STATE OF CALIFORNIA

DEPARTMENT OF NATURAL RESOURCES

KENNETH I. FULTON, DIRECTOR

THIRTY-SEVENTH BIENNIAL REPORT

OF THE DIVISION OF

FISH AND GAME

FOR THE YEARS 1940-1942

CONTENTS

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 employees.

	Entered Service	*Died*
Merrill Brown	6/15/30	12/ 8/40
Harrison A. Laws	3/23/31	5/29/41
J. H. Vogt	5/14/27	12/20/40

		Retired
H. B. Nidever	6/29/08	9/ 1/41
George M. Null	9/ 1/27	10/ 9/41
Iva G. Porter	9/ 3/26	9/ 1/39
John J. Shannon	5/ 7/21	6/30/40
J. W. Thornburg	9/27/27	4/ 2/41

LETTER OF TRANSMITTAL

July 1, 1942

To His Excellency, Culbert L. Olson,
Governor, State of California,
Sacramento.

Sir: We, the members of the Fish and Game Commission, are happy to submit our Biennial Report covering the period July 1, 1940, to June 30, 1942.

The following report covers the activities of the various functions within the division.

Respectfully submitted.

Nate F. Milnor, President
Germain Bulcke, Commissioner
Edwin L. Carty, Commissioner
Lee F. Payne, Commissioner
W. B. Williams, Commissioner

FIG. 1. Antelope head. Antelope was taken by Lee Mead of Bill, California, under permit No. 270, June 14, 1942, on the Carlo Mesa, Lassen County.

Weight dressed, 110 pounds

Horns: Length, left $15\frac{3}{8}$", right $15\frac{1}{4}$"
Prong, 4"
Spread 14"
Tip to tip, $5\frac{1}{2}$"
Base, $6\frac{3}{8}$"

REPORT OF THE EXECUTIVE SECRETARY

GEORGE P. MILLER

The impact of the war on the Division of Fish and Game struck as it did all types of American life with the rapidity that for the moment disrupted its orderly functioning.

The day after Pearl Harbor, the Division of Fish and Game was called upon by the Twelfth Naval District Headquarters and the Sheriff of Contra Costa County to lend its aid in guarding vital bridges in the Bay area. The division responded immediately and for approximately three months successfully guarded one or more of these structures. We were particularly entrusted with guarding the Southern Pacific Carquinez Bridge from the waterside.

Because of their training in police work, great demands were made upon the services of our law enforcement personnel by the Federal Bureau of Investigation, Naval Intelligence and other groups in the internal security of California, and in ferreting out draft dodgers and enemy aliens.

A Defense Advisory Committee was set up under the Chairmanship of Commissioner Edwin L. Carty who made an independent investigation of coastal security and worked in conjunction with other public and quasi-public agencies charged with internal security.

Immediately upon the outbreak of the war, steps were taken to insure the free flow of commercial fish through the ports of California, the commission modifying its rules and regulations to meet the emergency conditions brought about by the war effort. One of the phases of this problem directly affecting the sardine fishery was the hermetically sealing of the ports of San Francisco and San Pedro by the Navy. In February, 1942, Commissioner Carty and the Executive Secretary made a trip to Washington, D. C. for the purpose of laying the problem before high ranking naval authorities. Working in conjunction with Mr. Jeff Kibre of the International Fishermen and Allied Workers Union of America, we were successful in our mission and as a result of it, a series of conferences were initiated by the Commandants of the Twelfth and Eleventh Naval Districts that resulted in allowing the fishing fleets to proceed to sea.

One of the vexatious problems that heretofore confronted the commission was the matter of issuance of permits to take birds, their nests and eggs, and mammals for scientific purposes. Unquestionably there had been an abuse of the privileges granted individuals for the purpose of the advancement of scientific knowledge. Commissioner Germain Bulcke was appointed chairman of a special committee consisting of representatives of the scientific institutions in California to study and suggest a new method of issuing permits. As a result of the work of this committee, all of the then-existing permits were rescinded and a system was devised whereby designated scientists would pass upon the

qualifications and integrity of those people seeking permits. The plan has worked exceptionally well.

The establishment of the trout hatcheries at Hot Creek, Mono County, and Fillmore, Ventura County, marked a new milestone in fish culture in California. Mr. Nate F. Milnor, President of the Fish and Game Commission, through his intense interest and practical knowledge in this field encouraged the change in technique that is responsible for increasing the efficiency of the division's hatcheries.

Under the Chairmanship of Commissioner Lee F. Payne, an intensive study was made of the game management area law and out of a committee appointed for this purpose, came a series of recommendations to be acted upon by the commission and presented to the Legislature to bring about more workable legislation.

During the biennium, the first antelope hunt in over 40 years was held under a new section of the Fish and Game Code enacted in 1941. Commissioner W. B. Williams of Alturas took a personal interest in the rules and regulations governing this hunt and it was through his intimate knowledge of these animals and the country that the hunt was made a success.

Commencing with December 7, 1941, a close check was kept upon the daily license sales of the Division of Fish and Game without regard to the calendar or fiscal year so that we could readily gauge the effect the war was having upon our revenue. This study has been continued, on that basis and it is interesting to note that the sale of angling licenses decreased only six per cent for the comparable period between December 7, 1941 and with that commencing with December 7, 1940. The sale of hunting licenses showed greater decrease and with the sale of deer tags went down about 21 per cent for the comparable period of the preceding year. This, it was felt, was brought about by lack of gasoline, control of travel due to the war emergency, and inability of hunters to obtain shells.

Foundation for better and more intimate relationships with the administrators of fish and wildlife of our sister states of Oregon, Nevada and Arizona was initiated during this period. The problems of the West as they pertain to wildlife are common problems and differ from those throughout other sections of the country. It is through the fullest cooperation with our sister states that we can best achieve the maximum benefits arising out of rational, wildlife management.

The competition for the use of the waters of California for agricultural, industrial and other purposes and the effects of the disruption of the natural flow of streams as the result of it has begun to manifest itself. The necessity for a rational program of water conservation is becoming more evident as the effects of building such dams as the great Shasta Dam on the Sacramento and the Friant Dam on the San Joaquin rivers begin to materialize. The studies of what these dams will do to the anadromous fishes, particularly salmon, point to the losses that will be sustained by the commercial fishing industry and those who take this fish for recreational purposes. The closest cooperation must be obtained between the agencies of government and those who benefit from the storage of water, and a program of education undertaken that will establish with these groups the full value of the fish life in our streams.

As the war progressed, the Division of Fish and Game began to feel the pinch in both personnel and material. Many of our people were taken into the armed forces because of special training, education or other

qualifications. Some of them were attracted by the higher salaries being paid in the defense industries in California.

Finally, I want to pay compliment to the staff and employees of the Division of Fish and Game for their loyalty and devotion to duty. In these times of stress brought about by the war effort, they have been called upon to make sacrifices in time and energy, and they have unhesitatingly and wholesomely given of both to carry on the important work of the Division of Fish and Game.

LIBRARY

By Bessie W. Kibbe, Departmental Librarian

During the past few months of this biennial period, while many of our force have left for service in the Army or Navy, and other defense work, the volume of Library reference, loans, bibliography cataloging and other library details have been maintained and enlarged.

Due to the growing difficulties attendant upon war, literature from Nazi occupied countries has ceased coming to the library. Luckily we are still receiving scientific and other material from China and from Great Britain and her colonies.

We have been most fortunate in completing one set of the Division's Biennial Reports dating from that of 1870, thus adding materially to the Division's historical records.

The law library of 711 bound volumes, previously in the custody of the librarian, was offered to and accepted by the California State Library at Sacramento.

Our two years' annual preparation of periodicals and worn books for binding was made.

During this period, 289 bound volumes were added to the library of which $150.05 represented gifts and $915.45 purchases. With these additions, the total number of bound volumes held by the library as of June 30, 1942, number 2914 with a total value of $10,340.69.

The scientific and subject miscellaneous pamphlet collection totals 7279 with an appraised value of $1,222.78, of these 904 were added during this biennial period, $119.30 by gifts and $43.53 as purchases. The Library's present holdings represent $11,563.47, with a replaceable value far in excess of this amount.

REPORT OF THE BUREAU OF FISH CONSERVATION

By A. C. Taft, Chief

The fisheries management program for interior waters, which is largely under the supervision of the Bureau of Fish Conservation, has been extended and improved in numerous ways during the biennium. Some phases of the work have only been changed in minor ways such as might be expected under normal growth and as the result of experience, other parts of the work have been changed radically and merit recording and description in this report.

For many years trout and salmon hatcheries throughout the country have in large part depended upon beef liver as the principal food for fry and fingerlings. This material has become increasingly expensive and at the same time it has become evident that an increasing production in terms of the pounds of fish reared was necessary if more fish of larger size were to be planted. During the last year of the preceding biennium a program was initiated whereby condemned fluke liver could be obtained for our hatcheries. During the following two years the program has been expanded and we are now using more than 800,000 pounds of food per year of which over 600,000 pounds is fluke liver obtained at a cost of about eight cents per pound delivered at the hatcheries. Even this increased amount of liver would be inadequate in amount and overly expensive for the production of trout that is now contemplated, and as a result we have sought for even cheaper and more plentiful substitutes. During 1941 there were used in addition to fluke liver, 23,619 pounds of condemned canned fish, 35,210 pounds of fresh fish, 141,286 pounds of horse meat, 26,940 pounds of fish meal, 23,871 pounds of miscellaneous meat and cereal products. It appears at the present time that the use of fresh marine fishes such as anchovies and sardines can be greatly increased and supply additional food at low cost.

The following table shows the number of pounds of trout and salmon produced and planted each year since 1935.

TABLE I

POUNDS OF TROUT AND SALMON PLANTED

(Not including rescued fish)

Year	*Pounds*
1936	143,868
1937	119,758
1938	84,760
1939	95,142
1940	133,948
1941	167,647
1942	243,000

The poundage for 1936 was abnormally increased by the planting of 52,937 pounds of trout taken from excess brood stock. In 1938 production was at its lowest level for the period covered, largely as a result of

the flood damage of that year. Since that time the increase has been constant and this year the amount produced and planted will be nearly twice as great as during any previous year.

Tables I and II, in conjunction, show to what extent the planting of trout has kept pace with the increase in the number of licenses sold each year and at the same time with only a moderate increase in the total operating expenditures of the bureau.

TABLE II

OPERATING EXPENDITURES, BUREAU OF FISH CONSERVATION, 1937 TO 1942

Fiscal Year	Salaries and wages	Materials and supplies	Service and expense	Property and equipment	Total	Angling licenses sold
1935-36 87th	$172,645	$104,435	$29,518	$6,913	$313,512	223,908
1936-37 88th	198,460	118,600	40,196	19,465	376,721	298,736
1937-38 89th	222,085	117,000	40,350	21,325	400,760	312,969
1938-39 90th	216,519	92,640	40,123	20,266	369,549	346,661
1939-40 91st	225,409	75,280	35,522	13,273	349,484	366,452
1940-41 92d	252,804	92,639	40,488	16,870	402,802	388,472
1941-42 93d	252,944	85,682	48,912	8,123	395,722	458,177

It will be noted that the principal budgetary increase has been in salaries and wages. This resulted first from the raise to the minimum authorized by the State Personnel Board in 1937 and secondly, in the following years through annual salary increases provided for by action of the Legislature. To a lesser but wholly justifiable extent there has been an increase in the total number of employees of the bureau. The increase in the salaries and wages item has been largely compensated for by economies in other items such as fish food and equipment so that the total operating budget has only been increased by about 4.6 per cent during the last three years as compared with the first four years of the period indicated in the table. In addition to operating expenditures shown in the table there has been a considerable amount expended for permanent improvements such as new hatcheries which will be described in detail later in this report.

The question might naturally be asked as to whether angling, particularly for trout and salmon, is holding up under the additional drain put upon the resource through an increase of over 100 per cent in the number of licensed anglers in California between 1935 and 1941. In 1935 the Bureau of Fish Conservation instituted a system whereby annual records of the anglers' catch throughout the State could be obtained from year to year in order to answer the question as to the condition of our game fisheries and thus supply information that would be of great value in their management.

The first system of collecting the records was based on voluntary reports made by the anglers on the license application form and was in effect until 1939. There were several drawbacks to this system. The fisherman's memory of his season's catch had become hazy by the time he came to report it on his next year's license application. The publicity and haste attendant upon buying the new license also made for poor individual reports. Further, the records for any year were not complete until all applications for the succeeding year had reached the statistical department, with a resulting lag of over a year in the compilation of the final report.

To overcome these defects a new system was tried in 1939 and is now in use. A random sample list of approximately 10 per cent of the anglers was built up throughout 1939 as the license stubs reached the statistical department, and in Jauary of 1940 questionnaires were mailed to these names. The angler was thus enabled to make his report at leisure and reasonably soon after the close of the season; and inspection of the returns shows great improvement over the earlier ones. Further, the final consolidated report could be completed at least a year sooner than was possible under the old system.

It should be noted that the voluntary report continues to be basic. This means that not all anglers in the sample make reports, and that estimates of the total catch of any kind of fish by all the anglers have had to be based on the catches reported by those anglers who do make returns. The proportion of report returns, under all systems so far tried, has been in the neighborhood of 30 per cent. Even under the postal card questionnaire, this has involved close to 10,000 units, a number which would be considered statistically adequate to serve as a basis of estimate *provided* it constituted a true random sample, that is, provided the reporting anglers were truly representative of the whole angling population. Unfortunately, there is every reason to believe that this is not the case. The consideration of only one factor serves to demonstrate this: men who catch no fish obviously are less likely to report than those who do, and the proportion of such men is therefore greater among the nonreporters than among the reporters. The game records, where the deer tags furnish an absolute check unequaled in the fish records, have clearly demonstrated the truth of this general proposition.

In an effort to shed light on the darkness surrounding the activities of these nonreporters, a "second call" was sent out in 1938 to a sample of the licensees who had failed to report their 1937 catches on their 1938 license applications. In this case only 18 per cent returned catch records, leaving again a large blind spot. The principal piece of information gleaned from this work was that at least 12 per cent of all licensees catch no fish, of which about half do not fish at all, while the other half fish but catch nothing. This figure has been adopted as a basic factor to use in working up all estimates of total catches.

In spite of all questions as to the validity of the sample and as to the reliability of the individual reports, information of great value is none the less furnished by the catch records. The distribution of the angling licensees by county of residence is factual matter to which no shadow of question attaches; the distribution of their fishing effort by species and by county of catch, while not factual, may be looked upon as having considerable reliability.

As for the estimates of total catch, it should be stated that these are based on two general assumptions; first, that catch reporters and nonreporters fish for each species in similar proportion; and second, that the average catch of the nonreporters, after making allowance for the 12 per cent of all anglers who catch no fish, is the same as the average catch of reporters. While there may be and probably are fallacies in these assumptions which make for errors in the absolute values of the estimates, it seems none the less probable that the comparative values of the estimates from year to year are highly significant, and that they do present a fairly accurate picture of the yearly fluctuations in the total catch of any

fish—information which is more important in fisheries management than the absolute values.

TABLE III

ESTIMATED TOTAL CATCHES OF INLAND WATER FISH

	1935[1]	1936	1937[2]	1938	1939[3]	1940	1941[3]
Number of licensees	223,098	298,736	312,969	346,661	366,452	388,472	458,177
Trout: Catch	11,700,000	12,000,000	11,900,000	12,900,000	12,800,000	------	15,700,000
Successful anglers	142,000	149,000	151,000	160,000	179,000	------	238,000
Average catch	81	80	78	79	71	------	66
Striped Bass: Catch	------	2,130,000	2,070,000	1,970,000	1,900,000	------	2,035,000
Successful anglers	------	85,000	83,000	94,000	91,000	------	111,000
Average catch	------	25	25	21	21	------	18
Black Bass: Catch	------	930,000	849,000	1,190,000	1,340,000	------	1,529,000
Successful anglers	------	34,400	32,700	45,800	67,000	------	75,400
Average catch	------	27	26	26	20	------	20.3
Crappie: Catch	------	1,040,000	917,000	1,210,000	1,720,000	------	2,177,000
Anglers	------	23,300	24,100	28,200	52,200	------	69,700
Average catch	------	47	38	43	33	------	31
Sunfish: Catch	------	590,000	1,164,000	934,000	2,090,000	------	2,771,000
Anglers	------	10,900	22,700	17,000	51,000	------	62,500
Average catch	------	54	51	55	43	------	44
Salmon: Catch	------	196,000	160,000	178,000	215,000	------	253,000
Anglers	------	24,600	20,000	22,300	30,700	------	37,800
Average catch	------	8	8	8	7	------	6.7
Catfish: Catch	------	2,040,000	2,810,000	3,480,000	4,330,000	------	6,100,000
Anglers	------	37,700	43,200	48,300	74,600	------	97,400
Average catch	------	78	65	72	58	------	63

[1] Estimates were not prepared for other species than trout in the 1935 catch.
[2] 1937 estimates are derived from "First" and "Second" Call combined.
[3] 1939 and 1941 figures derive from mailed questionnaire instead of license application form; also, the method of estimate is different. As a result, the estimates for trout catch and anglers are lower than they would have been by the old methods (which would have given 19,000,000 trout caught by 256,000 anglers for an average of 74 trout per angler). At the same time, the estimates for minor species are increased, due to the tendency of reporters to give more complete records on the mailed questionnaire than on the application form.

TABLE IV

LEADING COUNTIES OF TROUT CATCH

Showing Rank in Each Year

	1936	*1937**	*1938*	*1939***	*1941***
Mono	1	1	1	1	1
Inyo	2	2	2	2	2
Fresno	5	6	7	6	3
Plumas	4	3	4	3	4
Humboldt	6	4	3	4	5
Tulare	8	15	9	7	6
Mendocino	7	7	11	9	7
Tuolumne	11	19	10	10	8
Shasta	15	8	8	5	9
El Dorado	3	9	5	11	10
Siskiyou	18	5	12	8	11
San Bernardino	10	10	29	20	12

* By "First" and "Second" Call combined—1937.
** Postal card questionnaire—1939 and 1941.

The statistical department of the Division of Fish and Game, thanks to its excellent personnel and equipment, is able to produce reports giving from all angles information on the number of fish of each kind caught in each county by residents of every county in the State. These detailed data have many uses. They are available in annual catch record reports, but are too lengthy to present here. Only the major results are summarized in the accompanying tables. Certain clarifying comments seem desirable.

1. The 1940 catch has not yet been analyzed. Reported on the old application blank system while the new mailed questionnaire was being

tested out on the 1939 catch, the 1940 individual reports reached the statistical department at the same time as the 1941 returned questionnaires, and it was thought desirable to put them aside in favor of the more up to date material. They will be recorded later as time becomes available.

2. As the number of licensees has increased, the percentage of them who fish for trout has remained comparatively constant at between 55 and 60 per cent (59.7 per cent in 1941). The total trout catch has increased, but the average catch per angler has declined. Part of this decline is due to the difference between the estimates derived from the license application reports (1935-1938) and from the mailed questionnaire (1939 and 1941) but part of it is significant. There were not as many trout available per angler in 1941 as in 1935; or, to put it differently, there has not been a rapid enough increase in the State's trout population to provide the same average catch per angler, although there has been a definite increase in the total number of trout taken.

3. The percentage of all licensees who fish for striped bass has shown a steady decline from 32.5 per cent in 1935 to 28 per cent in 1941. The total number of anglers for this fish has increased, but the total catch has remained quite constant. The decrease in the average catch per angler is not, in itself, evidence of depletion as long as the total number of fish taken does not decrease as the number of anglers increases.

4. The great increase in the reported numbers of crappie, sunfish and catfish after 1938, and especially in 1941, is probably due in large part to the new system of collecting the data and in part to the increased fish rescue program since 1938. All evidence points to the fact that on the mailed questionnaire, filled out at leisure and in private, the angler is more apt to count and report his catch of these comparatively minor species than he was on the old application form filled out at the time of buying his license.

It is evident from the foregoing statistics of the anglers' catch records for trout that more trout will have to be reared and planted if we are to keep pace with the increasing demands for that type of fishing. In the last biennial report attention was called to the need for certain changes and additions to the present facilities for rearing trout. A program was outlined for the construction of new hatcheries with particular emphasis on the need for rearing ponds to supply trout of catchable size for planting.

This program has in part been put into effect through the establishment of new stations and the addition of facilities at existing hatcheries. At Hot Creek, in Mono County, temporary ponds had been in use since 1931 and it had been demonstrated that the water at a temperature of approximately 60 degrees made possible a rapid growth that could hardly be duplicated any other place in the State.

The need for permanent and expanded construction there coincided with the construction of two large dams in the area by the City of Los Angeles. At neither of these dams did it appear that fish ladders would be practical and as provided by Sections 526 to 529 of the Fish and Game Code a request was made to the city for fish cultural facilities in lieu of ladders over the two dams. After negotiation the city agreed to provide the hatchery site of about 140 acres, the use of all water arising on the property, and the sum of $25,000 for construction. Since the hatchery was planned of a size to serve a greater area than that affected by the

construction of the two dams, the Fish and Game Commission provided an additional $100,000 for construction work. During the summer of 1941 the construction was carried forward to completion consisting of 30 ponds, a 30-trough hatchery, a spawning house and holding raceways, a six-car garage and workroom, a food house with refrigerating room, and three houses for employees.

Even during construction the use of temporary ponds and existing equipment made it possible to rear and plant 793,988 trout averaging 4.5 inches in length. With the new facilities in use it will be possible to materially increase this production both in the size and number of the fish produced.

The producton of larger trout for Mono and Inyo counties, the two leaders in that type of fishing in the State, was further increased in 1942 by the operation of the Black Rock rearing pond near Independence, see Figure 2. This pond was artificially created some years ago by the City of Los Angeles by the building of a dam for diversion purposes near the

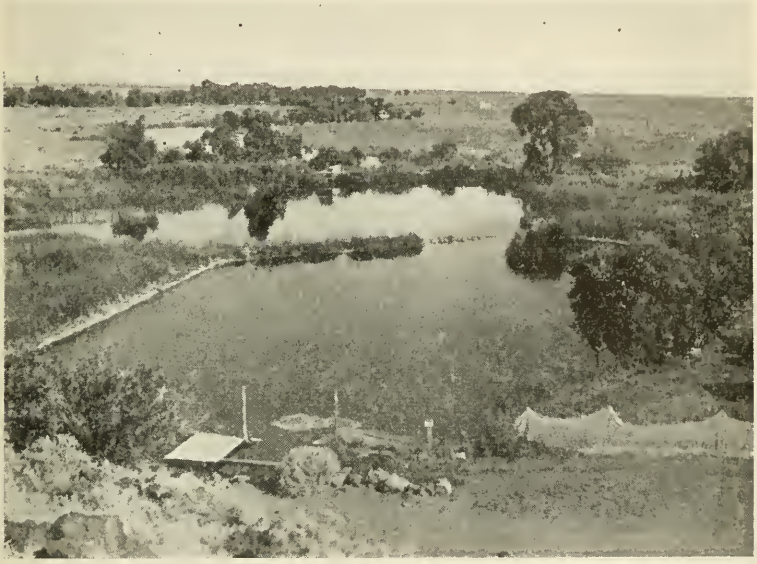

FIG. 2. Black Rock Springs Rearing Pond, Inyo County. Photo by E. H. Vestal.

source of the Black Rock springs. The springs have a flow of from 12 to 15 c.f.s. at a temperature of 59°. In the fall of 1941 the outlet to the pond was screened and 450,000 fingerling Rainbow trout were planted in this single large pond. Some risks were obviously involved in rearing such a large number of fish in a single pond but that they were justified can be seen from the results obtained. During the spring of 1942 a total of 274,385 Rainbow trout averaging over five inches in length and having a total weight of over 36,000 pounds was planted from the pond. These fish were for the most part used in stocking the heavily fished waters from the foot of Sherwin grade south to Lone Pine.

The second large hatchery constructed during the biennium was at Fillmore, Ventura County. Following the destruction of the Forest Home Hatchery in San Bernardino County during the flood of 1937-38 search was made for a satisfactory site for a hatchery to serve southern California. A site was tentatively selected on Lytle Creek, San Bernardino County, but this was later found to be unusable due to objections from the City of San Bernardino, which takes its water supply from the stream below. During the summer of 1940 a supply of spring water with a favorable temperature of 60° was found in a side channel of the Santa Clara River near the town of Fillmore. Temporary ponds, tanks and troughs were installed and put into use. Results during the following year indicated that a rapid growth nearly equal to that at Hot Creek could be obtained and the Fish and Game Commission authorized the expenditure of $75,000 for a permanent installation consisting of 30 ponds, a food house and refrigerating room, a small hatchery with rearing tanks, a six-car garage and workroom, and four houses for employees. The hatchery was completed near the end of the biennium and has not yet been in full production. It should be able to produce nearly a million fish of catchable size for planting in southern California. See figure 3.

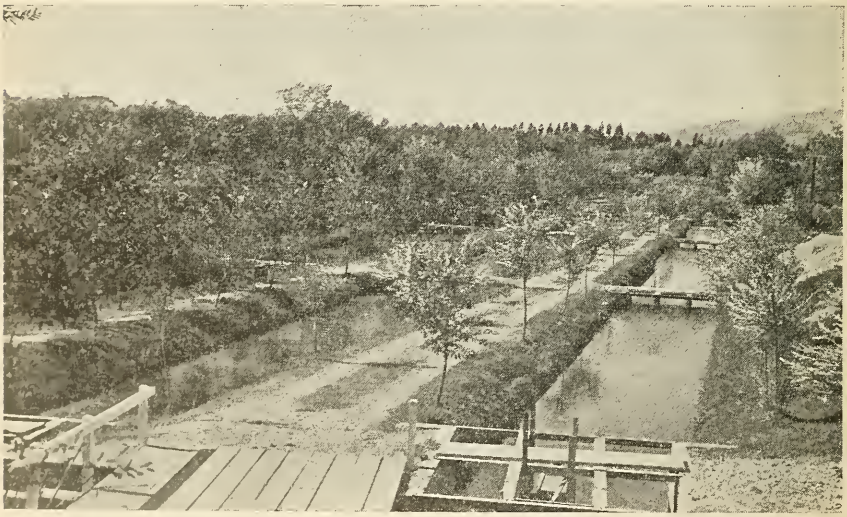

FIG. 3. Fillmore Hatchery Rearing Ponds. Photo by A. E. Burghduff.

Experimentation was started during 1940 with the use of an entirely new source of water for the rearing of larger trout. Fresno and Tulare counties are well up amongst those producing trout and although the bulk of the trout streams and lakes are in the back country and reached only by pack trip, there are certain more accessible waters such as Huntington Lake, Hume Lake, the South Fork of the Kings River, the Kaweah River and Tule River which can be reached for stocking with larger fish. Little spring water of suitable temperature for good growth, such as was obtained at Hot Creek and Fillmore, exists in these two counties. An extensive use is made of well water for irrigation in this area and it was

thought possible that suitable temperatures might be found, particularly since higher temperatures had been so effective in producing rapid growth. After some search a satisfactory well was found on the Kaweah delta near the town of Visalia. Temporary arrangements were made and two circular tanks installed. The test showed the water satisfactory in all respects save the amount of dissolved oxygen and this was increased in amount to about 8 ppm. when the water passed through the jets in the supply pipes over the tanks. During the summer of 1941 a permanent installation of 10 circular redwood tanks 14 feet in diameter was made. A new well was drilled and equipped with gas engine power as well as electricity, two small houses were built for the employees and a feed room was constructed in the same building housing the pump. The cost of the project was greatly reduced by making arrangements with the owner for use of the property without charge in return for the use of the pumped water for irrigation.

Fingerlings are transferred to this Sequoia Station in July of each year and about 100,000 fish are reared to a size of four inches in time to be planted in the fall. More extended use of this plant during the coming year will be made by taking in fall-spawned Rainbow eggs and rearing them to good planting size before the summer quota of fingerlings is brought in. These 10 tanks will therefore produce about 150,000 four-inch fish per year.

The only other major construction project carried on during the biennium was the rehabilitation of the Mt. Shasta Hatchery. This hatchery was first started in 1888 and growth over a period of years finally brought it to consist of five large hatchery buildings and a number of ponds. For many years it was the largest hatchery in the State in numbers of fish produced, and salmon and trout from it were distributed by railway car throughout the State. Unfortunately, it is now ill adapted to present needs both from the standpoint of the size of fish it is possible to rear there and the distribution of trout to rather distant areas where they must be planted. However, repairs were urgently needed to keep the plant in operating condition until a more thorough and complete solution could be worked out for supplying the areas it serves from other new stations. The foundation and floors of hatchery E were rebuilt and a new head pipe installed, hatchery A was remodeled, a new garage was built from salvaged material from older buildings and five new raceway type ponds were constructed for the handling of brood stock and the rearing of fingerlings. One of the important products of the Mt. Shasta Hatchery is eggs for use at that station and other hatcheries in the State. A fall spawning stock of Rainbow brood fish has been established, which, together with those at Hot Creek and Mt. Whitney gives us a supply of early Rainbow eggs taken in October and November that is an absolutely essential element in the present program for rearing larger fish for planting.

It can be seen that the new hatcheries with extensive pond systems have been established first in those areas where angling pressure is greatest, and further extension should be determined largely by the same factor, together with that of abundance of satisfactory trout water for the planting of larger fish. Among these is the North Coast area where a hatchery should be built to replace the Cold Creek Hatchery destroyed by flood in 1938 and the old Fort Seward Hatchery which is obsolete. A

tentative site has been selected on Cedar Creek in northern Mendocino County. A hatchery at that location would not only serve to produce salmon and trout for stocking the streams of the area but would serve as a central working headquarters for stream improvement and fish rescue crews which play an important part in a program that of necessity must be largely dependent upon natural propagation if the runs of steelhead and salmon are to be maintained.

Another very important recreation area in California where the fishing could be improved through better hatchery production is that of Tahoe, the lake itself, the surrounding lakes and streams, and the Truckee River. The present Tahoe Hatchery has a very unsatisfactory water supply in that it has an average temperature of 42°, too cold for the satisfactory growth of trout. During recent years the production of the Tallac Hatchery has been increased so that about a million fish are turned out each year, of which about 400,000 are from 3 to 4 inches in length. This is obviously inadequate since Lake Tahoe itself has an area of over 210 square miles. The water supply at the Tallac Hatchery is not entirely adequate for present operations and additional expansion is therefore dependent to a large extent upon the location of new sources, which at the present time remain unknown.

The third area needing development is that around and to the north of Mt. Lassen. There are many famous trout waters in that area and with the development of the lake above Shasta Dam it will undoubtedly become more important as a recreation area. Fortunately, there is an abundance of spring water in this region although much of it is a little low in temperature for the best growth. Two satisfactory sites have been located and development should be considered in the near future.

No program for fish conservation would be satisfactory or complete that depended solely upon artificial propagation. Artificial propagation and the planting of fish can only be successful if it is solidly based upon a knowledge of the life history of the fishes handled and of their habitats. Further than that the rearing and planting of fish in such a State as California only supplements the production of nature itself. The natural abundance of fish in the streams and lakes of California in the early days is well known but too frequently the great natural production of trout and salmon is overlooked or minimized by sportsmen. It is true that it has been greatly reduced by the use and modification of our waters for industrial and agricultural purposes. Streams have been dried up and diverted from their natural courses, dams have blocked migrating fish and pollution has killed many of the fish that then remained. In hundreds of ways the development of the State has tended to reduce the number of fish in our streams and lakes, for the most part unavoidably, but in many cases the damage would have been less if proper protective measures had been taken. The proper protective measures to be taken are basically dependent upon the habits of the fish and their requirements for living space. These, together with a complete knowledge of the complex pattern and interdependence of the other necessary uses of water go to make up the problem of the fisheries biologist.

In 1938 a comprehensive plan for handling this phase of the work was set up in the Bureau of Fish Conservation. District biologists were assigned to five key areas in the State and in 1941 Mr. Brian Curtis was appointed as Supervising Fisheries Biologist to direct their work. The

broad objective sought was to provide men who could obtain the information and plan the program for the basic fish conservation work of the bureau. They have aided in the solution of a hundred or more minor problems and have been a constant source of information and assistance to local sportsmen. It would be impossible to fully outline their work here but the following list of their formal reports and major projects during the biennium will indicate the scope of their work.

BRIAN CURTIS, Supervising Fisheries Biologist.

1. Report on the Lake Tahoe-Sierra Association recommendations of Aug. 20, 1940.
2. Twelve Million Trout, California Conservationist, Vol. 5, No. 8, pp. 4, 15, 20, Aug. 1940.
3. The Effects of Tremmie Concrete on Trout in the Upper Truckee River, Oct. 1940.
4. Mt. Ralston Club 1941 Stocking Recommendations, Dec. 1940.
5. 1938 Angling Catch Records, Jan. 31, 1941.
6. The Frog Lake Fishery in 1940, Apr. 19, 1941.
7. Creel Counts in California, Cal. Fish & Game, Vol. 27, No. 3, pp. 185-189, July, 1941.
8. The Frog Lake Fishery in 1941, Mar. 23, 1942.
9. Truckee River Creel Counts, May 1, 1941.
10. Truckee River Creel Counts, May 1, 1942.
11. South Fork American River Creel Counts of May 31, 1941.
12. Angling Catch Records, Jan. 16, 1942.
13. Introduction of Alien Fishes into California Waters, the General Situation and the Biological Effects, Cal. Fish and Game, Vol. 28, No. 1, pp. 2-8, Jan., 1942.

WILLIAM A. DILL, Senior Fisheries Biologist.

1. The Little Kern Drainage, Tulare County, Progress Report No. 1, Dec. 8, 1941.
2. A Report on a Proposed Dam on the San Joaquin River above Kerckhoff Reservoir, Dec. 29, 1941.
3. The Spawning Season of Large Mouthed Bass in the Fresno District, California, Mar. 10, 1942.
4. Sugar Pine Lake, Madera County, California, Mar. 27, 1942.

WILLIAM A. DILL, Senior Fisheries Biologist and
CHESTER WOODHULL, Junior Aquatic Biologist.

1. Colorado River Survey, Progress Report No. 1, April 21, 1942.
2. The Tule Indian Reservation Creel Count, 1941. April 29, 1942.
3. The Upper Salinas Reservoir, San Luis Obispo County, Report No. 1, June 17, 1942.

LEO SHAPOVALOV, Senior Fisheries Biologist.

1. Report on Four Reservoirs in Napa and Solano Counties, July 10, 1940.
2. Report on a Survey of a Proposed Planting Base in Glenn and Certain Waters in Glenn and Colusa Counties, July 23, 1940.
3. Report on Planting of Marked Steelhead Trout in the Lagoon of Santa Ynez River, Santa Barbara County, 1940. Oct. 24, 1940.
4. Report on Possibilities of Establishment and Maintenance of Salmon and Steelhead Runs in Cache ad Putah Creeks, Oct. 27, 1940.
5. Report on Possibilities of Utilization of Hinkley Creek, Santa Cruz County, for Fish Cultural and Fish Management Purposes. Nov. 18, 1940.
6. The Homing Instinct in Trout and Salmon. Proceedings of the Sixth Pacific Science Congress of the Pacific Science Association, Vol. III, pp. 317-322, April, 1941.
7. The Freshwater Fish Fauna of California. Proceedings of the Sixth Pacific Science Congress of the Pacific Science Association, Vol. III, pp. 441-446, April, 1941.
8. Fish Rescue Work in the North Coast District in 1940. July 9, 1941.
9. Preliminary Notes for a Fish Management Program for the Mendocino County Coast Area. Juy 16, 1941.
10. Prospectus for an Eel River Fish Management Area, Aug. 15, 1941.
11. Fish Rescue Work in the North Coast District in 1941. April 30, 1942.
12. Creel Census of Stevens Creek and Stevens Creek Reservoir, Santa Clara County, May 1, 2 and 3, 1942. May 25, 1942.

