to increase this number, as we desire to make it possible for the sportsmen to procure licenses wherever they may need them.

On November 1, 1937, at the request of the State Department of Finance, the accounts of all license agencies were transferred from the offices of this bureau to the departmental accounting office. This transfer permits the Bureau of Licenses to devote more time to the establishing of agencies, and contacting agencies already established, explaining the various problems in connection with distribution and license work, particularly the matter of obtaining statistical information on the application as to the previous year's take.

STATISTICAL REPORTS

DEPARTMENT OF NATURAL RESOURCES, DIVISION OF FISH AND GAME, STATEMENT OF REVENUE

For the Period July 1, 1936, to June 30, 1937, of the Eighty-eighth Fiscal Year

	Detail	Total
Revenue for the Fish and Game Preservation Fund, Current Year		
License sales:		
Angling licenses, 1936	$441,686 50	
Angling licenses, 1937	147,116 95	
Commercial hunting club licenses, 1936-1937	750 00	
Commercial hunting club operators' licenses, 1936-1937	145 00	
Deer tags, 1936	126,852 00	
Deer tags, 1937	2 00	
Fish breeders' licenses, 1936	30 00	
Fish breeders' licenses, 1937	340 00	
Fish importers' licenses, 1936	5 00	
Fish importers' licenses, 1937	80 00	
Fish packers and wholesale shellfish dealers licenses, 1936-1937	1,130 00	
Fishing party vessel permit, 1937	231 00	
Fishing party vessel permit, 1936	59 00	
Game breeders' licenses, 1936	120 00	
Game breeders, 1937	1,075 00	
Hunting licenses, 1934-1935	661 16	
Hunting licenses, 1935-1936	19,851 00	
Hunting licenses, 1936-1937	414,225 50	
Hunting licenses, 1937-1938	60 00	
Kelp licenses, 1936	10 00	
Kelp licenses, 1937	20 00	
Market fishermen's licenses, 1936-1937	41,760 00	
Market fishermen's licenses, 1937-1938	32,690 00	
Trapping licenses, 1936-1937	2,093 00	
Total license sales		$1,230,993 11
Other income:		
Court fines	$63,094 02	
Fish packers tax	317,052 19	
Fish tag sales	2,727 54	
Game tag sales	211 17	
Importers' contributions	230 00	
Interest on bank balances	6,086 10	
Kelp tax	174 80	
Lease of kelp beds	1,592 80	
Miscellaneous sales	5,651 24	
Publication sales	249 43	
Salmon tax—Chap. 1015-35	22,893 18	
Total other income		$419,962 47
Prior year revenue 87th fiscal year—		
Publication sales	$45 74	
		$45 74
Total revenue for the Fish and Game Preservation Fund		$1,651,001 32
Revenue for the General Fund—		
Unclaimed checks and deposits		2 25
Grand total, all funds		$1,651,003 57

STATEMENT OF EXPENDITURES

For the Period July 1, 1936, to June 30, 1937, of the Eighty-eighth Fiscal Year

Function	Salaries and wages	Materials and supplies	Service and expense	Property and equipment	Total
OPERATING EXPENDITURES, EIGHTY-EIGHTH FISCAL YEAR					
Administration:					
Executive	$5,000 00				$5,000 00
General office	5,670 00	$1,701 34	$1,487 68	$250 31	9,109 33
Printing, general		4,148 39			4,148 39
Printing Fish and Game Magazine		1,623 86			1,623 86
Automobiles		364 27	218 77		583 04
Traveling			2,294 56		2,294 56
Postage			4,105 38		4,105 38
Telephone and telegraph			4,175 44		4,175 44
Freight, cartage and express			848 71		848 71
Rent			11,017 61		11,017 61
Accident and death claims			3,734 55		3,734 55
Departmental administration, pro rata	12,233 95		266 05		12,500 00
Librarian	1,650 00	188 23	72 63	140 02	2,050 88
Legal			4,770 83		4,770 83
Premiums on bonds			35 00		35 00
Publicity			1,238 22		1,238 22
Pro rata General Fund expense, Chap. 923-33			6,496 93		6,496 93
Sales tax on sales			—7 78		—7 78
Temporary help	394 19				394 19
Total Administration	$24,948 14	$8,026 09	$40,754 58	$390 33	$74,119 14
Patrol and Law Enforcement:					
Chief and assistants	$14,653 06				$14,653 06
General office	4,852 51	$263 78	$49 22	$68 17	5,233 68
Automobiles		35,539 27	15,114 81	26,138 20	76,792 28
Traveling			50,603 89		50,603 89
Postage			793 17		793 17
Telephone and telegraph			2,498 33		2,498 33
Freight, cartage and express			2 73		2 73
Rent			876 48		876 48
Heat, light, water and power			8 72		8 72
Captains and wardens	205,685 86	645 37	1,092 37	115 41	207,539 01
Launches	9,986 44	11,801 14	7,305 93	23,510 43	52,603 94
Premiums on bonds			63 48		63 48
Temporary help	1,642 29				1,642 29
Assistant fish and game wardens, seasonal	22,814 03				22,814 03
Total Patrol and Law Enforcement	$259,634 19	$48,249 56	$78,409 13	$49,832 21	$436,125 09
Commercial Fisheries:					
Chief and assistant	$10,440 00				$10,440 00
General office	8,419 11	$46 24	$25 34	$278 83	8,769 52
Automobiles		680 17	332 46	623 15	1,635 78
Travel			7,343 61		7,343 61
Telephone and telegraph			829 90		829 90
Freight, cartage and express			223 92		223 92
Rent			151 51		151 51
Heat, light, water and power			623 19		623 19
Research, oyster	2,280 00	66 59			2,346 59
Laboratory	30,062 42	2,361 55	1,712 52	2,375 69	36,512 18
Fish tags		327 33			327 33
Cooperative Research		30 38	16,000 00		16,030 38
Statistics		1,353 29	2,110 39	255 21	3,718 89
Temporary help	897 09				897 09
Terminal Island grounds	1,050 00	26 23	9 43	7 67	1,093 33
Fish cannery auditing			2,665 00		2,665 00
Total Commercial Fisheries	$53,148 62	$4,891 78	$32,027 27	$3,540 55	$93,608 22
Fish Conservation:					
Chief and assistant	$6,865 81	$4 53			$6,870 34
General office	4,838 12	12 26	$13 15	$22 19	4,885 72
Automobiles		10,793 10	4,397 27	5,896 31	21,086 68
Travel			10,062 47		10,062 47
Postage			184 34		184 34
Telephone and telegraph			1,192 66		1,192 66
Freight, cartage and express			573 90		573 90
Rent			1,875 49		1,875 49
Heat, light, water and power			2,338 32		2,338 32
Research (oyster)		105 51	309 17	82 03	496 71
Fish planting		605 69	1,754 77	583 50	2,943 96
Hatcheries	109,402 08	59,258 10	943 50	1,079 29	170,682 97
Fish cars	1,800 00	1 44	962 64		2,764 08
Blue printing			6 85		6 85

STATEMENT OF EXPENDITURES—Continued

For the Period July 1, 1936, to June 30, 1937, of the Eighty-eighth Fiscal Year

Function	Salaries and wages	Materials and supplies	Service and expense	Property and equipment	Total
Fish Conservation—Continued					
Cooperative Research	$2,263 23	$191 13	$180 14	$21 33	$2,655 83
Statistical	1,598 71	77	1,122 99		2,722 47
Temporary help	1,093 69				1,093 69
Special field	13,880 00	88 67	10 71	11 49	13,990 87
Fish rescue	1,920 00	41	25 50		1,945 91
Assistant fish and game wardens—seasonal	32,670 06				32,670 06
Total Fish Conservation	$176,331 70	$71,061 61	$25,953 87	$7,696 14	$281,043 32
Hydraulics:					
Chief and assistant	$7,677 96				$7,677 96
General office	1,920 00	$72 78	$5 86	$26 32	2,024 96
Automobiles		364 58	87 20	10 97	462 75
Traveling			2,287 32		2,287 32
Telephone and telegraph			1 20		1 20
Blue printing		1 65	72 45		74 10
Temporary help	84 64				84 64
Total hydraulics	$9,682 60	$439 01	$2,454 03	$37 29	$12,612 93
Game Conservation:					
Chief and assistants	$16,033 29				$16,033 29
General office	4,035 00	$99 72	$27 60	$36 77	4,199 09
Automobiles		2,053 20	714 80	2,623 14	5,391 14
Traveling			4,538 34		4,538 34
Telephone and telegraph			418 33		418 33
Freight, cartage and express			131 13		131 13
Heat, light, water and power			3,333 91		3,333 91
Maintenance of game farms	12,098 97	17,104 18	560 40	3,039 09	32,802 64
Statistics	758 87	1 22	1,101 20		1,861 29
Temporary help	8,486 46				8,486 46
Maintenance of game refuges	4,358 00	2,308 39	751 70	705 52	8,123 61
Total Game Conservation	$45,770 59	$21,566 71	$11,577 41	$6,404 52	$85,319 23
Licenses:					
General office	$14,850 00	$923 50	$215 60	$27 16	$16,016 26
Printing licenses and applications		3,466 93			3,466 93
Traveling			384 27		384 27
Postage			1,136 13		1,136 13
Freight, cartage and express			43 39		43 39
Premiums on bonds			1,253 67		1,253 67
Identification license buttons		9,657 21			9,657 21
License commissions			54,993 46		54,993 46
Total licenses	$14,850 00	$14,047 64	$58,026 52	$27 16	$86,951 32
Special Item:					
State Fair and other exhibits (payable from support, Chap. 341-35 or E. O. for support)	$40 00	$117 37	$1,200 00		$1,357 37
Total eighty-eighth fiscal year expense paid from support appropriations	$584,405 84	$168,399 77	$250,402 81	$67,928 20	$1,071,136 62
Prior year, eighty-seventh fiscal year for support					54 34
Total eighty-seventh and eighty-eighth fiscal years for support					$1,071,190 96
Special Items:					
Predatory Animal Control:					
Eighty-eighth fiscal year:					
Chief and assistant	$3,700 00				$3,700 00
General office	897 72			$25 00	922 72
Automobiles		$3,321 63	$964 67	650 87	4,937 17
Traveling			3,152 36		3,152 36
Predatory animal control	20,765 76	1,420 37	6,354 99	15 14	28,556 26
Predatory animal hunters and trappers, seasonal	6,000 00				6,000 00
Freight, cartage and express			4 65		4 65
Total eighty-eighth fiscal year	$31,363 48	$4,742 00	$10,476 67	$691 01	$47,273 16
Total expenditures, eighty-seventh and eighty-eighth fiscal years					$1,118,464 12

STATEMENT OF EXPENDITURES—Continued

For the Period July 1, 1936, to June 30, 1937, of the Eighty-eighth Fiscal Year

Function	Salaries and wages	Materials and supplies	Service and expense	Property and equipment	Total
Expenditures for Additions and Betterments:					
Permanent Improvements:					
Purchase of game refuges and public shooting grounds, and C. I. E. Chapter 341-35	$16,094 67	$26,221 94	$8,729 14	$18,596 26	$69,642 01
Contribution to Employees' Retirement System, eighty-eighth fiscal year					17,035 24
Total current biennium					$1,205,141 37
Special Items:					
Construction of Russian River jetties, Chapter 989-33:					
Eighty-eighth fiscal year			$215 25		$215 25
California Code Commission, Chap. 645-33			1 50		1 50
Total operating expenditures, eighty-eighth fiscal year			$216 75		$216 75
Grand totals					$1,205,358 12

REPORTS

DEPARTMENT OF NATURAL RESOURCES, DIVISION OF FISH AND GAME, STATEMENT OF REVENUE

For the Period July 1, 1937, to June 30, 1938, of the Eighty-ninth Fiscal Year

Revenue for the Fish and Game Preservation Fund, Current Year

	Detail	Total
License sales:		
Hunting, 1936-1937	$20,000 50	
Hunting, 1937-1938	418,934 53	
Hunting, 1938-1939	142 00	
Angling, 1937	391,848 35	
Angling, 1938	237,733 19	
Trapping, 1937-1938	2,574 00	
Trapping, 1938-1939	3 00	
Deer tags, 1937	124,109 68	
Deer tags, 1938	80 00	
Market fisherman, 1937-1938	45,020 00	
Market fisherman, 1938-1939	25,380 00	
Game breeders, 1937	117 50	
Game breeders, 1938	982 50	
Fish breeders, 1937	40 00	
Fish breeders, 1938	355 00	
Fish importers, 1937	20 00	
Fish importers, 1938	95 00	
Fish packers and wholesale shellfish dealers, 1937-1938	1,070 00	
Fish packers and wholesale shellfish dealers, 1938-1939	30 00	
Kelp license, 1937	20 00	
Kelp license, 1938	20 00	
Commercial hunting club, 1937-1938	900 00	
Commercial hunting club operator, 1937-1938	280 00	
Fishing party boat permit, 1937	186 00	
Fishing party boat permit, 1938	377 00	
Fish tags	3,815 97	
Game tags	243 41	
Total license revenue		$1,274,377 63
Other revenue:		
Fish packers tax	$237,688 40	
Salmon packers tax	37,284 65	
Kelp tax	253 45	
Lease of kelp beds	1,666 36	
Court fines	42,212 25	
Interest on bank balances	712 73	
Publication sales	15 01	
Other miscellaneous sales	5,285 45	
Total other revenue		$325,118 30
Total revenue Fish and Game Preservation Fund		$1,599,495 93