JOSEPH H. WALES, Biological Surveyor.

1. Progress Report of Trout Hatchery Experiments, 1940. April 7, 1941. 15 pp.
2. Summary of Weekly Disease Reports for 1940. April 9, 1941. 11 pp.
3. Observations on a Klamath River Fish Screen, May 19, 1941. 2 pp.
4. Canadian Creek (Trinity River) Diversion Dam. May 30, 1941. 2 pp.
5. Progress Report of Trout Hatchery Experiments, 1941. Nov. 1941. 12 pp. plus graphs.
6. Development of Steelhead Trout Eggs, Cal. Fish & Game, Vol. 27, No. 4, pp. 250-260. 3 plates.
7. Carp Control Work in Lake Almanor, 1941. Cal. Fish & Game, Vol. 28, No. 1, pp. 28-33. 3 figs.
8. Castle Lake Report for 1941. Feb. 1942. 40 pp. 24 figs.
9. Mt. Shasta Rainbow Egg Selection. Mar. 27, 1942.
10. Progress Report of the 1941 Squaw Creek Creel Census. Mimeographed by U. S. Forest Service, May 15, 1942. 15 pp. 1 map.
11. Summary of Weekly Disease Reports for 1941. June, 1942. 10 pp.
12. Shasta River Irrigation Ditch Fish Screen Report. June, 1942. 8 pp. 1 sketch.
13. The Non-Migratory Rainbow Problem. Feb. 19, 1941. 7 pp.

ELDEN H. VESTAL, Junior Aquatic Biologist.

1. Treatment with Rotenone of Pond Systems and Water Supplies at Hot Creek State Hatchery for Control of Ichthyopthirius, Parts I and II. Reports prepared with R. C. Lewis, Hatchery Foreman.
2. Rough Fish Control in Gull Lake, Mono County, California. Cal. Fish & Game, Vol. 28, No. 1, pp. 34-61, April, 1942.
3. Report on the Gull Lake Fisheries Project for 1941. May, 1942.
4. Preliminary Report on Proposed Improvement of Silver Lake, Mono County, Fishery. June 23, 1942.
5. Reclamation with Rotenone of Crystal Lake, Los Angeles County, California. Cal. Fish & Game, Vol. 28, No. 3, pp. 136-142. July 1942.
6. Creel Returns and Trout Production in June Lake, Mono County, California, 1939-1941. 1942.

CHESTER WOODHULL, Junior Aquatic Biologist.

1. A Report on the Kern River Small Mouthed Bass, Nov. 15, 1941.
2. Supplementary Report No. 1 to a Report on the Kern River Small Mouthed Bass. Nov. 21, 1941.
3. The Inland Mullet Fishery of California, Preliminary Report No. 1. May 13, 1942.

A. J. CALHOUN, Student Biologist.

1. The Biology of the Black Spotted Trout in Two Sierra Lakes, July, 1942.

GARTH MURPHY, Student Biologist.

1. Relationships of the Freshwater Mussel to Trout in the Truckee River, Cal. Fish & Game, Vol. 28, No. 2, pp. 89-102. April 1942.

One of the most interesting new methods in fishery management is the use of the organic poison, rotenone, for the removal of undesirable fishes from lakes and streams.[1] During the biennium the biological staff has made extended use of this material with success. Although detailed reports have been published in CALIFORNIA FISH AND GAME, a brief summary of all of the work of this sort done so far is given herewith.

Rough fish, such as carp, goldfish and minnows often live together with trout without causing trouble. However, in some cases the balance is upset, and they become so numerous in a body of water that practically no trout remain. The only remedy then is to remove all fish and start again. One of the most effective agents for such an operation is rotenone, a poisonous constituent of derris, timbo, cube and other insecticide

[1] Pioneer work in the application of rotenone to the control of rough fish was done at the Michigan Institute for Fisheries Research. See Leonard, Justin W., Notes on the Use of Derris as a Fish Poison, Transactions of the American Fisheries Society, Vol. 68, pp. 269-280, 1939.

powders. In very dilute concentrations (1:2,000,000) this kills fish without being injurious to plant life, to many forms of fish food, or to human beings and other mammals. Six bodies of water in California have been subjected to this treatment by the Bureau of Fish Conservation in the last two years, and are listed below.

Gull Lake, Mono County. This 70-acre lake, once an excellent trout fishery, had become overrun with lake chubs. The lake was poisoned with timbo on September 11, 1940. An estimated 500,000 chubs were killed, of which all but 100,000 were over two inches long. Only 254 trout were found in the lake. It was restocked November 1st to 4th, some 50 days after the treatement, with 76,000 eastern brook trout five inches long. The catch the following season (1941) is estimated at over 10,000 trout.

Hume Lake, Fresno County. Deterioration of trout fishing in this 94-acre reservoir had been ascribed to the number of minnows present and had led to requests for remedial measures. Draining of the water by the United States Forest Service in early October, 1940, in order to repair the dam removed a large proportion of the rough fish, and on October 10th poisoning with timbo of the remaining pools and springs on the lake bottom, and of the tributary streams, was undertaken. The complexity of the operation made estimates difficult, but it is reported that great numbers of the minnow *Lavinia exilicauda* were destroyed. The lake was restocked in late November with four-inch rainbow and satisfactory fishing was reported the following season.

Thompsons Lake, Plumas County. This two-acre lake lies 500 feet above and one-quarter mile from Bucks Lake, an excellent trout fishing water. Black bass placed therein by unauthorized persons constituted a menace to trout due to the possibility of their migrating down into Bucks Lake in the overflow from Thompson's which occurs after heavy winters. The lake was poisoned with timbo October 16, 1940, and 1,000 large-mouthed black bass and 27 Lock Leven trout were destroyed. This lake was not restocked; serving as domestic water supply for local cabin owners, the presence of fishermen on its shores was not desired.

Lake Almanor, Plumas County. Carp present in this lake had been blamed by fishermen for deterioration in the rainbow fishing. Although no positive evidence of this exists, it was decided to experiment with carp control during May and June of 1941. At this season the carp come into the shallow bays to spawn. It was found that the best results were obtained by spreading a strong solution of timbo across the mouth of a bay which carp had entered, and then working back toward the head of the bay. As the fish tried to escape they were killed passing through the timbo barrier, and it is estimated that from 10,000 to 12,000 were disposed of in this way in the course of the season. Some minnows were killed but, so far as is known, only one small trout. Trout do not frequent the warm shallows where the carp spawn.

Hot Creek Hatchery Water Supply, Mono County. Infections of rainbow trout at this hatchery with *Ichthyopthyrius* having caused considerable losses in the past, it was decided to try to destroy all fish in the springs which form the water supply in the hope that elimination of these hosts for the parasite would do away with the disease. A great difficulty lay in the fact that the water issues from caves which extend far back under the ground, thus making it impossible to poison the actual

sources. The operations were carried out in October and November, 1941, using cube as the rotenone source. All fish were thought to have been destroyed in System No. 2 and all but two in System No. 1, but the later reappearance of more fish indicates that some must have survived in a manner unknown. However, the fact remains that Hot Creek Hatchery went through the 1942 season with no epidemic of *Ichthyopthiriasis.*

Crystal Lake, Los Angeles County. This 10-acre lake at an elevation of 5,500 feet in Crystal Lake Park in the Angeles National Forest had become so overrun with chubs and goldfish that trout had practically disappeared therefrom. At the request of the Los Angeles County Department of Forester and Fire Warden, and with the active cooperation of this agency, the lake was treated with cube on November 5, 1941. An estimated 250,000 chubs and goldfish were eliminated, and only 48 trout were seen. The lake was restocked with 14,000 six-inch rainbow in January, 1942, of which 7,000 by actual count were caught out in the first 15 days of the 1942 season. Further plants have been made as the season advanced, with an indicated yield to the angler of 66 per cent of the trout stocked.

Among the major projects which the biologists now have underway but for which final reports have not been prepared are the following:

1. A program for the annual study of barren waters in Fresno County. Under the supervision of W. A. Dill in cooperation with the Fresno Sportsmen's Club.

2. A study of the sport and commercial fishery in the Colorado River and Salton Sea area by W. A. Dill and Chester Woodhull.

3. A continuance of the creel counts on the South Fork of the Tule River, by W. A. Dill.

4. Small mouthed bass studies by Chester Woodhull.

5. The Waddell and Scott Creek studies on the life histories and propagation of steelhead trout and silver salmon by Leo Shapovalov. Report in preparation.

6. The Castle Lake project for the study of the comparative productiveness of planting with rainbow, Loch Leven and eastern brook trout, by J. H. Wales.

7. Experimental hatchery work at Mt. Shasta Hatchery for the study and prevention of fish diseases and the utilization of various types of fish food. The work is being done by J. H. Wales and assistants.

8. Studies of the fish production in June and Gull Lakes, Mono County, by E. H. Vestal.

During the biennium a WPA project was in operation at the Stanford University laboratory of the California Division of Fish and Game, and also rendered field assistance at the Waddell Creek Experimental Station and the Scott Creek Egg Collecting Station. Much useful aid was rendered in clerical and laboratory assistance of various kinds and in the translation of fisheries papers in other languages. The projects were numbered 50-11861, May 24, 1940 to September 15, 1941, and 50-12364, October 20, 1941 to July 20, 1942.

A statistical report of the number and sizes of fish reared, rescued and planted during the years 1940 and 1941 will be found at the end of this volume.

BUREAU OF FISH CONSERVATION
POLLUTION DETAIL

PAUL A. SHAW, In Charge

The present biennium, covering an expansion period for industries and military camps, combined with restrictions through rationing of equipment and materials, brought many changes in the work of the Pollution Detail. The program in relation to war conditions may be summarized as follows:

OIL AND REFUSE

Federal requests, originating from gasoline and oil losses of an unusual character in coastal areas, resulted in certain personnel transfers to cover the coast line and harbors more adequately. Prosecutions through additional air patrol served to minimize offshore pumping of oily bilge and ballast, but on our entry into the war this type of patrol was no longer permitted and at San Diego and Port Hueneme full control by the Navy ruled out further coverage.

However, in San Francisco and Los Angeles harbors, emphasis on oil pollution enforcement was essential due to new and inexperienced crews handling rush orders on both cargo and tanker shipments. Here, full cooperation with Federal agencies continued through the biennium with emphasis on prevention and clean-ups to aid the program of harbor security and reduce fire hazards. Prevention became particularly important where ownership of new vessels resided in the Maritime Commission or War Shipping Administration, since violations could not ordinarily be prosecuted.

Refuse piling and timbers from improvement of docks and new construction may be discharged into State waters and constitute a serious navigation hazard, especially in the landing of sea planes, and military authorities have relied on our assistance in preventing the discharge of such material. In this connection, out of five men from the Detail who are on military leave, three have harbor security assignments and two of these are continuing duties where their cooperation on oil and refuse pollution is still effective.

MILITARY CAMPS

In cooperation with Navy and Army officials, and the State Bureau of Sanitary Engineering, numerous conferences were held relative to installing proper sewage disposal plants at military camps to safeguard State waters.

DEFENSE PLANTS

Exceptionally good cooperation was received in providing adequate waste disposal protection at many new or expanding plants for war production.

FOOD AND BEVERAGE PLANTS

A deferment on installation of recommended screening facilities was granted to fruit and vegetable canners. This unfortunately extended the date for compliance with the law beyond the time that equipment could be purchased under wartime restrictions. However, while permanent corrections have not been attained, a marked improvement was effected through insistance on improvised or manually operated equipment which reduced pollution, particularly from asparagus plants and delta area packing sheds.

At Monterey and San Francisco fish processing plants, a slow but continued improvement was secured. These included enclosures to collect waste, screening facilities, improved settling tank design, and two by-product recovery plants for stick-liquor. War restrictions and priorities deferred some anticipated construction, the largest of these being a City of Los Angeles project for treatment of Terminal Island plant wastes, which reach a peak flow of 25,000,000 gallons daily.

Other food and beverage plants including sugar refineries, dairy and milk plants, wineries, etc., where prior work of the Detail had established a reasonable degree of control, required continued inspections and some enforcement action. One bay area sugar refinery completed a treatment plant installation prior to materials restrictions and a southern California concern installed settling basins in lieu of permanent mechanical equipment. In the wine industry there were indications that the problem of still slop disposal would be minimized through use to recover tartrate by-products.

SAWMILLS

War time demands greatly accelerated lumber production particularly in the north coast area, thus requiring more inspection time and enforcement where pollution and stream obstructions were not eliminated upon request.

MINING

Due to government declaration of the nonessential character of gold mining and inability of owners to secure equipment replacement, activity in this line was rapidly declining as the biennium drew to a close. Thus, with many potential sources of pollution disappearing, the patrol of mining areas was discontinued and the personnel transferred to more essential coastal work.

Earlier in the biennium, ordinances adopted by Trinity and Sonoma counties and passage of a State law requiring clarification of tailings from placer mines within the Sacramento and San Joaquin watersheds had aided in control of mining pollution. A committee of miners and sportsmen with representatives of the corresponding State agencies failed to reach an agreement on amending Section 482, but a temporary injunction brought by Del Norte County against certain Klamath River dredges served to improve the clarity of that stream.

Special efforts were made to safeguard salmon spawning tributaries of the Sacramento River in the Shasta Dam area and concerns furnishing sand and gravel for the Shasta and Friant dams took steps to prevent silting of the Sacramento and San Joaquin rivers.

The study on copper drainage from tunnels in the Shasta Dam area was completed and a construction project to seal a number of those contributing to the condition is in progress. Two other tunnels which contribute dangerous quantities of dissolved copper may have to be sealed by the division as the owners are insolvent and the United States Bureau of Reclamation failed to approve our request to conduct the work. One copper mine that closed down in Plumas County caused severe damage to fish life through drainage of untreated tunnel water, but was successfully prosecuted and remedial action taken.

RESEARCH AND INVESTIGATIONS

The employment of a sanitary engineer as recommended in the previous report enabled the completion of a number of detailed investigations on polluted water areas and the character of plant wastes. Such data is essential in making practical recommendations for correction and to provide suitable prosecuting evidence where necessary. The man employed for this work is now on military leave, and a laboratory trailer completed for his use is temporarily idle. While this is regrettable, it is usually true that problems requiring laboratory and engineering data to solve are also the ones that would require restricted mechanical equipment to correct so that the situation automatically adjusts itself to present war conditions.

One study demonstrating the damage to salmon spawning from mining silt should be of particular value in future control work, and an article covering this data is being prepared.

WASTE DISPOSAL INSTALLATIONS

Among the major installations provided for pollution control may be mentioned the $120,000 treatment plant for Santa Fe Springs oil well wastes which was completed; the $400,000 project for improving an oil refinery waste disposal system in the bay area which was 70 per cent completed; a $30,000 "Vacuator" installation for solids removal at a fruit and vegetable cannery; the treatment plant for San Diego domestic and industrial sewage which was nearly completed, and several modern oil separator installations at railroad yards.

ENFORCEMENT

In addition to types of violations that have previously been prosecuted, the present period included the initial and successful prosecution of violations originating from wineries, fish boats and plants, fruit and vegetable canning, dairy refuse, and mine tunnel drainage.

The officers of the Pollution Detail were empowered during the biennium to enforce certain sections of the Public Health and Safety Code relating to pollution of waters from garbage, and secured corrections on many conditions that had been a source of complaint. As yet no violation of this type has required prosecution.

Mr. C. L. Towers continued to supervise court actions until his departure on military leave at the end of the biennium. A total of 174 cases were prosecuted with fines of $29,500 of which amount only $900 was suspended.

Instructions for 1942 Antelope Hunting

ADULT BUCK

ADULT BUCK'S HORNS

IMMATURE BUCK

Your Antelope Permit is Enclosed Herewith

The area open to antelope hunting in Modoc and Lassen counties only, is outlined on the reverse side of your permit. You must report at checking station before hunting and check out when through hunting, at that time turning in your antelope report card.

Hunters are cautioned to exercise great care while in the field. Remember you are in stock country and for the most part hunting on private property. You are the guest of the landowner and as such should conduct yourself so as not to damage livestock, water holes, fences, or other property. Do not make camp near stock watering places, leave gates open, or otherwise make a nuisance of yourself.

Your conduct may be the deciding factor as to whether we will ever have another antelope season.

REMEMBER THE FOLLOWING:

- No shooting from cars.
- No chasing with cars.
- No male antelope to be shot with horns shorter than ears.
- No female antelope shall be shot.
- No camping near stock water.
- No transfer of permits.
- Remember you must check in at checking stations and after hunting check out, turning in your card report.
- Do not bring friends with you who have no permits.
- Do not leave gates open.
- Do not make a nuisance of yourself.
- Hunting license must bear antelope permit number.
- Evidence of sex must be left on hide.
- Hide must be retained for ten days after close of season.
- Antelope, unlike deer, have a gall bladder, so look for it when you dress your animal.

Ticks in antelope areas carry spotted fever; watch for them. If ticks do not stay on you more than 3 hours there is little danger.

ADULT DOE

ADULT DOE'S HORNS

AVERAGE DOE'S HORNS

FIG. 4

REPORT OF BUREAU OF GAME CONSERVATION

By J. S. Hunter, Chief

At the last session of the Legislature an act was passed providing for an open season and limited kill of 500 male antelope the first in our State in 48 years. Antelope formerly ranged over much of the State but on account of heavy hunting and agricultural development were wiped out in practically all parts of it except the plateau country in the northeastern part of the State.

The bill provided that the commission could establish regulations under which the hunt could be carried on. In accordance with the provisions of the law, the commission fixed the shooting area as the eastern part of Modoc and Lassen counties and the open dates May 29th to June 15th, inclusive. Nearly 3,000 applications were made for the 500 permits to be granted. Each application was numbered as received and at the closing time for the filing of applications, cards bearing the numbers were placed in a large container, thoroughly shaken and numbers drawn in the presence of newspaper men, sportsmen and State officials. After the first 500 were recorded, 150 more were drawn as alternates should any of the 500 not qualify. In all, 452 hunters showed up in the field and killed 405 animals. There was no scarcity of antelope and the only reason all were not successful was on account of not putting the bullet where the antelope happened to be. The animals were taken in good condition: not fat—antelope seldom are—but in good flesh. Those weighed averaged, camp dressed, 92.9 pounds. Horns were fully developed. None were of exceptional length or spread. Nearly 40 per cent, however, were more than 14 inches in length.

There was complaint from hunters on the spring season. Scalps, generally, were not good for mounting. This was on account of the fact that the climatic season was, according to the weather bureau, two to three weeks late. In the spring, for the most part, bucks and does do not run together and hunters are less likely to make errors. Recommendations for future seasons would be to give the commission authority to fix a 15-day season some time between May 20th and July 1st, the dates to be selected in accordance with climatic conditions. If the season is advanced, earlier, and if backward, later. When the number of hunters and the kill are limited there is no reason for a long season. Seventy-seven per cent of the kill was made during the first three days and 93 per cent during the first ten.

Hunters should be given instructions as to how the animals should be handled after killing and be required to follow them. Much excellent meat was lost by sloppy treatment.

THE GAME KILL

In order that we may have a definite idea as to the amount of game taken each year by the thousands of hunters in California, we send out from our laboratory at Terminal Island thousands of questionnaires to

hunters in all counties asking that they send us a record of their kill during the previous open season. At the close of the hunting season these forms are mailed to those who purchased hunting licenses during the past license year. For 1940 nearly 11,000 returned the questionnaire and for 1941 nearly 13,000. From these reports Donald H. Fry, Jr., has completed an estimate of the game take throughout the State. We believe that it is reasonably accurate. This information as gathered each year will give valuable information as to the changes that are taking place and will eliminate much of the guesswork of the past.

The kill during the 1940 season totals 6,009,185 head of game and in 1941, 5,673,282, approximately 5 per cent less. By varieties the kill was:

	1940	*1941*
Quail	1,290,487	1,208,788
Doves	1,711,862	1,368,464
Ducks	1,520,207	1,579,651
Geese	138,709	140,399
Pigeons	116,614	123,969
Pheasants	167,033	245,666
Deer	46,317	43,493
Rabbits	1,017,956	962,852
	6,009,185	5,673,282

While the 1941 take was not as great as in the year previous the drop was not enough to be alarming. War conditions entered the picture and without doubt cut down the hunting effort. The 47 per cent increase in the pheasant take indicates the excellent condition of that species, particularly in the rice counties. Nearly two-thirds of the State kill is in the Sacramento Valley.

The success of the dove hunters of northern California depends upon climatic conditions in the late summer. If in late August cooler weather prevails the birds move from localities where they are abundant and are not found by the hunters. In 1940 hundreds of birds were taken near Tupman in Kern County. In August, 1941, in the same area, doves were even more abundant but by September 1st all had moved out and only one shot was fired. At best, most of the northern part of the State has only two or three days of dove hunting.

Throughout the State the take of game corresponds very well with the license sales. Hunters of the populated centers spread out more, hunting in practically all counties and taking game in proportion to the percentage of licenses they buy. Fifty-seven per cent of the game is taken by residents of the county in which it is killed. This percentage varies with the species, two-thirds of the quail and doves and less than half of the ducks, geese and pheasants.

The deer kill in the biennium was the heaviest on record. In all 89,810 were harvested; nearly 3,000 less in 1941 than in 1940, probably on account of hunters having less time and opportunity. In certain counties there are from time to time conditions arising that cut down the deer population. In the upper coast counties there is considerable loss nearly every year from abnormal development of internal parasites. In other parts of the coast, particularly in San Benito, Monterey and San Luis Obispo counties, there was in 1941 a heavy loss due to screw worms.

PARASITES AND DISEASES

Exeellent progress has been made by the medical profession in the control of the diseases and parasites that man is heir to. The span of life has been lengthened generally by their work. Veterinarians have worked hard and have gained much ground in their work with domestic animals. Game administrators, however, have neglected this important field and it is probable that lack of success in many instances is the result. It is true that it will be difficult to doctor wild animals, but is it impossible? We must have full knowledge of the diseases and of the life histories of the parasites. When you know the cause then only are you competent to recommend the cure. Dr. C. M. Herman, recently employed by the division, outlines in the following paragraphs some of the problems that we have in California.

A little over a year ago a cooperative agreement with the Los Angeles Wildlife Disease Research Station of the United States Fish and Wildlife Service made it possible for us to utilize their personnel and the per-

FIG. 5

sonnel of their WPA project in studies on diseases of California game, particularly parasitic infections. The studies pursued were chiefly surveys of parasitism in quail in various areas of the State. The greatest number of samples were secured by the Pittman-Robertson project studying quail management in the southern coastal counties. Examination of fecal samples from over 3,000 quail was undertaken and it was found that coccidia, an intestinal parasite, were very prevalent in most areas. Other intestinal parasites were comparatively infrequent. Over twice as many blood smears from quail have been studied. The most frequent blood parasite was *Haemoproteus lophortyx* O'Roke, but several other parasites new to quail were also observed. During March, 1942, with the termination of the WPA project, the cooperative agreement was concluded but since then we have been able to reopen our own laboratory and plans are under way to continue these studies and gradually broaden the scope of the work to include all game species and related animals and predators particularly as they may relate to management.

FIG. 6

Several phases of the problem will be investigated. Extensive surveys will be carried out to determine what parasites occur, how widespread are certain diseases and what other animals may be affected or may serve as carriers. From such information, plus laboratory experiments on life histories and pathology, it is hoped that we shall be able to evaluate the importance of diseases and the nature of damage to wild animal populations. Once such information has been obtained control measures will be attempted. One of the important still unanswered questions in wildlife is the fluctuation of populations known as cycles. The first known project on this subject was the British Grouse investigation on which a report was published in 1911. Similar surveys have been carried out in other parts of the world as well as in this Country since that time. At the Matamek Conference on Biological Cycles (1932) a great deal of importance was placed on the disease factor. Although much investigation has been made, particularly on rabbits and game birds, the reasons for the periodicity, with cyclic diseases as a possible factor, are still obscure and much more extensive work is indicated. Often the

FIG. 7

FIG. 8

evaluation of certain diseases of wildlife has been based on the findings in similar domestic species but we are finding, as in the case of coccidiosis in valley quail, that the picture may be vastly different in many respects and therefore requires a different method of approach and interpretation. Whereas in poultry coccidiosis soil contamination appears to be an important factor, it does not seem to be involved in the spread of coccidiosis among the wild quail. Analysis of over 500 soil samples from quail concentration spots from three areas in the State, where coccidia were found to be very prevalent in the quail, revealed practically none of the resistant stages found in soil examinations of poultry runs.

A number of doves in California in recent years have been found infected with a disease of the throat. This is usually easily recognized by the presence of yellowish masses in the back of the mouth. These lesions may vary in size from hardly noticeable dots to a mass or masses sufficient in bulk to occlude the passage of food. It is assumed that in

FIG. 9

such cases the birds die of starvation rather than any toxic effects of the disease. The lesions may be cheesy or rubbery in texture and can easily be broken into pieces or scraped from the throat entirely. The latter procedure, followed by generous swabbing of the resulting raw surface with a weak tincture of iodine will clear up the condition in captive birds. Infection has usually been noted to be severe chiefy in concentrations of doves being fed in one spot by humans. Apparently the coarse grain causes pieces of the lesions to sluff off from infected doves and these are then in turn picked up by other doves. The disease is readly transmitted to other doves and domestic pigeons (young) experimentally by swabbing the throat of an infected dove with moist cotton and then immediately repeating the procedure in the experimental bird.

The disease has been referred to as roup, canker, frownse, and other terms. It is usually caused by a protozoan parasite—*Trichomonas*

gallinae—which can easily be demonstrated under the lesions. It has been observed by several workers along the eastern seaboard and in Ohio in wild mourning doves and has also been observed from the Imperial Valley and Hollywood, California. The California records have not been published but were reported at the A.O.U. meetings in Denver in 1941. The Hollywood outbreak affected a flock of about 180 to 200 birds and about 60 to 80 per cent of this flock was decimated.

Although there have been many surveys on the occurrence of parasites in rodents, deer and many other species of mammals and birds from

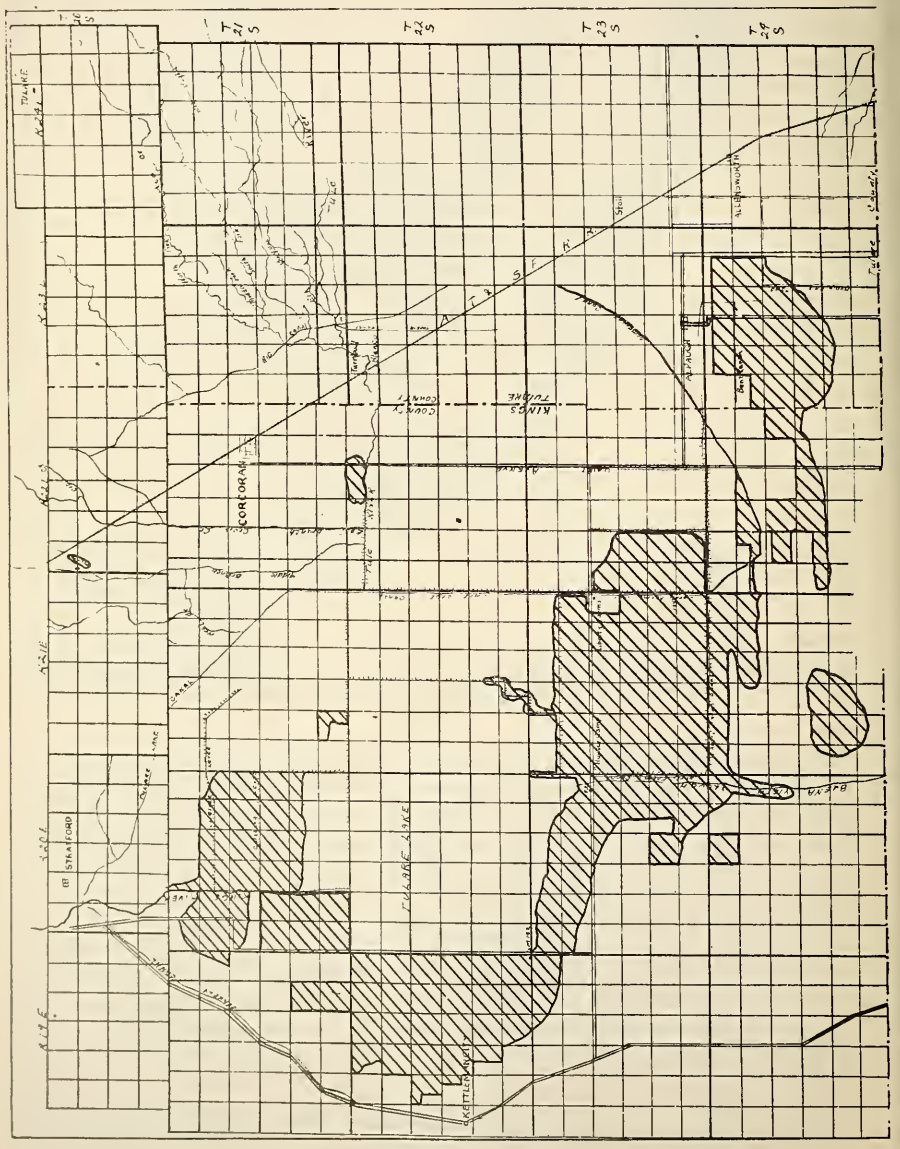

FIG. 10

various parts of the world, there have been only meager attempts to interpret or evaluate the importance of the parasites or diseases observed. With the broad program being planned for our laboratory it is hoped that the California Division of Fish and Game will be able to make a substantial contribution toward the solution of some of these problems.

BOTULISM

Duck disease, or botulism, continues to take a heavy toll from our waterfowl. Thousands of birds have died in various parts of our State,

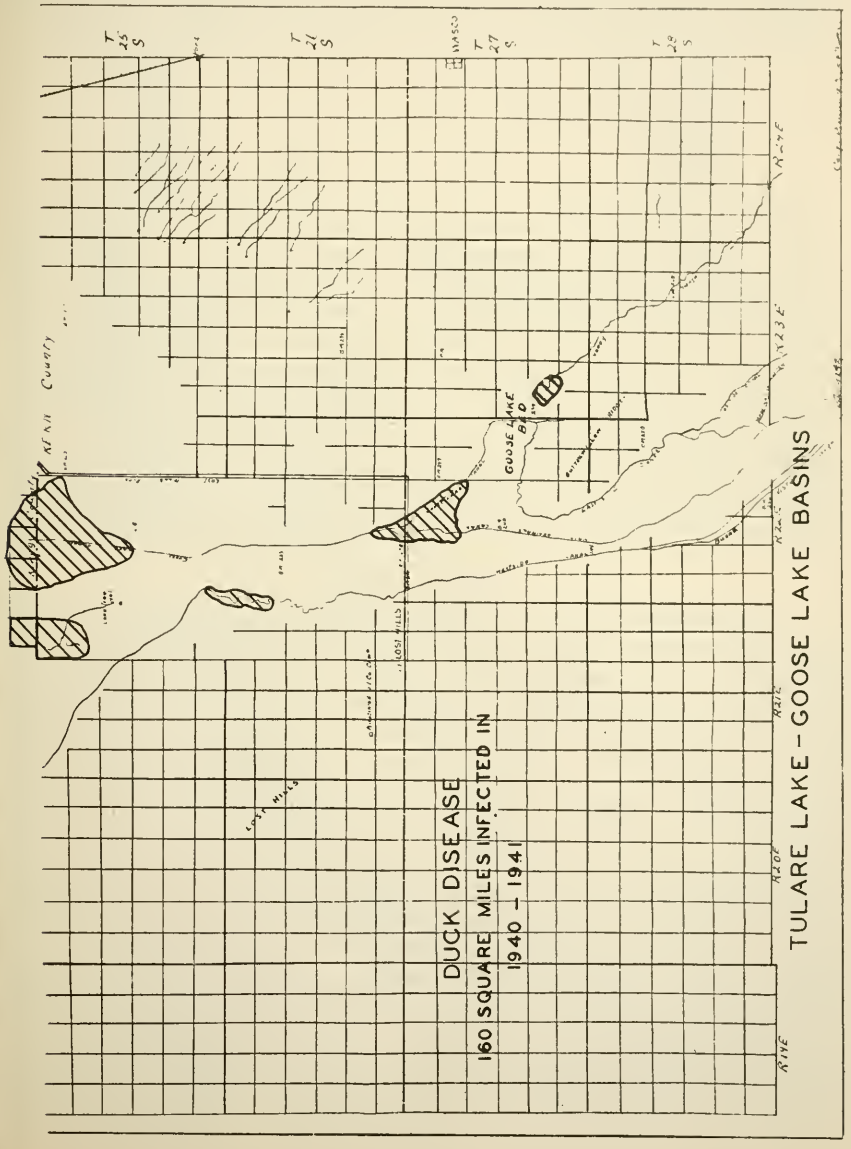

Fig. 11

particularly at Tulare, Tule and Goose lakes and in the lower Klamath Lake region. Tulare Lake, dry for many years, filled with the heavy run-off during the winter of 1937-38 and will continue as a lake until we have a cycle of years of lesser rainfall. Irrigation practices together with the summer heat and decaying vegetation produce ideal conditions for the development of botulism. Water is pumped to preirrigate many thousands of acres in the lake basin. This happens just prior to the arrival of the first wave of migration early in August. Almost immediately sick ducks are noted. More and more birds arrive and the condition becomes progressively worse until the temperature drops in October or November. Some idea as to the duck population can be secured from the estimate made by our field men during the summer of 1940:

August 2	12,000
August 25	100,000
September 5	350,000
September 19	800,000
October 2	1,500,000
October 14	900,000
November 6	600,000

The duck rescue crew must work under the most unfavorable conditions. Thousands of acres of disease area covered from a few inches to two or more feet with water but for the most part too shallow for any kind of a boat; mud sticky and deep; few roads and a temperature overhead of upwards of 110°. The rescued birds often must be carried for miles to cars that in turn take them to the hospital pens where good water and food are available. During the two seasons of 1940-41, 11,193 birds were picked up and hospitalized. Of these 80 per cent recovered. Most of them were banded and released. On account of the vast area and the adverse conditions under which the rescue crews work, it is probable that less than 10 per cent of the sick birds are picked up. All told, the annual loss throughout the State must run into hundreds of thousands.

CROP DAMAGE

Crop damage by game, particularly waterfowl and deer, is not a new problem in California. With the increase of both species during the past several years, complaints have become more strenuous. Ducks and blackbirds are blamed by rice ranchers for causing extreme losses in the rice fields and in the Imperial Valley not only in the rice but in alfalfa and other crops as well. Blackbirds work during the daytime and can be kept out by the use of a 22 rifle. The ping of the bullet over the field is very effective. Ducks, however, work largely at night and are more difficult to control. Particularly strenuous complaints have been received from the Imperial Valley. One of our field men, Bob Hart, was detailed to the valley to study methods of control. He found that the most effective method was the use of a revolving light that he perfected. This light, run from a storage battery, was constructed with gears so that it flashed intermittently. The first difficulty was on account of air beacons. This was overcome by making the light revolve in the opposite direction to the beacon. It was found that one light in the center of a 160-acre field was very effective. With the experience gained the light was improved and several were constructed to use more extensively. Then blackout regulations arose and further experiments

along this line were prohibited. However, we believe that there has been developed a method of crop protection from ducks that will be generally satisfactory when conditions permit its use.

PREDATORY ANIMALS

During the years 1940-41 the division paid bounties on 471 mountain lions bringing the total since the inception of the lion bounty in 1907 to 8,877. More than half, 4,446, have been killed in the eight counties in the northwestern part of the State; 973 in Humboldt County alone. In the six southern counties 668 have been taken; San Diego County leading with 230. The distribution of lions in the State is well shown by the map on page 37 of this report. The scarcity of the animal in the eastern part of the State is noteworthy. During the two-year period our force of predatory animal trappers accounted for 6,477 coyotes, 2,050 wildcats and 4,809 other predators. The catch by county is shown in the table on page 86 of the report.

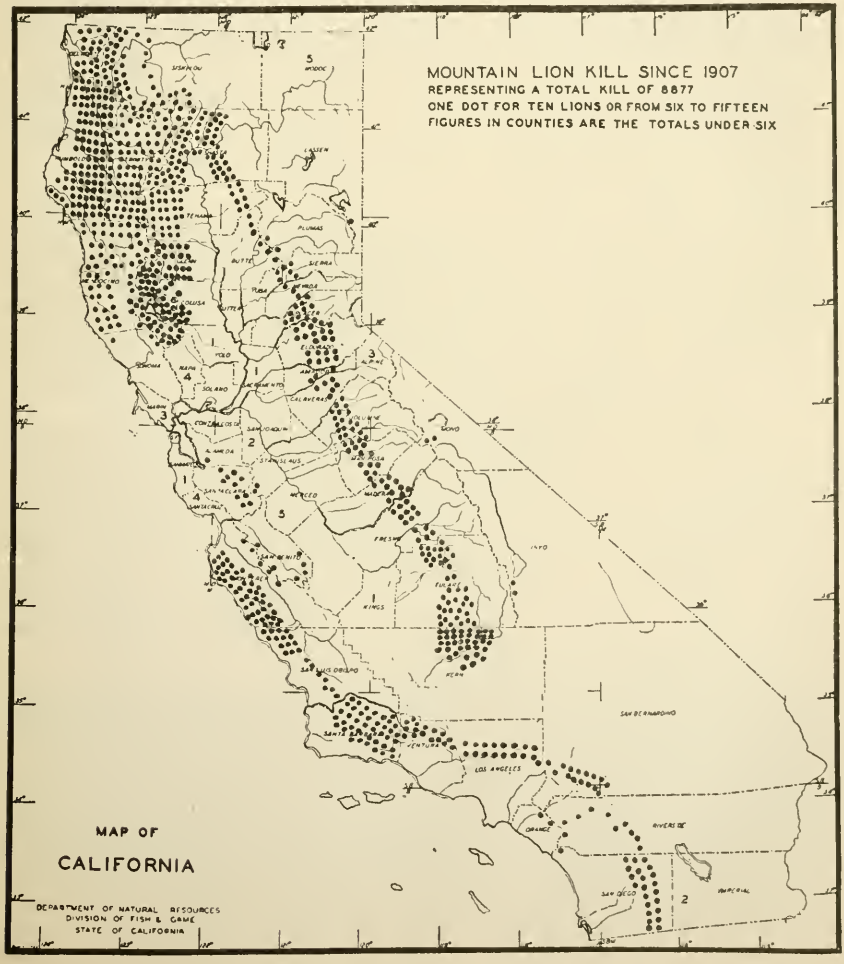

FIG. 12

PITTMAN-ROBERTSON PROJECTS

Coincident with the passage of the necessary enabling legislation in 1939, California became an active participant in the Pittman-Robertson program. By the end of the period covered by this report this State had been allotted Federal Aid funds amounting to $307,352.92. The State's contribution of $102,450.93, one-third of the Federal apportionment, brought the total to $409,803.85.

Eleven Pittman-Robertson projects, involving the obligation of funds amounting to $342,093.60, have been undertaken and six were completed during the past biennium.

Pittman-Robertson projects fall into three categories: surveys and investigations; development; and land acquisition. Of California's projects, five are in the first category, four in the second, and two in the third.

Surveys and Investigations

The first investigational project undertaken (Project 2-R) was a survey to determine the status of the kinds of beaver native to the State. This study was carried on in cooperation with the University of California, Museum of Vertebrate Zoology. The University paid the salary of the investigator and provided most of the supervision, while expenses were paid from project funds. The investigation has been completed and a final report of the beaver survey is now in the process of publication.

Shortly after the beaver survey was begun, a general survey of California's fur resources (Project 5-R) was inaugurated. The investigators assigned to this project are determining the status of our more important fur bearers, the amount and value of the fur crop, and the effectiveness of present laws relating to the taking of fur. The data that are being assembled will provide the basis on which a sound program of fur management may be built in the future. This project, begun in July, 1940, will continue for a period of five years.

In 1937, the United States Forest Service in cooperation with the United States Fish and Wildlife Service, launched a study of the management of deer in the Gibraltar area of the Los Padres National Forest in Santa Barbara County. The investigation was carried on until 1940, when the lack of funds made its continuation under its original auspices impossible. The Division of Fish and Game then entered the picture and agreed to carry on the study with Pittman-Robertson funds (Project 3-R). The project was continued until January 1, 1942, when it became necessary to terminate it.

The management of the valley quail, California's most important native game bird, is being made the object of exhaustive studies in the south coast region (Project 6-R). The course of the investigation is being directed toward the development of management tools that may be put to practical use throughout the State. The investigators are concerning themselves particularly with the effect that the manipulation of food, water, and cover will have on quail populations and with the limiting effect of such factors as disease, predation, and the poisoning of rodents. The project was originally set up for a five-year period. Two years of study had been completed at the end of the biennium.

An aerial survey of big game in northeastern California (Project 12-R) was begun in February, 1942, for the primary purpose of determining the numbers and distribution of antelope in Modoc, Lassen, and adjacent counties. In addition, information on the feasibility of censusing deer, elk and sagehen from the air was secured. The survey was completed just prior to the opening of the antelope season during the latter part of May and a final report is now being prepared.

Development Projects

Two water development projects, Projects 1-D and 4-D, were begun during the summer and winter of 1940. Project 1-D, still in operation, involves the development of springs and the construction of enclosures primarily designed to restore sagehen habitat, but also benefiting valley quail, cotton-tail, antelope, and mule deer. The locale is northeastern California. Project 4-D, located in Inyo, San Bernardino, and eastern Kern counties was completed just prior to the end of the biennium. Ninety-four springs were developed, fenced against livestock, and the enclosures were planted with trees and shrubs which will supplement existing food and cover. Valley, Gambel, and mountain quail, chukar partridge, rabbits, and mountain sheep are the game species which will be primarily benefited by the 4-D development program.

Much of the work that has been completed by Projects 1-D and 4-D has been done in cooperation with the United States Forest Service, United States Grazing Service, and the AAA. These agencies have contributed materials or CCC labor for the development of springs that will benefit both livestock and game.

Project 7-D, undertaken in October, 1941, involves the resurvey and reposting of the legislative game refuges. It is estimated that approximately two years will be required for the completion of this project.

Project 9-D, the Suisun Waterfowl Refuge development project, was completed during July, 1942. The construction of 41,047 feet of levee and four new flood gates will protect the refuge from inundation during periods of high water and will enable the better control of the water supply during all seasons of the year. The end result will be the production of a more adequate food supply for the migratory waterfowl that use the refuge during the fall and winter months.

Land Acquisition Projects

Two land acquisition projects were begun during the biennium. The first involves the purchase of black-tailed deer winter range in the foothills of eastern Tehama County (Project 10-L) and the second, the creation of a waterfowl management area in Honey Lake Valley, Lassen County (Project 11-L). Both projects require the purchase of a number of parcels over a period of years. One parcel of 23,000 acres has already been acquired in Tehama County and negotiations for the purchase of the basic unit of the Honey Lake Valley area were nearing completion at the end of the biennium.

BUREAU OF THE GAME FARMS

By August Bade, Chief

Two principle factors are responsible for more efficient production and distribution of game birds in the State in the past two years.

(1) Many of the counties have, through the use of half of the fine money collected in the county, built and are operating many more rearing pen units than in the past.

(2) The Bureau of Game Farms is now working more directly with the county board of supervisors, as well as the local sportsmen's clubs, which gives the program more stability and places responsibility on the shoulders of men who are more dependable and experienced in business matters. This combination also helps the budget of the Bureau of Game Farms as the materials for these pens and feed for the birds is provided out of a portion of this fine money.

In 1940 breeding stock of pheasants and partridges was installed at Willows, Sacramento, Fresno, Bakersfield, Castaic and Valley Center, in addition to the regular complement of breeders at Yountville and Chino. The eggs from these breeding birds are shipped to Yountville and Chino for incubation and the day old chicks shipped back to these several units for brooding and rearing.

During the latter part of 1941 incubators were installed at Fresno to help take care of the South San Joaquin Valley projects and eliminate shipping costs into that area. So far this incubating unit at Fresno has done very well and will be increased as business demands. Small incubators have been installed at Willows and Sacramento in order to take care of eggs that are brought in by sportsmen from nests that have been destroyed by farming operations.

GAME MANAGEMENT COURSE AT HUMBOLDT STATE COLLEGE

Possibly the outstanding accomplishment of the Bureau of Game Farms during this biennium period was the establishment of a Game Management Course at the Humboldt State College at Arcata. The course consists of two years of class work in conjunction with actual experience with the incubators, brooders, rearing pens and the fish hatchery. This project was made possible by the Humboldt County Board of Supervisors, the Humboldt State College and local conservationists. Particular credit is due Arthur Gist, president of the school, and Fred Telonicher, a teacher who has direct charge of the course. Three boys who have taken one year of this course are now employed by the Bureau of Game Farms, and their fine work proves that men who have had the advantage of this schooling are better fitted to carry on the work of handling and producing game birds. In other words, class room work, plus actual experience, well fits these men for the duties that follow on a game farm or in the field of game management.

GAME MANAGEMENT PROGRAM

In 1940, the first year of the game management program, 18 areas were organized and operated with a total of 70,318 acres. This acreage was cut to 53,447 in 1941 with 21 areas in operation, three more than in the previous year. During the first year of the game management program 7,008 game birds were released on the 18 areas. In 1941 a total of 8,750 birds were released on the 21 areas.

The first year's kill was 2,369, while 4,480 were taken in 1941.

In 1941 with a total release of 8,750 birds, and a kill of 4,480, the records show that 24 per cent of the birds taken were banded birds that were purchased and released by game management operators. During the previous year only a few banded birds were reported by sportsmen. The records of banded birds taken by sportsmen during the regular open season show that many of these birds had traveled many miles from the original point of release. In one particular case two banded birds were taken 18 miles from the area on which they were released six weeks previously.

Another interesting side light on game management areas shows that of a total of 53,447 acres but 15,893 were cultivated and 37,554 uncultivated. Many seem to think that all game managed areas were established on cultivated lands.

At the end of two years of game management operations, a check on the areas adjacent to these game managed properties shows a decided increase in the number of birds found on these nearby areas. In other words game management areas have helped in a great measure to populate all contiguous territory.

There has been some opposition to game management areas in certain districts. It is believed that it has been brought about by misconception of the working of the game management law.

BATTERY BROODERS

For the first time in the history of California game bird production, battery brooders were tried out at both Chino and Yountville. The results of experiments so far carried on indicate that the battery brooder may play an important part in the future of upland game bird production.

With this equipment as an aid in the brooding of birds for the first two weeks, mortality, that usually comes during this period, is reduced materially. It is planned to go on with this type of brooding and try to work out the details that may lead to more universal use of this equipment. Individual manpower is multiplied three fold by using battery equipment. With the labor situation as it is, this is a factor worth considering. The cost of labor makes up a very large part of production costs, so if this battery system, which is not expensive to install, will help to reduce cost and multiply production three fold, it is worth a thorough trial.

REARING PENS

It is more evident as time goes on that the rearing pen program is sound and has the effect of making game bird production and distribution a community project. With added interest because of this fact, the birds

reared and released through these pens become community property, and receive more protection.

At the present time the Bureau of Game Farms is serving 129 communities in the State with more being under consideration.

FIELD DOG TRIALS

It is generally conceded by all well informed sportsmen that the hunting dog is a real factor in upland game bird conservation. The hunter who shoots over a good dog leaves no cripples and actually saves time as well as birds.

For this reason the Bureau of Game Farms has always taken a keen interest in field trials and the use of more good dogs in the field.

And at the same time we are fully aware of some abuses along the lines of promotion and commercialism that has crept into this fine sport.

FERTILITY-HATCHABILITY-BROODING LOSS

On the average, fertility of game birds' eggs runs about 85 per cent and the average hatchability for the past two years was 60 per cent of all eggs set for the season.

In the past few years this hatching percentage has been raised each season due to better mechanics and local hatching information. Generally speaking heat, moisture, and ventilation, or better yet the proper combination of these factors, causes an egg to hatch a strong healthy chick. All well informed men fully agree that incubation is always a local problem and must be worked out with local atmospheric conditions considered.

For many years, in fact going back to the old English and Scotch game breeders, it was a general rule that $2\frac{1}{2}$ eggs from the laying pens were required to put one bird in the field. Even with modern methods and fine equipment this rule still holds good.

Not all eggs are fertile. Some are cracked, or have faulty shells and must be discarded. So when infertile and faulty shelled eggs are discarded. and to this list is added dead germ-embryos that die in the process of incubation, we can readily see why it takes two and a half, or even three eggs from the laying pens to put one fully developed bird in the field.

After the chicks are hatched there is a small loss in the process of brooding, and still another small loss in the rearing pen before final release. When all these factors are considered it is easy to see why it requires $2\frac{1}{2}$ to 3 eggs from the laying pens to put one matured bird in the field for natural propagation.

EGGS LAID

Ring-necked pheasant, Mongolian pheasant, Chinese pheasant, Reeves pheasant	*Partridges*	*Quail*	*Turkey*
241,071	49,136	18,042	812

EGGS DISTRIBUTED

Ring-necked pheasant, Mongolian pheasant, Chinese pheasant, Reeves pheasant	*Partridges*	*Quail*	*Turkey*
2,484	-----	408	---

BIRDS LIBERATED

Ring-necked pheasant, Mongolian pheasant, Chinese pheasant, Reeves pheasant	*Partridges*	*Quail*	*Turkey*
114,092	17,757	6,252	282

Total birds released 138,383

REPORT OF THE BUREAU OF PATROL AND LAW ENFORCEMENT

By L. F. Chappell, Chief

The early part of November, 1940, Lt. Col. E. L. Macaulay, Chief, Bureau of Patrol, was called to active duty in the United States Army and in January, 1941, Assistant Chief of Patrol L. F. Chappell was appointed Chief of Patrol to act during the absence of Lt. Col. Macaulay. Assistant Chief of Patrol C. S. Bauder was transferred from the southern district to the central district to take the place of L. F. Chappell in Sacramento and Captain Earl Macklin was placed in charge of the southern district with headquarters in the Los Angeles office.

Captain Harp was promoted to Assistant Chief in October, 1941, with headquarters in San Francisco, occasioned by the resignation of Assistant Chief K. P. Allred.

Assistant Chief of Patrol C. H. Groat took a leave of absence on April 1, 1942, to enter defense activities and Warden L. G. Van Vorhis was promoted captain and placed in charge of the Terminal Island office.

During this biennium Assistant Chief of Patrol K. P. Allred resigned on October 15, 1941, Warden J. W. Thornburg retired on disability April 2, 1941, J. H. Gyger, who retired from active service during the previous biennium, passed away in the fall of 1941, just one year after his retirement was effective.

George Seymour was given charge of Junior Game Patrol in February, 1941, and on May 11, 1942, William Bostwick took charge of this and other activities.

The following members of the Bureau of Patrol have taken military leaves of absence during this biennium:

Wardens

E. R. Hyde	12/10/40
Rudolph Switzer	10/ 9/41
William Sholes	11/ 1/41
George Werden	2/ 9/42
A. Crocker	3/24/42
L. E. Golden	3/26/42
Donald Glass	6/12/42
Eugene Durney	6/18/42

Assistant wardens

E. A. Johnson	6/10/41
Jacob Myers	12/ 1/41
John Finigan	2/17/42
Elmer Doty	3/ 3/42
William Dye	3/10/42
Richard Hardin	3/26/42

Cooks

Virgil Swenson	2/11/42

Deckhands

W. Plett	2/11/42

The following resigned to engage in defense work:

Assistant Wardens

LeRoy Hage	4/ 3/42
Robert Macklin	4/17/42
P. Wenker	4/16/42
P. Westcott	6/22/42
Chris Loris	3/21/42

Deckhands

Paul Richmond	5/25/42
Harry Rouch	6 /5/42

Cooks

Peter Nylund	2/10/42

Byron Sylvester entered the service on March 26, 1941, and was killed in an airplane accident shortly after his entrance into active military duty.

The M. V. "Bluefin" was placed back in service in December, 1940, and a fine modern and efficient diesel-powered vessel was developed from the ship damaged when she struck a reef off north Coronado Island on November 12, 1939.

The cruiser "Marlin" broke her moorings on the evening of November 20, 1941, during a heavy gale at Avalon and was blown ashore which resulted in a total loss, except for the engines and a few miscellaneous items of small hardware which were salvaged to be used on other patrolboats as required.

The patrolboat "Aerial" was contracted for in April, 1942, to work in place of the "Marlin." Due to war conditions, the building of a new boat was not attempted at this time to replace the "Marlin."

The "Perch," formerly stationed at Walnut Grove working the Sacramento and San Joaquin rivers, was assigned to Antioch in December 1941.

The "Shrapnel" was transferred from Lakeport to the Colorado River after it was completely overhauled in the shipyards down south and new engine installed.

Since the declaration of war, the Navy has been very interested in securing both our larger and smaller vessels either by outright purchase or by charter. Negotiations for transferring this equipment are now under way.

Due to the Government freezing order affecting the tires on all motorized transportation, which became effective early in the spring of 1942, a survey was made of all tires in the division and it was determined upon completion of this survey that by restricting mileage, the Bureau of Patrol could operate its fleet with the present tires for a period of from 18 to 20 months, at which time it is possible that there will be some relaxation in the present regulations.

The record of arrests and fines and forfeitures for this biennium has been one of the largest in the history of the department. A complete summary and recapitulation of arrests and convictions will be found in the appendix on page 88.

REPORT OF THE BUREAU OF MARINE FISHERIES

By Richard Van Cleve, Chief

During the two years 1940 and 1941, the commercial fish landings in California ports amounted to 2,817,441,484 pounds. In addition to that used as fresh fish, 19,196,252 cases of canned fish, 188,949 tons of fish meal, and 30,892,188 gallons of oil were produced. The total value of these fisheries products was $114,647,208. Production figures for the two years are shown in Table I.

TABLE I

	1940	*1941*
Total landings (pounds)	1,292,388,421	1,525,053,063
Cases of fish canned	9,374,133	9,822,119
Tons of fish meal produced	86,137	102,812
Gallons of fish oil produced	13,214,990	17,677,198
Value of fishery products	$46,557,144	$68,090,064

Some appreciation of the magnitude of these landings can be gained by comparing them with the total production of fishery products for the entire United States and Alaska. To obtain a representative figure, the average amount of fish produced in California each year from 1935 to 1938, inclusive, is compared with the corresponding average yearly production for the United States and Alaska. During the four years used as the basis for Table II, California's landings on the average amounted to 33.45 per cent of all fish delivered in the United States and Alaska. This State also produced 36.53 per cent of all canned fish, 47.96 per cent of all fish meal, and 52.1 per cent of all fish oil.

TABLE II

COMPARISON BETWEEN CALIFORNIA AND TOTAL PRODUCTION OF UNITED STATES AND ALASKA FOR 1935-1938, INCLUSIVE

	Total landings (pounds)	*Cases of canned fish*	*Tons of fish meal*	*Gallons of fish oil*
United States and Alaska	4,390,333,250	18,517,060	220,335	35,650,570
California	1,468,398,750	6,763,503	105,664	18,574,663
Per cent of California compared to United States and Alaska	33.45	36.53	47.96	52.10

The number of people engaged in the California fisheries remained fairly stable during the biennium. There were 9,087 commercial fishermen licensed during 1940-41, and 9,350 in 1941-42. A considerable increase was noted in the number of employees in the plants, chiefly in the canneries. During the year 1940, 10,919 workers were engaged by the plants, with 14,632 for the year 1941.

EFFECT OF WAR

The effect of the war has been felt for some time in the California fisheries in increased prices for canned fish used for the "lend-lease"

allocations, as well as in the loss of boats to the United States Navy, and of the fishermen to the armed forces. With the opening of hostilities in the Pacific in December 1941, further curtailment of fishing activity occurred, with an immediate increase in the number of boats taken over by the Federal Government. Restrictions were immediately imposed upon the entrance and clearance of boats from the various ports, and all enemy aliens were barred from offshore fishing.

By July 1942, the number of boats available for sardine fishing had been reduced from over 300 to about 180.

Of the total of 9,350 fishermen registered during the 1941-42 season, 1,303 were unnaturalized aliens, while 973 of foreign birth had completed their first papers. Of the fishermen licensed in the State, 1,027 were of Japanese parentage, 699 of these being aliens and 328 born in the United States. All of these Japanese fishermen were immediately eliminated from the fisheries. Of the 1,511 Italian fishermen, 787 were subject to elimination from the offshore fisheries as enemy aliens. The elimination of these aliens cut the total number of fishermen 19 per cent, to approximately 7,600 fishermen, with a comparable temporary loss in the productivity of the fisheries. The number of fishermen of the different nationalities, with their citizenship, are shown in Table III.

Port restrictions were felt most in San Francisco and Los Angeles harbors, where the major fisheries require the daily clearance and entrance of large numbers of fishing vessels. It was impossible to coordinate immediately the needs of the fisheries with the necessary restrictions. However, recognition of the importance of maintaining the production of

TABLE III

CITIZENSHIP RECORD OF LICENSED COMMERCIAL FISHERMEN IN CALIFORNIA—LICENSE YEAR 1941-1942

Nativity or race	*Citizenship not stated*	*Alien*	*First papers*	*Full * citizenship*	*Total fishermen*
United States less Orientals	---	---	---	4,156	4,156
Italy	12	299	488	712	1,511
Japan **	---	699	---	328	1,027
Jugoslavia	12	85	187	674	958
Norway	2	11	83	483	579
Portugal	1	81	79	214	375
British Empire	2	11	14	82	109
Sweden	---	9	17	63	89
Finland	2	8	14	34	58
Spain	---	18	19	20	57
China **	---	---	---	56	56
Greece	---	21	11	19	51
Denmark	---	2	10	35	47
Russia	2	13	10	19	44
Germany	---	---	6	36	42
Mexico	1	17	10	13	41
France	1	4	7	13	25
Austria	---	2	1	20	23
All others	5	23	17	57	102
Total licensed fishermen in California 4/1/41 through 3/31/42	40	1,303	973	7,034	9,350

* Full citizenship includes native born, foreign born of United States parents, citizenship through father's naturalization, and second papers.

** United States born Orientals have been listed by race rather than nativity.

fish has resulted in as much freedom of movement for the fishing fleet as is consistent with National safety.

SARDINES

Production of sardines and sardine products is calculated on a seasonal rather than an annual basis and is tabulated in Table IV for the biennium. Production figures summarized in Table IV are given in detail in Circulars 15 and 16 reprinted in the appendix.

TABLE IV

	1940-1941	*1941-1942*
Total tons landed	454,709	585,463
Tons received for canning	226,188	366,292
Total cases of all sizes packed	3,188,089	5,395,286
Number of permits issued	70	74
Permit tonnage granted	350,000	343,684
Number of tons used under permits	223,587	211,356
Tons of meal produced	71,122	85,103
Gallons of oil produced	12,398,310	16,498,965

The beginning of sardine fishing was delayed until October, 1940, at Monterey and San Francisco because of disagreements as to price of fish and fishing conditions. Activities in these two ports were again curtailed in the latter part of the season by stormy weather. In spite of heavy landings of sardines in southern California, the restrictions in the two northern ports were sufficient to hold the landings down to the relatively low figure noted.

Profiting by the experience obtained in the previous season, prices were settled before the 1941-42 season opened, and fishing began on August 1st in San Francisco, and on August 14th in Monterey. In spite of the closure of the San Francisco fishery on December 1, 1941, and the very low catches made after that time in Monterey and San Pedro, the catch, practically all of which had been landed before December 7th, was large.

Increased prices for canned goods stimulated the canning industry, with the result that a higher proportion of sardines was canned during this biennium than in previous years. In 1940-41, 50 per cent of the sardine catch was received for canning, while 63 per cent was used for this purpose in 1941-42, as compared with from 23 to 42 per cent in the preceding six years. The emphasis given to canning, combined with the heavy catch, resulted in a record pack of 5,395,286 cases of canned sardines in the last half of the biennium. Failure of the reduction plants to utilize the full tonnage allotted to them by the commission for straight reduction was in large part due to the cessation of fishing in December. However, all the canneries in Monterey and San Pedro packed more than the required 13½ cases per ton, and at least one canner in San Pedro packed all sardines received during the last part of the season.

Sardine investigations by the Bureau of Marine Fisheries have been particularly concerned with the measuring of the abundance and the fluctuations in this abundance from year to year. During 1941-42 the investigation of the age of sardines was undertaken in cooperation with the United States Fish and Wildlife Service.

Tagging of sardines was continued. Recovered tags have indicated that the sardine populations intermingle freely along the coast from California to British Columbia. These returns have also given a measure of the rate the sardines are caught by the fishery. Although the total catch has remained stable at about 550,000 tons since 1935, investigation of the catch indicates that there has been a decrease in the returns obtained by each boat. A decrease has also been noted in the size of fish composing the commercial catch. For example, in 1936-37 the average number of sardines in a ton was 6,056, while in 1941-42 it was 9,145, representing approximately a 50 per cent increase. Thus it took 50 per cent more fish to make up a ton of fish in 1941-42 than it did in 1936-37.

Although there is no reason to be concerned over the possibility of the extermination of the sardine by the fishermen, there is a possibility that if the fishery is carried on too intensively, the population will decline to the point where the success of a fishing season will depend upon the chance occurrence of an abundant year-class. It is expected that investigations now underway will, when completed, assist in the determination of the point at which the sardine fishery should be stabilized. Progress so far has served to emphasize the importance of a more thorough investigation of the rate of recruitment, since preliminary results obtained so far have indicated that the survival of young fish may not yet have been adversely affected by the fishery. Further investigation of this problem is now impossible due to the war. However, as soon as opportunity offers, the variation in numbers of young sardines that are produced each year must be studied intensively with the associated factors that cause such variation. When regulation is finally undertaken, it must be in the form of control of the total catch. The total catch is not controlled by present restrictions, which curtail only the number of tons of sardines taken for straight reduction and are insufficient for proper management.

TUNA

During 1940 a total of 199,556,603 pounds of the five species of tuna was landed in California ports, with a resulting pack of 3,799,912 cases. The 1941 tuna season was not as successful as that of the previous year, and only 124,729,913 pounds were taken and 2,400,862 cases packed. The decrease in the landings of 1941 was due to factors that are at present unknown; and the investigations by this bureau have not been sufficiently widespread to ascertain the causes. However, there is no reason at present to feel that this decrease is due to overfishing.

Immediately after December 7, 1941, tuna boats were prohibited from operating farther south than 10° N. latitude, which eliminated the very productive grounds in the vicinity of the Galapagos Islands and along the Central American coast. A number of the large tuna boats had already been acquired by the Navy, and before the end of the biennium most of the boats above 90 feet in length had been taken.

The investigation of the tuna fishery so far has been confined to an examination of the different species upon which the fishery is based. The studies therefore have been largely systematic in nature. Additional work has also been started to determine if the fishery is exploiting more than one population of each of the species concerned. Assistance has

been provided to the industry through the publication of the results of the investigation on the proper methods of refrigerating the fish on vessels, which resulted in a marked decrease in losses from rejected fish due to poor preservation.

MACKEREL

The mackerel fishery was especially successful in 1940, with 120,503,612 pounds landed; but it decreased in 1941 to 78,167,200 pounds. Scoop boats dominated the fishery and landed over two-thirds of the catch in the 1941-42 season. The success of this simple form of fishing requires no expensive gear, for almost any type of motor-propelled vessel is suitable; consequently the fishery has attracted large numbers of fishermen. As a result, competition between the various fishermen has meant a low individual return in spite of the fact that this method of fishing has produced a good total catch. The Navy's acquisition of many purse-seine boats has further increased the importance of the scoop boats.

Besides the loss of the purse-seine boats, many mackerel fishermen have entered the armed forces, and even more left the fishery to take part in the defense industries. Elimination of the enemy aliens also curtailed the productivity of this fishery. Port restrictions in Los Angeles Harbor have been particularly difficult for the scoop boats, since the delay in their daily passage in and out of port has restricted their fishing time.

Mackerel investigations of the Bureau of Marine Fisheries have consisted of tagging, sampling of the catch, and racial and age studies of the fish. During the biennium 42,401 mackerel were tagged and 4,486 tags have been recovered. Although the movements of the tagged fish indicate that the fish are migratory to some extent, the concentration of the fishery in one section of the range of distribution makes it very difficult to interpret the tagging results. The investigations of the possible occurrence and distribution of various races, and the studies of abundance of different age-classes of mackerel have been carried out to assist in measuring the rates of change of the various populations. There is little doubt that more extensive work will be necessary off the coast of Mexico in the future years before definite interpretation of the fluctuations in the local catch will be possible.

CENTRAL VALLEYS INVESTIGATIONS

Central Valleys investigations are designed to find ways and means to provide for the continued existence of the salmon runs which will be affected by the various units of the Central Valleys Water Development. So far the problem has been to try to salvage as much spawning area as possible and make it accessible to the fish. In each case where the fishery and agricultural or engineering interests conflict, the resultant solution of the problem has been decided largely on the basis of supposed relative values, and the difficulty of arriving at a proper evaluation of the salmon runs in the various streams has been a major handicap. Investigations have therefore been directed on the one hand to devising ways and means for caring for the fish, and on the other to reach some idea of the size and value of the runs currently affected, or that will eventually be affected by immediate developments of the Central Valleys water plan.

Care of the salmon on the spawning grounds involves provision of adequate passage upstream to suitable gravel beds. Ladders must be

provided to help the fish over otherwise insurmountable dams, and sufficient water must be maintained in the streams to provide passage. Stream blocks such as Shasta and Friant dams and the proposed dams on the American and Trinity rivers require adequate provisions for caring for or salvaging the fish that will be stopped by these structures.

Surveys have been made of spawning areas in the Central Valleys streams. A count of the salmon spawning in the American River is being made to estimate stream flows and spawning area necessary to care for them. This work is now required, since the United States Bureau of Reclamation has temporarily abandoned the Cross Delta Canal and has substituted a series of three storage reservoirs on the American River as a source of water to supplement the San Joaquin Valley supply. Counts are planned to provide similar information on the run in the Trinity River, where another dam is now contemplated to supplement the water supply in the Sacramento River Basin.

Tagging of salmon has been continued to determine the relation of the offshore fishing to the spawning stocks in various streams. Results so far indicate that of the fish recovered from those tagged north of Point Arena, over 50 per cent are taken in the Sacramento-San Joaquin River system, while 76 per cent of the recoveries from fish tagged south of Point Arena are taken there.

Measurements of the numbers of downstream salmon migrants lost in large diversion canals was begun during the spring of 1942 as a logical basis for the fish-screen program. Irrigation was started later than normally, due to the unusual extension of the rainy season, so that results were not significant, since most of the young salmon had left the streams before the diversions being tested started taking water.

SHARKS

Records of the landings of sharks during 1940 and 1941 show a decrease over the amount taken in 1939. The total landings were 7,813,000 pounds in 1940 and 7,511,595 in 1941. Legislation was adopted by the 1941 Legislature which was calculated to stop the waste of shark carcasses at sea, prevalent at that time. However, an unfortunate wording of this law made it unenforceable, and the practice is continued at the present time, except in districts where the market for fresh fish can absorb the shark meat. An examination of the detailed landings has indicated that approximately ten million pounds of sharks have been taken off the coast of California each year. The discrepancy in the recorded landings and the actual catch is due to the confusion brought about through the practice of recording only the liver weights. Therefore, the recorded decrease in landings over previous years can not be considered as significant.

Price of shark liver reached a high point in October and November, 1941, when $6 per pound was paid for the soupfin shark liver in California. Accumulation of large stocks of oil and enforced conservation brought about the issuance of Order No. L-40 by the War Production Board and resulted in the complete collapse of the market in the spring of 1942. With strict control of the utilization of vitamin A oils, there is little prospect that such wild speculation as occurred in 1941 will occur again.

Investigation of the soupfin shark fishery was undertaken by this Bureau in November 1941. In March, 1942, a contract was entered into with Stanford University to provide for an investigation of the vitamin A potency of shark liver oil.

FLATFISHES

In the fall of 1940 experimental fishing from the research vessel "N. B. Scofield" was carried on along the coast of California to check the distribution of the various species of flatfish according to size and age. At the same time, approximately 4,500 flatfish were tagged. The collection and analysis of detailed fishing and catch data have continued and have indicated a slight decrease in the catch per unit of effort during this biennial period. The significance of this decrease can not be determined from the material now available.

The difficulty of obtaining crews for the boats, as well as the loss of several of the drag boats to the Government as a result of the war, have made necessary a change from the old paranzella type of fishing to the more modern otter-board type. Most of the companies have now placed their crews on a share basis so that their earnings are determined by the amount of fish caught. The use of the otter trawls is still too new to judge their efficiency as compared with the paranzella. This is made even more difficult by port restrictions which have curtailed the boats' movements considerably, affecting principally the length of fishing time each day.

With the advent of the otter trawl operated by individual fishermen or by fishermen using company boats on a share basis, it is desirable that legislation be enacted which will give a force of law to the minimum size of mesh that can be used on drag nets or can be possessed in the State. Previous voluntary arrangements for this minimum-sized mesh was enforced through the various companies which both owned and operated the paranzella equipment.

AGAR

Declaration of war completely cut off the supply of agar formerly obtained from Japan. A yearly average of 500,000 pounds is consumed in the United States for bacterioligical work, in dental and surgical material, and as stabilizers of various food products. Loss of the Japanese source of agar has resulted in attempts to build up the local production of algae from which the agar is manufactured. The Bureau of Marine Fisheries made a survey of the agar beds in November, 1941, and has been cooperating with the War Production Board in stimulating the production of "agar weed."

CRABS

The crab fishery was given an impetus in this biennial period by the change in the law during the 1941 Session of the Legislature, providing that crabs taken in northern California districts might be shipped out of those districts. Present information indicates that the crab stocks are in good condition and well able to support the heavier fishing.

OYSTERS

The California native oyster industry has progressed satisfactorily. One company is now operating in Humboldt Bay and has expanded and

improved all beds and working facilities. Native oysters from the bay will be ready for market in the fall of 1942.

Some apprehension was entertained when the war began in regard to the future supply of pacific seed oysters, which formerly were supplied from Japan, but pacific oysters have been found to spawn and set successfully in Willapa Bay and Puget Sound, Washington, and seed oysters will be available from that source. In 1940 pacific oyster sales amounted to 1,290,000 pounds, and in 1941, 1,717,000 pounds were sold.