STATEMENT OF EXPENDITURES

For the Period July 1, 1937, to June 30, 1938, of the Eighty-ninth Fiscal Year

Function	Salaries and wages	Materials and supplies	Service and expense	Property and equipment	Total
OPERATING EXPENDITURES, EIGHTY-NINTH FISCAL YEAR					
Administration:					
Accident and death claims			$2,255 29		$2,255 29
Cashier	$1,200 00				1,200 00
Executive	5,000 00	$233 08	3,352 10	$919 13	9,504 31
Exhibits			1,200 00		1,200 00
General office	7,523 38	6,399 93	19,748 61	521 21	34,193 13
Legal			6,894 17		6,894 17
Library	1,800 00	43 23	143 15	696 69	2,683 07
Property inspection	741 33	35 27	137 29	818 44	1,732 33
Pro rata department administration	10,000 00		6,000 00		16,000 00
Pro rata General Fund expense			9,990 89		9,990 89
Publicity			2,035 88		2,035 88
Total Administration	$26,264 71	$6,711 51	$51,757 38	$2,955 47	$87,689 07
Patrol and Law Enforcement:					
Cannery inspection	$17,403 27	$1,009 04	$2,740 14	$266 48	$21,418 93
Executive	14,220 00	874 22	2,634 29	680 81	18,409 32
General office	5,947 80	940 25	1,947 08	1,031 32	9,866 45
Junior patrol	2,626 02	330 04	677 64		3,633 70
Land patrol	191,731 55	37,471 22	64,147 88	35,203 03	328,553 68
Marine patrol	52,800 61	20,210 59	33,517 21	17,786 67	124,315 08
Pollution patrol	7,047 52	1,917 47	4,122 47	738 10	13,825 56
Total, Patrol and Law Enforcement	$291,776 77	$62,752 83	$109,786 71	$55,706 41	$520,022 72
Marine Fisheries:					
Executive	$7,320 00	$185 85	$503 21	$791 69	$8,800 75
Field supervision	3,200 00	353 72	1,894 81		5,448 53
Fish cannery auditing			2,697 46		2,697 46
General office	8,555 59	142 30	924 85	297 54	9,920 28
Research and statistics	40,512 68	5,870 99	11,275 58	2,834 75	60,494 00
Total Marine Fisheries	$59,588 27	$6,552 86	$17,295 91	$3,923 98	$87,361 02
Fish Conservation:					
Cooperative Research, Stanford University	$3,869 67	$289 43	$804 04	$696 82	$5,659 96
Executive	6,460 00	235 61	602 22	1,026 58	8,324 41
Field supervision	10,059 15	1,307 04	3,788 47	3,123 86	18,278 52
Fish planting	2,683 87	1,418 54	1,970 42	4,334 24	10,407 07
Fish rescue	5,407 85	561 22	1,507 10	2,179 29	9,655 46
General office	4,756 40	1,003 86	55 84	452 27	6,268 37
Pollution inspection	3,120 00	390 87	763 87	38 56	4,313 30
Research	2,142 10	404 47	1,004 08	428 46	3,979 11
Statistical	2,280 00	105 54	1,050 50	109 09	3,545 13
Alpine	1,313 04	729 68	304 26	550 65	2,897 63
Basin Creek	4,690 42	2,532 17	440 69	568 04	8,231 32
Bear Lake Egg Collecting Station	433 87	105 47	29 80		569 14
Beaver Creek Egg Collecting Station	250 00		75 00		325 00
Beaver Creek	148 55	46 90	8 58		204 03
Big Creek	3,331 67	2,600 55	326 80	557 36	6,816 38
Blackwood	302 81	218 39	1 00		522 20
Blue Lakes Egg Collecting Station	590 00	7 08	16 00	105 55	718 63
Bogus Creek Egg Collecting Station	407 09	79 94	177 10		664 13
Brookdale	3,285 32	1,846 21	438 10	19 78	5,589 41
Burney Creek Hatchery	5,500 09	3,369 62	885 77	611 62	10,367 10
Carmen Lake Egg Collecting Station	312 00	2 24	10 43		324 67
Central Valleys	3,565 14	1,544 46	1,913 70	2,202 68	9,225 98
Cold Creek	2,492 27	1,807 59	617 71	579 48	5,497 05
Cottonwood Lakes Egg Collecting Station	263 04	43 05	75 23		381 32
Deep Creek Egg Collecting Station	200 00				200 00
Fall Creek Egg Collecting Station		29 21	85 00		114 21
Fall Creek	6,178 55	5,002 96	256 99	6 06	11,444 56
Feather River	4,048 21	2,063 92	500 73	247 05	6,859 91
Fern Creek	1,667 89	373 61	62 97		2,104 47
Fishing Creek Experiment Station	358 06	22 25	155 31		535 62
Forest Home	10,754 02	9,385 21	3,049 02	293 39	23,481 64
Fort Seward	4,294 71	1,210 22	156 55	708 72	6,370 20
Hat Creek Egg Collecting Station	130 00	113 98			243 98
Hornbrook Egg Collecting Station	243 84	58 63	112 97	20 77	436 21
Hot Creek Hatchery	2,928 56	2,455 29	194 10	14 32	5,592 27

STATEMENT OF EXPENDITURES—Continued

For the Period July 1, 1937, to June 30, 1938, of the Eighty-ninth Fiscal Year

Function	Salaries and wages	Materials and supplies	Service and expense	Property and equipment	Total
Fish Conservation—Continued					
Huntington Lake	$731 99	$594 20	$256 76	$30 18	$1,613 13
June Lake Egg Collecting Station			3 96		3 96
Kaweah	4,583 23	2,015 94	1,175 08	150 32	7,924 57
Kings River Hatchery	4,257 61	1,327 01	1,336 25	47 87	6,968 74
Klamathon Egg Collecting Station	1,412 91	121 48	321 76	12 21	1,868 36
Kosk Creek Egg Collecting Station		8 44			8 44
Lake Almanor	5,989 13	2,077 00	1,007 02	167 22	9,240 37
Lake Eleanor Egg Collecting Station		18 94			18 94
Little Walker Lake Egg Collecting Station	259 03				259 03
Madera	1,170 00	697 22	326 41	11 02	2,204 65
Marlette Lake Egg Collecting Station	713 17	4 79	56 90		774 86
Mt. Shasta Experiment Hatchery	1,061 29	619 29	33 59		1,714 17
Mount Shasta	28,990 38	17,345 83	2,915 92	235 65	49,487 78
Mount Tallac	1,705 65	1,509 42	100 52		3,315 59
Mount Whitney	11,012 85	4,474 64	2,329 00	882 21	18,698 70
Mud Creek Egg Collecting Station	259 49	17 97	3 00	4 50	284 96
Pasadena Reservoir Egg Collecting Station	325 00	4 81	17 25		347 06
Prairie Creek	5,528 15	1,659 84	557 18	640 09	8,385 26
Rush Creek Egg Collecting Station	511 21	49 81			561 02
San Lorenzo Egg Collecting Station	8 00	128 72	1 00		137 72
Scott Creek	1,500 00	140 40	148 25		1,788 65
Shackleford Creek Egg Collecting Station	456 00	36 55	70 00		562 55
Shasta River Experiment Station	152 00	94 74	184 20		430 94
Shasta River Egg Collecting Station	853 54	150 33	49 23	6 64	1,059 74
Snow Mountain Egg Collecting Station	2,305 61	257 91	223 02	19 68	2,806 22
Tahoe	5,730 35	1,959 63	677 48	895 66	9,263 12
Taylor Creek Egg Collecting Station					
Upper Truckee Egg Collecting Station	254 84	48 34			303 18
Waddell Creek Station	831 94	31 24	53 09	21 95	938 22
Warner Creek Station	402 53	54 35	2 40		459 28
Yosemite	3,926 25	1,388 35	313 47	155 83	5,783 90
Yuba River	3,176 64	1,252 10	318 02	3 12	4,749 88
Total Fish Conservation	$186,576 98	$79,454 50	$33,921 11	$22,158 79	$322,111 38
Hydraulics:					
Engineering	$4,911 43	$652 56	$1,965 65	$1,571 77	$9,101 41
Executive	4,140 00	348 52	857 49	623 41	5,969 42
Fish screens	3,449 16	3,145 28	130 28	3,684 25	10,408 97
General office	1,920 00	93 43	158 86	201 16	2,373 45
Total Hydraulics	$14,420 59	$4,239 79	$3,112 28	$6,080 59	$27,853 25
Game Conservation:					
Elk refuge	$2,176 32	$407 45	$539 33	$180 12	$3,303 22
Executive	12,122 50	979 54	2,334 68	578 03	16,014 75
Field				17 06	17 06
Game bird distribution	800 00	3,166 56	1,114 27	734 65	5,815 48
Game bird trapping		56 95			56 95
General office	4,278 89	152 31	28 45	103 06	4,562 71
Grey Lodge refuge	3,880 00	1,547 34	1,994 19	1,155 36	8,576 89
Imperial refuge	1,895 16	367 46	86 13	492 26	2,841 01
Los Banos refuge	3,111 10	585 25	632 50	633 39	4,962 24
Los Serranos game farm	14,732 39	6,644 53	2,825 56	2,439 73	26,642 21
Predatory animal control	31,771 73	5,018 98	14,332 33	2,472 05	53,595 09
Research	496 43	74 22	295 57	718 05	1,584 27
Statistics	1,412 74	57 97	1,103 37		2,574 08
Suisun refuge	2,151 77	742 68	523 54	132 00	3,549 99
Winter feeding and salting of game		475 12			475 12
Yountville game farm	16,836 55	11,075 72	4,281 75	1,735 07	33,929 09
Total Game Conservation	$95,665 58	$31,352 08	$30,091 67	$11,390 83	$168,500 16
Licenses:					
Executive	$3,300 00	$60 43	$168 68	$1,071 20	$4,600 31
General office	1,543 67	171 22	1,828 99	4,172 24	7,716 12
License distribution	10,987 63	17,856 78	60,973 23	355 15	90,172 79
Total Licenses	$15,831 30	$18,088 43	$62,970 90	$5,598 59	$102,489 22

STATEMENT OF EXPENDITURES—Continued

For the Period July 1, 1937, to June 30, 1938, of the Eighty-ninth Fiscal Year

Function	Salaries and wages	Materials and supplies	Service and expense	Property and equipment	Total
Special Items:					
Cons. of research boat				$37,804 00	$37,804 00
Improvement of office, Ferry Bldg., San Francisco			$25,000 00		25,000 00
Total Special Items			$25,000 00	$37,804 00	$62,804 00
Total 89th fiscal year expenses paid from Support appropriations					$137,830 82
Claim of Chief Accounting Officer, Dept. of Finance, Ch. 772-37					3,293 65
Expenditures for Additions and Betterments:					
Permanent Improvements:					
Purchase of game refuges and public shooting grounds and C. I. E., Ch. 157-37	$3,603 09	$8,968 02	$2,036 29	$1,690 85	$16,298 25
Contributions to Employees' Retirement System					23,948 80
Total current biennium					$1,422,371 52
89th fiscal year:					
Special Item: Expenses of California Code Commission, Ch. 645-33				$0 37	$0 37
Support:					
Eighty-eighth fiscal year				$53 57	
Eighty-fifth fiscal year				106 50	
Total Support					$160 07
Special Item: Predatory animal control, 85th fiscal year				—$106 50	—$106 50
Total prior biennium appropriations					$53 94
Grand total					$1,422,425 46

ANGLING LICENSE SALES, YEAR 1936

County	Total	Citizen	Duplicate	Non-resident	Alien
Alameda	$51,967 00	$51,070 00	$29 00	$78 00	$790 00
Alpine	695 50	298 00	2 50	225 00	170 00
Amador	2,075 00	2,048 00	2 00		25 00
Butte	7,328 50	7,266 00	10 50	12 00	40 00
Calaveras	1,380 50	1,372 00	50	3 00	5 00
Colusa	1,274 00	1,268 00	1 00		5 00
Contra Costa	14,011 50	13,670 00	11 50	15 00	315 00
Del Norte	4,299 50	3,820 00	6 50	438 00	35 00
El Dorado	4,124 50	4,058 00	7 50	24 00	35 00
Fresno	18,444 00	18,226 00	18 00	15 00	185 00
Glenn	1,289 00	1,276 00	4 00	9 00	
Humboldt	10,804 00	10,726 00	6 00	57 00	15 00
Imperial	944 00	944 00			
Inyo	7,061 00	6,866 00	11 00	144 00	40 00
Kern	8,536 50	8,528 00	8 50		
Kings	2,035 50	1,976 00	4 50		55 00
Lake	1,762 50	1,748 00	2 50	12 00	
Lassen	2,943 50	2,850 00	5 50	48 00	40 00
Los Angeles	142,319 00	139,048 00	186 00	225 00	2,860 00
Madera	3,088 00	3,070 00	3 00		15 00
Marin	7,313 00	7,064 00	11 00	18 00	130 00
Mariposa	3,146 00	2,980 00	5 00	141 00	20 00
Mendocino	5,749 50	5,684 00	6 50	24 00	25 00
Merced	3,432 00	3,378 00	4 00	15 00	35 00
Modoc	1,862 00	1,828 00	1 00	33 00	
Mono	11,470 00	6,476 00	4 00	4,965 00	25 00
Monterey	6,342 50	5,882 00	12 50	3 00	445 00
Napa	4,695 00	4,602 00	15 00	3 00	75 00
Nevada	6,158 50	5,372 00	9 50	597 00	180 00
Orange	13,016 00	12,944 00	6 00	21 00	45 00
Placer	5,280 50	5,136 00	5 50	69 00	70 00
Plumas	5,994 50	5,686 00	17 50	201 00	80 00
Riverside	5,769 00	5,706 00	5 00	3 00	55 00
Sacramento	23,443 50	20,936 00	108 50	84 00	2,315 00
San Benito	1,006 50	960 00	1 50		45 00
San Bernardino	13,613 00	13,564 00	3 00	21 00	25 00
San Diego	20,047 00	19,692 00	14 00	186 00	155 00
San Francisco	50,223 00	48,950 00	223 00	90 00	950 00
San Joaquin	16,232 00	15,648 00	10 00	24 00	550 00
San Luis Obispo	9,818 50	9,668 00	9 50	6 00	135 00
San Mateo	4,767 00	4,594 00	3 00		170 00
Santa Barbara	7,121 50	7,058 00	2 50	21 00	40 00
Santa Clara	14,612 50	14,170 00	13 50	9 00	420 00
Santa Cruz	7,143 00	6,816 00	13 00	9 00	305 00
Shasta	5,789 50	5,696 00	6 50	42 00	45 00
Sierra	1,423 00	1,248 00	3 00	162 00	10 00
Siskiyou	8,379 00	7,686 00	9 00	309 00	375 00
Solano	10,162 00	9,772 00	20 00		370 00
Sonoma	11,990 00	11,706 00	20 00	39 00	225 00
Stanislaus	7,742 00	7,632 00	14 00	21 00	75 00
Sutter	1,187 00	1,146 00	3 00	3 00	35 00
Tehama	2,710 00	2,700 00	7 00	3 00	
Trinity	1,132 00	1,126 00	3 00	3 00	
Tulare	7,789 50	7,652 00	6 50	36 00	95 00
Tuolumne	3,783 50	3,756 00	4 50	3 00	20 00
Ventura	5,919 00	5,878 00	1 00		40 00
Yolo	2,604 00	2,524 00	2 00	3 00	75 00
Yuba	3,356 00	3,196 00	4 00	6 00	150 00
Totals	$608,515 50	$586,660 00	$937 50	$8,478 00	$12,440 00
Number of licenses	300,611	293,330	1,875	2,826	2,580

ANGLING LICENSE SALES, YEAR 1937

County	Total	Citizen	Duplicate	Non-resident	Alien
Alameda	$55,157 00	$54,794 00	$39 00	$69 00	$255 00
Alpine	671 50	358 00	50	303 00	10 00
Amador	2,074 50	2,064 00	50		10 00
Butte	7,665 00	7,576 00	6 00	33 00	50 00
Calaveras	1,502 50	1,486 00	50	6 00	10 00
Colusa	1,318 00	1,276 00	2 00	15 00	25 00
Contra Costa	15,831 50	15,414 00	18 50	24 00	375 00
Del Norte	3,853 50	3,436 00	2 50	375 00	40 00
El Dorado	4,488 00	4,368 00	5 00	90 00	25 00
Fresno	18,049 50	17,662 00	11 50	21 00	355 00
Glenn	1,298 00	1,236 00	1 00	36 00	25 00
Humboldt	12,167 50	11,920 00	7 50	150 00	90 00
Imperial	1,240 00	1,240 00			
Inyo	4,152 50	3,946 00	4 50	177 00	25 00
Kern	9,560 50	9,492 00	4 50	24 00	40 00
Kings	2,511 50	2,444 00	2 50	15 00	50 00
Lake	1,788 00	1,774 00	1 00	3 00	10 00
Lassen	3,460 00	3,280 00	3 50	102 00	75 00
Los Angeles	141,302 50	140,224 00	23 50	345 00	710 00
Madera	3,125 50	3,084 00	1 00	15 00	25 00
Marin	8,397 00	8,164 00	2 00	81 00	150 00
Mariposa	2,744 00	2,682 00	5 00	27 00	30 00
Mendocino	6,211 00	6,156 00	4 00	6 00	45 00
Merced	3,802 50	3,742 00	2 50	33 00	25 00
Modoc	1,872 00	1,842 00		30 00	
Mono	8,050 50	6,312 00	5 50	1,683 00	50 00
Monterey	7,034 50	6,522 00	7 50	15 00	490 00
Napa	5,213 50	5,164 00	10 50	9 00	30 00
Nevada	6,598 50	5,550 00	7 50	906 00	135 00
Orange	11,841 00	11,768 00		33 00	40 00
Placer	5,652 00	5,480 00	12 00	75 00	85 00
Plumas	6,557 00	6,078 00	29 00	300 00	150 00
Riverside	6,927 00	6,844 00	1 00	12 00	70 00
Sacramento	26,184 50	23,342 00	27 50		2,815 00
San Benito	1,359 50	1,300 00	3 50	6 00	50 00
San Bernardino	12,745 50	12,692 00	4 50	24 00	25 00
San Diego	21,537 50	20,646 00	13 50	243 00	635 00
San Francisco	59,459 50	57,118 00	13 50	168 00	2,160 00
San Joaquin	17,868 00	17,080 00	20 00	18 00	750 00
San Luis Obispo	7,755 00	7,584 00	6 00	15 00	150 00
San Mateo	6,430 00	6,238 00	2 00	15 00	175 00
Santa Barbara	6,016 50	5,800 00	1 50	15 00	200 00
Santa Clara	16,151 50	15,704 00	11 50	6 00	430 00
Santa Cruz	7,245 50	6,744 00	4 50	42 00	455 00
Shasta	5,837 50	5,740 00	5 50	42 00	50 00
Sierra	1,367 50	1,318 00	1 50	18 00	30 00
Siskiyou	8,219 00	7,562 00	2 00	330 00	325 00
Solano	12,092 50	11,600 00	17 50		475 00
Sonoma	13,417 50	13,124 00	22 50	21 00	250 00
Stanislaus	8,810 00	8 714 00	16 00	30 00	50 00
Sutter	1,830 50	1,742 00	3 50		85 00
Tehama	2,850 50	2,832 00	3 50	15 00	
Trinity	1,179 50	1,168 00	3 50	3 00	5 00
Tulare	7,445 50	7,352 00	3 50	15 00	75 00
Tuolumne	4,203 00	4,134 00	7 00	27 00	35 00
Ventura	5,488 50	5,484 00	4 50		
Yolo	2,572 00	2,490 00	2 00	15 00	65 00
Yuba	3,890 00	3,800 00	3 00	12 00	75 00
State of Nevada	2,937 00			2,937 00	
State of Oregon	136 00	100 00		36 00	
Totals	$637,147 00	$614,786 00	$425 00	$9,066 00	$12,870 00
Number	313,819	307,393	850	3,022	2,554

HUNTING LICENSE SALES, SERIES 1936-1937

Counties	Total	Citizen	Junior citizen	Duplicate	Non-resident	Alien	Declarant alien
Alameda	$17,578 00	$16,622 00	$752 00	$19 00	$10 00	$125 00	$50 00
Alpine	177 00	94 00	3 00		80 00		
Amador	2,187 00	1,974 00	154 00	9 00			50 00
Butte	8,345 50	7,694 00	651 00	50			
Calaveras	1,317 50	1,264 00	53 00	50			
Colusa	3,347 00	3,072 00	254 00	11 00			10 00
Contra Costa	6,230 00	5,886 00	296 00	8 00			40 00
Del Norte	1,050 00	908 00	64 00	3 00	30 00	25 00	20 00
El Dorado	2,764 50	2,640 00	119 00	5 50			
Fresno	17,828 00	16,452 00	1,250 00	21 00	20 00	25 00	60 00
Glenn	3,867 50	3,454 00	370 00	8 50	10 00	25 00	
Humboldt	8,842 50	8,272 00	473 00	7 50			
Imperial	3,777 00	3,452 00	325 00				
Inyo	2,086 50	1,924 00	120 00	2 50	30 00		10 00
Kern	13,477 00	12,742 00	708 00	7 00	20 00		
Kings	3,310 50	3,060 00	224 00	1 50		25 00	
Lake	2,930 50	2,714 00	214 00	2 50			
Lassen	4,377 00	3,992 00	229 00	6 00	50 00		100 00
Los Angeles	81,651 00	78,170 00	2,872 00	179 00	120 00	150 00	160 00
Madera	2,391 50	2,226 00	137 00	3 50		25 00	
Marin	3,279 50	2,978 00	238 00	3 50			60 00
Mariposa	720 50	688 00	29 00	3 50			
Mendocino	6,103 00	5,634 00	383 00	6 00	20 00		60 00
Merced	5,627 50	5,028 00	523 00	11 50		25 00	40 00
Modoc	4,137 00	3,270 00	217 00	5 00	620 00	25 00	
Mono	2,639 00	1,084 00	5 00		1,550 00		
Monterey	8,848 00	7,838 00	527 00	23 00		200 00	260 00
Napa	4,646 00	4,090 00	397 00	19 00	20 00		120 00
Nevada	4,326 50	3,648 00	141 00	7 50	440 00		90 00
Orange	6,237 00	5,854 00	378 00	5 00			
Placer	4,810 00	4,270 00	414 00	6 00		100 00	20 00
Plumas	3,703 00	3,474 00	162 00	7 00	30 00		30 00
Riverside	7,079 50	6,582 00	484 00	3 50	10 00		
Sacramento	16,070 00	14,516 00	1,009 00	65 00	90 00	200 00	190 00
San Benito	2,566 00	2,286 00	255 00	5 00			20 00
San Bernardino	7,650 00	7,240 00	403 00	7 00			
San Diego	12,788 50	11,884 00	771 00	18 50	60 00	25 00	30 00
San Francisco	24,053 50	22,310 00	591 00	47 50	140 00	375 00	590 00
San Joaquin	10,347 50	9,634 00	580 00	8 50		75 00	50 00
San Luis Obispo	7,635 50	6,948 00	627 00	20 50	10 00		30 00
San Mateo	4,506 50	4,150 00	277 00	4 50		25 00	50 00
Santa Barbara	8,135 50	7,396 00	668 00	6 50	40 00	25 00	
Santa Clara	11,813 00	10,844 00	734 00	15 00	30 00	100 00	90 00
Santa Cruz	6,054 00	5,282 00	416 00	6 00		200 00	150 00
Shasta	5,389 50	5,236 00	107 00	6 50	40 00		
Sierra	1,007 50	952 00	55 00	50			
Siskiyou	12,086 00	8,484 00	467 00	15 00	2,940 00		180 00
Solano	5,440 50	5,148 00	284 00	8 50			
Sonoma	10,075 00	9,150 00	737 00	13 00		75 00	100 00
Stanislaus	7,272 50	6,522 00	650 00	15 50		75 00	10 00
Sutter	1,306 00	1,210 00	91 00	5 00			
Tehama	3,802 50	3,580 00	216 00	6 50			
Trinity	1,068 50	1,030 00	36 00	2 50			
Tulare	9,572 00	8,872 00	683 00	7 00			10 00
Tuolumne	2,104 00	1,978 00	83 00	3 00			40 00
Ventura	5,416 50	5,242 00	171 00	3 50			
Yolo	4,350 00	3,958 00	357 00	5 00	10 00		20 00
Yuba	4,052 50	3,728 00	297 00	7 50			20 00
Value sales	$434,255 00	$398,630 00	$23,731 00	$699 00	$6,420 00	$1,925 00	$2,850 00
Number licenses	225,448	199,315	23,731	1,398	642	77	285

HUNTING LICENSE SALES, SERIES 1937-1938

Counties	Total	Citizen	Junior citizen	Duplicate	Non-resident	Alien	Declarant alien
Alameda	$19,558 00	$18,744 00	$796 00	$18 00			
Alpine	216 00	216 00					
Amador	2,210 00	2,060 00	150 00				
Butte	9,462 00	8,738 00	715 00	9 00			
Calaveras	1,412 00	1,330 00	82 00				
Colusa	3,708 00	3,386 00	290 00	12 00	$20 00		
Contra Costa	6,551 50	6,154 00	341 00	6 50	30 00		$20 00
Del Norte	645 50	546 00	34 00	50	30 00	$25 00	10 00
El Dorado	3,127 50	2,878 00	133 00	1 50	40 00	75 00	
Fresno	18,722 00	17,296 00	1,409 00	17 00			
Glenn	4,310 00	3,890 00	384 00	16 00	20 00		
Humboldt	12,131 50	11,442 00	542 00	7 50			140 00
Imperial	3,943 00	3,580 00	363 00				
Inyo	2,034 00	1,864 00	95 00		50 00	25 00	
Kern	16,917 00	16,070 00	813 00	14 00	20 00		
Kings	3,633 00	3,362 00	271 00				
Lake	3,376 00	3,126 00	248 00	2 00			
Lassen	4,500 50	4,216 00	218 00	6 50	40 00		20 00
Los Angeles	79,341 00	76,058 00	2,719 00	59 00	160 00	175 00	170 00
Madera	2,673 00	2,510 00	161 00	2 00			
Marin	3,840 00	3,560 00	280 00				
Mariposa	40 00	40 00					
Mendocino	5,897 50	5,476 00	412 00	9 50			
Merced	5,466 50	5,000 00	449 00	7 50	10 00		
Modoc	4,432 00	3,176 00	246 00		1,010 00		
Mono	919 50	840 00	29 00	50			
Monterey	9,315 00	8,258 00	620 00	12 00	30 00	275 00	110 00
Napa	5,563 50	4,250 00	1,292 00	1 50	10 00		10 00
Nevada	4,633 00	3,642 00	171 00		820 00		
Orange	5,197 00	4,588 00	606 00	3 00			
Placer	4,782 50	4,312 00	412 00	3 50		25 00	30 00
Plumas	4,189 00	3,772 00	208 00	4 00	100 00	25 00	80 00
Riverside	7,715 00	7,304 00	410 00	1 00			
Sacramento	17,577 00	15,722 00	981 00	44 00	60 00	300 00	470 00
San Benito	2,137 00	1,928 00	148 00	6 00	10 00	25 00	20 00
San Bernardino	7,792 50	7,352 00	437 00	3 50			
San Diego	14,459 50	13,516 00	887 00	16 50			40 00
San Francisco	27,187 00	25,224 00	500 00	38 00	140 00	525 00	690 00
San Joaquin	12,099 50	11,312 00	710 00	7 50			70 00
San Luis Obispo	4,242 00	3,656 00	581 00	5 00			
San Mateo	4,826 00	4,416 00	305 00			75 00	30 00
Santa Barbara	5,507 00	5,120 00	387 00				
Santa Clara	12,590 50	11,662 00	853 00	15 50	20 00		40 00
Santa Cruz	6,519 00	5,820 00	524 00	25 00			150 00
Shasta	5,370 50	5,016 00	213 00	6 50	110 00	25 00	
Sierra	888 00	850 00	38 00				
Siskiyou	9,885 50	7,942 00	402 00	6 50	1,340 00	25 00	170 00
Solano	5,096 00	4,786 00	305 00	5 00			
Sonoma	10,223 50	9,356 00	809 00	8 50	30 00		20 00
Stanislaus	6,836 00	6,190 00	629 00	7 00	10 00		
Sutter	1,833 00	1,682 00	148 00	3 00			
Tehama	3,705 00	3,500 00	202 00	3 00			
Trinity	856 00	824 00	30 00	2 00			
Tulare	10,406 00	9,652 00	750 00	4 00			
Tuolumne	2,486 50	2,366 00	118 00	2 50			
Ventura	5,829 00	5,428 00	388 00	3 00			
Yolo	4,571 00	4,228 00	343 00				
Yuba	4,439 00	4,158 00	281 00				
State of Nevada	1,500 00	200 00			1,300 00		
State of Oregon	1,839 50	458 00	20 00	1 50	1,360 00		
Totals	$451,163 50	$414,118 00	$25,958 00	$427 50	$6,770 00	$1,600 00	$2,290 00
Number	234,842	207,059	25,958	855	677	64	229

DEER TAG LICENSE SALES BY COUNTIES, YEAR 1936

County	1936
Alameda	$5,261 00
Alpine	59 00
Amador	799 00
Butte	2,680 00
Calaveras	534 00
Colusa	1,154 00
Contra Costa	1,788 00
Del Norte	340 00
El Dorado	1,272 00
Fresno	4,188 00
Glenn	1,284 00
Humboldt	3,782 00
Imperial	251 00
Inyo	802 00
Kern	3,823 00
Kings	651 00
Lake	1,448 00
Lassen	1,987 00
Los Angeles	18,279 00
Madera	701 00
Marin	1,249 00
Mariposa	261 00
Mendocino	2,891 00
Merced	1,029 00
Modoc	1,685 00
Mono	590 00
Monterey	2,923 00
Napa	1,921 00
Nevada	1,730 00
Orange	1,471 00
Placer	1,670 00
Plumas	1,861 00
Riverside	1,701 00
Sacramento	3,676 00
San Benito	908 00
San Bernardino	2,099 00
San Diego	2,312 00
San Francisco	6,268 00
San Joaquin	2,269 00
San Luis Obispo	2,741 00
San Mateo	1,196 00
Santa Barbara	2,651 00
Santa Clara	3,773 00
Santa Cruz	1,761 00
Shasta	2,398 00
Sierra	400 00
Siskiyou	4,235 00
Solano	1,649 00
Sonoma	4,065 00
Stanislaus	1,587 00
Sutter	418 00
Tehama	1,631 00
Trinity	519 00
Tulare	2,758 00
Tuolumne	867 00
Ventura	1,973 00
Yolo	1,410 00
Yuba	1,226 00
Total sales	$126,855 00

DEER TAG LICENSE SALES BY COUNTIES, YEAR 1937

County	1937
Alameda	$5,924 00
Alpine	71 00
Amador	825 00
Butte	1,887 00
Calaveras	606 00
Colusa	1,101 00
Contra Costa	1,839 00
Del Norte	244 00
El Dorado	1,349 00
Fresno	4,329 00
Glenn	1,501 00
Humboldt	3,875 00
Imperial	186 00
Inyo	651 00
Kern	4,117 00
Kings	650 00
Lake	1,705 00
Lassen	1,872 00
Los Angeles	17,024 00
Madera	779 00
Marin	1,473 00
Mariposa	18 00
Mendocino	2,763 00
Merced	1,0[illegible]0 00
Modoc	1,[illegible]03 00
Mono	3[illegible]3 00
Monterey	3,155 00
Napa	2,031 00
Nevada	1,781 00
Orange	1,422 00
Placer	1,675 00
Plumas	2,048 00
Riverside	1,773 00
Sacramento	4,201 00
San Benito	8[illegible]0 00
San Bernardino	1,9[illegible]2 00
San Diego	2,089 00
San Francisco	7,018 00
San Joaquin	2,421 00
San Luis Obispo	2,68[illegible] 00
San Mateo	1,413 00
Santa Barbara	1,592 00
Santa Clara	4,191 00
Santa Cruz	1,779 00
Shasta	2,435 00
Sierra	449 00
Siskiyou	3,816 00
Solano	2,150 00
Sonoma	4,223 00
Stanislaus	1,503 00
Sutter	472 00
Tehama	1,586 00
Trinity	426 00
Tulare	2,789 00
Tuolumne	1,051 00
Ventura	2,120 00
Yolo	1,501 00
Yuba	1,444 00
State of Nevada	142 00
State of Oregon	303 00
Total sales	$128,436 00

MISCELLANEOUS LICENSE SALES

	License year	Fee	Value
Market fisherman	License year, 4/1/37 to 3/31/38	Fee, $10 00	$78,210 00
Trapping license sales	License year, 7/1/37 to 6/30/38	Fee 1 00 Cit. Fee 2 00 Alien	2,502 00
Fish packers and wholesale shellfish dealers	License year, 7/1/37 to 6/30/38	Fee 5 00 Cit. 10 00 Alien	1,090 00
Game breeders	License year, 1/1/37 to 12/31/37	Fee 2 50	1,192 50
Fish breeders	License year, 1/1/37 to 12/31/37	Fee 5 00	380 00
Domesticated fish importers license sales	License year, 1/1/37 to 1/ 1/38	Fee 5 00	100 00
Kelp license sales	Year 1937	Fee 10 00	40 00
Commercial hunting gun club license sales	License year, 7/1/37 to 6/30/38	Fee 25 00 Cit. 100 00 Alien	900 00
Commercial hunting club operators license sales	License year, 7/1/37 to 6/30/38	Fee 5 00 Cit. 25 00 Alien	290 00