ABALONES

Abalone diving has been confined for a number of years to district 18 (Monterey to the Santa Barbara-Ventura County line). To properly manage this resource the northern part of the State (Districts 6, 7, and 10) should be opened to commercial diving and District 18 closed for a number of years. An alternate opening and closing of these areas would result in the production of considerable quantities of food material now being lost and would distribute the fishing effort, thereby reducing periodic localized scarcity. A bill was introduced at the 1941 Session of the Legislature providing for this type of regulation of the abalone fishery, but was defeated.

Commercial diving for abalones does not affect the supply of these animals in the littoral zone. The decimation of the abalone population along the beaches is directly attributable to the noncommercial collector.

SCIENTIFIC INVESTIGATIONS

Problems involved in the conservation of California's marine fisheries are commensurate with the size of the fisheries themselves. The area covered by the fisheries alone presents problems in observation that are sufficient to tax the full resources of a large staff. Three major fisheries, the sardine, tuna, and mackerel, produce the bulk of the landings. However, 17 species yielded over 1,000,000 pounds, and 39 produced more than 100,000 pounds in 1941. The tuna fishery itself is based upon five distinct species.

Consideration of the basic requirements of an investigation in any one of the major fisheries indicates that the staff before the war was hardly more than a skeleton of what is required. Funds utilized during the present biennium for this purpose were inadequate for work that is essential to the solution of the many problems involved.

The research vessel "N. B. Scofield" was tied up immediately after December 7, 1941, thus eliminating further field operations during the war. Loss of staff members to the armed forces has further curtailed operations of this bureau. The next few years will probably see further restrictions upon the work that can be carried on by this bureau, due, not only to loss of personnel, but also to lack of materials and equipment.

Increased demands for fishery products may be anticipated after the war, with the natural growth of the population. Therefore, as soon as conditions allow, the research work of this bureau must embark upon a broad enough program to yield information essential to the rational exploitation of our fishery resources. Ample funds are provided through direct taxation of the commercial fisheries. These funds must be expended in such a manner as to insure the stability of the industry that forms their source.

REPORT OF THE BUREAU OF ENGINEERING

By J. Spencer, Chief

In the first portion of the biennium the limited personnel of the bureau was very busy in preparing plans and carrying on the required construction to fulfill the commission's extensive plan of additions and improvements. Due to the United States defense program which was later followed by the war and attendant difficulties as regards materials there was a lessening of construction in the latter period. In addition to this the bureau took care of the necessary work on fishways, fish screens and other stream improvement projects.

For the biennium there were 118 dams inspected to see what adverse affect, if any, these dams had on the required free movement of fish. Where it appeared that remedial measures were needed, the owners of these dams or obstructions were contacted and alterations or improvements were brought about. Ten fishways were repaired or replaced, this being necessary as the structures had been damaged by high waters or other causes. Where the dam was without a fishway and one was needed to permit fish an uninterrupted passage a survey was made and plans prepared for the installation of the required fishway by the owner of the dam. As a result of these surveys and negotiations eight new fishways were installed.

The work of replacing fish screens in accordance with commission policy continued to the summer of 1941, when 55 installations had been

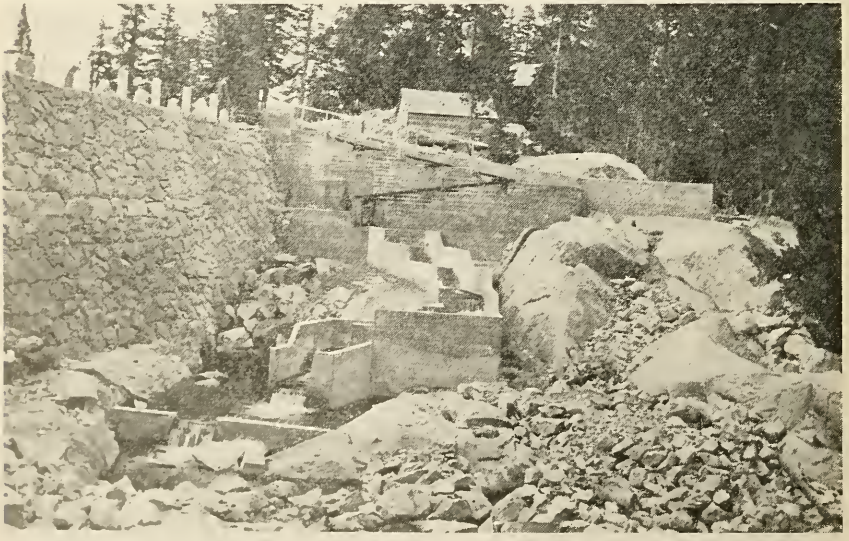

Fig. 13. Fishway at Silver Lake. Looking along downstream face of dam at fishway. Photo by J. Spencer.

completed and placed in operation. Of the installations made 21 were in Trinity County, 23 in Siskiyou, six in Shasta, and the remainder in three separate counties. In general the screen installations were self-cleaning of the reverse rotary type or the parallel bar type. Concrete foundations were used throughout.

Periodic inspections of their operation have been maintained and data at hand show that a reasonable degree of effectiveness has been attained in the protection of fish life with no adverse results to the water diverter. It has been observed that the installation of fish screens in certain locations has resulted in the creation of new fishing areas and improvements in others.

The general routine work of the bureau included over 200 special investigations or inspections and about 500 designs, maps, sketches, or plans were prepared. Some of these were rather extensive and a number are basic and will be used, in part at least, in the future.

A survey party was in the field during the major part of the biennium and for short periods there were two parties. Further field surveys would have been made if men and money had been available when needed. Ten surveys were made for the Bureau of Fish Conservation. Although the major portion of these were of a preliminary nature, usually for proposed hatchery sites, a number were more detailed in scope and preparatory for actual construction. This latter listing includes the Fillmore ponds, though the construction was done by the Bureau of Fish Conservation. Three surveys were made for the Bureau of Game Farms for the determination of property lines and additions and nine surveys were made for the Bureau of Game Conservation. All of the latter surveys were made in conjunction with investigations of sites and projects under the provisions of the Pittman-Robertson Act and administered by the United States Fish and Wildlife Service. This work included the survey and mapping of a 2,100-acre ranch in Lassen County which is under purchase under the terms of the Pittman-Robertson Act. Plans will be prepared covering a project for the improvement of this property.

Surveys and estimates were likewise prepared and submitted for the improvement of the Gray Lodge Refuge located about 10 miles west of Gridley. This refuge comprises an area of 2,540 acres. The project has been approved but work will probably be delayed due to war conditions.

For some years the Bureau of Game Conservation has maintained the Suisun Game Refuge on Joice Island, located about five miles south of Suisun and near Suisun Bay. Surveys and engineering studies were carried on and a project was submitted to the United States Fish and Wildlife Service in accordance with the terms of the Pittman-Robertson Act. This project proposed raising the levees and the placing of four redwood gate structures, all designed for optimum operations of this 1,711-acre refuge with its 14 miles of levees. A contract was let and 131,000 cubic yards of dredged material was placed on eight miles of levees.

The bureau constructed two cottages for the Bureau of Game Farms, one at the Yountville Farm and the other at the Los Serranos Farm. The Yountville cottage was a four-room structure while the Los Serranos

cottage was of a more extensive construction being a six-room stucco building in conformity with the existing architecture.

A four-room cottage was constructed for the Bureau of Patrol and located about seven miles from the town of Tulelake. This house was equipped with heat, electric lights, kitchen range, hot water heater, linoleum floor covering, pumphouse with well, pump, motor and pressure system, and a three-car garage.

The commission's interest in promoting fishing resulted in an extensive program of construction and maintenance for the Bureau of Fish Conservation. At the Mt. Shasta Hatchery two of the hatchery buildings received concrete foundations, rearrangement of hatchery troughs and water supply, flooring and incidentals; concrete tanks, shop and garage for several trucks, and incidental work. At the Fall Creek Hatchery a concrete egg taking station replaced the wooden structure, improvements to the hatchery water supply were effected and concrete floors were placed in the five ponds. At the Lake Almanor Hatchery improvements in the water supply were made and a 24-inch waste water line was installed replacing a wooden stave line that was beyond repair. Additions at Tallac Hatchery consisted of a garage and improvements to the water supply and tanks. Repairs to a limited extent were made at the Burney Creek Hatchery and a pump was installed as an auxiliary and safeguard to the water supply. A bridge was installed at Basin Creek Hatchery replacing one that was inadequate for the traffic and three small temporary buildings were constructed at Hot Creek Hatchery. On the San Lorenzo River at the town of Boulder Creek a concrete egg taking station, fish ladder and a two-room cabin were constructed. Near Visalia an ageing station was set up consisting of a 24″ envelope type well with pump, motor and gas engine standby with water delivery of over 900 gallons per minute, meat house, public rest rooms, 10 tanks under an open shed, two houses of three rooms each, roads, sewage disposal, etc. Two experimental systems of ponds and cabins were built in Inyo County to determine their value for raising fish.

The major piece of construction during the biennium was for the foregoing bureau and consisted of the complete construction of the Hot Creek Hatchery 37 miles north of Bishop, Inyo County. About mid April, 1941, the money for this work was made available and actual construction started April 28, 1941, and seven months later the complete job was turned over to the Bureau of Fish Conservation for operation though the work had been carried on without stopping the output of fish at any time. Prior to the commencement of construction field surveys had been made and preliminary plans based on the desires of the Bureau of Fish Conservation were prepared. These were the basis for the final plans prepared by the Division of Architecture of the Board of Public Works, whose excellent cooperation was greatly appreciated.

The water supply of this hatchery comes from springs and the topography of the site was such that the hatchery was generally built in two units about 2,200 feet apart.

In the upper unit there is constructed in two spring runs a total of about 1,800 feet of concrete flume with 17 concrete cross dams forming 30 pounds, each about 25 x 100 feet. For the operation of the hatchery a large main garage was constructed fully equipped, a meat house with its necessary mechanical appurtenances, including refrigeration, and a

superintendent's house, of very substantial construction and on account of the extreme cold weather was well insulated. The house was fully equipped with heating and lighting facilities and contained an office and garage. In addition to this house a four-room cottage of similar construction was erected and the original structures renovated and improved.

The lower unit contains a modern 30 trough hatchery supplied with water from a nearby spring where a concrete dam was constructed, a complete spawning house and a four-room residence similar to the houses on the upper unit. In addition to these buildings a small garage was constructed housing also the electric plant for this unit.

Each unit of this project had its own sewage disposal systems, electric plants, and fuel storage. This latter was a butane system, a new innovation for the commission's hatchery plants and is used for heating and cooking for all houses, fuel for operation of the many engines necessary for refrigeration, pumping and electric lighting plants.

In addition to the buildings the grounds were entirely fenced, roads were constructed and the grounds generally improved.

It is interesting to note that in spite of the substantial rise in labor and material costs savings were effected over the original estimates which permitted additions such as a four-room cottage, concrete spawning tanks, renovating of the existing buildings, increasing pressure range of storage tanks, graveling of the ponds, additional surfacing and oiling of roads, purchase of furniture, a tractor, and miscellaneous items without requiring any additional funds.

When the replacement of fish screens commenced tools and equipment were purchased from funds set aside for that construction. All this equipment has been used on all of the foregoing construction without any charge.

There was some other incidental and minor construction carried on and that together with the work as briefly set out in the foregoing totals about $225,000 for the biennial period.

REPORT OF THE BUREAU OF LICENSE DISTRIBUTION

By H. R. Dunbar, Chief

In the distribution and sale of licenses this bureau has three objectives: First, to establish as many agencies throughout the State as possible so as to enable the sportsmen to obtain licenses whenever and wherever they may apply; second, to maintain a harmonious and friendly relationship with these agencies in order to secure their cooperation since they are the means by which we are able to sell the licenses to the sportsmen; and third, to give the agencies the best possible service in supplying them with licenses for the purpose of overcoming the possibility of a shortage when most needed by the sportsmen.

To carry out the above named objectives branch offices are maintained at San Francisco, Los Angeles, Sacramento, Fresno, Terminal Island, San Diego, and Monterey. Approximately 2,000 agencies are served by these branch offices. All credit agencies, of which there are approximately 750, are handled through the main office at Sacramento.

During the past two years it has not been necessary to file a single claim with the bonding company for failure on the part of any credit agent to account in full for all licenses sold. As a consequence the premium on bonds has been reduced from $5 per $1,000 to $2.50 per $1,000.

In September, 1941, the compensation paid to credit agents was increased from 2½ per cent to 3½ per cent. Experience has proven that by the establishment of credit agencies a more satisfactory distribution of licenses may be had although it entails a greater responsibility on the part of the Bureau of Licenses.

At the close of deer and dove hunting seasons questionnaire postcards have been sent to all wardens throughout the State to determine if there was any shortage of licenses. From the information received from these cards it was found there had been a shortage in a very few localities and steps were taken to eliminate this shortage. For many years we had experienced an inadequate supply of licenses at the opening of deer season in Monterey and Santa Cruz counties. As the division maintained a branch office at Monterey it was decided to have that office distribute licenses to agencies in those two counties, with the result that since that time there has been no shortage of licenses in that locality.

In accordance with Section 1346 of the Fish and Game Code providing for an antelope season a drawing was conducted in Sacramento on April 22, 1942, to determine to whom the 500 permits should be issued. 2,811 applications were received. The drawing was conducted under the auspices of the Fish and Game officials, sportsmen and representatives of the press. Permits were issued in consecutive order and only to those applicants whose numbers were drawn. Many of the successful applicants were unable at the last moment to participate or to take out the permit that was allotted to them, in most cases due to war conditions. Since no permit or application was transferable, No. 628 was reached in order to complete the sale of the 500 permits.

The sale of the 1941 series of angling and hunting licenses and deer tags was the largest in the history of the Fish and Game Commission. The sale of the 1940 and 1941 series were as follows:

	Angling	*Hunting*	*Deer tags*
1940	$791,472	$565,395	$163,285
1941	933,586	643,700	173,699

The angling licenses are on a calendar year, and the hunting licenses and deer tags are on a fiscal year basis.

FINAL STATEMENT OF ANGLING LICENSE SALES, 1940 SERIES

County	Citizen, $2 each	Nonresident, $3 each	Alien, $5 each	Duplicate, 50¢ each	Total
Alameda	$62,540 00	$57 00	$1,780 00	$44 50	$64,421 50
Alpine	364 00	171 00	5 00	1 50	541 50
Amador	2,048 00	12 00	15 00	3 50	2,078 50
Butte	9,066 00	60 00	40 00	9 50	9,175 50
Calaveras	1,952 00	3 00	5 00	1 00	1,961 00
Colusa	1,396 00	9 00	5 00	3 00	1,413 00
Contra Costa	17,428 00	39 00	280 00	25 50	17,772 50
Del Norte	3,586 00	372 00	15 00	11 00	3,984 00
El Dorado	4,958 00	123 00	45 00	2 50	5,128 50
Fresno:					
Agents	21,996 00		430 00	2 50	22,428 50
Fresno Branch	462 00	72 00	85 00	36 50	655 50
Totals, Fresno	$22,458 00	$72 00	$515 00	$39 00	$23,084 00
Glenn	1,324 00		10 00	2 50	1,336 50
Humboldt	11,416 00	114 00	80 00	25 50	11,635 50
Imperial	2,232 00	129 00	15 00	1 00	2,377 00
Inyo	8,864 00	165 00	90 00	13 00	9,132 00
Kern	12,078 00	15 00	45 00	5 00	12,143 00
Kings	3,020 00		65 00	2 00	3,087 00
Lake	2,110 00	9 00	15 00	3 50	2,137 50
Lassen	3,708 00	54 00	40 00	3 50	3,805 50
Los Angeles:					
Agents	188,698 00	90 00	1,550 00	40 50	190,378 50
Los Angeles Branch	524 00	156 00	820 00	98 50	1,598 50
Terminal Island Branch	238 00	21 00	230 00	18 00	507 00
Totals, Los Angeles	$189,460 00	$267 00	$2,600 00	$157 00	$192,484 00
Madera	3,126 00	9 00	10 00	4 50	3,149 50
Marin	8,650 00	9 00	185 00	8 00	8,852 00
Mariposa	3,922 00	135 00	30 00	2 50	4,089 50
Mendocino	6,910 00	15 00	35 00	10 00	6,970 00
Merced	4,256 00	12 00	10 00	7 00	4,285 00
Modoc	2,954 00	123 00	5 00	3 50	3,085 50
Mono	7,046 00	489 00	10 00	18 50	7,563 50
Monterey:					
Agents	7,436 00	21 00	665 00	12 50	8,134 50
Monterey Branch					
Totals, Monterey	$7,436 00	$21 00	$665 00	$12 50	$8,134 50
Napa	6,058 00	3 00	10 00	9 00	6,080 00
Nevada	5,706 00	345 00	80 00	16 00	6,147 00
Orange	15,284 00	3 00	10 00	5 50	15,302 50
Placer	6,216 00	93 00	45 00	4 00	6,358 00
Plumas	6,726 00	153 00	55 00	13 00	6,947 00
Riverside	9,596 00	3 00		4 00	9,603 00
Sacramento:					
Agents	26,188 00		2,530 00	13 50	28,731 50
Sacramento Branch	498 00	156 00	380 00	90 00	1,124 00
Totals, Sacramento	$26,686 00	$156 00	$2,910 00	$103 50	$29,855 50
San Benito	930 00	3 00	40 00	4 00	977 00
San Bernardino	20,582 00	54 00	10 00	13 00	20,659 00
San Diego:					
Agents	37,782 00	84 00		4 00	37,870 00
San Diego Branch	208 00	162 00	$130 00	19 00	519 00
Totals, San Diego	$37,990 00	$246 00	$130 00	$23 00	$38,389 00
San Francisco:					
Agents	59,462 00	15 00	1,930 00	12 50	61,419 50
San Francisco Branch	608 00	168 00	1,230 00	107 00	2,113 00
Totals, San Francisco	$60,070 00	$183 00	$3,160 00	$119 50	$63,532 50

FINAL STATEMENT OF ANGLING LICENSE SALES, 1940 SERIES—Continued

County	Citizen, $2 each	Nonresident, $3 each	Alien, $5 each	Duplicate, 50¢ each	Total
San Joaquin	$20,686 00	$3 00	$925 00	$20 50	$21,634 50
San Luis Obispo	7,514 00	6 00	70 00	8 00	7,598 00
San Mateo	7,846 00		235 00	1 50	8,082 50
Santa Barbara	8,320 00	18 00	395 00	10 50	8,743 50
Santa Clara	18,124 00	12 00	610 00	18 50	18,764 50
Santa Cruz	7,438 00	12 00	460 00	13 50	7,923 50
Shasta	10,788 00	87 00	35 00	23 00	10,933 00
Sierra	1,494 00	21 00		2 00	1,517 00
Siskiyou	9,710 00	294 00	230 00	4 00	10,238 00
Solano	12,550 00	6 00	495 00	26 50	13,077 50
Sonoma	14,090 00	27 00	275 00	21 50	14,413 50
Stanislaus	10,438 00		95 00	19 00	10,552 00
Sutter	1,660 00	3 00	75 00	5 00	1,743 00
Tehama	2,828 00	12 00	15 00	6 00	2,861 00
Trinity	1,514 00	9 00	10 00	3 50	1,536 50
Tulare	9,922 00	54 00	70 00	2 50	10,048 50
Tuolumne	3,658 00	3 00		5 00	3,666 00
Ventura	6,808 00	3 00		3 00	6,814 00
Yolo	3,044 00			3 00	3,047 00
Yuba	4,554 00		145 00	3 50	4,702 50
State:					
Arizona					
Nevada	376 00	4,254 00			4,630 00
Oregon	8 00	1,260 00			1,268 00
Totals	$763,522 00	$9,810 00	$17,205 00	$935 00	$791,472 00
Number	381,761	3,270	3,441	1,870	

FINAL STATEMENT OF MARKET FISHERMAN LICENSE SALES, 1940 SERIES

County Licenses $10 each	Total
Contra Costa	$2,680 00
Del Norte	200 00
Humboldt	620 00
Lake	160 00
Los Angeles:	
Terminal Island Branch	39,310 00
Monterey Branch	11,980 00
Sacramento Branch	1,760 00
San Diego Branch	14,800 00
San Francisco Branch	18,620 00
Solano	380 00
Sonoma	360 00
Total	$90,870 00
Number	9,087

FINAL STATEMENT OF ANGLING LICENSE SALES, 1941 SERIES

County	Citizen, $2 each	Nonresident, $3 each	Alien, $5 each	Duplicate, 50¢ each	Total
Alameda	$74,666 00	$195 00	$2,200 00	$80 50	$77,141 50
Alpine	372 00	222 00		2 50	596 50
Amador	2,104 00	6 00	25 00	6 50	2,141 50
Butte	9,474 00	63 00	40 00	21 00	9,598 00
Calaveras	2,126 00		10 00	3 50	2,139 50
Colusa	1,476 00		5 00	3 00	1,484 00
Contra Costa	21,058 00	93 00	325 00	28 00	21,504 00
Del Norte	3,364 00	327 00	10 00	11 00	3,712 00
El Dorado	5,364 00	117 00	55 00	7 00	5,543 00
Fresno:					
Agents	24,288 00		565 00	7 50	24,860 50
Fresno Branch	478 00	105 00	145 00	45 50	773 50
Totals, Fresno	$24,766 00	$105 00	$710 00	$53 00	$25,634 00
Glenn	1,432 00	3 00	10 00	4 50	1,449 50
Humboldt	13,556 00	180 00	90 00	29 00	13,855 00
Imperial	3,104 00	75 00	20 00	3 00	3,202 00
Inyo	9,644 00	300 00	75 00	25 50	10,044 50
Kern	13,338 00	12 00	55 00	4 50	13,409 50
Kings	3,010 00	15 00	50 00	2 50	3,077 50
Lake	2,736 00	12 00	15 00	4 00	2,767 00
Lassen	4,322 00	84 00	50 00	8 00	4,464 00
Los Angeles:					
Agents	219,538 00	213 00	1,865 00	74 00	221,690 00
Los Angeles Branch	496 00	174 00	1,040 00	106 50	1,816 50
Terminal Island Branch	1,214 00	24 00	165 00	24 00	1,427 00
Totals, Los Angeles	$221,248 00	$411 00	$3,070 00	$204 50	$224,933 50
Madera	3,816 00	3 00	10 00	6 50	3,835 50
Marin	10,830 00	15 00	300 00	10 00	11,155 00
Mendocino	7,716 00	6 00	35 00	4 50	7,761 50
Mariposa	3,962 00	165 00	10 00	4 50	4,141 50
Merced	4,968 00	9 00	30 00	9 00	5,016 00
Modoc	2,914 00	123 00	10 00	2 00	3,049 00
Mono	6,876 00	522 00	15 00	28 00	7,441 00
Monterey:					
Agents	9,386 00	12 00	945 00	18 50	10,361 50
Monterey Branch					
Totals, Monterey	$9,386 00	$12 00	$945 00	$18 50	$10,361 50
Napa	7,984 00	27 00	15 00	12 50	8,038 50
Nevada	6,232 00	1,800 00	70 00	17 50	8,119 50
Orange	18,656 00		5 00	6 00	18,667 00
Placer	6,586 00	105 00	30 00	1 50	6,722 50
Plumas	7,376 00	222 00	80 00	17 00	7,695 00
Riverside	11,778 00	45 00	15 00	10 50	11,848 50
Sacramento:					
Agents	27,940 00		2,615 00	13 50	30,568 50
Sacramento Branch	456 00	153 00	455 00	112 50	1,176 50
Totals, Sacramento	$28,396 00	$153 00	$3,070 00	$126 00	$31,745 00
San Benito	1,224 00		35 00	3 50	1,262 50
San Bernardino	27,824 00	150 00	30 00	35 50	28,039 50
San Diego:					
Agents	53,830 00	54 00	30 00	6 00	53,920 00
San Diego Branch	304 00	228 00	270 00	27 00	829 00
Totals, San Diego	$54,134 00	$282 00	$300 00	$33 00	$54,749 00
San Francisco:					
Agents	73,480 00	66 00	2,140 00	14 50	75,700 50
San Francisco Branch	636 00	270 00	1,625 00	152 50	2,683 50
Totals, San Francisco	$74,116 00	$336 00	$3,765 00	$167 00	$78,384 00

FINAL STATEMENT OF ANGLING LICENSE SALES, 1941 SERIES—Continued

County	Citizen, $2 each	Nonresident, $3 each	Alien, $5 each	Duplicate, 50¢ each	Total
San Joaquin	$21,126 00	$27 00	$890 00	$21 50	$22,064 50
San Luis Obispo	10,802 00		65 00	15 50	10,882 50
San Mateo	10,598 00		330 00	4 00	10,932 00
Santa Barbara	9,208 00	15 00	360 00	10 50	9,593 50
Santa Clara	21,156 00	15 00	810 00	32 00	22,013 00
Santa Cruz	9,226 00	15 00	615 00	15 50	9,871 50
Shasta	11,882 00	165 00	55 00	29 00	12,131 00
Sierra	1,572 00	12 00		5 00	1,589 00
Siskiyou	10,252 00	408 00	210 00	9 00	10,879 00
Solano	18,476 00	33 00	560 00	31 00	19,100 00
Sonoma	15,056 00	24 00	330 00	21 00	15,431 00
Stanislaus	11,482 00	27 00	120 00	17 50	11,646 50
Sutter	1,648 00		50 00	6 50	1,704 50
Tehama	3,102 00	18 00	20 00	6 00	3,146 00
Trinity	1,382 00	9 00	5 00	2 00	1,398 00
Tulare	11,468 00	81 00	20 00	4 00	11,573 00
Tuolumne	4,430 00		10 00	6 00	4,446 00
Ventura	7,906 00	3 00	5 00	8 00	7,922 00
Yolo	3,174 00	6 00		6 00	3,186 00
Yuba	4,626 00		145 00	4 50	4,775 50
Out of State:					
Arizona	2 00	96 00			98 00
Nevada	60 00	4,389 00			4,449 00
Oregon	8 00	18 00			26 00
Totals	$900,576 00	$11,556 00	$20,185 00	$1,269 00	$933,586 00
Number	450,288	3,852	4,037	2,538	

FINAL STATEMENT OF MARKET FISHERMAN LICENSE SALES, 1941 SERIES

County Licenses $10 each	Total
Contra Costa	$1,400 00
Del Norte	580 00
Humboldt	950 00
Lake	160 00
Los Angeles:	
Terminal Island Branch	37,010 00
Monterey Branch	11,800 00
Sacramento Branch	1,410 00
San Diego Branch	17,240 00
San Francisco Branch	20,450 00
Santa Cruz	750 00
Solano	290 00
Sonoma	290 00
Total	$92,330 00
Number	9,233

FINAL STATEMENT OF HUNTING, DEER TAGS, AND TRAPPING LICENSE SALES, 1940 SERIES

County	Hunting licenses							Deer tags	Trapping licenses		
	Citizen $2 each	Junior $1 each	Non-resident $10 each	Declarant alien $10 each	Alien $25 each	Duplicate 50¢ each	Total Hunting	$1 each	Citizen $1 each	Alien $2 each	Total Trapping
Alameda	$26,000 00	$965 00	$20 00			$35 00	$27,020 00	$7,984 00			
Alpine	100 00	10 00	100 00			50	210 50	62 00			
Amador	2,354 00	156 00		$30 00		6 00	2,546 00	1,013 00	$8 00		$8 00
Butte	10,692 00	754 00	10 00			21 00	11,477 00	3,661 00	61 00		61 00
Calaveras	1,846 00	124 00				2 50	1,972 50	895 00			
Colusa	3,912 00	319 00		10 00	$50 00	14 50	4,305 50	1,243 00			
Contra Costa	8,716 00	417 00		50 00	25 00	11 50	9,219 50	2,762 00			
Del Norte	892 00	74 00	20 00			2 00	988 00	265 00	32 00		32 00
El Dorado	3,500 00	148 00		10 00		4 50	3,662 50	1,663 00	44 00		44 00
Fresno:											
Agents	21,538 00	1,421 00		40 00		68 50	23,067 50	5,943 00	21 00		21 00
Fresno Branch	320 00	27 00	10 00	70 00	75 00	25 00	527 00	101 00	66 00		66 00
Totals, Fresno	$21,858 00	$1,448 00	$10 00	$110 00	$75 00	$93 50	$23,594 50	$6,044 00	$87 00		$87 00
Glenn	$4,334 00	$346 00	$70 00	$10 00		$15 50	$4,775 50	$1,428 00	$3 00		$3 00
Humboldt	11,008 00	547 00	50 00	40 00		13 50	11,658 50	4,643 00	65 00		65 00
Imperial	4,050 00	204 00		10 00		3 50	4,267 50	270 00	4 00		4 00
Inyo	3,592 00	232 00	10 00	10 00		14 50	3,858 50	1,349 00	7 00		7 00
Kern	16,848 00	949 00	20 00			11 50	17,828 50	4,698 00	1 00		1 00
Kings	4,158 00	238 00				7 00	4,403 00	1,078 00			
Lake	3,652 00	323 00	10 00			9 50	3,994 50	2,022 00	10 00		10 00
Lassen	5,162 00	338 00	80 00	10 00		13 00	5,603 00	2,382 00			
Los Angeles:											
Agents	100,006 00	3,426 00				41 00	103,473 00	21,215 00			
Los Angeles Branch	364 00	80 00	110 00	230 00	$125 00	68 00	977 00	140 00	102 00	$4 00	106 00
Terminal Island Branch	96 00	30 00		20 00	25 00	9 50	180 50	22 00			
Totals, Los Angeles	$100,466 00	$3,536 00	$110 00	$250 00	$150 00	$118 50	$104,630 50	$21,377 00	$102 00	$4 00	$106 00
Madera	$2,904 00	$127 00		$30 00		$3 50	$3,064 50	$1,104 00	$1 00		$1 00
Marin	4,262 00	324 00		10 00		3 00	4,599 00	1,696 00			
Mariposa	1,036 00	56 00					1,092 00	465 00			
Mendocino	7,490 00	505 00	$30 00	10 00		7 00	8,042 00	3,909 00	20 00		20 00
Merced	6,196 00	551 00	10 00	40 00		18 00	6,815 00	1,444 00			
Modoc	3,888 00	236 00	390 00			5 00	4,519 00	2,005 00	28 00		28 00
Mono	1,376 00	44 00	90 00			2 50	1,512 50	592 00			

Monterey:											
Agents	8,836 00	626 00		150 00	$100 00	18 50	9,730 50	3,334 00			
Monterey Branch											
Totals, Monterey	$8,836 00	$626 00		$150 00	$100 00	$18 50	$9,730 50	$3,334 00			
Napa	$5,288 00	$439 00		$20 00		$5 50	$5,752 50	$2,532 00			
Nevada	3,606 00	225 00	$200 00	30 00		13 00	4,074 00	1,822 00	$19 00		$19 00
Orange	6,172 00	356 00				50	6,528 50	1,481 00			
Placer	5,582 00	470 00		20 00		7 00	6,079 00	2,211 00			
Plumas	4,180 00	181 00	110 00	10 00	$25 00	7 00	4,513 00	2,122 00			
Riverside	7,338 00	450 00				4 00	7,792 00	2,028 00			
Sacramento:											
Agents	20,518 00	1,272 00		110 00		6 50	21,906 50	5,369 00	50 00		50 00
Sacramento Branch	692 00	49 00	190 00	360 00	350 00	83 00	1,724 00	262 00	379 00	16 00	395 00
Totals, Sacramento	$21,210 00	$1,321 00	$190 00	$470 00	$350 00	$89 50	$23,630 50	$5,631 00	$429 00	$16 00	$445 00
San Benito	$2,036 00	$206 00				$5 00	$2,247 00	$958 00	$5 00		$5 00
San Bernardino	9,780 00	555 00				7 00	10,342 00	2,335 00			
San Diego:											
Agents	15,394 00	840 00				1 50	16,235 50	3,454 00			
San Diego Branch	106 00	12 00	10 00	10 00		17 00	155 00	27 00			
Totals, San Diego	$15,500 00	$852 00	$10 00	$10 00		$18 50	$16,390 50	$3,481 00			
San Francisco:											
Agents	28,554 00	522 00		70 00		5 50	29,151 50	7,707 00			
San Francisco Branch	398 00	115 00	230 00	1,070 00	775 00	104 00	2,692 00	219 00	677 00	34 00	711 00
Totals, San Francisco	$28,952 00	$637 00	$230 00	$1,140 00	$775 00	$109 50	$31,843 50	$7,926 00	$677 00	$34 00	$711 00
San Joaquin	$13,386 00	$743 00		$30 00	$50 00	$12 50	$14,221 50	$3,491 00	$10 00		$10 00
San Luis Obispo	6,632 00	510 00				13 00	7,155 00	2,819 00			
San Mateo	6,452 00	418 00					6,870 00	1,863 00			
Santa Barbara	6,768 00	544 00	$30 00		25 00	12 50	7,379 50	2,593 00			
Santa Clara	13,672 00	1,017 00		70 00	125 00	20 00	14,904 00	5,031 00	1 00		1 00
Santa Cruz	5,388 00	401 00		150 00	125 00	10 00	6,074 00	1,981 00	3 00		3 00
Shasta	9,506 00	358 00	60 00	10 00		24 50	9,958 50	4,248 00	90 00		90 00
Sierra	868 00	50 00					918 00	480 00			
Siskiyou	11,678 00	652 00	2,600 00	150 00		28 50	15,108 50	4,978 00	89 00		89 00
Solano	7,014 00	404 00				18 00	7,436 00	2,210 00	1 00		1 00
Sonoma	11,280 00	822 00	20 00	90 00	50 00	17 50	12,279 50	4,949 00	35 00		35 00
Stanislaus	8,138 00	642 00		20 00		14 50	8,814 50	2,157 00	13 00		13 00
Sutter	2,174 00	204 00				7 50	2,385 50	597 00			
Tehama	4,092 00	272 00	30 00	40 00		11 00	4,445 00	1,897 00	24 00		24 00
Trinity	1,256 00	61 00				2 50	1,319 50	669 00	9 00		9 00
Tulare	11,196 00	649 00				5 50	11,850 50	3,370 00			
Tuolumne	2,778 00	154 00		30 00		4 50	2,966 50	1,313 00	24 00		24 00
Ventura	5,492 00	337 00				13 50	5,842 50	2,241 00			
Yolo	5,674 00	490 00				10 00	6,174 00	1,900 00			
Yuba	5,726 00	351 00				12 50	6,089 50	1,740 00			

FINAL STATEMENT OF HUNTING, DEER TAGS, AND TRAPPING LICENSE SALES, 1940 SERIES—Continued

County	Hunting licenses							Deer tags	Trapping licenses		
	Citizen $2 each	Junior $1 each	Non-resident $10 each	Declarant alien $10 each	Alien $25 each	Duplicate 50¢ each	Total Hunting	$1 each	Citizen $1 each	Alien $2 each	Total Trapping
State:											
Arizona	$28 00	$2 00					$30 00				
Nevada	1,196 00	20 00	$2,360 00				3,576 00	$567 00			
Oregon	88 00	5 00	4,920 00			$1 50	5,014 50	276 00			
Totals	$519,254 00	$28,395 00	$11,790 00	$3,070 00	$1,925 00	$961 00	$565,395 00	$163,285 00	$1,902 00	$54 00	$1,956 00
Number	259,627	28,395	1,179	307	77	1,922		163,285	1,902	27	