ARRESTS AND CONVICTIONS

RECAPITULATION

	Number of arrests	Fines imposed	Jail sentences (days)
Fish cases, 1936-1937	1,618	$31,847 50	2,223½
Game cases, 1936-1937	1,480	40,121 56	5,933½
Totals, 1936-1937	3,098	$71,969 06	8,157
Fish cases, 1937-1938	1,808	$38,928 00	3,332½
Game cases, 1937-1938	1,476	39,148 00	5,622¾
Totals, 1937-1938	3,284	$78,076 00	8,955¼
Recapitulation—			
1936-1937	3,098	$71,969 06	8,157
1937-1938	3,284	78,076 00	8,955¼
Totals	6,382	$150,045 06	17,112¼

TOTAL ARRESTS FOR A PERIOD OF THIRTY-SIX YEARS

1902-1904	550
1904-1906	774
1906-1908	1,192
1908-1910	1,771
1910-1912	2,063
1912-1914	1,993
1914-1916	2,087
1916-1918	1,797
1918-1920	1,891
1920-1922	2,258
1922-1924	2,715
1924-1926	3,207
1926-1928	4,390
1928-1930	5,388
1930-1932	5,237
1932-1934	3,795
1934-1936	4,535
1936-1938	6,382

SEIZURES OF FISH AND GAME

	July 1, 1936, to June 30, 1937	July 1, 1937, to June 30, 1938	Total
Abalone	1,037	1,337	2,374
Abalone, pounds	2,856	60	2,916
Barracuda	125		125
Barracuda, pounds	825	5,823	6,648
Bass—			
Black	255	424	679
Black, pounds		34	34
Large Mouth Black		18	18
Rock	4		4
Sand Bass, pounds		200	200
Sea, barrels	60		60
Sea, pounds	39		39
Striped	438	632	1,070
Striped, pounds	250	418	668
Traps		6	6
White Sea, pounds	30		30
Bluecod, pounds	4		4
Bluefin Tuna		3	3
Bluegills		152	152
Carp	20		20
Carp, pounds		40	40
Catfish	46		46
Catfish, pounds	70	103¼	173¼
Clams	5,860	9,376	15,236
Clams, quarts		1	1
Clamforks		3	3
Cockles	1,227	220	1,447
Cockles, pounds	225	350	575
Crabs	536	3,574	4,110
Crabs, dozens		4	4
Crab nets		8	8
Crab traps, boxes		46	46
Crappie	52	75	127
Croaker	1		1
Eastern Brook		41	41
Fishing rod	1		1
Flounder		2	2
Frogs		141	141
Fyke nets		4	4
Grunion, pounds	10	10	20
Halibut		17	17
Halibut, pounds		106	106
Lake Tahoe Trout		40	40
Live car	1		1
Lobsters	1,012	1,104½	2,116½
Lobsters, dozens		4	4
Lobsters, pounds	330	2,233	2,563
Lobster pots	3	74	77
Lobster receivers		16	16
Lobster traps	12	161	173
Mackinaw Trout		1	1
Minnows	11		11
Perch	137	62	199
Pyramid Lake Trout		12	12
Rainbow Trout		151	151
Reel and line	1		1
Salmon	76	66	142
Salmon, pounds	381	4,691	5,072
Set lines	1		1
Set lines, feet		300	300
Sheepshead, pounds		220	220
Skipjack, pounds	52,157		52,157
Steelhead		231	231
Steelhead, pounds		280	280
Sturgeon		2	2
Sturgeon, pounds	62		62
Sunfish	244	489	733
Trammel net, feet	1,500		1,500
Traps	11		11
Trout	1,615	963	2,578
Trout, pounds	156½	14	170½
Trout fillets		27	27
Trout spawn, rolls		2	2
Tuna, pounds	6,421		6,421
Yellowfin Tuna, pounds	85,025	17,647	102,672
Yellowtail	1		1

SEIZURES OF FISH AND GAME

	July 1, 1936, to June 30, 1937	July 1, 1937, to June 30, 1938	Total
Antelope		1	1
Antelope, head		1	1
Beaver pelts		3	3
Bear	1	1	2
Bearskin		1	1
Bird traps		2	2
Brant, black sea		6	6
Canary, wild		3	3
Coot		1	1
Curlew		5	5
Deer	65	84½	149½
Deerhead	2	1	3
Deerhide	36	1	37
Deermeat, pounds	3,207½	4,406½	7,614
Doves	750	1,035	1,785
Ducks	2,571	192	2,763
Duck eggs		11	11
Eagle	1		1
Elk		2	2
Grebe	2	3	5
Geese	42	8	50
Godwit		1	1
Grouse	5	2	7
Hawk		2	2
Killdeer		3	3
Lesser Scaup		1	1
Mallard, hen		1	1
Marbled Godwit		1	1
Meadowlark	4	7	11
Minkhides		3	3
Mockingbird		1	1
Mudhens	25	43	68
Muskrat pelts	19	19	38
Nongame birds	143	14	157
Pheasants	154	99	253
Pigeons	1	1	2
Plover	52		52
Quail	709	306	1,015
Rabbits	94	132	226
Rail	1		1
Robins		6	6
Sandpiper		13	13
Sea gulls		1	1
Sea scoter		1	1
Sparrow		33	33
Spotted fawn		5	5
Squirrel skin		4	4
Surf scoter		2	2
Swan	4	4	8
Towhee		1	1
Trap		1	1
Tree squirrel	3	6	9
Tree squirrel hides	3	2	5
Turkey		2	2
Venison ham		1	1
Willits		2	2
Wood duck	1		1
Woodpecker	3	2	5
Yellowhammer		1	1

FISH CASES

Offense	July 1, 1936, to June 30, 1937			July 1, 1937, to June 30, 1938		
	Arrests	Fines	Jail	Arrests	Fines	Jail
Abalone: overlimit, undersize, closed season, possession sliced in closed season, taken in less than 20 feet of water	224	$4,041 50	339	203	$3,075 00	52
Anchoring: closed district	2	150 00				
Angling; no license	114	871 00	2	82	737 00	117½
Barracuda: overlimit, possession and sale of undersized, closed season, take with net, closed season	4	115 00		4	125 00	
Bass:						
Black, overlimit, undersized, spearing closed district	36	366 00	32	17	190 00	
Sea: overlimit, undersized	6	520 00				
Striped: overlimit, undersize, selling, possession for sale, failure to deliver to Fish and Game Commission	79	1,745 00	205	156	2,570 00	
Bluegills: closed season				8	129 00	
Catfish: selling, undersized, retaining less than 9 in. in length				8	90 00	
Clams: closed season, overlimit, undersized, instrument in preserve, out of shell, failure to show on demand, taken in preserve, offering for transportation, selling, overlimit from refuge	194	4,044 00	1,127	187	3,388 50	885
Cockles: Overlimit, undersized, no license	3	15 00		9	130 00	10
Commercial fishing; no license, failure to keep records, failure to register boats	137	972 50	5	206	2,150 00	97½
Crabs; possession female, undersized, closed season, holding in live box, mutilating, take from Dist. 1½ to Dist. 2	96	1,660 00	100	71	1,080 00	656
Crappie: taking, closed season, no license				16	130 00	
Crustaceans: fail to show on demand				1		
Diving for commercial purposes in less than 20 feet of water				1	100 00	
Failure to record fish purchased	1	25 00		5	1,800 00	50
Fish spear; possession within 300 ft. of stream				4		
Fish wasteage	3	100 00				
Fishing boat not registered	1	25 00				
Fishing; closed district, closed season, from fishway, too near dam; using prohibited gear, failure to provide license, over dam, failure to show license, using another's license, closed area, false statement in procuring license, through ice, taking brood fish from hatchery, disturbing nets	450	7,979 50	318½	367	7,393 50	202½
Fishing tackle in refuge	1	25 00				
Frogs, undersized, overlimit	1	25 00		3	75 00	
Fyke nets in District 12A, closed season				1		
Gaff, possession within 300 ft. of stream				2		
Game fish, no license, closed season				38	425 00	
Gill net; in Dist. 2, in Old River, in Dist. 20, meshes less than 5½" in length, illegal mesh, operating in Sacramento River without floats or buoys				11	145 00	
Grunion, closed season	1			3	15 00	
Halibut; undersized				1	10 00	
Illegal fishing				1	5 00	
Illegal gear				1	10 00	
License: using another's; making false statement, fail to show on demand, transferring	12	130 00	35	52	318 00	
Lobsters: closed season, undersized, overlimit, possession spiny lobsters less than 10½"	20	205 00	10	51	1,355 00	641½
Mackerel, take with illegal net in Dist. 20				14	850 00	
Minnows; transported	1	50 00				
Net: illegal operating in Dist. 1	25	995 00		1	25 00	
Night fishing	36	575 00		1	25 00	
Operating smokehouse, no packers license	1					
Perch; selling, closed season	3	75 00		14	183 00	15½
Pollution	46	2,210 00		64	6,305 00	
Roundhaul net in Dist. 19A				4	100 00	
Salmon: overlimit, undersized, spearing, gaffing, transporting, killing with rocks, shooting, taking in spawning area	21	365 00	30	35	900 00	285
Sardines: exceeding sardine permit tonnage allotment, reducing without permit	5	2,500 00				
Seining in Dist. 20				4	1,200 00	
Set lines in White Slough, in Taylor Slough, Middle River, Honker Bay, Dist. 1, in San Joaquin River				16	455 00	185
Skipjack, selling undersized	3	50 00				
Spear in possession in creek				3	75 00	

FISH CASES—Continued

Offense	July 1, 1936, to June 30, 1937			July 1, 1937, to June 30, 1938		
	Arrests	Fines	Jail	Arrests	Fines	Jail
Steelhead; overlimit, spearing, gaffing, closed season, no license, selling	2	$25 00		14	$150 00	21
Sturgeon; possession	1	20 00		1		
Sunfish, closed season, overlimit	21	195 00		43	690 00	37
Tuna; yellowfin, selling undersized	10	350 00		1	500 00	
Trout: taking with explosives, overlimit, using fresh spawn, using 2 poles, closed season, closed district, closed stream, selling, snagging	54	1,173 00	20	83	1,924 00	77
Using explosives to take fish, using dynamite	1	100 00		1	100 00	
Using fresh spawn	3	150 00				
Totals	1,618	$31,847 50	2,223½	1,808	$38,928 00	3,332½

GAME CASES

Offense	July 1, 1936, to June 30, 1937			July 1, 1937, to June 30, 1938		
	Arrests	Fines	Jail	Arrests	Fines	Jail
Antelope: possession buck	3	$100 00		1		
Bear: closed season				3	$75 00	
Beaver: hide, possession, no license, using sawtooth traps	2	10 00		4	200 00	30
Bird nets: possession	1	25 00		1	50 00	
Brant: take, black sea, closed season				3	50 00	
Deer: closed season, kill and possess spotted fawn, spike buck, doe, fail to tag deer, transferring tags, closed season, closed district, failure to retain hide and horns, failure to return tags, failure to mark packages, possession deer evidence of sex removed	403	12,839 50	3,761½	435	17,188 00	4,068¼
Destroying birds nests	1	25 00				
Distributing traps	2	20 00				
Dove: closed season, overlimit	71	2,870 00		92	2,690 00	
Ducks: operating commercial club no license, closed season, overlimit, possession woodducks, possess surfscoter, closed season	125	7,190 00	1,385	58	1,182 50	262
Eagle: possession	1	100 00				
Elk: possession	3					
Firearms: in refuge	66	850 00	89½	83	1,766 00	2
Game: possession 10 days after close of season				1	25 00	
Game birds: closed season, protected birds in possession, shoot from auto, sell wild game birds, no license	13	115 00	120	14	110 00	10
Geese: overlimit, closed season, shoot after 4 p.m.	13	425 00		7	120 00	
Grebe: possession	1	5 00				
Grouse: possession	5	360 00		1	50 00	
Hunting: no license, in refuge, closed area, no license, alien using citizens license, failure to show game on demand, false statement in procuring license	291	4,208 00	237½	279	4,342 50	367½
Illegal shooting	88	1,607 50	11	71	1,070 00	30
Interfering with officer discharging his duties	1					
License: using another's, false statement	7	75 00				
Mink: trapping, closed season				3	20 00	5
Mountain sheep: possession	1	50 00				
Mudhens: closed season, take after 4 p.m.	6	80 00		10	80 00	
Muskrat pelts; illegal possession				2		
Net: larger than 6 ft. to take bait				1	25 00	
Night hunting	16	410 00		5	45 00	10
Nongame birds: in possession, closed season, killing, pursuit of	56	1,047 50	16	41	750 00	100
Pheasants: closed season, overlimit, shipping in closed packages, kill hen, possession male, no license	104	3,517 50	71	96	3,745 00	327½
Pigeon: closed season	2	25 00		1	100 00	
Poisoning birds	1	25 00				
Protected birds: no license, marbled godwit				39	935 00	25
Quail: closed season, overlimit, trapping, failure to tag domesticated	58	1,408 56	95	58	1,944 00	93
Rabbits: closed season, no license	35	741 00	2	71	1,017 00	20
Rail: killing	2					
Robins: killing	1	25 00				
Seagull: killing, possession				1	25 00	
Shorebirds: possession, possession killdeer, possession avocet	1			11	140 00	
Sierra hare in possession	1	50 00				
Spotlighting	32	1,195 00	135	21	650 00	235
Swan: possession, killing	7	225 00		1	25 00	
Trapping: no license, bear, game birds, fur bearing mammals	38	219 50	10	35	253 00	
Tree squirrels: killing, possession, grey squirrel skins	9	145 00		7	90 00	3½
Trespass	13	132 50		12	205 00	
Using cane gun				1	25 00	
Waterfowl: take between 4 p.m. and 7 a.m.				7	155 00	
Totals	1,480	$40,121 56	5,933½	1,476	$39,148 00	5,622¾

Counties	Total
ALAMEDA	30,000
ALPINE	
	731,220
AMADOR	222,000
BUTTE	574,000
CALAVERAS	469,445
DEL NORTE	252,100
EL DORADO	
	,137,382
FRESNO	
	,934,121
HUMBOLDT	
	985,231
INYO	
	006,327
KERN	408,046
LAKE	91,000
LASSEN	
	485,270
LOS ANGELES	60,400
MADERA	
	03,790
MARIN	
	74,660
MARIPOSA	75,900
MENDOCINO	75,800
MODOC	45,000
MONO	
	21,324
MONTEREY	
	1,000
NAPA	0,000
NEVADA	
	4,092
NEVADA STATE	2,590
ORANGE	7,500

ELEVEN-YEAR RECORD OF DEER KILL

COUNTY	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937
	Total	Total	Total	Total	Total	Total	Total	Total	Total	Total	Total
Alameda	220	263	275	252	248	164	148	204	268	266	398
Alpine	67	66	89	124	129	191	137	102	144	153	275
Amador	59	78	87	101	104	69	66	76	100	108	183
Butte	228	212	234	314	494	287	205	235	221	206	335
Calaveras	149	191	175	283	227	148	114	148	119	149	235
Colusa	263	272	297	343	304	198	220	168	177	211	346
Contra Costa	5	6	14	6	11	8	9	19	27	32	30
Del Norte	42	48	55	40	38	13	17	32	39	23	23
El Dorado	535	548	597	685	699	462	368	417	478	428	678
Fresno	592	763	764	893	952	882	888	1,359	1,259	1,522	1,658
Glenn	623	592	586	601	430	348	253	260	353	548	829
Humboldt	821	777	689	917	1,069	807	842	877	921	796	940
Imperial	1	4	4	1		4	5		1	1	3
Inyo	173	239	253	251	211	180	297	285	301	386	316
Kern	218	295	297	324	354	196	266	251	203	249	278
Kings	3	3	3	12	10	13	5	6	8	9	7
Lake	901	1,038	841	885	726	524	481	419	570	757	1,418
Lassen	296	393	511	585	607	508	551	632	781	1,037	986
Los Angeles	435	369	691	637	949	819	572	750	800	772	1,192
Madera	260	300	313	379	442	316	268	310	360	314	421
Marin	367	444	394	403	449	376	301	341	328	411	482
Mariposa	95	134	144	235	190	134	100	160	121	139	181
Mendocino	1,475	1,468	1,355	1,483	1,706	1,273	1,234	1,185	1,207	1,372	2,072
Merced	67	68	48	68	60	45	45	60	26	53	67
Modoc	510	729	835	1,129	1,486	916	955	1,553	1,871	2,296	1,710
Mono	36	55	76	73	110	94	125	103	134	216	205
Monterey	757	830	734	864	900	484	631	736	702	759	821
Napa	442	569	523	536	488	304	285	288	278	415	544
Nevada	125	140	169	236	229	144	154	182	202	230	465
Orange	56	69	81	90	114	87	36	55	40	54	99
Placer	341	346	335	340	361	271	196	175	194	205	319
Plumas	551	586	695	764	968	829	917	1,128	1,144	1,270	1,718
Riverside	323	249	404	629	663	488	354	307	351	290	356
Sacramento		2		2	4	2	2	1	1	3	5
San Benito	217	320	269	313	275	152	172	214	160	285	408
San Bernardino	74	122	120	188	237	187	153	180	196	176	225
San Diego	169	232	233	250	334	263	173	259	237	263	363
San Francisco											
San Joaquin	21	14	22	22	24	15	14	17	11	14	21
San Luis Obispo	394	450	455	568	552	377	436	497	630	718	778
San Mateo	77	89	102	100	103	85	105	133	99	106	153
Santa Barbara	669	851	717	777	755	532	547	608	748	807	957
Santa Clara	397	536	577	650	697	415	393	421	463	595	754
Santa Cruz	78	92	102	115	127	85	108	108	81	92	118
Shasta	612	603	702	655	773	527	517	630	653	689	1,065
Sierra	101	102	132	137	190	151	158	179	210	302	531
Siskiyou	1,665	1,654	1,211	1,372	1,516	896	823	1,043	1,092	1,227	1,186
Solano	45	52	54	58	45	31	19	20	23	32	39
Sonoma	751	753	732	865	903	709	748	704	554	536	744
Stanislaus	91	115	119	111	94	37	37	39	39	77	107
Sutter	1	3	2	1	1						1
Tehama	799	846	758	845	715	487	569	866	813	647	1,391
Trinity	921	800	751	760	841	418	340	464	459	650	865
Tulare	744	939	807	965	890	725	625	836	924	1,108	1,206
Tuolumne	213	213	212	280	329	215	175	218	223	257	451
Ventura	274	362	346	308	390	317	408	398	465	554	972
Yolo	115	169	176	214	191	138	88	91	106	151	209
Yuba	53	52	55	93	91	34	31	56	40	42	102
Totals	19,507	21,515	21,222	24,132	25,805	18,380	17,686	20,805	21,955	25,008	32,241
Deer Tag License Sales	110,760	105,638	115,472	123,999	129,005	96,702	95,776	108,913	110,808	126,855	128,436

CALIFORNIA FRESH FISHERY PRODUCTS FOR YEAR 1936

Compiled by Division of Fish and Game, Bureau of Commercial Fisheries

Species of fish	Del Norte, Humboldt	Mendocino, Sonoma, Lake	Marin	Solano, Yolo	Sacramento, San Joaquin	Alameda, Contra Costa	San Francisco, San Mateo	Santa Cruz	Monterey
Albacore								6,413	36,128
Anchovy	2,020						133,050	16,250	13,950
Barracuda									
Bonito								32	410
Cabrilla									
Carp		61,625		4,815	32,120	10,173			
Catfish		12,031			172,931	119,668			
Cultus	217,696	123,566					249,419	52,997	108,326
Flounder	111,742	26,856	24			728	471,520	9,238	1,078
Flying Fish									
Hake		6,250					33,241	7,250	
Halibut—California		1,477	85				8,139	27,568	19,522
Halibut—Northern	500,927	21,921							
Hardhead		68,400			38,270				
Herring	5,849		382,848			4,300	444,370		1,315
Kingfish							12,847	35,559	174,295
Mackerel—Horse								335	30,802
Mackerel—Pacific	13	451					44,535	2,067	5,416,029
Mackerel—Spanish									
Mullet									
Perch	13,353	31	66,236			18	29,369	4,881	40,466
Pike				105	307	85			
Pompano								1	297
Rock Bass									8
Rockfish	234,318	170,396	5			43	547,813	666,000	2,046,863
Sablefish	476,079	130,020					15,693	199,455	25,510
Salmon	2,347,116	1,405,849		301,766	252,012	400,181	266,440	58,664	86,260
Sand Dab	147,047	65,209				250	322,732	56,180	21,758
Sardine							283,789,475	1,000	402,941,948
Sculpin								80	
Sea Bass—Black									25
Sea Bass—White			3,295				1,147	6,574	475
Shad				306,399	35,004	1,907,088	24,487	11	
Shark	210	13,996					141,422	16,763	1,165

Sheepshead									
Skate	3,948	36,275					247,165	31,554	21,420
Skipjack									
Smelt	15,116	9,513	9,167			5,353	41,639	21,202	102,885
Smelt—Jack	616		53,986				262,038	11,115	
Sole	1,885,845	1,193,685					3,919,675	829,465	114,731
Splittail		22,125			3,722	3,495			
Sucker		41,925			6,126				
Swordfish—Broadbill									
Swordfish—Marlin									
Tom Cod		70					4,083		
Tuna—Bluefin									22
Tuna—Yellowfin									
Turbot	825	1,010	984				95,042	8,621	9,866
Whitebait	77,333	111,054	24				2,271	19	7,037
Whitefish									
Yellowtail									
Miscellaneous	44,571	26,848		10	10	97	91,405	24,498	1,121
Total fish	6,084,624	3,550,583	516,654	613,095	540,502	2,451,569	291,199,017	2,093,792	411,223,712
Crustaceans:									
Crab	229,684	3,010				1,554	2,071,058	5,484	724
Shrimp			280,366			186,109	1,771,474		1,861
Spiny Lobster									
Mollusks:									
Abalone		23,067					10,600		1,575,675
Clam—Hardshell	231	1,023	119						
Clam—Mixed	34,065	5,286	411						
Clam—Pismo								2,245	18,044
Clam—Softshell		977	78,604				11,390		
Mussel								750	
Octopus	111	830					12,140	3,549	45,172
Oyster—Eastern and Japanese			198,131				422,094		9,266
Oyster—Native			37,350						
Squid		315					2,438	149	933,082
Miscellaneous mollusks									
Miscellaneous:									
Turtle									
Totals	6,348,715	3,585,091	1,111,635	613,095	540,502	2,639,232	295,500,211	2,105,969	413,807,536

All amounts shown in pounds unless otherwise specified. Skipjack and Albacore cleaned.

CALIFORNIA FRESH FISHERY PRODUCTS FOR YEAR 1936—Continued

Species of fish	San Luis Obispo, Santa Barbara, Ventura	Los Angeles	Orange	San Diego	Total taken in state waters and off coast of California	From west coast south of the International Boundary brought into San Pedro	From west coast south of the International Boundary brought into San Diego	Total landings in California, including fish from west coast south of the International Boundary
Albacore	1,780	870,230	39,817	2,403	956,771			956,771
Anchovy		29,852			195,122			195,122
Barracuda	47,350	1,824,526	159,777	221,943	2,253,596	298,899	424,659	2,977,154
Bonito	4,176	820,402	455,870	935,789	2,216,679	3,604,731	1,394,506	7,215,916
Cabrilla						72,762	124,061	196,823
Carp				142	108,875			108,875
Catfish					304,630			304,630
Cultus	143	118	9	2,051	754,325	275	3,634	758,234
Flounder					621,186			621,186
Flying Fish		55,627			55,627			55,627
Hake		4,050			50,791			50,791
Halibut—California	263,590	338,339	29,208	95,315	783,243	182,895	623,386	1,589,524
Halibut—Northern					522,848			522,848
Hardhead					106,670			106,670
Herring	225			1,533	840,530			840,530
Kingfish	699	419,538	7,716	1,273	651,927		166	652,093
Mackerel—Horse		4,506,609		60,771	4,598,517		1,200	4,599,717
Mackerel—Pacific	24,316	78,150,963	6,162,780	9,026,646	98,827,800		1,714,079	100,541,879
Mackerel—Spanish						16,117	1,425	17,542
Mullet		4,833	1,847	3,891	10,571			10,571
Perch	5,069	91,587	281	331	251,622		120	251,742
Pike					497			497
Pompano		7,016	115	95	7,524		402	7,926
Rock Bass	16,129	142,179	48,619	117,379	324,314	9,653	82,087	416,054
Rockfish	409,981	244,299	26,434	153,699	4,490,851	11,397	98,065	4,600,313
Sablefish	656	95,007	77,057	1,605	1,021,082	13,904	544	1,035,530
Salmon	270	750			5,119,308			5,119,308
Sand Dab		6,056	2,443		621,675			621,675
Sardine	1,657	252,667,215	268,080	15,855,403	955,524,778		547	955,525,325
Sculpin	216	97,699	8,099	3,657	109,751		746	110,497
Sea Bass—Black	531	10,562	2,917	5,819	19,854	281,228	96,609	397,691
Sea Bass—White	61,599	416,677	5,935	69,242	564,944	18,360	224,463	807,767
Shad					2,272,989			2,272,989

Shark	22,211	157,589	58,290	45,884	457,530	8,212	6,119	471,861
Sheepshead	19,308	86,660	3,068	6,830	115,486	1,968	10,623	128,577
Skate	13,722	12,433	2,616	9,067	378,200	1,741	2,003	381,944
Skipjack	7	5,177,285	288,020	3,322,410	8,787,722	3,443,705	14,236,066	26,467,493
Smelt	20,933	253,892	24,377	7,675	511,752		2,011	513,763
Smelt—Jaek					327,755		23	327,778
Sole	374,279	4,205	2,799	52	8,324,736	147		8,324,883
Splittail					29,342			29,342
Sucker					48,051			48,051
Swordfish—Broadbill	44,228	357,776	59,782	90,232	552,018	1,680	23,704	577,402
Swordfish—Marlin		13,212	1,525	1,616	16,353		292	16,645
Tom Cod					4,153			4,153
Tuna—Bluefin	7,147	13,623,047	507	177,855	13,808,578	4,021,330	1,094,975	18,924,883
Tuna—Yellowfin	65	603,241	36,950	126,975	767,231	17,626,807	57,924,714	76,318,752
Turbot		52			116,400			116,400
Whitebait					197,738			197,738
Whitefish	4,312	10,713	1,487	10,327	26,839	5,726	14,038	46,603
Yellowtail	46	162,596	21,418	69,663	253,723	1,963,692	7,875,055	10,092,470
Miscellaneous	5,041	2,278	728	386	196,993	20,851	40,621	258,465
Total fish	1,340,776	361,269,113	7,798,601	30,427,959	1,119,109,997	31,606,080	86,020,943	1,236,737,020
Crustaceans:								
Crab	76	16,126			2,327,716			2,327,716
Shrimp		94			2,239,904		4,489	2,244,393
Spiny Lobster	141,783	160,993	30,524	80,058	413,358	35,044	885,679	1,334,081
Mollusks:								
Abalone	1,692,143	710			3,302,195			3,302,195
Clam—Hardshell		21,429			22,802			22,802
Clam—Mixed		6			39,768			39,768
Clam—Pismo	189,540				209,829			209,829
Clam—Softshell					90,971			90,971
Mussel					750			750
Octopus		246	372	19	62,439			62,439
Oyster—Eastern and Japanese					629,491			629,491
Oyster—Native					37,350			37,350
Squid		8,925	530		945,439			945,439
Miscellaneous Mollusks		250			250			250
Miscellaneous:								
Turtle		475			475		2,163	2,638
Totals	3,364,318	361,478,367	7,830,027	30,508,036	1,129,432,734	31,641,124	86,913,274	1,247,987,132

All amounts shown in pounds unless otherwise specified. Skipjack and Albacore cleaned.

CANNED, CURED AND MANUFACTURED FISHERY PRODUCTS OF CALIFORNIA FOR THE YEAR 1936
SHORE PLANTS

Canned

Kind of fish or fishery product	Size of cans	Northern California district, cases	Monterey district, cases	San Pedro district, cases	San Diego district, cases	Total cases
Albacore	4-lb., 12's			838		838
	1-lb.			8,585		8,585
	½-lb.			43,525	35	43,560
	¼-lb.			901		901
Bonito	1-lb.			7,749	6,580	14,329
	½-lb.			55,747	29,657	85,404
	¼-lb.			1,464	506	1,970
	¼-lb., 100's			3,375		3,375
Mackerel	1-lb.		54,138	990,360	113,075	1,157,573
	½-lb.			7,640	9,669	17,309
	½-lb., 96's		1,001	56,430	4,680	62,111
	¼-lb.				75	75
Roe	1-lb.				43	43
Sardine	No. 10, 6's		4,492	749		5,241
	1-lb. oval		1,089,683	586,038		1,675,721
	1-lb. tall		202,148	259,793	9,728	471,669
	½-lb.			25,260		25,260
	½-lb. oval		728			728
	½-lb., 72's		1,031			1,031
	½-lb., 96's		86,506	107,228	2,755	196,489
	½-lb. B. & P.		432			432
	½-lb. fillet		113,516			113,516
	10½ oz.		37,454			37,454
	5-oz., 100's		124,490	156,649		281,139
	¼-lb.				10,380	10,380
	¼-lb. B. & P. 100's		583			583
Sardine paste	4-oz.		906			906
Shad	1-lb.	13,214				13,214
Shad roe	1-lb. oval	75				75
	½-lb. oval	5,028				5,028
Squid	9-oz.		12,091			12,091
	7-oz.		181			181
Tuna, bluefin	1-lb.			13,843	1,506	15,349
	½-lb.			247,752	18,235	265,987
	¼-lb.			24,546	2,649	27,195
	¼-lb., 100's			24,638		24,638
	12-oz.			1,208		1,208
Tuna, striped	1-lb.			7,016	12,802	19,818
	½-lb.			138,739	235,577	374,316
	¼-lb.			9,044	24,125	33,169
	¼-lb., 100's			29,557	22,826	52,383
	12-oz.			574		574
Tuna, yellowfin	4-lb., 12's			811	841	1,652
	1-lb.			33,243	68,294	101,537
	½-lb.			279,409	864,796	1,144,205
	¼-lb.			24,626	123,192	147,818
	¼-lb., 100's			4,284	17,688	21,972
	12-oz.			861		861
Tuna flakes	1-lb.			814	2,300	3,114
	½-lb.			9,092	12,431	21,523
	¼-lb.				236	236
Tuna, "tonno" style	½-lb.			6,450		6,450
	¼-lb., 100's			51,347	740	52,087
Yellowtail	1-lb.			6,157	12,471	18,628
	½-lb.			10,912	82,208	93,120
	¼-lb.				380	380
Pet food	Misc. sizes			128,384		128,384
Totals		18,317	1,729,380	3,365,638	1,690,480	6,803,815

NOTE—Forty-eight cans to the case unless otherwise specified. Sardines packed in Northern California included with Monterey.