FINAL STATEMENT OF MISCELLANEOUS LICENSE SALES BY BRANCH OFFICES AND AGENTS, 1940 SERIES

	Fresno	Los Angeles	Monterey	Sacramento	San Diego	San Francisco	Terminal Island	Agents	Total	Number
Commercial hunting club:										
Citizen, $25 each		$125 00		$325 00		$425 00			$875 00	35
Alien, $100 each										
Totals		$125 00		$325 00		$425 00			$875 00	
Commercial hunting club operator:										
Citizen, $5 each		30 00		135 00		115 00			280 00	56
Alien, $25 each				25 00					25 00	1
Totals		$30 00		$160 00		$115 00			$305 00	
Game tags, 3¢ each	$7 17	214 38		30 93		298 56			551 04	18,368
Game breeders, $2.50 each		967 50		235 00		262 50			1,465 00	586
Fish packer and shellfish dealer:										
Citizen, $5 each					$70 00	705 00	$270 00		1,045 00	209
Alien, $20 each						60 00			60 00	3
Totals					$70 00	$765 00	$270 00		$1,105 00	
Fish importers, $5 each						80 00			80 00	16
Fish party boat permit, $1 each			$33 00	1 00	34 00	315 00	224 00		607 00	607
Fish breeder, $5 each						515 00			515 00	103
Fish tags, 1¢ each		452 50		2 00		3,164 00			3,618 50	
San Francisco County								$185 26	185 26	
Totals, fish tags		$452 50		$2 00		$3,164 00		$185 26	$3,803 76	380,376
Kelp license, $10 each						$50 00			$50 00	5
Game management license, $10 each						170 00			170 00	17
Game management tags, 3¢ each						146 34			146 34	4,878

FINAL STATEMENT OF HUNTING, DEER TAGS, AND TRAPPING LICENSE SALES, 1941 SERIES

County	Hunting licenses							Deer tags	Trapping licenses		
	Citizen, $2 each	Junior, $1 each	Non-resident, $10 each	Declarant alien, $10 each	Alien, $25 each	Duplicate, 50¢ each	Total hunting	$1 each	Citizen, $1 each	Alien, $2 each	Total trapping
Alameda	$30,314 00	$1,242 00	$70 00	$100 00		$43 50	$31,769 50	$8,719 00			
Alpine	138 00	8 00	70 00				216 00	82 00			
Amador	2,434 00	166 00		40 00		5 00	2,645 00	1,063 00			
Butte	12,354 00	962 00	120 00			27 00	13,463 00	3,956 00			
Calaveras	2,068 00	116 00				2 00	2,186 00	956 00			
Colusa	4,344 00	384 00		20 00		19 50	4,767 50	1,329 00			
Contra Costa	12,512 00	580 00		60 00	$50 00	19 50	13,221 50	3,710 00			
Del Norte	906 00	58 00				2 50	966 50	261 00			
El Dorado	3,398 00	166 00	20 00	10 00		4 00	3,598 00	1,626 00			
Fresno:											
Agents	21,668 00	1,426 00		10 00		9 00	23,113 00	5,691 00			
Fresno Branch	274 00	40 00	70 00	140 00	75 00	35 50	634 50	121 00	$127 00		$127 00
Totals, Fresno	$21,942 00	$1,466 00	$70 00	$150 00	$75 00	$44 50	$23,747 50	$5,812 00	$127 00		$127 00
Glenn	$4,548 00	$424 00	$20 00	$40 00	$25 00	$19 50	$5,076 50	$1,419 00			
Humboldt	11,216 00	676 00	40 00	20 00		25 00	11,977 00	5,003 00			
Imperial	5,278 00	310 00				4 50	5,592 50	307 00			
Inyo	3,560 00	217 00	10 00	10 00		19 50	3,816 50	1,369 00			
Kern	17,648 00	896 00				13 50	18,557 50	4,682 00			
Kings	4,520 00	273 00				2 50	4,795 50	1,059 00			
Lake	3,656 00	318 00	30 00			12 50	4,016 50	1,950 00			
Lassen	5,622 00	363 00	100 00	50 00		15 50	6,150 50	2,608 00			
Los Angeles:											
Agents	119,904 00	4,305 00	20 00			72 00	124,301 00	23,285 00			
Los Angeles Branch	366 00	59 00	150 00	330 00	225 00	89 00	1,219 00	136 00	$136 00		$136 00
Terminal Island Branch	112 00	28 00	10 00	10 00	25 00	8 50	193 50	37 00	$120 00		120 00
Totals, Los Angeles	$120,382 00	$4,392 00	$180 00	$340 00	$250 00	$169 50	$125,713 50	$23,458 00	$256 00		$256 00
Madera	$3,258 00	$173 00		$40 00		$4 00	$3,475 00	$1,056 00			
Marin	5,206 00	348 00		40 00		8 50	5,602 50	2,028 00			
Mariposa	560 00	31 00				2 00	593 00	230 00			
Mendocino	7,716 00	629 00				8 50	8,353 50	3,931 00			
Merced	7,832 00	658 00		90 00		29 50	8,609 50	1,459 00			
Modoc	4,438 00	286 00	$650 00		$25 00	7 00	5,406 00	2,113 00			
Mono	1,122 00	50 00	100 00			3 50	1,275 50	509 00			

Monterey:											
Agents	9,770 00	602 00		140 00	50 00	21 00	10,583 00	3,513 00			
Monterey Branch											
Totals, Monterey	$9,770 00	$602 00		$140 00	$50 00	$21 00	$10,583 00	$3,513 00			
Napa	$6,390 00	$498 00		$20 00		$12 50	$6,920 50	$2,908 00			
Nevada	4,494 00	252 00	$290 00	40 00	$25 00	11 50	5,112 50	2,125 00			
Orange	7,084 00	449 00				3 50	7,536 50	1,434 00			
Placer	6,092 00	522 00		20 00		5 00	6,639 00	2,403 00			
Plumas	4,922 00	248 00	150 00	10 00		11 00	5,341 00	2,506 00			
Riverside	8,466 00	527 00	10 00			13 50	9,016 50	1,884 00			
Sacramento:											
Agents	25,624 00	1,703 00		120 00		6 00	27,453 00	6,219 00			
Sacramento Branch	500 00	56 00	180 00	330 00	325 00	94 00	1,485 00	149 00	$602 00	$20 00	$622 00
Totals, Sacramento	$26,124 00	$1,759 00	$180 00	$450 00	$325 00	$100 00	$28,938 00	$6,368 00	$602 00	$20 00	$622 00
San Benito	$1,520 00	$167 00		$30 00		$5 00	$1,722 00	$611 00			
San Bernardino	11,228 00	682 00	$10 00			18 00	11,938 00	2,400 00			
San Diego:											
Agents	20,810 00	1,044 00			$250 00	12 00	22,116 00	4,639 00			
San Diego Branch	104 00	5 00	10 00	30 00		31 50	180 50	31 00			
Totals, San Diego	$20,914 00	$1,049 00	$10 00	$30 00	$250 00	$43 50	$22,296 50	$4,670 00			
San Francisco:											
Agents	$32,442 00	$685 00		$150 00		$4 50	$33,281 50	$8,478 00			
San Francisco Branch	402 00	122 00	$250 00	1,050 00	$625 00	97 00	2,546 00	299 00	$1,145 00	$18 00	$1,163 00
Totals, San Francisco	$32,844 00	$807 00	$250 00	$1,200 00	$625 00	$101 50	$35,827 50	$8,777 00	$1,145 00	$18 00	$1,163 00
San Joaquin	$14,350 00	$767 00	$20 00	$70 00		$14 50	$15,221 50	$3,663 00			
San Luis Obispo	7,900 00	526 00				7 50	8,433 50	2,938 00			
San Mateo	6,994 00	475 00	70 00	110 00	$25 00	9 50	7,683 50	2,058 00			
Santa Barbara	6,888 00	459 00	20 00			11 00	7,378 00	2,670 00			
Santa Clara	14,730 00	1,034 00		150 00	75 00	23 50	16,012 50	4,997 00			
Santa Cruz	5,544 00	406 00		280 00	75 00	19 50	6,324 50	2,024 00			
Shasta	10,226 00	413 00	90 00	10 00	25 00	30 00	10,794 00	4,516 00			
Sierra	894 00	45 00				1 00	940 00	467 00			
Siskiyou	12,272 00	747 00	3,120 00	70 00		33 50	16,242 50	5,235 00			
Solano	10,122 00	553 00				21 00	10,696 00	3,016 00			
Sonoma	12,540 00	1,021 00		140 00	50 00	17 00	13,768 00	5,246 00			
Stanislaus	9,332 00	750 00	20 00	50 00		15 50	10,167 50	2,326 00			
Sutter	2,300 00	243 00				6 00	2,549 00	592 00			
Tehama	4,472 00	388 00	10 00	20 00		13 00	4,903 00	1,890 00			
Trinity	1,470 00	73 00				1 00	1,544 00	694 00			
Tulare	11,660 00	732 00				3 50	12,395 50	3,370 00			
Tuolumne	2,434 00	186 00		20 00		5 00	2,645 00	1,448 00			
Ventura	5,108 00	370 00				5 50	5,483 50	2,004 00			
Yolo	6,618 00	628 00				16 00	7,262 00	1,986 00			
Yuba	6,370 00	493 00				16 50	6,879 50	1,716 00			

FINAL STATEMENT OF HUNTING, DEER TAGS, AND TRAPPING LICENSE SALES, 1941 SERIES—Continued

County	Hunting licenses							Deer Tags	Trapping licenses		
	Citizen, $2 each	Junior, $1 each	Non-resident, $10 each	Declarant alien, $10 each	Alien, $25 each	Duplicate, 50¢ each	Total hunting	$1 each	Citizen, $1 each	Alien, $2 each	Total trapping
State:											
Arizona	$110 00	$4 00					$114 00	$13 00			
Nevada			$2,930 00				2,930 00	276 00			
Oregon	120 00	9 00	5,740 00			$1 50	5,870 50	260 00			
Totals	$589,274 00	$33,076 00	$14,400 00	$3,870 00	$1,950 00	$1,130 00	$643,700 00	$173,699 00	$2,130 00	$38 00	$2,168 00
Number	294,637	33,076	1,440	387	78	2,260		173,699	2,130	19	2,149

FINAL STATEMENT OF MISCELLANEOUS LICENSE SALES BY BRANCH OFFICE AND AGENTS, 1941 SERIES

	Fresno	Los Angeles	Monterey	Sacramento	San Diego	San Francisco	Terminal Island	Agents	Total	Number
Commercial hunting club:										
Citizen, $25 each		$125 00		$175 00		$725 00			$1,025 00	41
Alien, $100 each										
Totals		$125 00		$175 00		$725 00			$1,025 00	
Commercial hunting club operator:										
Citizen, $5 each		$35 00		$60 00		$265 00			$360 00	72
Alien, $25 each						25 00			25 00	1
Totals		$35 00		$60 00		$290 00			$385 00	
Game tags, 3¢ each	$4 38	$231 60		$24 96		$112 47			$373 41	12,447
Game breeders, $2.50 each		875 00		125 00		432 50			1,432 50	573
Fish packer and shellfish dealer:										
Citizen, $5 each					$60 00	$735 00	$135 00		$930 00	186
Alien, $20 each						20 00			20 00	1
Totals					$60 00	$755 00	$135 00		$950 00	
Fish importers, $5 each						$80 00			$80 00	16
Fish party boat permit, $1 each			$26 00		$34 00	321 00	$179 00		560 00	560
Fish breeder, $5 each						450 00			450 00	90
Fish tags, 1¢ each		215 99				3,873 27		$104 64	4,193 90	419,390
Kelp license, $10 each						50 00			50 00	5
Game management license, $10 each						220 00			220 00	22
Game management tags, 3¢ each						133 68			133 68	4,456

DEPARTMENT OF NATURAL RESOURCES, DIVISION OF FISH AND GAME,

RECORD OF FISH DISTRIBUTION

RECAPITULATION—1940

TROUT

Rainbow	14,560,447
Steelhead	3,668,954
Golden	87,190
Black Spotted	628,890
Loch Leven	6,840,694
Eastern Brook	5,393,157
Total	31,179,332

SALMON

King	6,585,744
Silver	362,337
Total	6,948,081

SPINY RAYED

Smallmouth Black Bass	62,918
Total	62,918

GENERAL FISH RESCUE

Rainbow	1,186
Steelhead	903,261
Cutthroat	1,251
Loch Leven	500
Eastern Brook	1,016
Black Spotted	66
Total	907,280

SALMON

King	78,326
Silver	121,922
Total	200,248

SPINY RAYED

Smallmouth Black Bass	36,461
Largemouth Black Bass	1,918,832
Striped Bass	5,668
Shad	5,482
Sacramento Perch	7,097
Crappie	350,865
Squaretail Catfish	1,944,662
Forkedtail Catfish	519,990
Bluegill Sunfish	365,558
Green Sunfish	1,142,484
Spotted Catfish	40,000
Warmouth Bass	119,384
Minnows	500
Total	6,456,983

DEPARTMENT OF NATURAL RESOURCES, DIVISION OF FISH

Hatchery	County	Total from county by hatchery	Rainbow	Steelhead
ALPINE	Alpine	800,990	51,000	
	El Dorado	55,000		
ARROWHEAD LAKE	Los Angeles	38,275		
	Riverside	18,000	8,000	
	San Bernardino	66,800	40,000	
BASIN CREEK	Alpine	123,760	93,270	
	Calaveras	568,750	223,125	
	Tuolumne	985,195	412,895	
BEAR RIVER PLANTING BASE	El Dorado	28,460	28,460	
	Nevada	1,105,814	469,116	
	Placer	766,173	577,569	
	Sierra	116,244	116,244	
BROOKDALE	Alameda	6,615	6,615	
	Marin	60,249	60,249	
	Monterey	167,885	86,907	80,978
	Napa	8,190	8,190	
	San Benito	9,526	9,526	
	San Francisco	3,200	200	3,000
	San Luis Obispo	15,470	15,470	
	San Mateo	102,353	6,363	95,990
	Santa Clara	82,041	50,989	31,052
	Santa Cruz	336,252	24,475	311,777
	Solano	7,506	7,506	
BURNEY CREEK	Lassen	234,000	90,000	
	Modoc	529,000	224,000	
	Shasta	1,937,900	1,155,600	
	Siskiyou	40,000		
CHINO RESERVOIR	Los Angeles	6,500	6,500	
	San Bernardino	18,000	18,000	
EXPERIMENTAL	Siskiyou	21,966	7,305	128
FALL CREEK	Siskiyou	5,500,251		1,367,821
FEATHER RIVER	Butte	3,000	3,000	
	Plumas	956,091	331,035	
	Sierra	278,720	110,780	
FERN CREEK	Fresno	77,315	77,315	
	Inyo	23,306	23,306	
	Madera	161,566	161,566	
	Mono	256,078	256,078	
FILLMORE	Santa Barbara	8,900	200	8,700
	Ventura	46,500	43,150	3,350
FOREST HOME	Los Angeles	19,000	19,000	
	San Bernardino	50,360	50,360	
	San Diego	3,000	3,000	
FORT SEWARD	Humboldt	774,047		305,642
	Mendocino	74,469		74,469
	Trinity	91,601		91,601
HOT CREEK	Inyo	67,370	67,370	
	Madera	41,000	41,000	
	Mono	602,951	453,825	
HUMBOLDT STATE COLLEGE	Humboldt	9,477		
HUNTINGTON LAKE	Fresno	292,049	164,089	
KAWEAH	Tulare	896,680	377,880	
KERN	Kern	34,878	13,686	
	Tulare	147,131	125,066	
KINGS RIVER	Fresno	1,177,313	972,869	
LAKE ALMANOR	Butte	27,500		
	Lassen	373,610	81,600	
	Plumas	1,095,820	676,460	
	Shasta	43,500	39,500	
	Tehama	70,000		

AND GAME, RECORD OF FISH DISTRIBUTION—1940

Golden	Black Spotted	Cutthroat	Loch Leven	Eastern Brook	King Salmon	Silver Salmon	Miscellaneous	Miscellaneous	Total
	573,890			176,100					
	55,000								855,990
			38,275						
			10,000						
			26,800						123,075
				30,490					
			345,625						
			423,180	149,120					1,677,705
			322,816	313,882					
			117,290	71,314					
									2,016,691
									799,287
			90,000	54,000					
			210,000	95,000					
			525,000	257,300					
				40,000					2,740,900
									24,500
			7,513	7,020					21,966
					4,132,430				5,500,251
			411,900	213,156					
			106,440	61,500					1,237,811
									518,265
									65,400
									72,360
					468,405				
									940,117
			4,934	144,192					711,321
						9,477			9,477
				127,960					292,049
			271,300	247,500					896,680
			21,192						
			22,065						182,009
			96,946	107,498					1,177,313
				27,500					
			127,000	164,670		340			
			224,910	55,000		139,450			
				4,000					
				70,000					1,610,430

DEPARTMENT OF NATURAL RESOURCES, DIVISION OF FISH

Hatchery	County	Total from county by hatchery	Rainbow	Steelhead
MADERA	Madera	497,825	216,195	----------
MOUNT SHASTA	Alpine	135,000	135,000	----------
	Amador	200,000	110,000	----------
	Butte	740,000	450,000	----------
	Calaveras	50,000	50,000	----------
	El Dorado	887,000	644,000	----------
	Lake	12,000	12,000	----------
	Placer	25,000	25,000	----------
	Plumas	275,000	240,000	----------
	Shasta	766,500	612,500	----------
	Siskiyou	3,063,960	573,460	----------
	Tehama	461,300	421,300	----------
	Trinity	603,500	84,000	348,000
MOUNT WHITNEY	Fresno	78,224	36,065	----------
	Inyo	1,110,715	401,586	----------
	Madera	10,800	----------	----------
	Mono	1,289,857	61,097	----------
	Tulare	44,051	16,010	----------
MOUNTAIN HOME	Los Angeles	65,000	30,000	----------
	Riverside	7,000	7,000	----------
	San Bernardino	119,000	39,000	----------
	San Diego	3,000	3,000	----------
	Ventura	6,000	6,000	----------
PRAIRIE CREEK	Del Norte	329,007	----------	288,507
	Humboldt	834,918	----------	637,439
	Trinity	20,500	----------	20,500
RAINBOW ANGLING CLUB	Los Angeles	85,000	85,000	----------
	Riverside	43,000	43,000	----------
	San Bernardino	201,000	201,000	----------
	San Diego	6,000	6,000	----------
	Ventura	15,000	15,000	----------
SEQUOIA	Fresno	17,945	17,945	----------
	Tulare	4,015	4,015	----------
TAHOE	Alpine	20,000	----------	----------
	El Dorado	719,400	----------	----------
	Nevada	100,050	----------	----------
	Placer	550,400	----------	----------
	Sierra	68,000	----------	----------
TALLAC	El Dorado	1,055,360	1,055,360	----------
	Nevada	151,000	151,000	----------
	Placer	15,000	15,000	----------
YOSEMITE	Madera	37,300	37,300	----------
	Mariposa	1,153,700	581,000	----------
	Merced	4,500	----------	----------
	Tuolumne	321,600	156,500	----------
YUBA RIVER	Nevada	151,555	----------	----------
	Sierra	308,834	129,405	----------
Totals		38,127,413	14,560,447	3,668,954

AND GAME, RECORD OF FISH DISTRIBUTION—1940—Continued

Golden	Black Spotted	Cutthroat	Loch Leven	Eastern Brook	King Salmon	Silver Salmon	Miscellaneous	Miscellaneous	Total
			137,790	143,840					497,825
			60,000	30,000					
			275,000	15,000					
			110,000	133,000					
			35,000						
			154,000						
			292,000	238,500	1,960,000				
			40,000						
				171,500					7,219,260
				42,159					
50,340			405,352	253,437					
10,800									
18,050			699,647	511,063					
8,000			20,041						2,523,647
			35,000						
			80,000						
									200,000
						40,500			
					24,909	172,570			1,184,425
									350,000
									21,960
				20,000					
			86,900	632,500					
				100,050					
			213,700	336,700					
				68,000					1,457,850
									1,221,360
			500,300	72,400					
			4,500						
			122,900	42,200					1,517,100
			129,535	22,020					
			35,843	143,586					460,389
87,190	628,890		6,840,694	5,393,157	6,585,744	362,337			38,127,413

DEPARTMENT OF NATURAL RESOURCES, DIVISION OF FISH AND GAME, RECORD OF FISH DISTRIBUTION

RECAPITULATION—1941

TROUT

Rainbow	13,182,439
Steelhead	3,781,781
Black Spotted	803,834
Loch Leven	4,890,332
Eastern Brook	4,143,302
Total	26,801,688

SALMON

King	7,424,728
Silver	93,045
Kokanee	67,365
Total	7,585,138

SPINY RAYED

Smallmouth Black Bass	105,892
Kentucky Bass	4,684
Sacramento Perch	51
Total	110,627

GENERAL FISH RESCUE

TROUT

Rainbow	4,226
Steelhead	465,030
Cuttbroat	79
Loch Leven	54
Eastern Brook	2,584
Total	471,973

SALMON

King	38,785
Silver	11,915
Total	50,700

SPINY RAYED

Smallmouth Black Bass	365,151
Largemouth Black Bass	2,321,873
Striped Bass	9,367
Shad	2,000
Sacramento Perch	86,845
Crappie	336,830
Squaretail Catfish	1,054,507
Forkedtail Catfish	662,154
Bluegill Sunfish	766,577
Green Sunfish	921,574
Warmouth Bass	185,349
Hardheads	32
Sturgeon	5
Gambusia	1,000
Total	6,713,264

DEPARTMENT OF NATURAL RESOURCES, DIVISION OF FISH

Hatchery	County	Total from county by hatchery	Rainbow	Steelhead
ALPINE	Alpine	993,978	86,644	
ARROWHEAD LAKE	Los Angeles	70,000	15,000	
	Orange	5,000	5,000	
	Riverside	42,000	12,000	
	San Bernardino	113,400	38,400	
	San Diego	43,000	43,000	
BASIN CREEK	Alpine	51,000	25,000	
	Amador	90,245	22,880	
	Calaveras	422,325	287,860	
	Tuolumne	876,080	601,300	
BEAR RIVER PLANTING BASE	Nevada	1,202,670	464,416	
	Placer	537,859	363,451	
	Sierra	60,816	60,816	
BROOKDALE	Marin	59,988	59,988	
	Monterey	130,520	36,469	94,051
	San Benito	10,080	10,080	
	San Luis Obispo	10,876	10,876	
	San Mateo	96,563	11,088	85,555
	Santa Clara	33,180	33,180	
	Santa Cruz	370,433	26,983	328,765
	Solano	15,000	15,000	
BURNEY CREEK	Lassen	227,000	207,000	
	Modoc	470,000	319,000	
	Shasta	1,251,900	972,900	
	Siskiyou	47,000		
EXPERIMENTAL	Shasta	14,630	14,630	
	Siskiyou	14,890	7,880	
FALL CREEK	Siskiyou	6,379,600		1,403,600
FEATHER RIVER	Plumas	690,289	333,729	
	Sierra	220,635	90,435	
FERN CREEK	Madera	82,076	82,076	
	Mono	49,777	34,577	
FILLMORE	Los Angeles	54,073	54,073	
	San Bernardino	4,126	4,126	
	San Diego	10,000	10,000	
	Santa Barbara	3,342	3,342	
	Ventura	22,723	22,723	
FORT SEWARD	Humboldt	802,408		227,680
	Mendocino	167,320		167,320
	Trinity	63,510		63,510
HOT CREEK	Inyo	92,500	85,500	
	Madera	46,000	46,000	
	Mono	636,458	543,873	
HUMBOLDT STATE COLLEGE	Humboldt	6,240		
HUNTINGTON LAKE	Fresno	191,097	115,515	
KAWEAH	Tulare	900,975	495,650	
KERN	Kern	45,700	23,151	
	Tulare	197,349	176,580	
KINGS RIVER	Fresno	961,892	640,570	
LAKE ALMANOR	Butte	15,000		
	Lassen	338,600	240,700	
	Modoc	1,600	1,600	
	Plumas	827,400	652,900	
	Shasta	88,200	58,200	
	Tehama	55,000	15,000	
MADERA	Madera	467,759	197,410	

AND GAME, RECORD OF FISH DISTRIBUTION—1941

Golden	Black Spotted	Cutthroat	Loch Leven	Eastern Brook	King Salmon	Silver Salmon	Kokanee Salmon	Miscellaneous	Total
	803,834			103,500					993,978
			55,000						
			30,000						
			75,000						
									273,400
				26,000					
							67,365		
			134,465						
			154,500	120,280					1,439,050
			425,234	313,020					
			107,593	66,815					
									1,801,345
						14,685			
									726,640
			20,000						
			100,000	51,000					
			177,000	102,000					
				47,000					1,995,900
				7,010					29,520
					4,976,000				6,379,600
			181,900	174,660					
			55,000	75,200					910,924
			15,200						131,853
									94,264
					574,728				
									1,033,238
				7,000					
				92,585					774,958
						6,240			6,240
				75,582					191,097
			233,600	171,725					900,975
			22,549						
			20,769						243,049
			181,659	139,663					961,892
				15,000					
			40,200	57,700					
			123,500	51,000					
			4,000	26,000					
				40,000					1,325,800
			128,930	141,419					467,759

DEPARTMENT OF NATURAL RESOURCES, DIVISION OF FISH

Hatchery	County	Total from county hatchery	Rainbow	Steelhead
MOUNT SHASTA	Alpine	84,500	77,000	----------
	Amador	226,200	173,000	----------
	Butte	619,000	366,000	----------
	El Dorado	604,000	390,000	----------
	Humboldt	7,200	----------	----------
	Plumas	105,000	60,000	----------
	Shasta	432,600	287,600	----------
	Siskiyou	2,882,100	639,200	----------
	Tehama	314,000	209,000	----------
	Trinity	739,700	55,400	513,000
MOUNT SHASTA—brood	Modoc	3,767	----------	----------
	Shasta	12,095	11,285	----------
	Siskiyou	52,849	30,618	----------
MOUNT WHITNEY	Fresno	100,415	67,410	----------
	Inyo	710,864	280,468	----------
	Mono	1,032,247	50,605	----------
	Tulare	41,054	16,022	----------
MOUNT WHITNEY—brood	Inyo	7,235	7,235	----------
PLASKETT MEADOWS	Glenn	38,000	38,000	----------
	Lake	20,000	20,000	----------
PRAIRIE CREEK	Del Norte	237,990	----------	218,990
	Humboldt	702,090	----------	648,970
	Trinity	30,340	----------	30,340
REARING RESERVOIRS	Los Angeles	69,536	62,636	----------
	Orange	1,700	1,700	----------
	Riverside	13,850	13,850	----------
	San Bernardino	121,499	121,499	----------
	San Diego	200	200	----------
	Santa Barbara	67	67	----------
SEQUOIA	Fresno	45,874	45,874	----------
	Tulare	46,286	46,286	----------
TAHOE	El Dorado	841,000	221,000	----------
	Nevada	65,770	----------	----------
	Placer	549,710	107,150	----------
	Sierra	56,150	----------	----------
TALLAC	El Dorado	1,020,410	1,020,410	----------
	Nevada	153,000	153,000	----------
YOSEMITE	Madera	17,800	12,300	----------
	Mariposa	781,900	433,800	----------
	Tuolumne	350,100	313,300	----------
YUBA RIVER	Nevada	91,142	----------	----------
	Sierra	466,242	172,033	----------
	Yuba	9,262	----------	----------
Totals		34,386,826	13,182,439	3,781,781

AND GAME, RECORD OF FISH DISTRIBUTION—1941—Continued

Golden	Black Spotted	Cutthroat	Loch Leven	Eastern Brook	King Salmon	Silver Salmon	Kokanee Salmon	Miscellaneous	Total
				7,500					
			40,000	13,200					
			245,000	8,000					
			170,000	44,000					
				7,200					
			45,000						
			140,000	5,000					
			167,000	201,900	1,874,000				
			105,000						
				171,300					6,014,300
			3,767						
			810						
			22,231						68,711
				33,005					
			289,134	141,262					
			525,697	455,945					
			25,032						1,884,580
									7,235
									58,000
						19,000			
						53,120			
									970,420
			6,900						
									206,852
									92,160
			32,000	588,000					
				65,770					
			268,060	174,500					
				56,150					1,512,630
									1,173,410
				5,500					
			348,100						
			36,800						1,149,800
			57,083	34,059					
			76,619	217,590					
				9,262					566,646
	803,834		4,890,332	4,143,302	7,424,728	93,045	67,365		34,386,826

SIZES AND NUMBERS OF TROUT AND SALMON REARED AND PLANTED, 1940

All fish counted by weight and sizes calculated from length-weight curves

Length, in inches	Rainbow	Steelhead	Black-spotted	Eastern brook	Loch Leven	Golden	Salmon	All species
1.00	157,992				80,000			237,992
1.25	1,378,887	124,000	50,000	52,000	1,023,475	87,190		2,715,552
1.50	5,862,318	2,819,253	419,050	1,566,102	2,775,949		4,486,980	17,929,652
1.75	4,014,093	498,626	159,840	1,839,893	2,474,178		1,626,234	10,612,864
2.00	578,739	23,040		636,652	259,133		81,017	1,578,581
2.25	534,297	79,045		780,006	85,000		53,650	1,531,998
2.50	511,033	13,860		269,100	112,913		700,200	1,607,106
2.75	323,178	12,310		65,970	20,288			421,746
3.00	31,205			18,536	8,650			58,391
3.25	91,513			17,300	1,108			109,921
3.50	210,980	65,540		28,406				304,926
3.75	116,142							116,142
4.00	82,975	11,280		24,410				118,665
4.25	183,406	19,000		18,590				220,996
4.50	157,980							157,980
4.75	86,968			42,400				129,368
5.00	128,601			33,792				162,393
5.25	3,000							3,000
5.50	3,840							3,840
5.75	14,520							14,520
6.00	88,780							88,780
Total number	14,560,447	*3,665,954	628,890	5,393,157	6,840 694	87,190	6,948,081	*38,124,413
Total wgt., pounds	75,727	8,441	960	21,265	12,894	69	14,592	133,948

* Total distribution included 3,000 eyed eggs not shown in this total.