CANNED, CURED AND MANUFACTURED FISHERY PRODUCTS OF CALIFORNIA FOR THE YEAR 1936
SHORE PLANTS—Continued

Cured and Manufactured

Fishery product	Size or quantity	Northern California district	Monterey district	San Pedro district	San Diego district	Total
Herring, pickled	Pounds	40,000				40,000
Mixed fish, dried	Pounds	71,514			17,975	89,489
Mixed fish, salted	Pounds				86,526	86,526
Sablefish, smoked	Pounds	226,471				226,471
Salmon, mild cure	Tierces	2,239				2,239
Salmon, smoked	Pounds	77,349				77,349
Sardines, salted	Pounds		47,750	12,600		60,350
Shad, salted	Tierces	10				10
Shrimp, dried	Pounds	178,656				178,656
Shrimp meal	Pounds	384,762				384,762
Fish meal	Tons	24,593	30,431	23,588	7,655	86,267
Fish oil	Gallons	5,626,422	6,756,541	2,834,887	260,059	15,477,909

Miscellaneous Data

Estimated value of pack	$3,402,517	$8,227,865	$14,296,022	$9,024,907	$34,951,311
Number of employees	1,134	2,706	4,041	1,946	9,827
Value of plants	$1,986,095	$3,351,831	$3,110,721	$998,656	$9,447,303

REPORT OF SARDINE PLANTS, SEASON 1936-37

While the season in Monterey and northern California opened on August 1st, no fishing was done until the 10th at Monterey and the 17th in the San Francisco Bay area, when a few light loads were brought in. Fishing was held up during the first of the month by the full-moon which occurred on August 2d, and by negotiations between plant operators and fishermen on prices and labor regulations. In southern California the season opened on November 1st but no fishing was done in November on account of a fishermen's strike. Permits for use of sardines by a reduction process were issued during the entire open season and amounted to 637,500 tons. None of the plants received tonnage to cover the quota granted, and during the season 363,242 tons of permit-tonnage was canceled on account of lack of fish. This report covers operations of the shore plants only and does not include sardines taken for fresh fish markets, bait or "quarter oil" pack.

During the season nine floating reduction ships operated off the coast of California, outside the jurisdiction of the State. It is estimated these floating plants took 239,257 tons of sardines, and produced 39,876 tons of meal and 9,034,041 gallons of oil. Adding the estimated tonnage of the floating plants to the tonnage of the shore plants would make a total of 727,398 tons of sardines taken in State waters and off the California coast. The floating reduction plants which operated off the California coast during the season, with names of the owners, were: *Lansing,* Fishermen's Products Co.; *Manatawny,* Deep Sea Fisheries; *Lake Miraflores,* Santa Cruz Oil Co.; *American Fisher,* Santa Cruz Oil Co.; *Brookdale,* Gardenia Packing Co.; *Monitor,* Interstate Fish Reduction Co.; *Polarine,* Polarine Fisheries, Inc.; *Santa Inez,* Pacific Ocean Products Co.; *Currier,* American Marine Products Co.

The following shore plants operated during the season:

MONTEREY AND NORTHERN CALIFORNIA DISTRICT

Benicia Fisheries, Benicia.
F. E. Booth Co., Inc., Monterey.
F. E. Booth Co., Inc., Pittsburg.
California Packing Corporation, Monterey.
Carmel Canning Company, Monterey.
Carquinez Fishery, Ltd., Port Chicago.
Custom House Packing Corporation, Monterey.
Cypress Fisheries, Inc., Monterey.[1]
Del Mar Canning Corporation, Monterey.[1]
East Bay Fisheries, Inc., Richmond.
Edible Fish Meals & Oils, Inc., Richmond.
Farallone Packing Company, San Francisco.
Fish-Dee-Lish-Corporation, Benicia.

Fish Packers, Inc., Benicia.
E. B. Gross Canning Company, Monterey.
Hofmann Packing Corporation, Benicia.
Hovden Food Products Corporation, Monterey.
Hovden Food Products Corporation, Moss Landing.
Mazama Fisheries Corporation (Barge *Mazama*), Richmond.
Monterey Canning Company, Monterey.
Old Capitol Land Company, Monterey.[1]
Old Capitol Packers, Inc., Benicia.
Ozol Packing Company, Martinez.
Pittsburg Canners, Inc., Pittsburg.
Point Edith Fisheries, Ltd., Port Chicago.
Redondo Fish Products Co. (Barge *Redondo*), Richmond.
Richmond Fisheries, Inc., Richmond.
San Carlos Canning Company, Monterey.
San Xavier Fish Packing Company, Monterey.
Sea Pride Packing Corporation, Ltd., Monterey.
Union Fish Company (Barge *Peralta*), San Francisco.

SAN PEDRO DISTRICT

Ambrose-Steele Canning Co., Long Beach.
California Marine Curing & Packing Company, Terminal Island.
California Packing Corporation, Terminal Island.
Coast Fishing Company, Wilmington.
Franco-Italian Packing Company, Inc., Terminal Island.
French Sardine Company, Inc., Terminal Island.
Italian Food Products Company, Inc., Long Beach.
K & M Fisheries, Inc., Terminal Island.
San Carlos Canning Company, Long Beach.
Sea Pride Packing Corporation, Ltd., Terminal Island.
Sea Pride Packing Corporation, Ltd., Wilmington.
South Coast Fisheries, Terminal Island.
Southern California Fish Corporation, Terminal Island.
Terminal Island Packing Co., Newport Beach (Sardines processed at Benicia).
Van Camp Sea Food Co., Inc., Terminal Island.

SAN DIEGO DISTRICT

American Fisheries Company, San Diego.
Point Loma Tuna Packers, Inc., Point Loma.
Sun Harbor Packing Company, San Diego.
Westgate Sea Products Company, San Diego.

[1] Plant destroyed by fire November 25, 1936.

PRODUCTION OF SARDINE PLANTS

August 1, 1936, to April 5, 1937

District	Sardines received, tons	Used for canning, tons	Used for meal and oil, tons	Offal, tons
Monterey and Northern California	345,658	76,482	269,062	38,245
San Pedro	137,914	72,340	64,097	36,165
San Diego	4,569	463	4,106	231
Totals	488,141	[1]149,285	337,265	74,641
Deduct fish received for purposes other than canning	275,863			
Received for canning	212,278			

[1] The law requires that 13½ cases of 1-lb. oval cans be canned from each ton of sardines received for canning, but in figuring amount actually used in canning, a basis of 20 cases per ton is used.

District	1-lb. ovals packed, cases	Other size cans packed, cases	Other size cans reduced to equivalent of 1-lb. ovals, cases	Cases per ton
Monterey and Northern California	1,017,530	541,081	512,282	13.5
San Pedro	629,802	801,534	819,859	14.6
San Diego		9,375	9,573	19.7
Totals	1,647,332	1,351,990	1,341,714	

District	Sardine meal, tons	Ratio per ton of meal	Sardine oil, gallons	Gallons of oil per ton of fish and offal	Fish used for purposes other than canning, tons
Monterey and Northern California	55,553	5.5	12,324,089	40.1	[2]232,750
San Pedro	18,735	5.3	1,898,134	18.9	[3]39,028
San Diego	827	5.2	77,700	17.9	[4]4,085
Totals	75,115		14,299,923		[5]275,863

[2] 232,636 tons for meal and oil under permit, 114 tons for salting and smoking.
[3] 37,551 tons for meal and oil under permit, 1,477 tons for pet food.
[4] 4,085 tons for meal and oil under permit.
[5] 274,272 tons for meal and oil under permit, 114 tons for salting and smoking, 1,477 tons for pet food.

SARDINE CATCH BY MONTHS, SEASON 1936-37

	Monterey and Northern California, tons	San Pedro, tons	San Diego, tons
August, 1936	10,620		
September	73,112		
October	65,282		
November	69,755	3	
December	68,647	18,311	
January, 1937	30,096	17,734	22
February	27,385	41,435	2,410
March	761	56,250	2,137
April 1st to 5th		4,181	
Totals	345,658	137,914	4,569

PACK OF 1-LB. OVALS BY MONTHS, SEASON 1936-37

	Monterey and Northern California, cases	San Pedro, cases	San Diego, cases
August, 1936	44,146		
September	256,464		
October	204,874		
November	179,292		
December	167,637	67,188	
January, 1937	87,773	117,333	
February	77,344	192,581	
March		234,217	
April 1st to 5th		18,483	
Totals	1,017,530	629,802	

PACK OF OTHER SIZE CANS REDUCED TO EQUIVALENTS OF 1-LB. OVALS BY MONTHS, SEASON 1936-37

	Monterey and Northern California, cases	San Pedro, cases	San Diego, cases
August, 1936	27,830		
September	118,168		
October	94,887		
November	104,585		
December	68,998	77,017	
January, 1937	48,891	102,813	
February	38,015	233,398	4,753
March	10,908	358,429	4,820
April 1st to 5th		48,202	
Totals	512,282	819,859	9,573

SARDINE MEAL PRODUCTION BY MONTHS, SEASON 1936-37

	Monterey and Northern California, tons	San Pedro, tons	San Diego, tons
August, 1936	1,499		
September	11,188		
October	10,209		
November	11,574	1	
December	11,350	2,838	
January, 1937	5,000	2,347	4
February	4,638	5,575	456
March	95	7,539	367
April 1st to 5th		435	
Totals	55,553	18,735	827

SARDINE OIL PRODUCTION BY MONTHS, SEASON 1936-37

	Monterey and Northern California, gallons	San Pedro, gallons	San Diego, gallons
August, 1936	375,664		
September	2,691,879		
October	2,501,662		
November	2,485,241		
December	2,498,381	312,708	
January, 1937	1,062,752	261,187	101
February	698,493	674,194	54,476
March	10,017	637,719	23,123
April 1st to 5th		12,326	
Totals	12,324,089	1,898,134	77,700

COMPARATIVE STATEMENT OF SARDINE PLANT OPERATIONS, SEASONS 1935-36 AND 1936-37

Monterey and Northern California District

	Season 1935-36	Season 1936-37	Increase
Tons of sardines received for canning	140,152	112,908	*27,244
Tons of sardines received under permit for meal and oil	118,086	232,636	114,550
Tons of sardines received for salting, etc.	106	114	8
Total tons of sardines received for all purposes	258,344	345,658	87,314
Cases of 1-lb. oval cans packed	1,256,051	1,017,530	*238,521
Cases of other size cans packed	599,725	541,081	*58,644
Other size cans reduced to equivalent cases of 1-lb. ovals	633,788	512,282	*121,506
Meal, tons	38,537	55,553	17,016
Oil, gallons	10,050,658	12,324,089	2,273,431

*Decrease.

San Pedro District

	Season 1935-36	Season 1936-37	Increase
Tons of sardines received for canning	95,949	98,886	2,937
Tons of sardines received under permit for meal and oil	41,783	37,551	*4,232
Tons of sardines received for salting, pet food, etc.	601	1,477	876
Total tons of sardines received for all purposes	138,333	137,914	*419
Cases of 1-lb. oval cans packed	680,103	629,802	*50,301
Cases of other size cans packed	588,570	801,534	212,964
Other size cans reduced to equivalent cases of 1-lb. ovals	627,117	819,859	192,742
Meal, tons	19,422	18,735	*687
Oil, gallons	2,939,863	1,898,134	*1,041,729

*Decrease.

San Diego District

	Season 1935-36	Season 1936-37	Increase
Tons of sardines received for canning	1,436	484	*952
Tons of sardines received under permit for meal and oil	9,053	4,085	*4,968
Total tons of sardines received for all purposes	10,489	4,569	*5,920
Cases of 1-lb. oval cans packed			
Cases of other size cans packed	17,047	9,375	*7,672
Other size cans reduced to equivalent cases of 1-lb. ovals	19,856	9,573	*10,283
Meal, tons	1,945	827	*1,118
Oil, gallons	210,171	77,700	*132,471

*Decrease.

All Districts Combined (Shore Plants)

	Season 1935-36	Season 1936-37	Increase
Tons of sardines received for canning	237,537	212,278	*25,259
Tons of sardines received under permit for meal and oil	168,922	274,272	105,350
Tons of sardines received for salting, pet food, etc.	707	1,591	884
Total tons of sardines received for all purposes	407,166	488,141	80,975
Cases of 1-lb. oval cans packed	1,936,154	1,647,332	*288,822
Cases of other size cans packed	1,205,342	1,351,990	146,648
Other size cans reduced to equivalent cases of 1-lb. ovals	1,280,761	1,341,714	60,953
Meal, tons	59,904	75,115	15,211
Oil, gallons	13,200,692	14,299,923	1,099,231

*Decrease.

CALIFORNIA FRESH FISHERY PRODUCTS FOR YEAR 1937

Compiled by Division of Fish and Game, Bureau of Marine Fisheries

Species of fish	Del Norte, Humboldt	Mendocino, Sonoma, Lake	Marin	Solano, Yolo	Sacramento, San Joaquin	Alameda, Contra Costa	San Francisco, San Mateo	Santa Cruz	Monterey
Albacore	2,526						680	50,462	532,202
Anchovy							102,100		44,205
Barracuda									
Bonito								43	221
Cabrilla									
Carp		7,600		1,342	19,329	8,150			
Catfish		26,208			160,930	115,795			
Cultus, Pacific	336,574	207,595					304,731	22,839	94,650
Flounder, Starry	185,511	70,088	34			14,216	689,424	9,889	5,608
Flying Fish									
Grouper									
Hake	768	17,663					41,506	1,170	
Halibut, California		254	64				8,604	6,704	12,255
Halibut, Northern	308,519	8,406							
Hardhead		20,739			33,223	200			
Herring, Pacific	6,495	53	298,433			12,050	302,825		4,335
Kelp Bass									
Kingfish							5,250	27,077	107,740
Mackerel, Horse									42,163
Mackerel, Pacific							11,502	592	2,018,957
Mackerel, Spanish									
Mullet									
Perch	10,963	32	70,897				27,727	1,228	38,660
Pike				13	351	119			
Pompano								70	31
Rock Bass									
Rockfish	412,837	54,607					680,329	611,002	1,516,885
Sablefish	507,702	64,371					20,697	848	3,330
Salmon	3,375,560	558,705		24,250	700,825	248,077	1,108,402	292,002	599,081
Sand Dab	177,598	61,787					245,443	10,355	12,747
Sardine		16					255,367,357	35	279,194,254
Sculpin									
Sea-bass, Black								88	
Sea-bass, White			8,476				3,158	24,558	3,682

Shad					140,157	33,993	476,601	275	37	
Shark	6,010	29,076	200				19,508	347,920	15,129	112,634
Sheepshead										
Skate	37,040	44,225						286,393	10,120	11,165
Skipjack										
Smelt	13,662	3,397	3,923				9,139	30,403	10,408	76,348
Smelt, Jack			69,796					206,095	5,141	
Sole	3,285,394	1,221,903						3,269,670	101,472	123,508
Split-tail		4,885				4,094	1,847			
Sucker		2,775				5,107				
Swordfish, Broadbill										
Swordfish, Marlin										
Tomcod		150					563	343		
Tuna, Bluefin										10
Tuna, Yellowfin										
Turbot	1,480	875	415					59,247	7,777	6,139
Whitebait	43,882	32,725	25					7,904		1,641
Whitefish										
Yellowtail										
Miscellaneous	55,864	29,232				2	11	70,781	6,557	474
Total fish	8,768,385	2,467,367	452,263	165,762		957,854	906,276	263,198,766	1,215,603	284,562,925
Crustaceans:										
Crab	191,792	5,580	224					1,412,595	8,970	3,438
Shrimp			218,801				194,570	695,376		3,041
Spiny Lobster										
Mollusks:										
Abalone										1,433,200
Clam, Hard-shell		560	150							
Clam, Mixed	18,977	5,882	166							
Clam, Pismo									582	13,505
Clam, Soft-shell	79	406	91,813				617			
Mussel									1,490	
Octopus	12	603						3,673	516	18,644
Oyster, Eastern and Japanese	6,657		546,911					491,162		
Oyster, Native			44,211							
Squid								500		464,739
Miscellaneous mollusks	100									
Totals	8,986,002	2,480,398	1,354,539	165,762		957,854	1,101,463	265,802,072	1,227,161	286,499,492

All amounts shown in pounds.