SIZES AND NUMBERS OF TROUT AND SALMON REARED AND PLANTED, 1941

All fish counted by weight and sizes calculated from length-weight curves

Length in inches	Rainbow	Steelhead	Black-spotted	Eastern brook	Loch Leven	Salmon	All species
1.00	210,000	136,540	288,120		55,100		689,760
1.25	476,181	1,209,304	214,520		325,787		2,225,792
1.50	3,067,408	1,893,313	301,194	837,591	3,233,764	5,513,000	14,846,270
1.75	5,556,081	279,409		1,216,947	964,593	1,934,933	9,951,963
2.00	665,749	172,588		501,738	85,696	78,920	1,504,691
2.25	925,836	12,800		1,052,234	101,626	25,200	2,117,696
2.50	428,031	54,765		236,863	65,445	33,085	818,189
2.75	170,240			188,309	31,513		390,062
3.00	157,029			4,035			161,064
3.25	163,102			6,000	12,950		182,052
3.50	63,411			16,435			79,846
3.75	63,724			83,150			146,874
4.00	125,932	23,062			7,286		156,280
4.25	198,882						198,882
4.50	346,776						346,776
4.75	190,994						190,994
5.00	195,473						195,473
5.25	23,980						23,980
5.50	18,345						18,345
5.75	44,085						44,085
6.00	32,971						32,971
6.25							
6.50	21,990						21,990
6.75							
7.00	9,631						9,631
7.25	5,480				3,767		9,247
7.50							
7.75							
8.00	8,105						8,105
8.25	266						266
8.50	4,113						4,113
8.75	8,387						8,387
9.00							
9.25							
9.50							
9.75	17						17
10.00 and over	220				2,805		3,025
Total number	13,182,439	3,781,781	803,834	4,143,302	4,890,332	7,585,138	34,386,826
Total weight, pounds	111,660	10,856	576	16,049	14,834	13,672	167,647

PREDATORY ANIMAL CATCH BY COUNTIES

County	July 1, 1940, to June 30, 1941				July 1, 1941, to June 30, 1942				Total for biennium
	Coyote	Bobcat	Other predators	Total	Coyote	Bobcat	Other predators	Total	
Amador	28	6	3	37	34	6	45	85	122
El Dorado	42	12	23	77	24		22	46	123
Fresno	115	9	78	202	84	12		96	298
Glenn		4	452	456	2	2	4	8	464
Inyo	118	11	6	135	38	4	75	117	252
Kern	192	29	21	242	265	35	31	331	573
Lassen	95	4	30	129	1			1	130
Los Angeles	201	123	91	415	341	146	94	581	996
Madera	44	8	58	110	9	2	25	36	146
Marin						4	7	11	11
Mariposa	105	24	209	338	105	15	63	183	521
Modoc	9	1	5	15	115	5	70	190	205
Mono	94	6	10	110	103	7	17	127	237
Monterey	417	232	385	1,034	215	156	120	491	1,525
Nevada	80	11	255	346	62	6	194	262	608
Orange	52	50	92	194					194
Riverside	44	15	22	81	163	62	130	355	436
San Benito	183	92	37	312	139	104	73	316	628
San Bernardino	164	12	28	204	9	3	4	16	220
San Diego	127	38	155	320	247	89	285	621	941
San Luis Obispo	82	41	55	178	112	68	101	281	459
Santa Barbara	511	144	165	820	473	87	137	697	1,517
Santa Clara	29	25	46	100	14	10	21	45	145
Santa Cruz	7	5	7	19	42	52	117	211	230
Shasta	63	27	193	283	161	18	97	276	559
Siskiyou	68	10	74	152	68	19	93	180	332
Stanislaus	73	37	56	166	72	35	52	159	325
Trinity	39	6	13	58	101	39	49	189	247
Tulare	54	13	107	174	63	7	74	144	318
Tuolumne	60	4		64	47	7	22	76	140
Ventura	97	18	20	135	175	39	91	305	440
Totals	3,193	1,017	2,696	6,906	3,284	1,039	2,113	6,436	13,342

	1940-41	*1941-42*
Average number of trappers	21	23
Miles of trapline	279,135	263,999
Number of sets	315,413	323,329
Number of days	5,931	6,934

LEADING COUNTIES IN GAME TAKE, 1940-1941

	Quail		Doves		Ducks		Geese		Pheasants		Pigeons	
	1940	1941	1940	1941	1940	1941	1940	1941	1940	1941	1940	1941
Alameda					68,750	55,648						
Amador											6,833	1,199
Butte					60,938	67,729	12,647	13,062	19,457	28,227		
Colusa					110,768	140,717	22,026	24,147	15,646	27,154		
Contra Costa					55,887	43,340						
Fresno	62,926	64,148	143,655	119,549								
Glenn					44,618	62,947	11,571	15,575	18,907	26,438		
Humboldt	36,477	29,437										
Imperial	34,603	38,957	158,524	155,208	43,565	35,825						
Kern	118,882	99,398	113,233	90,433	41,207	55,985					1,397	30,062
Kings			30,681	28,924								
Lassen							8,666	5,937	2,120	5,175		
Los Angeles	62,713	52,175	79,144	74,801							2,576	5,006
Mendocino											3,149	1,050
Merced			61,087	46,561	154,413	174,218	8,718	7,473	6,804	10,684		
Modoc					42,160	45,743	20,551	27,871	3,303	5,616		
Monterey	37,400	27,431									29,397	24,420
Riverside	92,668	80,002	76,938	59,952							1,744	3,339
Sacramento			39,022	23,173					10,751	17,873		
San Bernardino	55,465	51,816	47,040	37,273								
San Diego	55,901	64,130	53,764	62,812	56,447	75,893					11,820	11,016
San Joaquin			53,271	38,397	53,391	59,084			5,937	7,372		
San Luis Obispo	36,141	37,980	50,447	42,423							15,112	1,740
San Mateo											3,130	1,591
Santa Cruz											6,934	7,283
Siskiyou	17,999	27,092			71,776	87,738	21,006	18,555	4,263	4,259		
Solano					129,008	108,076						
Sonoma	37,042	29,628										
Stanislaus			58,860	42,920					8,276	9,851		
Sutter					43,109	56,479	4,715	4,625	12,505	17,786		
Tulare	49,677	37,841	140,903	120,128								
Tuolumne											3,095	1,439
Ventura											1,176	16,001
Yolo					21,167	40,550	3,286	3,419	14,164	21,608		

ARRESTS AND CONVICTIONS
RECAPITULATION

	Number of arrests	Fines imposed	Jail sentences (days)
Fish cases, 1940-1941	1,900	$53,062 50	3,396
Game cases, 1940-1941	1,647	46,194 50	2,561½
Totals, 1940-1941	3,547	$99,257 00	5,957½
Fish cases, 1941-1942	1,772	$47,940 00	5,580
Game cases, 1941-1942	1,943	55,394 46	3,710
Totals, 1941-1942	3,715	$103,334 46	9,290
Recapitulation—			
1940-1941	3,547	$99,257 00	5,957½
1941-1942	3,715	103,334 46	9,290
Totals	7,262	$202,591 46	15,247½

TOTAL ARRESTS FOR A PERIOD OF FORTY 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
1938-1940	7,444
1940-1942	7,262

RECORD OF MOUNTAIN LION BOUNTIES PAID BY DIVISION OF FISH AND GAM

1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930
								1							
1									1	1					
	1						2			1	1	1	1	3	4
		1		2			1			1	1	1	1	2	
3				2		3		1	2	1	2	4	9	3	
1			3			1	2	1	2	2	5	2	2	4	9
2	9	4	2	5	1	3	4	2	8	6	4	9	5	8	2
	2	1	1	8	6	14	7	3	3	4	13	17	5	7	15
1	1	4	3	4	2	6	2	3	10	2	4	12	7		6
		1	3	3	3	3	10	1	4	1	2	1	10	2	15
26	39	29	22	8	19	16	14	10	11	13	13	15	10	21	22
1					1										
3	1			1		1		4	4				1		1
15	18	17	10	15	12	8	17	22	21	14	20	14	20	3	9
		1													
8	2	5	11	9	11	10	21	21	12	17	22	9	27	28	19
				1		2									
5	1	7	8	9	12	7	5	3	4	3	3	3	11	22	13
10	1	2	5	1	1			1	2	2	1	1	2	1	1
2	14	13	12	5	4	6	7	5			13	3	7	4	2
7	7	15	18	22	13	15	22	9	15	30	20	14	32	13	16
					1	1				1				1	
			1						1						
	5				1	2	1		1	2	1		2		
8	6	12	12	19	12	7	16	17	30	23	26	23	37	34	27
	2		2						1				1		
		2	2	1											
1	4	2	2	3	9	13		5			6	3	1	6	
		1					1								1
	3	4	4	5	6	8		2	2	3	3		4	2	2
				1											
2	5	1	2	1	2	2	2	3	2	1	3	1	1	1	
1		1	5	3	6	2	4	3	4	10	5	5	7	4	7
1	1	3	4	5	4	2		1	5	5	3	10	7	34	5
2															
10	3	9	3	6	9	12	13	10	8	5	5	8	7	4	10
4	6	3	6	19	5	15	26	13	11	5	11	14	13	17	20
1	4	2	3	2	2	4	1	11	4	3	3		3	2	2
				1				2							
7	10	11	26	30	8	8	37	16	16	17	11	13	15	16	19
														1	1
9	9	7	1		2	9	14	5	6	3	3	16	8	8	2
	1	4	2	1	2		1					1	1		
1		3	1	1		1				3			3	1	
				1											
4	1	3	6	3	17	18	14	4	14	2	5	6	9	11	6
4	3	2	12	14	13	21	19	11	16	15	11	4	33	28	36
8	8	4	11	17	23	17	22	15	45	9	4	12	16	9	10
7	11	6	9	12	4	15	13	11	4	1	11	2	7	2	5
7	1	8	2	2	8	4	1	8	15	15	14	17	2	6	4
				1				1	1	4			5	1	1
162	179	188	214	243	219	256	299	225	285	225	249	241	332	309	292

E

1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941	Total	County
------	1	2	------	1	------	------	------	------	1	------	7	Alameda
------	------	------	------	------	------	------	------	------	------	------	3	Alpine
------	2	1	------	1	------	------	------	------	------	------	26	Amador
1	3	1	3	4	2	1	------	4	1	------	60	Butte
------	9	1	4	------	2	2	1	1	3	1	62	Calaveras
8	8	------	4	4	------	1	------	1	2	------	75	Colusa
------	------	------	------	------	------	------	------	------	------	------	------	Contra Costa
4	8	3	1	4	4	6	11	7	8	5	210	Del Norte
8	10	5	13	3	3	8	------	2	6	3	203	El Dorado
12	4	2	4	------	4	3	6	16	2	7	137	Fresno
11	18	9	5	7	8	9	11	7	5	7	192	Glenn
13	19	29	22	28	19	24	25	28	16	22	973	Humboldt
------	------	------	------	------	------	------	------	------	------	------	2	Imperial
------	------	------	------	------	------	------	------	1	3	------	22	Inyo
15	7	6	6	4	5	5	12	5	2	10	371	Kern
------	------	------	------	------	------	------	------	------	------	------	1	Kings
18	21	11	11	13	13	12	15	10	8	12	447	Lake
------	------	1	2	------	------	------	------	------	------	------	12	Lassen
------	4	1	3	2	3	8	5	6	5	3	175	Los Angeles
1	------	------	8	3	1	2	4	3	4	12	89	Madera
1	------	1	------	------	------	------	------	------	1	------	3	Marin
1	------	1	3	------	------	------	1	4	------	------	138	Mariposa
9	24	21	5	13	4	12	16	21	11	31	585	Mendocino
------	------	------	------	------	------	------	------	------	------	------	5	Merced
------	------	------	------	------	------	------	------	------	------	------	5	Modoc
------	------	1	------	------	------	------	------	------	------	------	18	Mono
16	23	3	2	19	8	17	11	19	14	16	505	Monterey
------	------	------	------	------	------	------	1	------	------	------	4	Napa
3	1	4	6	1	------	1	1	5	------	1	32	Nevada
------	2	------	------	------	2	------	------	------	5	------	18	Orange
3	2	9	1	5	3	------	7	4	2	------	116	Placer
2	1	------	3	1	------	------	------	------	1	------	19	Plumas
1	2	7	6	8	1	2	3	------	3	2	96	Riverside
------	------	------	------	------	------	------	------	------	------	------	1	Sacramento
1	2	3	2	------	------	------	1	------	------	------	60	San Benito
1	5	7	8	2	7	4	4	15	8	6	147	San Bernardino
14	13	5	12	12	12	14	4	11	10	6	230	San Diego
------	------	------	------	------	------	------	------	------	------	------	------	San Francisco
------	------	------	------	------	------	------	------	------	------	------	2	San Joaquin
8	5	7	------	1	1	2	4	5	4	5	209	San Luis Obispo
------	------	------	------	------	------	------	------	------	------	------	1	San Mateo
25	26	17	14	20	7	5	11	11	18	5	408	Santa Barbara
1	7	7	6	13	3	2	5	1	4	1	104	Santa Clara
------	------	------	------	------	------	------	------	------	------	------	4	Santa Cruz
15	26	29	20	22	3	18	8	11	8	7	604	Shasta
3	3	4	2	12	1	------	------	------	------	2	35	Sierra
15	3	3	7	12	20	18	18	22	12	31	478	Siskiyou
------	------	------	------	------	------	------	------	------	------	------	------	Solano
------	1	1	1	------	------	------	------	------	------	------	30	Sonoma
------	3	1	1	------	------	------	3	------	------	------	25	Stanislaus
16	10	21	7	9	8	6	10	9	3	4	368	Tehama
40	31	26	12	18	18	29	28	50	38	24	781	Trinity
17	8	11	4	7	9	8	15	13	17	12	398	Tulare
1	6	------	3	5	4	3	1	------	1	6	180	Tuolumne
8	1	2	1	1	2	1	9	------	2	2	163	Ventura
------	1	------	------	------	------	------	------	------	------	------	1	Yolo
1	5	6	3	------	------	1	2	------	------	------	35	Yuba
293	325	269	215	255	177	224	253	292	228	243	8,877	Totals

SEIZURES OF FISH AND GAME

Fish	July 1, 1940, to June 30, 1941	July 1, 1941, to June 30, 1942	Total
Abalones	179		179
Abalones, green	25	246	271
Abalones, red	490	67	557
Abalones, black	304	168	472
Abalones, pink		56	56
Abalones, pounds	60		60
Albacore, pounds		300	300
Assorted fish, pounds	375		375
Barracuda		59	59
Barracuda, pounds	6,255		6,255
Bass	36	21	57
Bass, pounds	2	740	742
Bass, black	39	89	128
Bass, black, pounds	10		10
Bass, calico	9		9
Bass, striped	414	225	639
Bass, striped, pounds	3		3
Bass, traps		2	2
Bass, white sea, pounds	1,303		1,303
Bass, rock		23	23
Bass, largemouth	2		2
Bonito, pounds	100		100
Carp	7	1	8
Carp, pounds	27		27
Catfish	113	80	193
Catfish, pounds	355	283	638
Clams, Fismo	3,010	693	3,703
Clams, Washington	64	45	109
Clams, Razor, sacks	10		10
Clams, pounds	653		653
Clams, Jacknife		1	1
Cockles	7,690	4,492	12,182
Cockles, pounds	125		125
Corbina		7	7
Crabs	22	18	40
Crappie	76	85	161
Crappie, pounds	5	20	25
Croakers, spotfin		44	44
Croakers, spotfin, pounds		4	4
Fish traps		9	9
Devil fish	2		2
Frogs		14	14
Frog legs, pounds	16		16
Fyke net	4		4
Halibut		6	6
Halibut, pounds	506	375	881
Lobsters	1,581	125	1,706
Lobster, traps	37	63	100
Lobsters, spiney		202	202
Lobsters, spiney, pounds		267	267
Mullet, pounds		370	370
Mussels, pounds	400		400
Oysters, pounds	400		400
Perch	97	69	166
Salmon	447	77	524
Salmon, silver, pounds	20	26	46
Salmon, pounds		100	100
Salmon, king, pounds		1,500	1,500
Sardines		10	10
Sardines, pounds		52,220	52,220
Scallops		1,500	1,500
Set lines		8	8
Skipjack, pounds		46,612	46,612
Sunfish		299	299
Sunfish, bluegill	209	279	488
Sunfish, bluegill, pounds	2	12	14
Sunfish, green	66		66
Shark livers, blue, pounds		15	15
Shark livers, soupfin, pounds		237	237
Throw nets		2	2
Trout	222	315	537
Trout, pounds	43¼		43¼
Trout, Rainbow	249	394	643
Trout, Eastern Brook	45		45
Trout, Steelhead	204	23	227
Trout, Loch Leven	7	1	8
Tuna, pounds		5,293	5,293
Tuna, bluefin, pounds	431	3,000	3,431
Tuna, yellowfin, pounds	470	380,459	380,929
Yellowtail, pounds	6,803	12	6,815

SEIZURES OF FISH AND GAME—Continued

Game	July 1, 1940, to June 30, 1941	July 1, 1941, to June 30, 1942	Total
Antelope		2	2
Antelope, pounds		80	80
Avocet	1	2	3
Beaver pelts		4	4
Bear, head		1	1
Bear, steaks	4		4
Bear, hide		1	1
Bittern		3	3
Coot	1	28	29
Cranes, longbill		3	3
Curlew	1	4	5
Deer	8	35	43
Deer, doe	5		5
Deer, forked horn	1		1
Deer, spotted fawn	1		1
Deer meat, pounds	7,940½	9,153	17,093
Deer, hides	5	5	10
Deer, head		1	1
Deer, spike buck	7		7
Doves	879	407	1,286
Dowitchers	3		3
Ducks	898	672	1,570
Ducks, mallard	28		28
Duck, scoters	5		5
Ducks, sprig	62		62
Ducks, wood	22		22
Finch	1		1
Flycatchers		3	3
Frogs	11		11
Geese	67	87	154
Goldfinch		1	1
Grebe	2	5	7
Ibis		3	3
Kingfisher	1		1
Jacksnipe		1	1
Lark	1		1
Loon		1	1
Meadowlark	4	6	10
Mudhens	7	6	13
Mocking bird	2		2
Muskrat pelts	76		76
Non-game birds	7		7
Pheasants	166	594	760
Pheasants, Chinese	6		6
Phalaropes	8		8
Pigeons	33	64	97
Plover		7	7
Quail	27	574	601
Quail, Mountain	1		1
Quail, Valley	21		21
Quail, Desert	18		18
Rabbits	18	1	19
Rabbits, brush	6	39	45
Rabbits, cottontail	46	232	278
Rabbits, jack	10	6	16
Roadrunners	1		1
Robins	9	17	26
Sagehens	37	13	50
Sandhill crane	1	2	3
Sierra Hare		1	1
Sandpipers	9	1	10
Sea Scoters	1		1
Sparrows		9	9
Squirrels, tree	5	1	6
Squirrels, grey	1	2	3
Stilts	2		2
Swan	3		3
Tern		1	1
Thrush		1	1
Willits	5		5
Willits, western		2	2
Woodpecker	1		1
Yellowlegs	3	1	4
Yellowhammer		5	5

FISH CASES

Offense	July 1, 1940, to June 30, 1941			July 1, 1941, to June 30, 1942		
	Arrests	Fines	Jail	Arrests	Fines	Jail
Abalones: Taking undersize red, overlimit, take from shells below high water mark, no license, closed season, overlimit black, pink and green	138	$3,372 50	120½	117	$2,360 00	5
Albacore: Selling undersize				1	50 00	
Alien purchasing and using citizen's license				1	150 00	
Angling: No license, closed district, fail to wear license in visible position, fail to show license on demand, closed waters, overlimit, making false statement to obtain license, fish with more than one rod and line, angling with more than two rods, within 150 feet lower side of dam, transferring license, at night, with set line, use another's license, closed season, closed area, alien using citizen's angling license	321	4,114 00	281½	335	4,536 00	65
Barracuda: No license, overlimit	14	280 00	87½			
Bass: Taking striped bass after sunset, undersize, selling striped bass, no license, take with more than one rod and line, black bass, no license, closed season, at night, with nets, take white sea bass with round haul net	145	2,588 50	119½	248	4,244 50	412
Bass, black: No license, undersize, overlimit	12	80 00	87½			
Bass, sea: Undersize, overlimit	3	50 00				
Bass, striped: No license, at night, undersize, with 2 rods, with nets	201	3,702 50	537			
Catfish: Closed season, undersize, offering for sale, no license, overlimit	28	1,461 00	187	14	402 50	
Clams: Taking jackknife clams, no license, undersize, Pismo clams, overlimit, razor clams, closed season, District 9, undersize cockle clams, overlimit Washington clams, fail to keep records of clams bought from diggers, no license	198	3,887 50	194½	174	3,202 50	1,008
Cockles, rock: No license	3	15 00				
Commercial fishing: No license, fail to register commercial fishing boat	205	2,550 00	331½	88	935 00	357½
Crabs: Closed season, undersized	11	305 00		7	175 00	37
Crab traps: Illegally used				1	100 00	
Crappie: Overlimit, closed season, no license	16	285 00		12	187 00	180
Croaker, spotfin	1	5 00		2	110 00	
Crustaceans: Fail to show on demand				1	10 00	
Dip net: Take fish with baited dip net	1	25 00				
Diver net: No buoys				1	25 00	
Drag net	5	200 00				
Explosives: Use to take fish in the Pit River	6	100 00	100			
Fail to apply for Fish and Game plates to replace lost ones, fail to keep records of registration plates				2	25 00	
Fail to apply for identification cards				4	60 00	12½
Fail to keep catch records, receipts	3	100 00		4	25 00	
Fail to show license on demand and fish	2	35 00		4	40 00	
Fail to register commercial fishing boat				2		
Fishing: 150 feet of dam, within 2 miles of the mouth of Blue Lake, within 300 feet of the mouth of WoodCreek, within 150 feet lower side of a dam	22	347 50		2	50 00	
Fish trap: In the waters of Latham Slough	2	35 00				
Fishway: Fish in upper end	1					
Frogs: Taking undersized, overlimit	3	50 00		3	100 00	
Fyke nets: Meshes less than 2½ inches	12	500 00	50			
Gaff: Within 300 feet of a stream, possess at Woodbridge Dam, Mokelumne River				10	247 50	
Gill net: With meshes over 1¾ inches in length, in District 2, in tidewater at Klamath River, use to take flying fish, in District 1½, with mesh over 1¾ inches in size, before sunrise and set net in District 19A, closed district, use in District 21 for taking yellowfin croaker	22	1,450 00	780	16	850 00	
Halibut: Undersized, no license	1	25 00		3	5 00	10
License: Alien purchase of citizen license, predated license, false statement in procuring license				6	135 00	
Lobsters: Closed season, undersized, oversized	24	265 00	50	34	450 00	40
Lobster traps: Illegally used				2	335 00	
Minnows: Use illegal net, seine over 6 feet long, in District 2, using for bait, selling, no license	1	10 00		5	65 00	
Mussels: Take in San Diego Marine Life Refuge	1	25 00				
Net: Operate in closed area, unlawful use of in District 19A, possess throw net in closed area, round haul net in District 20, operate in Eel River	6	425 00		24	1,850 00	
Night fishing	2	50 00		9	95 00	30
Obstruction: Placing in a stream	1	100 00				
Oysters: Take from beds without permission	2	75 00				

FISH CASES—Continued

Offense	July 1, 1940, to June 30, 1941			July 1, 1941, to June 30, 1942		
	Arrests	Fines	Jail	Arrests	Fines	Jail
Operating drag boat in District 118.5				2	$300 00	
Operate net to take fish	3	$5 00				
Operate party boat, no permit, no plates	1			3	10 00	
Paranzella net: Operate inside of three mile limit				9	1,100 00	
Perch: No license, closed season, overlimit	8	127 50	12½	4	110 00	
Pollution	84	15,500 00		90	12,750 00	
Purse seine net: Illegal use in closed district, in District 118.5	21	1,975 00		12	800 00	
Refuge: Take fish in refuge	1	10 00				
Refuse to show fish on demand	5	20 00				
Round haul net				34	1,425 00	
Salmon: No license, overlimit, take within 250 feet of the lower side of dam, overlimit in District 11, closed stream, salmon gaff within 300 feet of stream, take with rifle, closed season, spear, take other than with hook and line, closed area	120	2,595 00	124½	48	1,260 50	24
Sardines: Reduction with no permit				1	25 00	
Scallops: Undersized, no license				4	45 00	
Seine: Beach in District 1, closed area				5	220 00	
Set lines: In District 12, in District 1, in Whiskey Slough, in District 4¾	22	425 00	171	1	5 00	
Shark liver and no carcass on boat				4		
Steelhead: No license	10	240 00	100			
Spear: Possession in Cosumnes River within 300 feet of stream, 200 feet of stream	21	200 00	40	12	255 00	
Sturgeon				4	75 00	10
Sunfish: Closed season, no license, bluegill sunfish, during closed season, green	50	634 00	85	45	1,370 00	10
Taking fish in a closed area with ring net	18	1,600 00				
Throw net				1	100 00	
Trammel net in closed area	2			2	300 00	
Trolling with 2 lures on one line	2	25 00				
Transfer of license				1	10 00	
Trout: Using 2 rods to take trout, taking trout within 300 feet of the mouth of a stream, overlimit taking trout with more than two attractors, night fishing, no license, 2 poles and set line, closed season, within 2 mile limit on Blackwood Creek, closed area, closed stream, take by explosives, take from rearing ponds, clubbing, take with snag hook	116	2,277 50	20	118	2,371 00	5
Tuna: Undersized, yellowfin tuna, selling, no commercial license, taking bluefin tuna with purse seine nets, closed area, offering undersized yellowfin tuna and skipjack for sale	2	900 00		88	2,485 00	180
Wasting fish				2	50 00	50
Yellowtail: On boat carrying round haul net	1	25 00		10		
Totals	1,900	$53,062 50	3,396	1,772	$47,940 00	5,580

GAME CASES

Offense	July 1, 1940, to June 30, 1941			July 1, 1941, to June 30, 1942		
	Arrests	Fines	Jail	Arrests	Fines	Jail
Antelope: Taking and possessing, hunting with no permit and killing female				7	$235 00	
Avocets: Possession	2	$20 00		3	75 00	
Bear: Closed season, illegally taken	8	160 00				
Beaver pelts	1			1	25 00	
Brant: Closed season	7	150 00				
Coots: Shooting from auto, shooting from motor boat, after four p.m.	2	35 00		3	55 00	
Cranes: Possession sandhill cranes	1		15	1	40 00	
Curlew: Closed season, no license	4	85 00		1	25 00	
Deer: Take at night, possess doe, closed season, female deer, deer in refuge, no deer tags, spotted fawn, spot-lighting, killing doe, fail to have deer tags validated, evidence of sex removed from hide, fail to fill out deer tags, spike buck, failure to retain horns, illegal venison, allow dogs to run and kill deer, hunt in refuge, sale of deer meat, fail to retain hide and horns, transporting deer meat, forked horn deer in District 1¾	358	13,639 00	2,757	418	17,435 46	2,039½
Deer meat: Closed season, doe meat, untagged female	103	3,110 00	1,015½	98	3,467 50	766
Deer tags: Fail to validate, no deer tags, not properly filled out, fail to have countersigned, defacing deer tags	47	1,175 50	95			
Doves: Closed season, no license, overlimit, shoot from auto, trapping doves	110	2,454 00	214	69	1,729 50	4
Ducks: Closed season, early shooting, no license, shoot from power boat, shooting after sunset, overlimit, shoot from auto, possess woodducks	192	7,032 50	130	222	5,852 50	30
Eggs: Illegally taken game bird eggs				1		12½
Firearms: In refuge, using roadsign as target	100	2,588 50	22½	130	3,065 00	
Frogs: Undersized	2	30 00				
Gallinules: Closed season				1	25 00	
Game birds: Bring into California without a permit, no license, shoot from power boat, sandpiper, no license	21	540 00				
Geese: Closed season, illegal possession, overlimit, before sunrise, shoot from auto, no license	44	1,120 00		57	1,307 50	
Grouse	2	35 00				
Hare: Possession Sierra Hare				1	50 00	
Hunting: No license, at night, with artificial light, false statement to secure license, in refuge, fail to show license on demand, hunting on posted land, transferring license, hunting at night, closed area	151	2,581 00	143	200	3,423 00	70½
Hunting Club: Operate without a license	2	10 00		1	20 00	
Jacksnipe: Killing in closed area				4	10 00	60
Light and gun: Possess in deer district	3					
Meadowlarks: Kill and possess, non-game birds	2	50 00		6	155 00	
Mudhens: Closed season, no license	6	75 00		16	335 00	
Muskrats: Closed season	2	50 00				
Night hunting	18	340 00	125			
Non-game birds	21	415 00		27	427 50	24
Pheasants: Closed season, no license, hen	202	5,428 00	745½	259	10,643 00	547
Pigeons: Closed season	18	485 00	90	14	210 00	20
Plover				2	50 00	
Quail: Closed season, no license, trapping valley quail	62	1,650 50	36	66	1,585 00	
Rabbits: Taking brush rabbits, closed season, cottontails, possession jackrabbits, no license, take with snare	67	688 50	36½	154	2,208 50	42½
Robins: No license	4	75 00		11	170 00	19
Sagehens: Bring illegally into the State	4	160 00		6	125 00	25
Shoot: Non-game birds from auto, from road, early shooting, after sunset, no gun plug, at night, in State Park, in refuge	55	835 00	12½	47	805 00	25
Shorebirds: Possession shooting bitterns, curlew, grebe	24	565 00	15	15	330 00	
Silencer: Possess and operate for taking wild game	1	300 00				
Snares: Take game birds with snares	7	37 50	75			
Sparrow	1	10 00				
Squirrels, tree and grey	6	110 00	50	3	125 00	25
Swan: Possession, shooting, taking whistling swan	3	75 00		2	50 00	
Trap: Interfere with trapper, on refuge, no permit, disturbing traps of a licensed trapper	9	110 00				
Trespass	2			3	45 00	
Waterfowl: Closed season, early shooting before sunrise	93	1,695 00		94	1,290 00	
Totals	1,647	$46,194 50	2,561½	1,943	$55,394 46	3,710

CALIFORNIA FRESH FISHERY PRODUCTS FOR YEAR 1940

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	348						48,238	133,234	701,492
Anchovy							13,775		37,440
Barracuda									
Bonito								11	3,941
Cabrilla									
Carp				753	3,069	5,915			
Catfish		16,498		231	88,646	46,255			
Cultus	237,672	149,102	221				235,604	15,440	51,707
Eels							7		
Flounder	193,277	5,093				14,845	566,206	16,055	8,421
Flying fish									
Grouper									
Hake	1,450	3,530					13,058		
Halibut, California		5,862	117				61,533	4,736	15,919
Halibut, Northern	236,937	11,292							
Hardhead					4,962				
Herring	34,003		356,400			236	56,850		3,595
Kingfish							16,510	30,083	92,083
Mackerel, Horse									110,267
Mackerel, Pacific							928	2,046	449,890
Mackerel, Spanish									
Mullet									
Perch	2,128		9,959				12,502	1,260	8,375
Pike				2	91	68			
Pompano								7	413
Rock Bass							114		
Rockfish	342,097	254,130	875				439,813	465,141	1,194,715
Sablefish	251,317	126,410	22				74,851	48,662	38,061
Salmon	2,989,171	434,506		188,546	335,123	996,665	1,112,473	217,835	395,389
Sand Dab	257,773	56,928					412,613	5,770	37,072
Sardine	765					12,353	231,347,041	104,988	363,010,413
Sculpin									

Sea Bass, Black									661
Sea Bass, Shortfin									
Sea Bass, White			3,399				23,322	128,518	4,803
Shad				49,386	14,126	1,664,171			
Shark	634,823	438,666	5,207			3,335	4,456,702	166,830	647,446
Sheepshead									
Skate	13,442	10,307					160,628	765	10,276
Skipjack									
Smelt	10,985	24,910	26,681			655	84,530	3,839	97,072
Sole	2,740,017	980,009					3,391,026	67,704	63,091
Splittail					1,611	10,507			
Sucker					106				
Swordfish, Broadbill									
Tom Cod	2,196					642	1,729		
Tuna, Bluefin									4,689
Tuna, Yellowfin									
Turbot	700		1,055				53,762	5,101	1,440
Whitebait	84,322	29,252					11,958		1,917
Whitefish									
Yellowtail									
Miscellaneous	88,083	26,193	13				74,922	624	819
Total fish	8,121,506	2,572,688	403,949	238,918	447,734	2,755,647	242,670,695	1,418,649	366,991,407
Crustaceans:									
Crab	1,858,104	2,884				44,614	3,212,756	5,574	21,058
Shrimp			53,638			144,772	881,780		2,361
Spiny Lobster									
Mollusks:									
Abalone									813,400
Clam, Hardshell			469						
Clam, Mixed	21,275	4,276	470						
Clam, Pismo								526	12,998
Clam, Softshell	314		49,118			13,803			
Mussel								100	
Octopus	222	2,702					5,557	266	17,333
Oyster, Eastern and Japanese			1,288,084						
Oyster, Native	9,360		15,164						
Squid									1,654,332
Snails							100		
Totals	10,010,781	2,582,550	1,810,892	238,918	447,734	2,958,836	246,770,888	1,425,115	369,512,889

CALIFORNIA FRESH FISHERY PRODUCTS FOR YEAR 1940—Continued

Species of fish	San Luis Obispo, Santa Barbara, Ventura	Los Angeles	Orange	San Diego	Total taken in state waters and off the coast of California	South of the International Boundary brought into Los Angeles	South of the International Boundary brought into San Diego.	Total landings in California, including fish from west coast south of the International Boundary brought in by boat
Albacore	1,108,308	1,264,530	27,278	601,008	3,884,436		880	3,885,316
Anchovy		4,583,491	1,668,336	14,755	6,317,797			6,317,797
Barracuda	127,125	1,407,032	477,523	533,700	2,545,380	1,064,934	86,969	3,697,283
Bonito	18,866	2,798,897	6,680	724,674	3,553,069	1,328,204	409,691	5,290,964
Cabrilla						17,541	73,038	90,579
Carp					9,737			9,737
Catfish					151,630			151,630
Cultus	786	596	28	143	691,299		311	691,610
Eels					7			7
Flounder	192				804,089			804,089
Flying Fish		37,056	653		37,709			37,709
Grouper						5,497	73,326	78,823
Hake		11			18,049			18,049
Halibut, California	398,921	184,007	117,694	132,742	921,531		86,549	1,008,080
Halibut, Northern	50				248,279			248,279
Hardhead					4,962			4,962
Herring	200			1,909	453,193			453,193
Kingfish	288	242,471	29,957	836	412,228			412,228
Mackerel, Horse	45	1,309,667	679	11,979	1,432,637			1,432,637
Mackerel, Pacific	341,104	96,912,147	19,149,202	3,648,295	120,503,612			120,503,612
Mackerel, Spanish						2,847	85	2,932
Mullet				2,004	2,004			2,004
Perch	1,028	20,090	591	2,093	58,026		355	58,381
Pike					161			161
Pompano	1,582	8,208	366	17	10,593		86	10,679
Rock Bass	55,469	48,164	74,048	61,715	239,510	1,298	4,694	245,502
Rockfish	301,239	276,809	60,803	146,891	3,482,513		87,465	3,569,978
Sablefish	183	21,667	12,612		573,785			573,785
Salmon		24			6,669,732			6,669,732
Sand Dab	55	8,242	590	35	779,078			779,078
Sardine	58,126	307,299,464	2,033,092	2,106,961	905,973,203		200	905,973,403
Sculpin	368	78,135	9,764	33,804	122,071		62	122,133

Sea Bass, Black	13,039	9,698	15,311	4,075	42,784	251,573	71,080	365,437
Sea Bass, Shortfin				356	356			356
Sea Bass, White	204,291	311,162	30,369	102,519	808,383	9,388	94,692	912,463
Shad					1,727,683			1,727,683
Shark	911,221	132,625	244,994	167,956	7,809,805	129	3,066	7,813,000
Sheepshead	36,566	12,696	3,776	2,711	55,749	650	5,518	61,917
Skate	34,648	4,895	2,878	448	238,287			238,287
Skipjack	299	452,572	66,804	2,646,336	3,166,011	23,558,552	29,925,592	56,650,155
Smelt	20,863	149,848	838	27,836	448,057		1,058	449,115
Sole	129,636	8,001	6,352	1,916	7,387,752			7,387,752
Splittail					12,118			12,118
Sucker					106			106
Swordfish, Broadbill	311,978	163,593	233,683	120,160	829,414	1,835	55,096	886,345
Tom Cod					4,567			4,567
Tuna, Bluefin	15,582	16,470,388	3,797	2,355,512	18,849,968	712,850	407,450	19,970,268
Tuna, Yellowfin		75,836	1,733	166,026	243,595	33,264,988	80,251,317	113,759,900
Turbot	3	63			62,124			62,124
Whitebait					127,449			127,449
Whitefish	36,782	5,338	4,438	1,007	47,565	705	11,336	59,606
Yellowtail	536	64,750	18,831	244,919	329,036	3,188,060	2,439,708	5,956,804
Miscellaneous	14,362	13,019	22,370	345	240,750	148	595	241,493
Total fish	4,143,741	434,375,192	24,326,070	13,865,683	1,102,331,879	63,409,199	114,090,219	1,279,831,297
Crustaceans:								
Crab		2,656	804		5,148,450			5,148,450
Shrimp					1,082,551			1,082,551
Spiny Lobster	94,091	106,569	24,994	55,448	281,102	47,722	767,997	1,096,821
Mollusks:								
Abalone	910,559		125		1,724,084			1,724,084
Clam, Hardshell		13,863	144		14,476			14,476
Clam, Mixed					26,021			26,021
Clam, Pismo	153,431				166,955			166,955
Clam, Softshell					63,235			63,235
Mussel					100			100
Octopus	48	253	199		26,580			26,580
Oyster, Eastern and Japanese	94,386				1,382,470			1,382,470
Oyster, Native					24,524			24,524
Squid		105,011	1,859	39,430	1,800,632			1,800,632
Snails		125			225			225
Totals	5,396,256	434,603,669	24,354,195	13,960,561	1,114,073,284	63,456,921	114,858,216	1,292,388,421

All amounts shown in pounds unless otherwise specified.

NOTE.—This record does not include albacore shipped in from Oregon and Washington, or fish imported from Japan, or the Gulf of California. This record is, as far as practicable, the catch made in or off the districts shown in the tables. Exceptions: Del Norte-Humboldt district, 108,512 pounds of fish of different varieties originated in waters off the coast of Oregon. Los Angeles district, 1,080,922 pounds of albacore originated in waters off the coast of Oregon and Washington. San Diego district, 471,582 pounds of albacore originated in waters off the coast of Oregon and Washington.