NOTE: This record does not include albacore shipped in from Oregon and Washington or fish imported from Japan or Gulf of Mexico.

This report is, as far as practicable, the catch made in or off the districts shown in the table. In most cases the catch was landed in the district to which it was credited, but there are a few exceptions to this. For example: 1. The sardine catch taken by the San Francisco fleet is landed at plants in San Francisco, Contra Costa, Marin and Solano counties but is all credited to the San Francisco district. 2. The Monterey sardine fleet comes as far north as San Mateo and San Francisco counties but delivers to Monterey plants and this catch is credited to the Monterey district. The thought in making these exceptions is to keep the two fisheries separate, rather than combine part of the catch delivered to Monterey plants with the San Francisco catch.

CALIFORNIA FRESH FISHERY PRODUCTS FOR YEAR 1937—Continued

Species of fish	San Luis Obispo, Santa Barbara, Ventura	Los Angeles	Orange	San Diego	Total taken in state waters and off coast of California	From west coast south of the International Boundary brought into San Pedro by boat	From west coast south of the International Boundary brought into San Diego by boat	Total landings in California, including fish from west coast south of the International Boundary brought in by boat
Albacore	83	830,213	277,480	326,370	2,020,016			2,020,016
Anchovy		6,201	73,723		226,229			226,229
Barracuda	91,574	1,044,229	288,057	375,185	1,799,045	453,430	686,015	2,938,490
Bonito	19,988	4,235,238	50,266	1,401,456	5,707,212	865,472	1,235,216	7,807,900
Cabrilla						59,668	71,459	131,127
Carp					36,421			36,421
Catfish					302,933			302,933
Cultus, Pacific	884	899		28	968,200		58	968,258
Flounder, Starry					974,770			974,770
Flying Fish		41,880			41,880			41,880
Grouper						4,533	53,327	57,860
Hake		2,337	10		63,454			63,454
Halibut, California	311,319	285,994	54,642	132,245	812,081	27,973	366,897	1,206,951
Halibut, Northern					316,925			316,925
Hardhead					54,162			54,162
Herring, Pacific	20			7,119	631,330			631,330
Kelp Bass	91	520	102	920	1,633	50	392	2,075
Kingfish	75	482,562	22,343	712	645,759			645,759
Mackerel, Horse		6,400,422	335	98,106	6,541,026			6,541,026
Mackerel, Pacific	31,678	48,642,289	6,831,447	3,295,889	60,832,354		104,347	60,936,701
Mackerel, Spanish						19,450	7,672	27,122
Mullet		3,020		5,472	8,492			8,492
Perch	5,724	90,556	655	2,268	248,710		879	249,589
Pike					483			483
Pompano		4,669		57	4,827		162	4,989
Rock Bass	12,269	73,234	31,672	112,144	229,319	19,322	74,267	322,908
Rockfish	366,544	316,107	29,601	143,700	4,131,612		159,542	4,291,154
Sablefish	10	41,744	95,575	154	734,431			734,431
Salmon	922	9			6,907,833			6,907,833
Sand Dab	100	5,700	2,452	13	516,195			516,195
Sardine	899	346,663,267	796,948	9,407,659	891,430,435		90	891,430,525
Sculpin	133	116,044	11,959	8,978	137,114		198	137,312
Sea-bass, Black	11,860	3,538	1,712	3,214	20,412	456,831	237,003	714,246
Sea-bass, White	72,415	61,259	3,298	86,349	263,195	10,784	325,440	599,419

Shad					651,063			651,063
Shark	123,477	166,969	75,085	70,306	906,314	2,020	4,771	913,105
Sheepshead	14,054	54,682	1,474	2,939	73,149	1,332	6,985	81,466
Skate	44,128	10,541	2,394	1,386	447,392			447,392
Skipjack	21	415,975	159,417	1,308,735	1,884,148	15,008,669	30,211,275	47,104,092
Smelt	22,554	220,344	1,596	2,307	394,081		2,100	396,181
Smelt, Jack	832	3,796		141	285,801		88	285,889
Sole	296,381	1,849	1,994	24	8,302,195		27	8,302,222
Split-tail					10,826			10,826
Sucker					7,882			7,882
Swordfish, Broadbill	101,933	177,776	118,570	191,598	589,877		35,430	625,307
Swordfish, Marlin	157	2,534	868		3,559	490		4,049
Tomcod					1,056			1,056
Tuna, Bluefin	8,144	9,962,219	7,686	844,012	10,822,071	1,316,712	555,139	12,693,922
Tuna, Yellowfin	195	140,479	14,801	32,257	187,732	25,961,522	65,373,204	91,522,458
Turbot	36	4	17		75,990			75,990
Whitebait					86,177			86,177
Whitefish	13,235	12,545	350	6,217	32,347	3,906	20,945	57,198
Yellowtail	11	122,237	3,246	98,489	223,983	419,130	4,728,123	5,371,236
Miscellaneous	2,340	5,661	2,028	1,660	174,610	1,357		175,967
Total fish	1,554,086	420,589,542	8,961,803	17,968,109	1,011,768,741	44,632,651	104,261,051	1,160,662,443
Crustaceans:								
Crab	49	1,362	151		1,624,161			1,624,161
Shrimp			14		1,111,802			1,111,802
Spiny Lobster	113,986	147,537	48,121	76,281	385,925	1,530	934,971	1,322,426
Mollusks:								
Abalone	1,428,247	1,728			2,863,175			2,863,175
Clam, Hard-shell		27,781	61		28,552			28,552
Clam, Mixed					25,025			25,025
Clam, Pismo	209,868				223,955			223,955
Clam, Soft-shell					92,915			92,915
Mussel					1,490			1,490
Octopus	278	89	69		23,884			23,884
Oyster, Eastern and Japanese					1,044,730			1,044,730
Oyster, Native	6				44,217			44,217
Squid	13	36,250	160		501,662			501,662
Miscellaneous mollusks					100			100
Totals	3,306,533	420,804,289	9,010,379	18,044,390	1,019,740,334	44,634,181	105,196,022	1,169,570,537

All amounts shown in pounds.

CANNED, CURED AND MANUFACTURED FISHERY PRODUCTS OF CALIFORNIA FOR THE YEAR 1937—SHORE PLANTS

Canned

Kind of fish or fishery product	Size of cans	Northern California district, cases	Monterey district, cases	San Pedro district, cases	San Diego district, cases	Total cases
Albacore	1-lb.			11,642	102	11,744
	½-lb.			71,268	7,934	79,202
	¼-lb.			147		147
	¼-lb., 100's			66		66
Bonito	1-lb.			16,856	6,757	23,613
	½-lb.			64,979	35,551	100,530
	¼-lb.				1,430	1,430
	¼-lb., 100's			3,683	316	3,999
Mackerel	1-lb.		13,415	727,656	30,482	771,553
	½-lb., 96's		441	12,529	429	13,399
	½-lb.			3,561	5,063	8,624
	¼-lb.				163	163
	¼-lb., 100's				41	41
Oyster	1-lb.	33				33
	10½ oz.	16				16
Salmon	1-lb.	147				147
Sardine	No. 10 cans, 6's		3,291	1,509		4,800
	1-lb. oval		679,317	761,776		1,441,093
	1-lb. tall		227,806	634,215	7,823	869,844
	½-lb.			25,364		25,364
	½-lb. oval		1,528			1,528
	½-lb., 96's		48,957	238,365	2,565	289,887
	½-lb. B. & P.		583			583
	½-lb. fillet		73,785			73,785
	10½-oz.		5,098			5,098
	6-oz. B. & P. 100's		2			2
	5-oz., 100's		68,164	200,060		268,224
	¼-lb. B. & P. 100's		876			876
	¼-lb.				2,103	2,103
	¼-lb. fillet 100's		17			17
Shad	1-lb.	4,677				4,677
Shad roe	½-lb.	1,684				1,684
Squid	9-oz.		3,052			3,052
	7-oz.		2,479			2,479
Tuna, bluefin	1-lb.			16,542	1,611	18,153
	½-lb.			140,492	20,853	161,345
	12-oz.			629		629
	¼-lb.			19,926	3,091	23,017
	¼-lb., 100's			10,843	1,548	12,391
Tuna, striped	1-lb.			13,748	17,414	31,162
	½-lb.			198,964	408,960	607,924
	¼-lb.			14,316	24,636	38,952
	¼-lb., 100's			49,137	36,741	85,878
Tuna, yellowfin	4-lb. 12's			962	450	1,412
	1-lb.			42,787	89,866	132,653
	12-oz.			1,290		1,290
	½-lb.			333,422	916,287	1,249,709
	¼-lb.			29,995	157,169	187,164
	¼-lb., 100's			8,155	2,094	10,249
Tuna flakes	1-lb.			8,716	2,563	11,279
	½-lb.			25,818	12,947	38,765
	¼-lb.				394	394
Tuna, "tonno" style	½-lb.			11,404		11,404
	¼-lb., 100's			125,208	1,125	126,333
Yellowtail	1-lb.			1,545	14,968	16,513
	½-lb.			1,807	29,131	30,938
	¼-lb.				29	29
Pet food	Misc. sizes	7,049		172,181		179,230
Totals		13,606	1,128,811	4,001,563	1,842,636	6,986,616

NOTE.—Forty-eight cans to the case unless otherwise specified. Sardines packed in Northern California included with Monterey.

CANNED, CURED AND MANUFACTURED FISHERY PRODUCTS OF CALIFORNIA FOR THE YEAR 1937—SHORE PLANTS—Continued

Cured and Manufactured

Fishery product	Size or quantity	Northern California district	Monterey district	San Pedro district	San Diego district	Total
Herring, smoked	Pounds	3,650				3,650
Mixed fish, dried	Pounds	57,152				57,152
Mixed fish, salted	Pounds				151,369	151,369
Sablefish, smoked	Pounds	206,016				206,016
Salmon, mild cure	Tierces	1,012	9			1,021
Salmon, salted	Pounds	8				8
Salmon, smoked	Pounds	78,834				78,834
Sardine, salted	Pounds		18,000			18,000
Shrimp, dried	Pounds	63,880				63,880
Shrimp meal	Pounds	126,813				126,813
Fish meal	Tons	22,916	21,118	29,184	8,300	81,518
Fish oil	Gallons	4,431,668	4,122,817	2,578,600	191,757	11,324,842

Miscellaneous Data

Estimated value of pack	$2,867,396	$5,487,565	$18,646,700	$11,474,841	$38,476,502
Number of employees	1,301	2,691	4,520	2,186	10,698
Value of plants	$2,932,041	$3,091,433	$3,147,279	$1,011,429	$10,182,182

REPORT OF SARDINE PLANTS, SEASON 1937-38

Sardine fishing started in the Monterey Bay area on August 9th and in the San Francisco Bay area on August 11th. In southern California fishing started on November 1st.

Permits to take and use sardines by a reduction process for the manufacture of meal and oil were issued for 12,500 tons to all plants with a reduction plant capacity per hour of one to twenty tons; and permits for 16,500 tons were issued to plants having an hourly capacity of twenty-one to forty tons. In Monterey and northern California a monthly limit was placed on the amount that could be taken in each plant. However, if the tonnage allotted for any month was not taken, it could be carried over and taken at any time during the season up to February 15th. No plant during any month took the full monthly allotment. For the entire State permits to take 765,500 tons for use by a reduction process were issued, and the plants received and used 183,858 tons of sardines by a reduction process; and at the close of the season there were 581,642 tons of unused permit tonnage canceled.

This report covers operations of the shore plants only and does not include sardines taken for fresh fish markets, bait or quarter-oil pack.

During the season six floating reduction ships operated off the coast of California outside the jurisdiction of the State. These floating plants started to operate in September and came in and ceased operations early in December. It is estimated that these floating plants took 74,334 tons of sardines, and produced 12,389 tons of meal and 2,479,731 gallons of oil. Adding the estimated tonnage taken by the floating plants to the tonnage taken by the shore plants would make a total of 420,168 tons of sardines taken in State waters and off the coast of California. This is 307,230 tons less than was taken during the previous season, a decrease of forty-two per cent. There was a greater fishing effort on account of the increase in the number of fishing boats and at no time were any limits put on catch of the boats, all plants taking all fish brought in.

The floating plants which operated off the California coast with names of the owners were: *American Fisher,* Santa Cruz Oil Co., *Currier,* American Marine Products Co., *Lake Miraflores,* Santa Cruz Oil Co., *Lansing,* Fishermen's Produce Co.. Inc., *Manatawny,* Deep Sea Fisheries, Inc., *Santa Inez,* Pacific Ocean Products Co. The *Polarine* did not operate and the *Brookdale* and *Monitor* came inside and operated as shore plants in State waters under permit from the Commission. These three plants were operated outside of State jurisdiction during the previous season.

The following shore plants operated during the season:

MONTEREY AND NORTHERN CALIFORNIA DISTRICT

Benicia Fisheries, Benicia
F. E. Booth Co., Inc., Monterey
F. E. Booth Co., Inc., Pittsburg
California Packing Corp., Monterey
Carmel Canning Co., Monterey
Carquinez Fisheries, Ltd., Richmond
Custom House Packing Corp., Monterey
Cypress Fisheries, Inc., San Francisco
Del Mar Canning Co., Monterey
East Bay Fisheries, Inc., Richmond
Edible Fish Meals & Oils, Inc., Richmond
Farallone Packing Co., San Francisco
Fish-Dee-Lish Corp., Richmond
Fish Packers, Inc., McNears Point
Gardenia Packing Co., Sausalito
E. B. Gross Canning Co., Monterey
Hofmann Packing Co., McNears Point
Hovden Food Products Corp., Monterey
Hovden Food Products Corp., Moss Landing
Interstate Fish Reduction Corp., Richmond
Mazama Fisheries Corp., Richmond
Monterey Canning Co., Monterey
Monterey Fish Products, Seaside
Northern Packing Co., San Francisco
Old Capitol Packers, Inc., McNears Point
Ozol Packing Co., Martinez
Pittsburg Canners, Inc., Richmond
Point Edith Fisheries, Ltd., Port Chicago
Redondo Fish Products Co., Richmond
Richmond Fisheries, Inc., Richmond
San Carlos Canning Co., Monterey
San Pablo Fisheries, Richmond
San Xavier Fish Packing Co., Monterey
Sea Pride Packing Corp., Ltd., Monterey
Union Fish Company, Richmond

SAN PEDRO DISTRICT

Ambrose Steele Canning Company, Long Beach
California Marine Curing & Packing Company, Terminal Island
California Packing Corp., Terminal Island
Coast Fishing Company, Wilmington
Franco-Italian Packing Company, Terminal Island
French Sardine Company, Inc., Terminal Island
Italian Food Products Company, Long Beach
Italian Food Products Company, Newport Beach
Point Loma Tuna Packers, Inc., Newport Beach
San Carlos Canning Company, Long Beach
Sea Pride Packing Corp., Ltd., Terminal Island
Sea Pride Packing Corp., Ltd., Wilmington

South Coast Fisheries, Inc., Terminal Island
Southern California Fish Corp., Terminal Island
Van Camp Sea Food Company, Inc., Terminal Island

SAN DIEGO DISTRICT

Sun Harbor Packing Corp., San Diego
Westgate Sea Products Company, San Diego

PRODUCTION OF SARDINE PLANTS

August 1, 1937, to March 31, 1938

District	Sardines received, tons	Tons used for canning	Cannery fish overage used for meal and oil, tons	Used for meal and oil under permit, tons
Monterey and Northern California	236,712	49,516	23,235	163,935
San Pedro	109,015	65,416	22,704	19,873
San Diego	107	49	8	50
Totals	345,834	[1]114,981	45,947	183,858
Add cannery overage used for meal and oil		45,947		
Total tons received for canning purposes		160,928		

District	Offal, tons	1-lb. ovals packed, cases	Other size cans packed, cases	Other size cans reduced to equivalent of 1-lb. ovals, cases	Cases per ton
Monterey and Northern California	24,757	629,408	383,566	360,306	13.6
San Pedro	32,708	553,306	747,482	756,369	14.8
San Diego	24		1,013	1,040	18.1
Totals	57,489	1,182,714	1,132,061	1,117,715	

District	Sardine meal, tons	Ratio per ton of meal	Sardine oil, gallons	Gallons of oil per ton of fish and offal
Monterey and Northern California	38,441	5.5	7,726,734	36.4
San Pedro	14,525	5.2	1,447,631	19.3
San Diego	15	5.4	912	11.1
Totals	52,981		9,175,277	

District	Permits issued, tons	Unused permit tonnage cancelled, tons	Used for other purposes, tons
Monterey and Northern California	499,000	335,065	[2]26
San Pedro	216,500	196,627	[3]1,022
San Diego	50,000	49,950	
Totals	765,500	581,642	1,048

[1] The law requires that 13½ cases of 1-lb. oval cans be canned from each ton of sardines received for canning purposes, but in figuring amount actually used in canning, a basis of 20 cases per ton is used.
[2] 26 tons for salting.
[3] 1,022 tons for pet food.