CANNED, CURED AND MANUFACTURED FISHERY PRODUCTS OF CALIFORNIA FOR THE YEAR OF 1940

Canned

Kind of fish or fishery product	Size of cans	San Francisco district, cases	Monterey district, cases	San Pedro district, cases	San Diego district, cases	Total cases
Albacore	4-lb., 12's			1,934	407	2,341
	1-lb.			12,196	1,079	13,275
	½-lb.		3,953	98,465	17,645	120,063
	¼-lb.			9,459	173	9,632
	¼-lb., 100's			430		430
Bonito	1-lb.			22,450	3,085	25,535
	½-lb.			36,637	14,136	50,773
	¼-lb.			11	1,001	1,012
	¼-lb., 100's			6,266	3,781	10,047
Mackerel	1-lb.			1,331,453	40,821	1,372,274
	½-lb.			5,904	127	6,031
	½-lb., 96's			56,101	636	56,737
Roe	½-lb., 96's				71	71
Sardine	No. 10 cans, 6's		10,939			10,939
	1-lb., oval	178,316	755,639	664,241		1,598,196
	1-lb., tall	52,877	196,318	398,960		648,155
	10 oz.	4,021				4,021
	½-lb., oval		3,497			3,497
	½-lb.			26,439		26,439
	½-lb., 96's	3,913	150,890	204,332		359,135
	½-lb., fillet		118,707			118,707
	½-lb., B & P		536			536
	½-lb., sq.		32,275			32,275
	6-oz., sq. 100's		27			27
	¼-lb., sq.				37	37
	¼-lb., sq. 100's		3,187	72		3,259
	¼-lb., paste		210			210
	5-oz., 100's	77,760	148,215	156,681		382,656
Shad	1-lb.	12,187				12,187
Shad Roe	1-lb.	100				100
	½-lb.	3,556				3,556
Squid	9-oz.		34,603			34,603
Tuna, bluefin	4-lb., 12's			337		337
	1-lb.			24,565	6,371	30,936
	½-lb.			196,331	37,522	233,853
	¼-lb.			16,205	1,534	17,739
	¼-lb., 100's			29,905	440	30,345
Tuna, striped	1-lb.			18,248	27,288	45,536
	½-lb.			213,674	432,657	646,331
	¼-lb.			19,137	28,837	47,974
	¼-lb., 100's			55,388	40,994	96,382
Tuna, yellowfin	4-lb., 12's			2,639	3,750	6,389
	1-lb.			45,419	79,331	124,750
	12-oz.			677		677
	½-lb.			419,771	1,149,763	1,569,534
	¼-lb.			32,301	222,449	254,750
	¼-lb., 100's			35,584	14,135	49,719
Tuna flakes	4-lb., 12's			754	285	1,039
	1-lb.			8,605	9,569	18,174
	½-lb.			74,913	131,857	206,770
	¼-lb.			1,187	150	1,337
Tuna, "tonno" style	4-lb., 12's				226	226
	½-lb.			16,205	5,712	21,917
	¼-lb., 100's			107,889	54,200	162,089
Yellowtail	4-lb., 12's				7	7
	1-lb.			11,403	6,018	17,421
	½-lb.			29,458	19,044	48,502
	¼-lb., 100's				2,552	2,552
Pet food	Misc. sizes	14,198		817,893		832,091
Totals		346,928	1,458,996	5,210,519	2,357,690	9,374,133

NOTE.—Forty-eight cans to the case unless otherwise specified. San Francisco District includes all area north of Monterey. San Pedro District includes Orange County.

Cured and Manufactured

Fishery product	Size or quantity	San Francisco district	Monterey district	San Pedro district	San Diego district	Total
Mixed fish, dried	Pounds	42,580				42,580
Mixed fish, salted	Pounds				189,228	189,228
Herring, smoked	Pounds	37,000				37,000
Mackerel, salted	Pounds			5,520		5,520
Sablefish, smoked	Pounds	339,644				339,644
Salmon, mild cure	825-lb. tierces	865				865
Salmon, smoked	Pounds	94,624				94,624
Sardines, salted	Pounds		9,683	22,360		32,043
Shrimp, dried	Pounds	138,722				138,722
Shrimp, meal	Pounds	261,986				261,986
Fish meal	Tons	21,256	28,004	29,542	7,335	86,137
Fish oil	Gallons	4,831,500	5,745,120	2,509,291	129,079	13,214,990

Miscellaneous Data

	San Francisco district	Monterey district	San Pedro district	San Diego district	Total
Estimated value of pack	$3,920,502	$7,358,651	$21,141,928	$14,136,063	$46,557,144
Number of employees	1,759	3,151	3,945	2,064	10,919
Value of plants	$4,275,098	$3,497,715	$3,469,283	$1,066,715	$12,308,811

REPORT OF SARDINE CANNING AND REDUCTION PLANTS, SEASON 1940-1941

Disagreement on the price of sardines delayed the opening of the sardine season in the San Francisco and Monterey districts in 1940. With the exception of one plant in San Francisco that did not belong to the San Francisco Sardine Association, all plants were idle until October. A price of $10.50 per ton was eventually agreed upon and plants in the Monterey district began receiving sardines on October 7th, and in the San Francisco district on October 8th.

A total of 226,188 tons of sardines were received for canning purposes, as compared with 225,357 tons for the previous season. The overage on the canning fish was 70,404 tons, and the offal from the fish canned was 77,896 tons, making a total of 148,300 tons of the total received for canning that went into the reduction plant. A decrease in the pack of one-pound oval cans was offset by an increase in the pack of other sizes. The total pack was approximately 25,000 cases less than that of the previous season.

No change was made in the law pertaining to the taking of sardines for canning or reduction purposes, and the same method of determining the percentage of sardines received for canning that may be used for reduction has not been altered from that shown in Circular 13.

Permits to receive and use sardines by a reduction process were issued for 5,000 tons for each plant regardless of press capacity. Seventy permits were issued for 350,000 tons but at the close of the season 126,413 tons granted under permit were canceled. Of the permit tonnage granted for use for reduction, only 60 per cent of the total was taken in the San Francisco district, 84 per cent in the Monterey district, 64 per cent in the San Pedro district, and 6 per cent in the San Diego district.

The permits issued for the San Francisco and Monterey districts were on a monthly allotment basis of 20 per cent each month for the first five months of the season and the tonnage not taken in the month for which it was allocated could be accumulated and taken at any time thereafter until the close of the season February 15th. In southern California the total allotment for the season was made available at the opening of the season.

This report does not include sardines taken for fresh fish markets, bait, or quarter oil pack.

The following plants operated during the season:

SAN FRANCISCO DISTRICT

Alaska Salmon Co., Richmond
Benicia Fisheries (2 plants), Benicia
F. E. Booth Co., Inc. (2 plants), Pittsburg
Burnett and Parr (*Currier*), Richmond
Burnett and Parr (*Monitor*), Richmond
California Fish Products Co., Richmond
Carquinez Fishery, Ltd., Richmond
Cypress Fisheries, Inc., San Francisco
Deep Sea Fisheries, Inc., Benicia
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. (*Brookdale*), Richmond
Golden State Fisheries, Inc., Benicia
Hofmann Packing Co., McNears Point
W. L. Martignoni (Charterer *Lansing*), Richmond
Martinez Food Canners, Ltd., Martinez
Northern Packing Corp., San Francisco
Old Capitol Packers, Inc., McNears Point
Ozol Packing Co., Martinez
Pittsburg Canners, Inc., Richmond
Point Edith Fisheries, Ltd., Port Chicago
Polarine Fisheries, Inc., Richmond
Red Rock Fisheries, Inc., Richmond
Redondo Fish Products Co., Richmond
Richmond Fisheries, Inc., Richmond
San Pablo Fisheries, Richmond
Santa Cruz Oil Corp., Port Costa
Santa Inez Fisheries, Inc., Port Costa

MONTEREY DISTRICT

F. E. Booth Co., Inc., Monterey
California Packing Corp., Monterey
Carmel Canning Co., Monterey
Custom House Packing Corp., Monterey
Del Mar Canning Co., Monterey
E. B. Gross Canning Co. (2 plants), Monterey
Hovden Food Products Corp. (2 plants), Monterey
Hovden Food Products Corp. (2 plants), Moss Landing
Monterey Canning Co., Monterey
Monterey Fish Products, Inc. (2 plants), Monterey
San Carlos Canning Co. (2 plants), Monterey
San Xavier Fish Packing Co., Monterey
Sea Pride Packing Corp., Ltd., Monterey

SAN PEDRO DISTRICT

California Marine Curing & Packing Co., Terminal Island
California Sea Food Co., Long Beach
Coast Fishing Co., Wilmington
Franco Italian Packing Co., Terminal Island
French Sardine Co. of California, Inc. (2 plants), Terminal Island
Italian Food Products Co., Long Beach
K & M Fisheries, Terminal Island
Sea Pride Packing Corp., Ltd., Terminal Island
Sea Pride Packing Corp., Ltd., Wilmington
South Coast Fisheries., Inc., Terminal Island
South Pacific Canning Co., Long Beach
Southern California Fish Corp., Terminal Island
Van Camp Sea Food Co., Inc. (3 plants), Terminal Island

SAN DIEGO

American Fisheries Co., San Diego
Fishermen's Tuna Packing Co.,[1] San Diego
Sun Harbor Packing Corp., San Diego
Westgate Sea Products Co., San Diego

[1] Permit granted, no sardines received.

PRODUCTION OF SARDINE PLANTS

August 1, 1940, to March 31, 1941

District	Sardines received, tons	Used for canning, tons	Cannery fish overage used for meal and oil, tons	Used for meal and oil under permit, tons
San Francisco	117,817	14,423	6,849	95,667
Monterey	165,145	60,991	28,601	75,519
San Pedro	170,559	80,351	34,952	51,234
San Diego	1,188	19	2	1,167
Totals	454,709	[1]155,784	70,404	223,587
Add cannery overage used for meal and oil		70,404		
Total tons received for canning purposes		226,188		

[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 calculating the amount of fish actually used in canning, a basis of 20 cases per ton is used.

District	Cannery 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
San Francisco	7,213	168,700	130,784	119,713	13.5
Monterey	30,495	622,219	650,672	597,627	13.6
San Pedro	40,179	672,780	947,796	934,975	13.9
San Diego	9		452	452	21.5
Totals	77,896	1,463,699	1,729,704	1,652,767	

District	Sardine meal, tons	Ratio per ton of meal	Sardine oil, gallons	Gallons of oil per ton of fish and offal
San Francisco	20,541	5.3	4,809,853	43.8
Monterey	25,805	5.2	5,197,570	38.6
San Pedro	24,560	5.1	2,369,300	18.7
San Diego	216	5.4	21,587	18.3
Totals	71,122		12,398,310	

District	Reduction permits issued, tons	Unused reduction permit tonnage cancelled, tons	Used for other purposes, tons
San Francisco	160,000	64,333	[2]878
Monterey	90,000	14,481	[3]34
San Pedro	80,000	28,766	[4]4,022
San Diego	20,000	18,833	
Totals	350,000	126,413	[5]4,934

[2] 878 tons for pet food.
[3] 34 tons for salting.
[4] 4,022 tons for pet food.
[5] 4,900 tons petfood, 34 tons for salting.

COMPARATIVE STATEMENT OF SARDINE PLANT OPERATIONS, SEASONS 1939-40 AND 1940-41

San Francisco District

	Season 1939-40	Season 1940-41	Increase
Tons of sardines received for canning	21,201	21,272	71
Tons of sardines received under permit for meal and oil	189,590	95,667	*93,923
Tons of sardines received for pet food, etc.	680	878	198
Total tons of sardines received for all purposes	211,471	117,817	*93,654
Cases of 1-lb. oval cans packed	196,011	168,700	*27,311
Cases of other size cans packed	98,296	130,784	32,488
Other size cans reduced to equivalent cases of 1-lb. ovals	90,628	119,713	29,085
Meal, tons	36,324	20,541	*15,783
Oil, gallons	9,313,706	4,809,853	*4,503,853

* Decrease.

Monterey District

	Season 1939-40	Season 1940-41	Increase
Tons of sardines received for canning	130,518	75,519	*54,999
Tons of sardines received under permit for meal and oil	96,713	89,592	*7,121
Tons of sardines received for salting		34	34
Total tons of sardines received for all purposes	227,231	165,145	*62,086
Cases of 1-lb. oval cans packed	1,092,981	622,219	*470,762
Cases of other size cans packed	728,612	650,672	*77,940
Other size cans reduced to equivalent cases of 1-lb. ovals	670,420	597,627	*72,793
Meal, tons	34,568	25,805	*8,763
Oil, gallons	7,090,963	5,197,570	*1,893,393

* Decrease.

San Pedro District

	Season 1939-40	Season 1940-41	Increase
Tons of sardines received for canning	73,634	115,303	41,669
Tons of sardines received under permit for meal and oil	17,032	51,234	34,202
Tons of sardines received for salting	2,415	4,022	1,607
Total tons of sardines received for all purposes	93,081	170,559	77,478
Cases of 1-lb. oval cans packed	545,182	672,780	127,598
Cases of other size cans packed	558,878	947,796	388,918
Other size cans reduced to equivalent cases of 1-lb. ovals	539,666	934,975	395,309
Meal, tons	12,145	24,560	12,415
Oil, gallons	984,851	2,369,300	1,384,449

San Diego District

	Season 1939-40	Season 1940-41	Increase
Tons of sardines received for canning	4	21	17
Tons of sardines received under permit for meal and oil	91	1,167	1,076
Total tons of sardines received for all purposes	95	1,188	1,093
Cases of 1-lb. oval cans packed			
Cases of other size cans packed	80	452	372
Other size cans reduced to equivalent cases of 1-lb. ovals	80	452	372
Meal, tons	16	216	200
Oil, gallons	472	21,587	21,115

California, All Districts Combined

	Season 1939-40	Season 1940-41	Increase
Tons of sardines received for canning	225,357	226,188	831
Tons of sardines received under permit for meal and oil	303,426	223,587	*79,839
Tons of sardines received for pet food, salting, etc.	3,095	4,934	1,839
Total tons of sardines received for all purposes	531,878	454,709	*77,169
Cases of 1-lb. oval cans packed	1,834,174	1,463,699	*370,475
Cases of other size cans packed	1,385,866	1,729,704	343,838
Other size cans reduced to equivalent cases of 1-lb. ovals	1,300,794	1,652,767	351,973
Meal, tons	83,053	71,122	*11,931
Oil, gallons	17,389,992	12,398,310	*4,991,682

* Decrease.

SARDINE CATCH BY MONTHS, SEASON 1940-41

Month	San Francisco			
	Canning	Reduction	Other purposes	Total
August, 1940	1,205	635	----------	1,840
September	2,371	764	----------	3,135
October	6,480	35,685	27	42,192
November	6,272	36,832	350	43,454
December	3,656	12,353	219	16,228
January, 1941	1,044	7,597	160	8,801
February	244	1,801	122	2,167
Totals	21,272	95,667	[6]878	117,817

[6] 878 tons for pet food.

Month	Monterey			
	Canning	Reduction	Other purposes	Total
August, 1940	----------	----------	----------	----------
September	----------	----------	----------	----------
October	29,249	26,715	13	55,977
November	23,630	17,668	1	41,299
December	19,006	16,795	----------	35,801
January, 1941	12,675	10,139	20	22,834
February	5,032	4,202	----------	9,234
Totals	89,592	75,519	[7]34	165,145

[7] 34 tons for salting.

Month	San Pedro			
	Canning	Reduction	Other purposes	Total
November, 1940	34,043	29,887	1,086	65,016
December	27,202	8,141	645	35,988
January, 1941	29,528	8,338	1,229	39,095
February	23,721	4,781	976	29,478
March	809	87	86	982
Totals	115,303	51,234	[8]4,022	170,559

[8] 4,022 tons for pet food.

Month	San Diego			
	Canning	Reduction	Other purposes	Total
November, 1940	----------	210	----------	210
December	----------	818	----------	818
January, 1941	13	132	----------	145
February	8	7	----------	15
March	----------	----------	----------	----------
Totals	21	1,167	----------	1,188

PACK OF 1-LB. OVALS BY MONTHS, SEASON 1940-41

Month	San Francisco, cases	Monterey, cases	San Pedro, cases	San Diego, cases	Total cases
August, 1940	6,412				6,412
September	11,931				11,931
October	52,928	212,990			265,918
November	54,559	138,077	197,531		390,167
December	33,009	134,519	161,134		328,662
January, 1941	7,506	96,360	180,537		284,403
February	2,355	40,273	126,347		168,975
March			7,231		7,231
Totals	168,700	622,219	672,780		1,463,699

PACK OF OTHER SIZE CANS REDUCED TO EQUIVALENTS OF 1-LB. OVALS, BY MONTHS, SEASON 1940-41

Month	San Francisco, cases	Monterey, cases	San Pedro, cases	San Diego, cases	Total cases
August, 1940	9,862				9,862
September	20,050				20,050
October	34,695	182,062			216,757
November	30,140	182,048	262,060		474,248
December	17,264	122,676	210,052		349,992
January, 1941	6,666	82,711	247,062	329	336,768
February	1,036	28,130	207,926	123	237,215
March			7,875		7,875
Totals	119,713	597,627	934,975	452	1,652,767

SARDINE MEAL PRODUCTION BY MONTHS, SEASON 1940-41

Month	San Francisco, tons	Monterey, tons	San Pedro, tons	San Diego, tons	Total tons
August, 1940	269				269
September	400				400
October	7,143	8,517			15,660
November	7,765	6,408	9,880	37	24,090
December	2,870	5,576	5,275	152	13,873
January, 1941	1,647	3,735	5,215	27	10,624
February	447	1,569	4,079		6,095
March			111		111
Totals	20,541	25,805	24,560	216	71,122

SARDINE OIL PRODUCTION BY MONTHS, SEASON 1940-41

Month	San Francisco, gallons	Monterey, gallons	San Pedro, gallons	San Diego, gallons	Total gallons
August, 1940	65,247				65,247
September	104,296				104,296
October	1,936,256	2,018,332			3,954,588
November	1,817,191	1,323,580	1,211,120	3,060	4,354,951
December	602,557	1,173,743	529,113	15,953	2,321,366
January, 1941	235,417	523,746	471,856	2,574	1,233,593
February	48,889	158,169	154,484		361,542
March			2,727		2,727
Totals	4,809,853	5,197,570	2,369,300	21,587	12,398,310

CALIFORNIA FRESH FISHERY PRODUCTS FOR YEAR 1941

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

Species of fish	Eureka region	Sacramento region	San Francisco region	Monterey region	Santa Barbara region
Albacore	383		2,485	1,172,855	1,136,438
Anchovy			600	33,306	33,215
Barracuda				1,550	156,484
Bonito				31	35,294
Cabezone	686		6,470	5,806	310
Cabrilla					
Carp		6,120			
Catfish		176,923			
Crevally					
Cultus, Pacific	159,697		283,685	70,789	2,701
Eel				29	74
Flounder, Starry	281,371		302,632	16,058	1,184
Flying Fish					102
Grouper					
Hake	5,482		8,726	300	
Halibut, California	330		20,516	15,366	212,538
Halibut, Northern	211,879		2,659		
Hardhead		1,841			
Herring, Pacific	1,392		686,220	102,062	39
Kingfish			2,676	118,543	63
Mackerel, Horse				264,503	240
Mackerel, Pacific			31,602	1,823,621	528,915
Mackerel, Spanish					
Mullet					
Perch	1,550		2,898	8,955	2,223
Pike		606			
Pompano, California				254	
Rock Bass					36,901
Rockfish	455,983		440,213	1,459,997	290,056
Sablefish	360,700		57,966	53,971	5,185
Salmon	2,413,368	844,963	373,215	153,662	3,188
Sand Dab	170,694		228,200	36,361	
Sardine	893	134,301,050	261,024,070	522,804,868	10,692,857
Sculpin					272
Sea Bass, Black			179	16	20,727
Sea Bass, Shortfin					
Sea Bass, White	1,736		35,154	185,405	93,569
Sea Trout, California				135	8
Shad		112,912		189	
Shark	1,480,702		2,827,094	885,865	940,183
Sheepshead					28,407
Skate	47,720		121,716	12,646	30,964
Skipjack					
Smelt	25,475		112,398	99,754	12,221
Sole	2,670,278		1,720,566	171,868	55,100
Splittail		20,383			
Sucker		83			
Swordfish, Broadbill					477,793
Tomcod	695		264		
Tuna, Bluefin			4,344		3,898
Tuna, Yellowfin					
Turbot			22,793	4,143	
Whitebait	90,090		40,882	67	
Whitefish, Ocean					15,326
Yellowtail					349
Miscellaneous Fish	89,711		48,395	3,799	22,665
Total fish, in pounds	8,470,815	135,464,881	268,408,618	529,506,774	14,839,489
Crustacean:					
Crab	464,012		3,750,652	45,676	263
Shrimp			952,152	5,357	
Spiny Lobster					152,621
Mollusk:					
Abalone				488,950	511,375
Clam, Cockle			390		
Clam, Gaper			1,539		
Clam, Pismo				9,972	158,681
Clam, Softshell			65,988		
Clam, Washington	20,084		680		
Octopus	3,224		6,499	30,080	84
Oyster, Eastern			102,040		
Oyster, Japanese			1,529,157		188,624
Oyster, Native			9,338		
Squid				1,282,381	
Total shellfish, in pounds	487,320		6,418,435	1,862,416	1,011,648
Grand total, in pounds	8,958,135	135,464,881	274,827,053	531,369,190	15,851,137

CALIFORNIA FRESH FISHERY PRODUCTS FOR YEAR 1941—Continued

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

Species of fish	Los Angeles region	San Diego region	Total taken in state waters and off the coast of California	South of International Boundary brought into Los Angeles	South of International Boundary brought into San Diego	Total landings in California, including fish from west coast south of the International Boundary brought in by boat
Albacore	323,365	111,448	2,746,974			2,746,974
Anchovy	4,038,261		4,105,382			4,105,382
Barracuda	2,340,182	473,133	2,971,349	959,405	271,174	4,201,928
Bonito	5,366,214	1,798,957	7,200,496	2,217,440	758,763	10,176,699
Cabezone	74		13,346			13,346
Cabrilla				204,683	178,994	383,677
Carp	179,116		185,236			185,236
Catfish			176,923			176,923
Crevally				563		563
Cultus, Pacific	545	691	518,108			518,108
Eel			103			103
Flounder, Starry	282		601,527			601,527
Flying Fish	37,774		37,876			37,876
Grouper				107,127	170,651	277,778
Hake	220		14,728			14,728
Halibut, California	256,404	106,097	611,251	40,532	73,207	724,990
Halibut, Northern			214,538			214,538
Hardhead			1,841			1,841
Herring, Pacific		40	789,753			789,753
Kingfish	202,933	940	325,155			325,155
Mackerel, Horse	1,803,519	423	2,068,685			2,068,685
Mackerel, Pacific	74,114,133	1,668,929	78,167,200			78,167,200
Mackerel, Spanish				2,675	1,271	3,946
Mullet		1,334	1,334			1,334
Perch	10,367	52	26,045			26,045
Pike			606			606
Pompano, California	4,709		4,963			4,963
Rock Bass	58,552	37,821	133,274	1,919	6,784	141,977
Rockfish	447,437	92,922	3,186,608		206,004	3,392,612
Sablefish	45,795		523,617			523,617
Salmon	10		3,788,406			3,788,406
Sand Dab	7,229		442,484			442,484
Sardine	330,715,079	2,941,576	1,262,480,393			1,262,480,393

Sculpin	63,074	31,614	94,960		317	95,277
Sea Bass, Black	11,006	5,873	37,801	247,060	124,628	409,489
Sea Bass, Short-fin		2,305	2,305			2,305
Sea Bass, White	455,189	54,011	825,064	44,238	31,604	900,906
Sea Trout, California			143			143
Shad			113,101			113,101
Shark	968,422	408,858	7,511,124	307	164	7,511,595
Sheepshead	11,314	3,948	43,669	462	4,988	49,119
Skate	11,522	130	224,698			224,698
Skipjack	2,132,136	2,082,237	4,214,373	5,184,446	16,186,649	25,585,468
Smelt	195,623	6,976	452,447		40	452,487
Sole	7,023	814	4,625,649		168	4,625,817
Splittail			20,383			20,383
Sucker			83			83
Swordfish, Broadbill	419,155	15,304	912,252		4,305	916,557
Tomcod			959			959
Tuna, Bluefin	7,485,192	1,354,713	8,848,147	463,454	207,411	9,519,012
Tuna, Yellowfin	241	1,498	1,739	18,800,386	57,899,635	76,701,760
Turbot			26,936			26,936
Whitebait			131,039			131,039
Whitefish, Ocean	7,324	733	23,383	1,301	12,286	36,970
Yellowtail	17,075	78,500	95,924	2,205,670	7,529,096	9,830,690
Miscellaneous Fish	95,791	935	261,296	1,615	1,600	264,511
Total fish, in pounds	431,832,287	11,282,812	1,399,805,676	30,483,283	83,669,739	1,513,958,698
Crustacean:						
Crab	2,382		4,262,985			4,262,985
Shrimp			957,509			957,509
Spiny Lobster	115,910	88,803	357,334	20,450	927,321	1,305,105
Mollusk:						
Abalone			1,000,325			1,000,325
Clam, Cockle			390			390
Clam, Gaper			1,539			1,539
Clam, Pismo			168,653	10,837		179,490
Clam, Softshell			65,988			65,988
Clam, Washington			20,764			20,764
Octopus	188		40,075			40,075
Oyster, Eastern			102,040			102,040
Oyster, Japanese			1,717,781			1,717,781
Oyster, Native			9,338			9,338
Squid	111,654	37,001	1,431,036			1,431,036
Total shellfish, in pounds	230,134	125,804	10,135,757	31,287	927,321	11,094,365
Grand total, in pounds	432,062,421	11,408,616	1,409,941,433	30,514,570	84,597,060	1,525,053,063

NOTE.—All amounts shown in pounds unless otherwise specified.

This record does not include albacore shipped from Oregon and Washington or fish imported from Japan, South America, or the Gulf of California. This record is the catch made in or off the regions shown in the tables. Exceptions: Eureka region—94,457 pounds, and San Francisco region—28,858 pounds of fish of different varieties originating in the waters off the coast of Oregon. Los Angeles region—323,269 pounds, and San Diego region—1,875 pounds of albacore originating in waters off the coast of Oregon and Washington.

CANNED, CURED AND MANUFACTURED FISHERY PRODUCTS OF CALIFORNIA FOR THE YEAR OF 1941

Canned

Kind of fish or fishery product	Size of cans	San Francisco district, cases	Monterey district, cases	San Pedro district, cases	San Diego district, cases	Total cases
Abalone	No. 10, 6's		82			82
	1-lb.		48			48
	½-lb.		737			737
Albacore	4-lb., 12's			1,068		1,068
	1-lb.			13,329	1,432	14,761
	½-lb.		9,071	52,875	7,718	69,664
	¼-lb.			5,752	995	6,747
Bonito	1-lb.			35,375	12,592	47,967
	½-lb.			85,879	26,199	112,078
	¼-lb.			1,145		1,145
	¼-lb., 100's			13,195	2,474	15,669
Clams	½-lb.			51		51
Clam Juice	No. 10, 6's			378		378
Mackerel	1-lb.		6,700	811,467	19,484	837,651
	½-lb.			1,444		1,444
	½-lb., 96's			4,652		4,652
Rockfish	No. 10, 6's		293			293
	1-lb.		369			369
Roe	1-lb.				68	68
	½-lb., 96's				8	8
Salmon	1-lb.	1,125				1,125
Sardine	No. 10, 6's		9,632			9,632
	1-lb. Oval	459,454	1,142,052	689,210		2,290,716
	1-lb. tall	323,757	768,963	870,256	496	1,963,472
	½-lb.		75,142	9,989		85,131
	½-lb. Oval	2,246	1,171			3,417
	½-lb. 96's	2,102	153,432	206,983		362,517
	½-lb. filet		182,703			182,703
	5-oz., 100's	80,021	216,547	151,384		447,952
	¼-lb. sq.				2,279	2,279
	¼-lb. sq. 100's		16,968	2,136		19,104
	10½-oz., E. O.	20,561				20,561
	3-oz.	7,800				7,800
Squid	9-oz.		21,857			21,857
Tuna, bluefin	1-lb.			13,137	182	13,319
	½-lb.			98,029	27,496	125,525
	¼-lb.			11,243	2,747	13,990
	¼-lb., 100's			13,924	1,944	15,868
Tuna, striped	1-lb.			7,255	18,052	25,307
	½-lb.			74,073	253,928	328,001
	¼-lb.			14,939	37,727	52,666
	¼-lb., 100's			13,296	13,759	27,055
Tuna, yellowfin	4-lb., 12's			2,007	2,065	4,072
	1-lb.			41,428	130,554	171,982
	12-oz.			1,565		1,565
	½-lb.			233,699	729,496	963,195
	¼-lb.			15,960	151,213	167,173
	¼-lb., 100's			14,227	3,431	17,658
Tuna Flakes	4-lb., 12's				277	277
	1-lb.			6,271	6,977	13,248
	½-lb.			33,487	121,862	155,349
	¼-lb.			787	888	1,675
Tuna, "tonno" style	½-lb.			5,322		5,322
	¼-lb., 100's			28,208	308	28,516
Yellowtail	1-lb.			8,849	16,462	25,311
	½-lb.			17,392	79,450	96,842
	¼-lb.					
	¼-lb., 100's				7,154	7,154
Pet food	Misc. sizes	30,822		997,081		1,027,903
Totals		927,888	2,605,767	4,608,747	1,679,717	9,822,119

NOTE.—Forty-eight cans to the case unless otherwise specified. San Francisco District includes all area north of Monterey. San Pedro District includes Orange County.

Cured and Manufactured

Fishery product	Size or quantity	San Francisco district	Monterey district	San Pedro district	San Diego district	Total
Herring, smoked	Pounds	40,000				40,000
Mixed fish, dried	Pounds	45,003				45,003
Mixed fish, salted	Pounds				158,915	158,915
Sablefish, smoked	Pounds	297,787				297,787
Salmon, mild cure	825-lb. tierces	360				360
Salmon, salted	200-lb. barrels	5				5
Salmon, smoked	Pounds	123,348				123,348
Sardines, salted	Pounds		27,000			27,000
Shrimp, dried	Pounds	48,381				48,381
Shrimp, meal	Pounds	108,624				108,624
Fish meal	Tons	32,773	38,875	25,832	5,332	102,812
Fish oil	Gallons	7,429,493	7,537,870	2,627,959	81,876	17,677,198
Shark liver oil	Gallons	109,554	78,343	20,393		208,290

Miscellaneous Data

	San Francisco district	Monterey district	San Pedro district	San Diego district	Total
Estimated value of pack	$15,746,480	$20,091,185	$21,309,333	$10,943,066	$68,090,064
Number of employees	2,408	3,468	6,405	2,351	14,632
Value of plants	$3,837,818	$3,679,119	$3,955,338	$1,087,484	$12,559,759

REPORT OF SARDINE CANNING AND REDUCTION PLANTS, SEASON 1941-1942

Compiled by S. H. Dado

Fishermen and plant operators in the San Francisco district agreed on a price of $16.50 per ton of sardines prior to the opening of the season August 1st. Fish were landed on August 1st, although the opening date was just prior to the full moon which occurred on the seventh. In the Monterey district agreement on price was delayed nearly two weeks after August 1st. Fishing started on the fourteenth with the fishermen receiving $17 per ton. Shortly thereafter the price was raised to $17 per ton in San Francisco.

In southern California fishing was started promptly on October 1st, and although the moon was full on the fifth, fair catches were made during the first three days of the season.

No change was made in the law pertaining to taking of sardines for canning or use by a reduction process, and the method of determining the percentage of sardines received for canning that may be used for reduction was not altered from that shown in Circular 13.

After a hearing held April 25, 1941, permits were granted to take an aggregate of not to exceed 332,500 tons of sardines for use by a reduction or extraction process during the 1941-1942 sardine season, to be allotted on the basis of 4,750 tons to each plant which held a permit during the previous season, and would be ready and equipped to operate on the opening of the season in the region in which the plant was located. In August four additional permits were granted for 4,500 tons each with deductions on the monthly allotment for every month or proportionate part thereof that the plants were not ready to operate. After all adjustments were made, permits were issued as follows:

San Francisco	district,	35 permits for	160,433 tons
Monterey	district,	18 permits for	84,765 tons
San Pedro	district,	17 permits for	79,486 tons
San Diego	district,	4 permits for	19,000 tons

making a total of 74 permits for 343,684 tons.

With declaration of war early in December, all sardine fishing ceased in San Francisco and practically all of the sardine fleet left San Francisco for their home ports. In Monterey and southern California fishing continued after December 7th but the catches were lighter than during the same months of previous seasons. Most of the tonnage brought into Monterey and southern California was canned, only a small part of the catch being used by a reduction process under permit.

Of the permits granted, only 75.6 per cent of the tonnage was received at San Francisco, 82.7 per cent at Monterey, 23.4 per cent at San Pedro and less than 8. per cent at San Diego. For the State

as a whole, 61.5 per cent of the tonnage granted was received with cancellation of 132,328 tons at the close of the season.

The permits issued for the San Francisco and Monterey districts were on a monthly allotment basis of 20 per cent for each of the first five months of the season, and in southern California it was allotted on the basis of 25 per cent for each month of the first four months of the season. Any tonnage not taken in the month for which it was allotted could be accumulated and taken at any time thereafter until the close of the season which fell on February 15th in northern California and March 1st in southern California.

In February a recommendation was made by a subcommittee of the National Defense Committee that the sardine season be extended 30 days. This report was adopted by the commission and referred to the Governor who accepted the report and directed that it be adopted as a necessary measure of State and National defense to enable the Federal Government to be supplied with the sea food requirements of the Army and Navy of the United States. In the San Francisco district no additional sardine fishing was done after the regular closing, but in Monterey and southern California sardine fishing continued into March. This report does not include sardines taken for fresh fish markets, bait or quarter oil pack.

The following plants operated during the season:

SAN FRANCISCO DISTRICT

Alaska Salmon Co., Richmond
American Sardine Co., Benicia
Benicia Fisheries (2 plants), Benicia
F. E. Booth Co., Inc. (2 plants), Pittsburg
California Fish Products Co., Richmond
Carquinez Fishery, Ltd., Richmond
Cypress Fisheries, Inc., San Francisco
East Bay Fisheries, Richmond
Edible Fish Meals & Oils, Richmond
Farallone Packing Co., Div. of Borden Co. (2 plants), San Francisco
Fish-Dee-Lish Corp., Richmond [2]
Fish Packers, Inc., McNears Point
Gardenia Packing Co., Richmond
Golden State Fisheries, Inc., Benicia
Hofmann Packing Co., McNears Point
Lansing Fisheries, San Francisco
Martinez Food Canners, Ltd., Martinez
McGovern and McGovern, Richmond
Northern Packing Corp., San Francisco
Old Capitol Packers, Inc., McNears Point
Ozol Packing Co., Martinez
Pittsburg Canners, Inc., Richmond
Point Edith Fisheries, Ltd., Richmond
Polarine Fisheries, Inc., Richmond
Port Costa Packing Co., Port Costa [1]

[1] Plant destroyed by fire September 2, 1941.
[2] Plant destroyed by fire October 28, 1941.

Red Rock Fisheries, Inc. (2 plants), Richmond
Redondo Fish Products Co., Richmond
Richmond Fisheries, Inc., Richmond
San Pablo Fisheries, Richmond
Santa Inez Fisheries, Inc., Port Costa [1]
Tamalpais Fishing and Packing Co., Richmond

MONTEREY DISTRICT

California Packing Corp., Monterey
Carmel Canning Co., Monterey
Custom House Packing Corp., Monterey
Del Mar Canning Co., Monterey
Edgewater Packing Co., Monterey
E. B. Gross Canning Co. (2 plants), Monterey
Hovden Food Products Corp. (2 plants), Monterey
Hovden Food Products Corp. (2 plants), Moss Landing
Lucido Fisheries, Monterey
Monterey Canning Co., Monterey
Monterey Fish Products, Inc. (2 plants), Monterey
San Carlos Canning Co., Monterey
San Xavier Fish Packing Co., Monterey
Sea Pride Packing Corp., Ltd., Monterey

SAN PEDRO DISTRICT

California Marine Curing & Packing Co., Terminal Island
California Sea Food Co., Inc., Long Beach
Coast Fishing Co., Wilmington
Franco Italian Packing Co., Terminal Island
French Sardine Co. of California, Inc. (2 plants), Terminal Island
K & M Fisheries, Inc., Terminal Island
Oxnard Canners, Inc., Hueneme
Sardamack Fisheries, Inc., Wilmington
Sea Pride Packing Corp., Ltd., Terminal Island
South Coast Fisheries, Inc., Terminal Island
South Pacific Canning Co., Inc., Long Beach
Southern California Fish Corp., Terminal Island
Van Camp Sea Food Co., Inc. (3 plants), Terminal Island
West Coast Packing Corp., Long Beach

SAN DIEGO DISTRICT

American Fisheries Co., San Diego [2]
High Seas Tuna Packing Co., Inc., San Diego
Sun Harbor Packing Co., San Diego
Westgate Sea Products Co., San Diego

[1] Plant destroyed by fire September 2, 1941.
[2] Permit granted, no sardines received.