SARDINE CATCH BY MONTHS, SEASON 1937-38

Month	Monterey and Northern California		San Pedro		San Diego	
	Canning	Reduction	Canning	Reduction	Canning	Reduction
August, 1937	75	4,810				
September	5,268	30,072				
October	19,167	48,293				
November	14,421	30,905	16,798	[5]8,572	26	47
December	22,067	[4]31,886	21,277	[6]6,679	31	3
January, 1938	10,732	17,977	19,188	[8]3,355		
February	1,021	18	24,398	[7]1,751		
March			6,459	[8]538		
Totals	72,751	163,961	88,120	20,895	57	50

[4] Includes 26 tons for salting.
[5] Includes 284 tons for pet food.
[6] Includes 352 tons for pet food.
[7] Includes 327 tons for pet food.
[8] Includes 59 tons for pet food.

PACK OF 1-LB. OVALS BY MONTHS, SEASON 1937-38

Month	Monterey and Northern California, cases	San Pedro, cases	San Diego, cases
August, 1937	165		
September	38,374		
October	156,895		
November	118,502	87,403	
December	202,508	114,663	
January, 1938	105,080	113,787	
February	7,884	168,447	
March		69,006	
Totals	629,408	553,306	

PACK OF OTHER SIZE CANS REDUCED TO EQUIVALENTS OF 1-LB. OVALS, BY MONTHS, SEASON 1937-38

Month	Monterey and Northern California, cases	San Pedro, cases	San Diego, cases
August, 1937	868		
September	32,786		
October	101,916		
November	76,915	145,618	574
December	96,997	183,638	466
January, 1938	42,443	172,643	
February	8,381	214,378	
March		40,092	
Totals	360,306	756,369	1,040

SARDINE MEAL PRODUCTION BY MONTHS, SEASON 1937-38

Month	Monterey and Northern California, tons	San Pedro, tons	San Diego, tons
August, 1937	832		
September	5,821		
October	10,979		
November	7,334	3,643	11
December	8,669	3,832	4
January, 1938	4,688	3,000	
February	118	3,212	
March		838	
Totals	38,441	14,525	15

SARDINE OIL PRODUCTION BY MONTHS, SEASON 1937-38

	Monterey and Northern California, gallons	San Pedro, gallons	San Diego, gallons
August, 1937	174,165		
September	1,186,497		
October	2,382,564		
November	1,484,380	463,187	902
December	1,619,492	418,475	10
January, 1938	860,356	264,850	
February	19,280	258,504	
March		42,615	
Totals	7,726,734	1,447,631	912

COMPARATIVE STATEMENT OF SARDINE PLANT OPERATIONS, SEASONS 1936-37 AND 1937-38

Monterey and Northern California District

	Season 1936-37	Season 1937-38	Decrease
Tons of sardines received for canning	112,908	72,751	40,157
Tons of sardines received under permit for meal and oil	232,636	163,935	68,701
Tons of sardines received for salting, etc.	114	26	88
Total tons of sardines received	345,658	236,712	108,946
Cases of 1-lb. oval cans packed	1,017,530	629,408	388,122
Cases of other size cans packed	541,081	383,566	157,515
Other size cans reduced to equivalent cases of 1-lb. ovals	512,282	360,306	151,976
Meal, tons	55,553	38,441	17,112
Oil, gallons	12,324,089	7,726,734	4,597,355

San Pedro District

	Season 1936-37	Season 1937-38	Decrease
Tons of sardines received for canning	98,886	88,120	10,766
Tons of sardines received under permit for meal and oil	37,551	19,873	17,678
Tons of sardines received for salting, pet food, etc.	1,477	1,022	455
Total tons of sardines received for all purposes	137,914	109,015	28,899
Cases of 1-lb. oval cans packed	629,802	553,306	76,496
Cases of other size cans packed	801,534	747,482	54,052
Other size cans reduced to equivalent cases of 1-lb. ovals	819,859	756,369	63,490
Meal, tons	18,735	14,525	4,210
Oil, gallons	1,898,134	1,447,631	450,503

San Diego District

	Season 1936-37	Season 1937-38	Decrease
Tons of sardines received for canning	484	57	427
Tons of sardines received under permit for meal and oil	4,085	50	4,035
Total tons of sardines received for all purposes	4,569	107	4,462
Cases of 1-lb. oval cans packed	9,375	1,013	8,362
Cases of other size cans packed	9,573	1,040	8,533
Other size cans reduced to equivalent cases of 1-lb. ovals	827	15	812
Meal, tons	77,700	912	76,788
Oil, gallons			

All Districts Combined (Shore Plants)

	Season 1936-37	Season 1937-38	Decrease
Tons of sardines received for canning	212,278	160,928	51,350
Tons of sardines received under permit for meal and oil	274,272	183,858	90,414
Tons of sardines received for salting, pet food, etc.	1,591	1,048	543
Total tons of sardines received for all purposes	488,141	345,834	142,307
Cases of 1-lb. oval cans packed	1,647,332	1,182,714	464,618
Cases of other size cans packed	1,351,990	1,132,061	219,929
Other size cans reduced to equivalent cases of 1-lb. ovals	1,341,714	1,117,715	223,999
Meal, tons	75,115	52,981	22,134
Oil, gallons	14,299,923	9,175,277	5,124,646

SARDINE CATCH, CASE PACK, MEAL AND OIL PRODUCTION

For Sardine Packing Seasons

Sardine Catch, Tons

Season	Monterey and Northern California	San Pedro district	San Diego district	Total
1925–1926	69,259	61,992	5,214	136,465
1926–1927	79,343	64,216		143,559
1927–1928	109,744	67,459	3,973	181,176
1928–1929	131,859	119,180	1,394	252,433
1929–1930	180,089	140,432	2,079	322,600
1930–1931	133,421	38,580		172,001
1931–1932	88,763	42,557		131,320
1932–1933	106,674	83,492		190,166
1933–1934	187,404	124,950	1,488	313,842
1934–1935	297,132	178,755	4,859	480,746
1935–1936	258,344	138,333	10,489	407,166
1936–1937	345,658	137,914	4,569	488,141
1937–1938	236,712	109,015	107	345,834

Sardines, 1-Lb. Ovals, Cases

Season	Monterey and Northern California	San Pedro district	San Diego district	Total
1925–1926	940,906	968,495	66,074	1,975,475
1926–1927	1,202,516	986,858		2,189,374
1927–1928	1,474,162	878,175	39,380	2,391,717
1928–1929	1,520,192	1,140,488	12,383	2,673,063
1929–1930	2,004,044	1,493,615	16,551	3,514,210
1930–1931	1,336,225	403,041		1,739,266
1931–1932	990,104	470,796		1,460,900
1932–1933	410,469	321,794		732,263
1933–1934	970,504	526,540		1,497,044
1934–1935	894,584	591,759		1,486,343
1935–1936	1,256,051	680,103		1,936,154
1936–1937	1,017,530	629,802		1,647,332
1937–1938	629,408	553,306		1,182,714

Other Size Cans Reduced to Equivalents of 1-Lb. Ovals, Cases

Season	Monterey and Northern California	San Pedro district	San Diego district	Total
1925–1926	35,956	16,361	13,065	65,382
1926–1927	21,673	63,264		84,937
1927–1928	54,985	145,143	31,995	232,123
1928–1929	115,664	173,540	10,368	299,572
1929–1930	169,462	458,416	12,552	640,430
1930–1931	246,316	170,388		416,704
1931–1932	52,197	159,066		211,263
1932–1933	15,944	75,775		91,719
1933–1934	123,688	331,631	5,396	460,715
1934–1935	154,560	222,661	13,058	390,279
1935–1936	633,788	627,117	19,856	1,280,761
1936–1937	512,282	819,859	9,573	1,341,714
1937–1938	360,306	756,369	1,040	1,117,715

Sardine Meal, Tons

Season	Monterey and Northern California	San Pedro district	San Diego district	Total
1925–1926	6,413	5,962	467	12,842
1926–1927	6,675	5,962		12,637
1927–1928	10,538	7,128	184	17,850
1928–1929	13,782	14,802	140	28,724
1929–1930	18,953	16,258	251	35,462
1930–1931	14,206	4,317		18,523
1931–1932	10,128	4,911		15,039
1932–1933	16,667	14,060		30,727
1933–1934	27,279	19,166	262	46,707
1934–1935	46,967	29,836	848	77,651
1935–1936	38,537	19,422	1,945	59,904
1936–1937	55,553	18,735	827	75,115
1937–1938	38,441	14,525	15	52,981

Sardine Oil, Gallons

Season	Monterey and Northern California	San Pedro district	San Diego district	Total
1925-1926	1,113,612	658,817	43,995	1,816,424
1926-1927	1,562,351	682,796		2,245,147
1927-1928	1,859,982	711,579	10,253	2,581,814
1928-1929	2,939,579	2,178,815	6,857	5,125,251
1929-1930	4,362,002	1,986,704	11,071	6,359,777
1930-1931	4,127,555	630,011		4,757,566
1931-1932	2,755,282	762,701		3,517,983
1932-1933	4,336,345	2,161,476		6,497,821
1933-1934	5,995,301	3,242,899	24,303	9,262,503
1934-1935	11,893,827	4,865,486	111,252	16,870,565
1935-1936	10,050,658	2,939,863	210,171	13,200,692
1936-1937	12,324,089	1,898,134	77,700	14,299,923
1937-1938	7,726,734	1,447,631	912	9,175,277

Sardine Oil Production, Gallons Per Ton

Season	Monterey and Northern California	San Pedro district	San Diego district
1930-1931	43.4	26.3	
1931-1932	43.9	28.5	
1932-1933	45.3	29.1	
1933-1934	37.5	31.3	17.7
1934-1935	43.9	30.7	24.7
1935-1936	47.5	27.9	21.0
1936-1937	40.1	18.9	17.9
1937-1938	36.4	19.3	11.1

CASE PACK, MEAL AND OIL PRODUCTION FOR CALENDAR YEARS 1916-1937

Sardines, 1-Lb. Ovals, Cases

Year	Monterey and Northern California	San Pedro district	San Diego district	Total
1916	97,100	2,512	7,133	106,745
1917	331,065	43,221	34,380	408,666
1918	593,315	136,632	17,790	747,737
1919	798,566	113,909	33,594	946,069
1920	687,777	213,714	50,302	951,793
1921	287,954	77,048	1,189	366,191
1922	353,188	340,860	3,595	697,643
1923	580,464	488,885	19,215	1,088,564
1924	631,286	693,133	12,135	1,336,554
1925	737,743	920,191	29,846	1,687,780
1926	1,158,133	861,088	63,410	2,082,631
1927	1,341,872	1,046,453	14,947	2,403,272
1928	1,511,535	945,676	39,755	2,496,966
1929	2,039,526	1,438,159	12,225	3,489,910
1930	1,579,408	863,254	15,500	2,458,162
1931	1,004,215	498,996		1,503,211
1932	459,756	415,874		875,630
1933	838,533	365,750		1,204,283
1934	1,091,158	531,619		1,622,777
1935	1,126,466	615,808		1,742,274
1936	1,089,683	586,038		1,675,721
1937	679,317	761,776		1,441,093

Fish Meal, Tons

Year	Monterey and Northern California	San Pedro district	San Diego district	Total
1916	249	261	25	535
1917	875	2,606		3,481
1918	2,874	4,737	1,123	8,734
1919	3,812	5,667	1,674	11,153
1920	3,969	3,328	1,559	8,856
1921	2,115	3,566	636	6,317
1922	2,695	5,373	959	9,027
1923	3,806	4,216	1,216	9,238
1924	6,601	7,726	1,001	15,328
1925	7,105	13,023	2,808	22,936
1926	7,807	7,066	1,394	15,767
1927	9,347	9,746	2,018	21,111
1928	12,575	12,923	2,367	27,865
1929	19,216	20,040	3,565	42,821
1930	17,127	13,653	4,859	35,639
1931	12,013	7,600	2,827	22,440
1932	14,995	9,846	2,659	27,500
1933	23,810	18,249	4,310	46,369
1934	45,630	27,236	4,858	77,724
1935	40,960	31,163	6,572	78,695
1936	55,024	23,588	7,655	86,267
1937	44,034	29,184	8,300	81,518

Includes meal produced from sardines and other species of fish.

Fish Oil, Gallons

Year	Monterey and Northern California	San Pedro district	San Diego district	Total
1916	25,563		500	26,063
1917	92,393	83,900		176,293
1918	261,466	67,858	17,400	346,724
1919	341,173	146,298	26,791	514,262
1920	419,474	152,937	39,174	611,585
1921	226,826	93,305	16,607	336,738
1922	295,858	244,310	6,882	547,050
1923	576,553	346,883	28,452	951,888
1924	1,240,296	1,059,001	51,425	2,350,722
1925	1,246,561	1,715,633	187,847	3,150,041
1926	1,418,512	651,006	54,410	2,123,928
1927	1,759,480	763,905	95,105	2,618,490
1928	2,456,716	1,268,518	24,068	3,749,302
1929	4,205,118	2,280,991	62,017	6,548,126
1930	4,517,881	1,282,893	41,989	5,842,763
1931	3,098,817	818,364	7,511	3,924,692
1932	3,805,760	1,293,961	25,678	5,125,399
1933	5,143,062	2,585,784	58,948	7,787,794
1934	11,812,236	4,221,447	94,525	16,128,208
1935	9,841,090	3,821,566	261,482	13,924,138
1936	12,382,963	2,834,887	260,059	15,477,909
1937	8,554,485	2,578,600	191,757	11,324,842

Includes oil produced from sardines and other species of fish.

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