PRODUCTION OF SARDINE PLANTS

August 1, 1941, to March 31, 1942

District	Sardines received, tons	Used for canning, tons	Cannery fish overage used for meal and oil, tons	Used for meal and oil under permit, tons
San Francisco	185,921	42,736	20,543	121,381
Monterey	249,717	121,489	58,060	70,139
San Pedro	146,285	93,381	30,015	18,633
San Diego	1,540	64	4	1,472
Totals	583,463	[1]257,670	108,622	211,625
Add cannery overage used for meal and oil		108,622		
Total tons received for canning purposes		366,292		

[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 calculating the amount of fish actually used in canning, a basis of 20 cases per ton is used.

District	Cannery 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
San Francisco	21,368	449,589	427,566	405,120	13.5
Monterey	60,744	1,098,747	1,413,846	1,331,057	13.5
San Pedro	46,690	633,298	1,244,910	1,236,037	15.1
San Diego	32		1,266	1,266	19.8
Totals	128,834	2,181,634	3,087,588	2,973,480	

District	Sardine meal, tons	Ratio per ton of meal	Sardine oil, gallons	Gallons of oil per ton of fish and offal
San Francisco	29,935	5.4	7,162,343	43.8
Monterey	36,309	5.2	7,222,683	38.2
San Pedro	18,590	5.1	2,088,695	21.9
San Diego	269	5.6	25,244	16.7
Totals	85,103		16,498,965	

District	Permits issued, tons	Unused permit tonnage cancelled, tons	Used for other purposes, tons
San Francisco	160,433	39,243	[1]1,261
Monterey	84,765	14,626	[2]29
San Pedro	79,486	60,899	[3]4,256
San Diego	19,000	17,560	
Totals	343,684	132,328	[4]5,546

[1] 1,261 tons for pet food.
[2] 29 tons for salting.
[3] 4,256 tons for pet food.
[4] 5,517 tons for pet food, 29 tons for salting.

COMPARATIVE STATEMENT OF SARDINE PLANT OPERATIONS SEASONS 1940-1941 AND 1941-1942

San Francisco District

	Season 1940-41	Season 1941-42	Increase
Tons of sardines received for canning	21,272	63,279	42,007
Tons of sardines received under permit for meal and oil	95,667	121,381	25,714
Tons of sardines received for pet food	878	1,261	383
Total tons of sardines received for all purposes	117,817	185,921	68,104
Cases of 1-lb. oval cans packed	168,700	449,589	280,889
Cases of other size cans packed	130,784	427,566	296,782
Other size cans reduced to equivalent cases of 1-lb. ovals	119,713	405,120	285,407
Meal, tons	20,541	29,935	9,394
Oil, gallons	4,809,853	7,162,343	2,352,490

Monterey District

	Season 1940-41	Season 1941-42	Increase
Tons of sardines received for canning	75,519	179,549	104,030
Tons of sardines received under permit for meal and oil	89,592	70,139	*19,453
Tons of sardines received for salting	34	29	*5
Total tons of sardines received for all purposes	165,145	249,717	84,572
Cases of 1-lb. oval cans packed	622,219	1,098,747	476,528
Cases of other size cans packed	650,672	1,413,846	763,174
Other size cans reduced to equivalent cases of 1-lb. ovals	597,627	1,331,057	733,430
Meal, tons	25,805	36,309	10,504
Oil, gallons	5,197,570	7,222,683	2,025,113

* Decrease.

San Pedro District

	Season 1940-41	Season 1941-42	Increase
Tons of sardines received for canning	115,303	123,396	8,093
Tons of sardines received under permit for meal and oil	51,234	18,633	*32,601
Tons of sardines received for pet food	4,022	4,256	234
Total tons of sardines received for all purposes	170,559	146,285	*24,274
Cases of 1-lb. oval cans packed	672,780	633,298	*39,482
Cases of other size cans packed	947,796	1,244,910	297,114
Other size cans reduced to equivalent cases of 1-lb. ovals	934,975	1,236,037	301,062
Meal, tons	24,560	18,590	*5,970
Oil, gallons	2,369,300	2,088,695	*280,605

* Decrease.

San Diego District

	Season 1940-41	Season 1941-42	Increase
Tons of sardines received for canning	21	68	47
Tons of sardines received under permit for meal and oil	1,167	1,472	305
Total tons of sardines received for all purposes	1,188	1,540	352
Cases of 1-lb. oval cans packed			
Cases of other size cans packed	452	1,266	814
Other size cans reduced to equivalent cases of 1-lb. ovals	452	1,266	814
Meal, tons	216	269	53
Oil, gallons	21,587	25,244	3,657

California, All Districts Combined

	Season 1940-41	Season 1941-42	Increase
Tons of sardines received for canning	226,188	366,292	140,104
Tons of sardines received under permit for meal and oil	223,587	211,625	*11,962
Tons of sardines received for pet food, salting, etc.	4,934	5,546	612
Total tons of sardines received for all purposes	454,709	583,463	128,754
Cases of 1-lb. oval cans packed	1,463,699	2,181,634	717,935
Cases of other size cans packed	1,729,704	3,087,588	1,357,884
Other size cans reduced to equivalent cases of 1-lb. ovals	1,652,767	2,973,480	1,320,713
Meal, tons	71,122	85,103	13,981
Oil, gallons	12,398,310	16,498,965	4,100,655

* Decrease.

SARDINE CATCH BY MONTHS, SEASON 1941-42

Month	San Francisco			
	Canning	Reduction	Other purposes	Total
August, 1941	11,775	26,547	18	38,340
September	15,267	30,271	420	45,958
October	17,876	34,122	446	52,444
November	18,361	30,441	377	49,179
December				
January, 1942				
February				
March				
Totals	63,279	121,381	1,261	185,921

Month	Monterey			
	Canning	Reduction	Other purposes	Total
August, 1941	23,529	14,495	19	38,043
September	41,807	15,489		57,296
October	43,206	16,807		60,013
November	51,317	16,783		68,100
December	4,330	1,474		5,804
January, 1942	12,393	4,097	10	16,500
February	2,920	994		3,914
March	47			47
Totals	179,549	70,139	29	249,717

Month	San Pedro			
	Canning	Reduction	Other purposes	Total
October, 1941	43,203	8,804	1,213	53,220
November	19,141	3,301	791	23,233
December	17,184	3,261	678	21,123
January, 1942	17,736	1,613	1,009	20,358
February	18,448	1,654	565	20,667
March	7,684			7,684
Totals	123,396	18,633	4,256	146,285

Month	San Diego			
	Canning	Reduction	Other purposes	Total
October, 1941	3	437		440
November		411		411
December		416		416
January, 1942		176		176
February	29			29
March	36	32		68
Totals	68	1,472		1,540

PACK OF 1-LB. OVALS BY MONTHS, SEASON 1941-42

Month	San Francisco, cases	Monterey, cases	San Pedro, cases	San Diego, cases	Total, cases
August, 1941	96,085	140,661	----------	----------	236,746
September	111,579	257,507	----------	----------	369,086
October	118,690	261,476	198,707	----------	578,873
November	123,235	317,969	99,437	----------	540,641
December	----------	26,991	76,949	----------	103,940
January, 1942	----------	75,559	92,871	----------	168,430
February	----------	18,584	113,624	----------	132,208
March	----------	----------	51,710	----------	51,710
Totals	449,589	1,098,747	633,298	----------	2,181,634

PACK OF OTHER SIZE CANS REDUCED TO EQUIVALENTS OF 1-LB. OVALS, BY MONTHS, SEASON 1941-42

Month	San Francisco, cases	Monterey, cases	San Pedro, cases	San Diego, cases	Total, cases
August, 1941	62,920	177,530	----------	----------	240,450
September	94,743	307,343	----------	----------	402,086
October	122,746	322,005	392,683	44	837,478
November	124,711	375,106	191,417	----------	691,234
December	----------	31,870	180,417	----------	212,287
January, 1942	----------	92,779	196,023	----------	288,802
February	----------	23,600	188,025	518	212,143
March	----------	824	87,472	704	89,000
Totals	405,120	1,331,057	1,236,037	1,266	2,973,480

SARDINE MEAL PRODUCTION BY MONTHS, SEASON 1941-42

Month	San Francisco, tons	Monterey, tons	San Pedro, tons	San Diego, tons	Total, tons
August, 1941	6,034	5,694	----------	----------	11,728
September	7,331	8,080	----------	----------	15,411
October	8,590	8,536	6,997	75	24,198
November	7,980	10,027	3,062	75	21,144
December	----------	868	2,791	77	3,736
January, 1942	----------	2,494	2,449	29	4,972
February	----------	605	2,487	3	3,095
March	----------	5	804	10	819
Totals	29,935	36,309	18,590	269	85,103

SARDINE OIL PRODUCTION BY MONTHS, SEASON 1941-42

Month	San Francisco, gallons	Monterey, gallons	San Pedro, gallons	San Diego, gallons	Total, gallons
August, 1941	1,439,124	1,120,016	----------	----------	2,559,140
September	1,761,632	1,744,880	----------	----------	3,506,512
October	2,086,946	1,838,355	1,048,576	8,785	4,982,662
November	1,874,641	2,012,572	386,607	7,851	4,281,671
December	----------	153,290	355,129	6,497	514,916
January, 1942	----------	275,136	165,174	1,830	442,140
February	----------	78,194	110,760	23	188,977
March	----------	240	22,449	258	22,947
Totals	7,162,343	7,222,683	2,088,695	25,244	16,498,965

SARDINE CATCH, CASE PACK, MEAL AND OIL PRODUCTION

For Sardine Packing Seasons

Sardine Catch, Tons

Season	San Francisco district	Monterey district	San Pedro district	San Diego district	Total
1925-26	248	69,011	61,992	5,214	136,465
1926-27	2,653	76,690	64,216	----------	143,559
1927-28	11,066	98,678	67,459	3,973	181,176
1928-29	12,757	119,102	119,180	1,394	252,433
1929-30	20,655	159,434	140,432	2,079	322,600
1930-31	24,468	108,953	38,580	----------	172,001
1931-32	19,938	68,825	42,557	----------	131,320
1932-33	17,417	89,257	83,492	----------	190,166
1933-34	35,467	151,937	124,950	1,488	313,842
1934-35	67,140	229,992	178,755	4,859	480,746
1935-36	74,231	184,113	138,333	10,489	407,166
1936-37	139,429	206,229	137,914	4,569	488,141
1937-38	132,248	104,464	109,015	107	345,834
1938-39	200,361	180,090	145,335	2,790	528,576
1939-40	211,471	227,231	93,081	95	531,878
1940-41	117,817	165,145	170,559	1,188	454,709
1941-42	185,921	249,717	146,285	1,540	583,463

Sardines, 1-Lb. Ovals, Cases

Season	San Francisco district	Monterey district	San Pedro district	San Diego district	Total
1925-26	3,892	937,014	968,495	66,074	1,975,475
1926-27	51,657	1,150,859	986,858	----------	2,189,374
1927-28	110,911	1,363,251	878,175	39,380	2,391,717
1928-29	114,446	1,405,746	1,140,488	12,383	2,673,063
1929-30	206,478	1,797,566	1,493,615	16,551	3,514,210
1930-31	266,598	1,069,627	403,041	----------	1,739,266
1931-32	269,586	720,518	470,796	----------	1,460,900
1932-33	157,469	253,000	321,794	----------	732,263
1933-34	221,798	748,706	526,540	----------	1,497,044
1934-35	264,805	629,779	591,759	----------	1,486,343
1935-36	336,554	919,497	680,103	----------	1,936,154
1936-37	198,621	818,909	629,802	----------	1,647,332
1937-38	127,214	502,194	553,306	----------	1,182,714
1938-39	172,454	687,287	630,998	----------	1,490,739
1939-40	196,011	1,092,981	545,182	----------	1,834,174
1940-41	168,700	622,219	672,780	----------	1,463,699
1941-42	449,589	1,098,747	633,298	----------	2,181,634

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

Season	San Francisco district	Monterey district	San Pedro district	San Diego district	Total
1925-26	----------	35,956	16,361	13,065	65,382
1926-27	----------	21,673	63,264	----------	84,937
1927-28	40,825	14,160	145,143	31,995	232,123
1928-29	69,886	45,778	173,540	10,368	299,572
1929-30	79,224	90,238	458,416	12,552	640,430
1930-31	69,932	176,384	170,388	----------	416,704
1931-32	8,381	43,816	159,066	----------	211,263
1932-33	5,129	10,815	75,775	----------	91,719
1933-34	9,846	113,842	331,631	5,396	460,715
1934-35	12,025	142,535	222,661	13,058	390,279
1935-36	39,597	594,191	627,117	19,856	1,280,761
1936-37	42,986	469,296	819,859	9,573	1,341,714
1937-38	33,763	326,543	756,369	1,040	1,117,715
1938-39	51,658	376,076	655,303	----------	1,083,037
1939-40	90,628	670,420	539,666	80	1,300,794
1940-41	119,713	597,627	934,975	452	1,652,767
1941-42	405,120	1,331,057	1,236,037	1,266	2,973,480

Sardine Meal, Tons

Season	San Francisco district	Monterey district	San Pedro district	San Diego district	Total
1925-26	20	6,393	5,962	467	12,842
1926-27	228	6,447	5,962	----------	12,637
1927-28	1,183	9,355	7,128	184	17,850
1928-29	1,387	12,395	14,802	140	28,724
1929-30	2,282	16,671	16,258	251	35,462
1930-31	2,716	11,490	4,317	----------	18,523
1931-32	2,303	7,825	4,911	----------	15,039
1932-33	2,297	14,370	14,060	----------	30,727
1933-34	5,073	22,206	19,166	262	46,707
1934-35	10,571	36,396	29,836	848	77,651
1935-36	11,604	26,933	19,422	1,945	59,904
1936-37	23,686	31,867	18,735	827	75,115
1937-38	23,058	15,383	14,525	15	52,981
1938-39	34,751	28,859	22,066	537	86,213
1939-40	36,324	34,568	12,145	16	83,053
1940-41	20,541	25,805	24,560	216	71,122
1941-42	29,935	36,309	18,590	269	85,103

Sardine Oil, Gallons

Season	San Francisco district	Monterey district	San Pedro district	San Diego district	Total
1925-26	2,629	1,110,983	658,817	43,995	1,816,424
1926-27	60,967	1,501,384	682,796	----------	2,245,147
1927-28	257,989	1,601,993	711,579	10,253	2,581,814
1928-29	288,055	2,651,524	2,178,815	6,857	5,125,251
1929-30	474,530	3,887,472	1,986,704	11,071	6,359,777
1930-31	763,643	3,363,912	630,011	----------	4,757,566
1931-32	612,181	2,143,101	762,701	----------	3,517,983
1932-33	574,958	3,761,387	2,161,476	----------	6,497,821
1933-34	1,175,401	4,819,900	3,242,899	24,303	9,262,503
1934-35	2,514,588	9,379,239	4,865,486	111,252	16,870,565
1935-36	3,196,286	6,854,372	2,939,863	210,171	13,200,692
1936-37	5,509,905	6,814,184	1,898,134	77,700	14,299,923
1937-38	4,659,147	3,067,587	1,447,631	912	9,175,277
1938-39	7,804,909	5,462,066	2,197,757	37,325	15,502,057
1939-40	9,313,706	7,090,963	984,851	472	17,389,992
1940-41	4,809,853	5,197,570	2,369,300	21,587	12,398,310
1941-42	7,162,343	7,222,683	2,088,695	25,244	16,498,965

Sardine Oil Production, Gallons per Ton

Season	San Francisco district	Monterey district	San Pedro district	San Diego district
1930-31	47.5	43.2	26.3	----------
1931-32	47.1	43.1	28.5	----------
1932-33	43.0	45.6	29.1	----------
1933-34	39.6	37.0	31.3	17.7
1934-35	41.7	44.5	30.7	24.7
1935-36	49.9	46.8	27.9	21.0
1936-37	41.3	39.1	18.9	17.9
1937-38	36.3	36.6	19.3	11.1
1938-39	40.2	35.6	19.8	13.4
1939-40	45.5	38.7	15.5	5.0
1940-41	43.8	38.6	18.7	18.3
1941-42	43.8	38.2	21.9	16.7

CASE PACK, MEAL AND OIL PRODUCTION FOR CALENDAR YEARS 1928-1941

Sardines, 1-Lb. Ovals, Cases

Year	San Francisco district	Monterey district	San Pedro district	San Diego district	Total
1928	109,198	1,402,237	945,676	39,755	2,496,966
1929	204,878	1,834,648	1,438,159	12,225	3,489,910
1930	237,159	1,342,249	863,254	15,500	2,458,162
1931	307,575	696,640	498,996	----------	1,503,211
1932	125,737	334,019	415,874	----------	875,630
1933	239,917	598,616	365,750	----------	1,204,283
1934	292,216	798,942	531,619	----------	1,622,777
1935	301,455	825,011	615,808	----------	1,742,274
1936	225,185	864,498	586,038	----------	1,675,721
1937	101,912	577,405	761,776	----------	1,441,093
1938	164,559	556,477	600,532	----------	1,321,568
1939	225,462	1,023,285	627,524	----------	1,876,271
1940	178,316	755,639	664,241	----------	1,598,196
1941	459,454	1,142,052	689,210	----------	2,290,716

Fish Meal, Tons

Year	San Francisco district	Monterey district	San Pedro district	San Diego district	Total
1928	1,589	10,986	12,923	2,367	27,865
1929	2,576	16,640	20,040	3,565	42,821
1930	3,375	13,752	13,653	4,859	35,639
1931	3,597	8,416	7,600	2,827	22,440
1932	2,435	12,560	9,846	2,659	27,500
1933	4,941	18,869	18,249	4,310	46,369
1934	11,138	34,492	27,236	4,858	77,724
1935	12,994	27,966	31,163	6,572	78,695
1936	24,593	30,431	23,588	7,655	86,267
1937	22,916	21,118	29,184	8,300	81,518
1938	31,773	25,202	24,209	6,732	87,916
1939	43,369	33,238	21,858	6,704	105,169
1940	21,256	28,004	29,542	7,335	86,137
1941	32,773	38,875	25,832	5,332	102,812

Includes meal produced from sardines and other species of fish.

Fish Oil, Gallons

Year	San Francisco district	Monterey district	San Pedro district	San Diego district	Total
1928	282,043	2,174,673	1,268,518	24,068	3,749,302
1929	454,726	3,750,392	2,280,991	62,017	6,548,126
1930	747,931	3,769,950	1,282,893	41,989	5,842,763
1931	726,514	2,372,303	818,364	7,511	3,924,692
1932	426,831	3,378,929	1,293,961	25,678	5,125,399
1933	933,696	4,209,366	2,585,784	58,948	7,787,794
1934	2,490,156	9,322,080	4,221,447	94,525	16,128,208
1935	3,106,785	6,734,305	3,821,566	261,482	13,924,138
1936	5,626,422	6,756,541	2,834,887	260,059	15,477,909
1937	4,431,668	4,122,817	2,578,600	191,757	11,324,842
1938	7,032,792	4,753,160	2,126,661	130,606	14,043,219
1939	10,395,398	6,894,201	1,594,122	96,806	18,980,527
1940	4,831,500	5,745,120	2,509,291	129,079	13,214,990
1941	7,429,493	7,537,870	2,627,959	81,876	17,677,198

Includes oil produced from sardines and other species of fish.

STATE OF CALIFORNIA

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF FISH AND GAME

San Francisco, California

CULBERT L. OLSON—GOVERNOR
KENNETH I. FULTON—DIRECTOR OF NATURAL RESOURCES

FISH AND GAME COMMISSION

NATE MILNOR, President—Los Angeles
GERMAIN BULCKE, Commissioner—San Francisco
EDWIN L. CARTY, Commissioner—Oxnard
LEE F. PAYNE, Commissioner—Los Angeles
W. B. WILLIAMS, Commissioner—Alturas
GEORGE P. MILLER, Executive Secretary—San Francisco

BUREAU OF FISH CONSERVATION

A. C. TAFT, Chief—San Francisco
A. E. Burghduff, Supervisor of Fish Hatcheries—San Francisco
Brian Curtis, Supervising Fisheries Biologist—San Francisco
L. Phillips, Assistant Supervisor of Fish Hatcheries—San Francisco
George McCloud, Assistant Supervisor of Fish Hatcheries—Mt. Shasta
Allan Pollitt, Assistant Supervisor of Fish Hatcheries—Independence
D. A. Clanton, Assistant Supervisor of Fish Hatcheries—San Bernardino
Earl Leitritz, Assistant Supervisor of Fish Hatcheries—San Francisco
J. C. Lewis, Assistant Supervisor of Fish Hatcheries—Tahoe
Ed Clessen, Foreman, Fort Seward Hatchery—Alderpoint
William Berrian, Foreman, Fall Creek Hatchery—Copco
Archie Thompson, Foreman, Yosemite Hatchery—Yosemite
John Marshall, Foreman, Feather River Hatchery—Clio
A. N. Culver, In Charge, Kaweah Hatchery—Three Rivers
Donald Evins, Foreman, Lake Almanor Hatchery—Westwood
Ross McCloud, Foreman, Basin Creek Hatchery—Tuolumne
Peter Topp, Foreman, Burney Creek Hatchery—Burney
C. L. Frame, Foreman, Kings River Hatchery—Fresno
Harold Hewitt, Foreman, Prairie Creek Hatchery—Orick
J. L. Stinnett, Foreman, Brookdale Hatchery—Brookdale
Harry Cole, Foreman, Yuba River Hatchery—Camptonville
Clarence Chansler, Fish Hatchery Man, Madera Hatchery—Madera
R. C. Lewis, Foreman, Hot Creek Hatchery—Bishop
Cecil Ray, In Charge, Kern Hatchery—Kernville
Joseph Wales, Biological Surveyor—Mt. Shasta
Leo Shapovalov, Senior Fisheries Biologist—Stanford University
William Dill, Senior Fisheries Biologist—Fresno
Elden H. Vestal, Junior Aquatic Biologist—June Lake
Chester Woodhull, Junior Aquatic Biologist—Fresno

BUREAU OF GAME CONSERVATION

J. S. HUNTER, Chief—San Francisco
Gordon H. True, Jr., In Charge, Pittman-Robertson Project—San Francisco
Donald D. McLean, Economic Biologist—San Francisco
Roy M. Wattenbarger, Supervisor Los Banos Refuge—Los Banos
L. H. Cloyd, Supervisor Gray Lodge Refuge—Gridley
Russell M. Reedy, Supervisor Imperial Refuge—Calipatria
Ralph R. Noble, Supervisor Suisun Refuge—Joice Island
Joe Vlasnik, Jr., Supervisor Elk Refuge—Tupman
John R. Wallace, In Charge, Predatory Animal Control—San Francisco
Asa L. Brown, Supervising Trapper—Beaumont
John L. McDonald, Supervising Trapper—Redding
O. R. Shaw, Supervising Trapper—Salinas

BUREAU OF GAME FARMS

AUGUST BADE, Chief—Yountville
E. D. Platt, Superintendent, Los Serranos Game Farm—Chino
C. Van Ornum, Superintendent, Yountville Game Farm—Yountville

BUREAU OF MARINE FISHERIES

RICHARD VAN CLEVE, Chief—San Francisco
S. H. Dado, Assistant Chief—San Francisco
W. L. Scofield, Supervising Fisheries Researcher—Terminal Island
G. H. Clark, Supervising Fisheries Researcher—Stanford University
Frances N. Clark, Supervising Fisheries Researcher—Terminal Island
Harry C. Godsil, Senior Fisheries Researcher—San Diego
Donald H. Fry, Jr., Senior Fisheries Researcher—Terminal Island
Richard S. Croker, Senior Fisheries Researcher—Terminal Island
J. B. Phillips, Senior Fisheries Researcher—Pacific Grove
Paul Bonnot, Senior Fisheries Researcher—Stanford University
S. Ross Hatton, Senior Fisheries Researcher—Stanford University
Geraldine Conner, Fisheries Statistician—Terminal Island

BUREAU OF ENGINEERING

JOHN SPENCER, Chief—San Francisco
Clarence Elliger, Assistant Hydraulic Engineer—San Francisco
Byron Wittorff, Assistant—Red Bluff
Samuel Kabakov, Civil Engineering Draftsman—San Francisco

BUREAU OF LICENSES

H. R. DUNBAR, Chief—Sacramento
L. O'Leary, Supervising License Agent—Sacramento
R. Nickerson, Supervising License Agent—Los Angeles
Emil Dorig, License Agent—San Francisco

ACCOUNTS AND DISBURSEMENTS

D. H. BLOOD, Departmental Accounting Officer—Sacramento

BUREAU OF PATROL

E. L. MACAULAY, Chief of Patrol (absent on military leave)—San Francisco
L. F. CHAPPELL, Chief of Patrol—San Francisco

CENTRAL DISTRICT (Headquarters, Sacramento)

C. S. Bauder, Inspector in Charge—Sacramento

Northern Division

A. A. Jordan, Captain—Redding
Jos. H. Sanders, Captain—Sacramento
A. H. Willard, Captain—Rocklin
E. O. Wraith, Captain—Chico
L. E. Mercer, Warden, Butte County—Chico
Chester Ramsey, Warden, Butte County—Oroville
Taylor London, Warden, Colusa County—Colusa
Albert Sears, Warden, El Dorado County—Placerville
E. C. Vail, Warden, Glenn County—Willows
Jack Sawyer, Warden, Lassen County—Westwood
Don Davison, Warden, Modoc County—Alturas
Earl Hiscox, Warden, Nevada County—Nevada City
Wm. La Marr, Warden, Placer County—Tahoe City
Nelson Poole, Warden, Placer County—Auburn
E. J. Johnson, Warden, Plumas County—Quincy
George Shockley, Warden, Plumas County—Portola
H. S. Vary, Warden, Sacramento County—Sacramento
Eugene Durney, Warden, Sacramento County—Sacramento
Charles Sibeck, Warden, Sacramento County—Sacramento
Earl Caldwell, Warden, Shasta County—Burney
Chas. Love, Warden, Shasta County—Redding
Don Chipman, Warden, Siskiyou County—Dunsmuir
Brice Hammack, Warden, Siskiyou County—Yreka
Louis Olive, Warden, Siskiyou County—Tulelake
Fred R. Starr, Warden, Siskiyou County—Dorris
R. E. Tutt, Warden, Sierra County—Downieville
J. E. Hughes, Warden, Solano County—Dixon
A. Granstrom, Warden, Sutter County—Yuba City
R. W. Anderson, Warden, Tehama County—Red Bluff
Harold Erwick, Warden, Tehama County—Corning
C. L. Gourley, Warden, Trinity County—Weaverville
C. O. Fisher, Warden, Yolo County—Woodland
R. A. Tinnin, Warden, Yuba County—Marysville

Southern Division

S. R. Gilloon, Captain—Fresno
John O'Connell, Captain—Stockton
R. J. Little, Warden, Amador County—Pine Grove
L. R. Garrett, Warden, Calaveras County—Murphys
F. A. Bullard, Warden, Fresno County—Reedley
Paul Kehrer, Warden, Fresno County—Fresno
Lester Arnold, Warden, Kern County—Bakersfield
C. L. Brown, Warden, Kern County—Kernville
C. S. Donham, Warden, Kern County—Taft
Ray Ellis, Warden, Kings County—Hanford
H. E. Black, Warden, Madera County—Madera
Gilbert T. Davis, Warden, Mariposa County—Mariposa
Hilton Bergstrom, Warden, Merced County—Los Banos
H. Groves, Warden, Merced County—Merced
R. J. Bullard, Warden, San Joaquin County—Tracy
Wm. Hoppe, Warden, San Joaquin County—Lodi
Geo. Magladry, Warden, Stanislaus County—Modesto
W. I. Long, Warden, Tulare County—Visalia
Roswell Welch, Warden, Tulare County—Porterville
F. F. Johnston, Warden, Tuolumne County—Sonora

COAST DISTRICT (Headquarters, San Francisco)

Wm. J. Harp, Inspector in Charge ..... San Francisco

Northern Division

Scott Feland, Captain ..... Eureka
J. D. Dondero, Captain ..... Lakeport
Henry Lencioni, Captain ..... Santa Rosa
Ray Diamond, Warden, Del Norte County ..... Crescent City
Walter Gray, Warden, Humboldt County ..... Garberville
John Hurley, Warden, Humboldt County ..... Eureka
W. F. Kaliher, Warden, Humboldt County ..... Fortuna
Laurence Werder, Warden, Humboldt County ..... Eureka
Kenneth Langford, Warden, Lake County ..... Lakeport
M. F. Joy, Warden, Marin County ..... Tiburon
R. J. Yates, Warden, Marin County ..... San Rafael
Ovid Holmes, Warden, Mendocino County ..... Fort Bragg
Floyd Loots, Warden, Mendocino County ..... Willits
Leo Mitchell, Warden, Mendocino County ..... Point Arena
R. Remley, Warden, Mendocino County ..... Willits
J. W. Harbuck, Warden, Napa County ..... Napa
Bert Laws, Warden, Sonoma County ..... Petaluma
Victor Von Arx, Warden, Sonoma County ..... Santa Rosa
George Johnson, Warden, Sonoma County ..... Cloverdale

Southern Division

O. P. Brownlow, Captain ..... Alameda
C. L. Bundock, Warden, Alameda County ..... Oakland
Ed Clements, Warden, Contra Costa County ..... Martinez
Owen Mello, Warden, Monterey County ..... Pacific Grove
Henry Ocker, Warden, Monterey County ..... King City
F. H. Post, Warden, Monterey County ..... Salinas
J. P. Vissiere, Warden, San Benito County ..... Hollister
Lee C. Shea, Warden, San Francisco County ..... San Francisco
F. W. Hecker, Warden, San Luis Obispo County ..... San Luis Obispo
Orben Philbrick, Warden, San Luis Obispo County ..... Paso Robles
C. R. Peek, Warden, San Mateo County ..... San Mateo
M. S. Clark, Warden, Santa Clara County ..... Palo Alto
C. E. Holladay, Warden, Santa Clara County ..... San Jose
F. J. McDermott, Warden, Santa Cruz County ..... Santa Cruz

SOUTHERN DISTRICT (Headquarters, Los Angeles)

Earl Macklin, Captain in Charge ..... Los Angeles
E. H. Ober, Captain, Special Duty ..... Los Angeles

Western Division

L. T. Ward, Captain ..... Escondido
Fred Albrecht, Warden, Los Angeles County ..... Los Angeles
Walter Shannon, Warden, Los Angeles County ..... Los Angeles
Walter Emerick, Warden, Los Angeles County ..... Palmdale
Theodore Jolley, Warden, Orange County ..... Orange
E. H. Glidden, Warden, San Diego County ..... San Diego
Chester Parker, Warden, San Diego County ..... Julian
A. R. Ainsworth, Warden, Santa Barbara County ..... Santa Maria
R. E. Bedwell, Warden, Santa Barbara County ..... Santa Barbara
W. Greenwald, Warden, Ventura County ..... Fillmore
John Spicer, Warden, Ventura County ..... Ojai

Eastern Division

H. C. Jackson, Captain ..... San Bernardino
Leo Rossier, Warden, Imperial County ..... El Centro
W. S. Talbott, Warden, Inyo County ..... Bishop
C. J. Walters, Warden, Inyo County ..... Independence
James Loundagin, Warden, Mono County ..... Leevining
W. C. Blewett, Warden, Riverside County ..... Indio
W. L. Hare, Warden, Riverside County ..... Hemet
R. C. O'Conner, Warden, Riverside County ..... Banning
A. L. Stager, Warden, San Bernardino County ..... Upland
W. C. Malone, Warden, San Bernardino County ..... San Bernardino
Erol Greenleaf, Warden, San Bernardino County ..... Big Bear Lake
Otto Rowland, Warden, San Bernardino County ..... Victorville

MARINE PATROL

Ralph Classic, Captain---Monterey
Lars Weseth, Master, M.V. *N. B. Scofield*---Terminal Island
Howard V. Shebley, Warden, Cruiser *Bonito*---Newport Harbor
A. Wallen, Assistant Warden, Cruiser *Bonito*---Newport Harbor
Kenneth Webb, Warden, Cruiser *Broadbill*---San Diego
Phillip Westcott, Asssitant Warden, Cruiser *Broadbill*---San Diego
Ralph Dale, Cruiser *Perch*---Antioch
Kenneth Hooker, Warden, Cruiser *Quinnat III*---San Francisco
V. Swenson, Assistant Warden, Cruiser *Quinnat III*---San Francisco
K. Lund, Warden, Cruiser *Rainbow III*---Martinez
G. Whitesell, Assistant Warden, Cruiser *Rainbow III*---Martinez
Otis Wright, Assistant Warden, Launch *Sturgeon*---Monterey
Walter Engelke, Captain and Warden, Cruiser *Tuna*---Santa Monica
Harry Rouch, Deckhand, Cruiser *Tuna*---Santa Monica
Robert Mills, Cruiser *Yellowtail*---Santa Barbara
Allen C. Swenson, Assistant Warden, Cruiser *Yellowtail*---Santa Barbara
John Barry, Warden---Ventura
Ellis Berry, Warden---Morro Bay
W. J. Black, Warden---Monterey
J. R. Cox, Warden---Watsonville
Donald Glass, Warden---Terminal Island
N. C. Kunkel, Warden---Terminal Island
Leslie E. Lahr, Warden---Terminal Island
Niles Millen, Warden---Terminal Island
Ralph Miller, Warden---San Francisco
Tate F. Miller, Warden---Terminal Island
C. L. Savage, Warden---Terminal Island
T. W. Schilling, Warden---Terminal Island
G. R. Smalley, Warden---Richmond
T. J. Smith, Warden---San Diego
L. G. Van Vorhis, Warden---Terminal Island
E. L. Walker, Warden---Terminal Island
Frank Felton, Assistant Warden---San Diego

POLLUTION DETAIL

Paul A. Shaw, Chemical Engineer---San Francisco
C. L. Towers, Warden---Los Angeles
Don Hall, Warden---Stockton
H. L. Lantis, Warden---Long Beach
J. G. McKerlie, Warden---Alameda
R. L. Schoen, Warden---Wilmington
Walter R. Krukow, Assistant Warden---Santa Barbara
J. A. Reutgen, Assistant Warden---Martinez
Clarence Whaley, Assistant Warden---San Diego
R. G. Kaneen, Assistant Warden---Terminal Island

CALIFORNIA JUNIOR GAME PATROL

George D. Seymour---San Francisco

MARINE PATROL AND RESEARCH BOATS

Motor Vessel *N. B. Scofield,* Terminal Island
Motor Vessel *Bluefin,* Monterey
Cruiser *Bonito,* Newport Harbor
Cruiser *Broadbill,* San Diego
Cruiser *Perch,* Antioch
Cruiser *Quinnat III,* San Francisco
Cruiser *Rainbow III,* Martinez
Cruiser *Tuna,* Santa Monica
Cruiser *Yellowtail,* Santa Barbara
Launch *Sturgeon,* Monterey

o

printed in CALIFORNIA STATE PRINTING OFFICE
SACRAMENTO, *1944* GEORGE H. MOORE, STATE PRINTER

25467 5-44 2M