

CALIFORNIA FISH AND GAME

"CONSERVATION OF WILD LIFE THROUGH EDUCATION"

Volume 16

San Francisco, October, 1930

Number 4



DEPARTMENT OF NATURAL RESOURCES DIVISION OF FISH AND GAME

San Francisco, California

Fish and Game Commissioners appointed by the Governor. Term at pleasure of Governor. No compensation

I. ZELLERBACH, President.....	San Francisco
REGINALD S. FERNALD, Commissioner.....	Santa Barbara
JOHN L. FARLEY, Executive Officer.....	San Francisco
EUGENE D. BENNETT, Attorney.....	San Francisco
Ralph W. Scott, Assistant Attorney.....	San Francisco
510 Russ Building, San Francisco. Phone Sutter 6100.	

BUREAU OF FISH CULTURE

W. H. SHEBLEY, In Charge.....	San Francisco
J. H. Vogt, Assistant to Chief of Bureau.....	San Francisco
A. E. Burghduff, Field Superintendent.....	San Francisco
L. Phillips, Field Superintendent.....	Sacramento
George A. Coleman, Biologist.....	Berkeley
Alex Culver and A. E. Doney, Surveyors.....	Sacramento
G. H. Lambson, Superintendent Mt. Shasta Hatchery and Klamath River Stations.....	Mt. Shasta
Geo. McCloud, Superintendent Mt. Whitney Hatchery.....	Independence
J. C. Lewis, Superintendent Fort Seward Hatchery.....	Alderpoint
E. V. Cassell, Foreman Fall Creek Hatchery.....	Copco
Peter Topp, Foreman Yosemite Hatchery.....	Yosemite
C. L. Frame, Foreman Big Creek Hatchery.....	Swanton
J. W. Ricker, Foreman Cold Creek Hatchery.....	Ukiah
J. J. Shebley, Foreman Feather River Hatchery.....	Clio
Ed. Clessen, Foreman Kaweah Hatchery.....	Three Rivers
George E. West, Foreman Tahoe Hatchery.....	Tahoe
Wm. Berrian, Foreman Clear Creek Hatchery.....	Westwood
D. A. Clanton, Foreman Bear Lake Hatchery.....	Pine Knot
H. E. Cole, Foreman Mormon Creek Hatchery.....	Sonora
K. H. Shebley, Foreman Burney Creek Hatchery.....	Burney
Guy C. Tabler, Foreman Kings River Hatchery.....	Fresno
Raymond Hadden, Foreman Yuba River Hatchery.....	Camptonville
John Marshall, Foreman Brookdale Hatchery.....	Brookdale
James L. Stinnett, Foreman Beaver Creek Station.....	Gottville
Archie Thompson, Foreman at Mt. Whitney Hatchery.....	Independence
Clarence A. Nixon, General Foreman at Mt. Shasta Hatchery.....	Mt. Shasta
Donald Evins, Superintendent Distribution Car 01.....	Mt. Shasta
Ross McCloud, Superintendent Distribution Car 02.....	Mt. Shasta

BUREAU OF COMMERCIAL FISHERIES

N. B. SCOFIELD, In Charge.....	San Francisco
H. B. Nidever, Supervising Captain.....	Terminal Island
S. H. Dado, Supervising Captain.....	San Francisco
C. H. Groat, Captain.....	Terminal Island
R. F. Classic, Captain.....	Monterey
Coburn F. Maddox, Captain.....	San Diego
W. L. Scofield, Acting Director State Fisheries Laboratory.....	Terminal Island
W. F. Thompson, Consultant, State Fisheries Laboratories.....	Terminal Island

Commercial Fisheries Patrol

Paul Bonnot.....	San Francisco	Ross W. Markley.....	Terminal Island
R. S. Cleaveland.....	Pismo Beach	Tate F. Miller.....	Terminal Island
N. C. Kunkel.....	Terminal Island	L. G. Van Vorhis.....	Terminal Island

Launch Patrol

Walter Engelke.....	Launch "Bluefin,"	Terminal Island
Jos. F. Childs.....	Launch "Bluefin,"	Terminal Island
Glen F. Grant.....	Launch "Bluefin,"	Terminal Island
L. F. Weseth.....	Launch "Albacore,"	Monterey
Erol Greenleaf.....	Launch "Albacore,"	Monterey

BUREAU OF FINANCE AND ACCOUNTS

H. R. DUNBAR, Assistant Executive Officer and In Charge.....	Sacramento
--	------------

BUREAU OF EDUCATION AND RESEARCH

LEO K. WILSON, Acting Director.....	San Francisco
Earl Soto, Assistant to Director.....	San Francisco
Rodney S. Ellsworth, Educational Assistant.....	San Francisco
D. D. McLean, Field Naturalist.....	San Francisco
E. S. Cheney, Photographer.....	Oakland
Paul A. Shaw, Toxicologist.....	San Francisco
Mrs. Bessie W. Kibbe, Librarian.....	San Francisco

BUREAU OF GAME REFUGES

J. S. HUNTER, In Charge.....	San Francisco
Jay C. Bruce, State Lion Hunter.....	San Lorenzo

BUREAU OF HYDRAULICS

JOHN SPENCER, In Charge.....	San Francisco
Clarence Elliger, Assistant.....	San Francisco

BUREAU OF GAME FARMS

AUGUST BADE, In Charge.....	Yountville
E. D. Platt, Assistant in Charge.....	Chino

BUREAU OF FISH RESCUE AND RECLAMATION

GEORGE NEALE, In Charge.....	Sacramento
------------------------------	------------

CALIFORNIA FISH AND GAME

"CONSERVATION OF WILD LIFE THROUGH EDUCATION."

Volume 16

SACRAMENTO, OCTOBER, 1930

No. 4

TABLE OF CONTENTS

	Page
THE EARLY HISTORY OF DUCK CLUBS IN CALIFORNIA.....	
..... <i>M. Hall McAllister</i>	281
DUCK DISEASE CAUSED BY THE POISON OF THE BACILLUS BOTULINUS	
..... <i>M. Hobmaier</i>	285
ANGLING FOR STRIPED BASS.....	
..... <i>Charles E. Cole</i>	286
BLACK BASS FISHING TACKLE—USING THE RIGHT TACKLE IS MORE THAN HALF OF ANGLING PLEASURE.....	
..... <i>Earl R. Kauffman</i>	293
FISH RESCUE AND RECLAMATION WORK.....	
..... <i>George Neale</i>	296
CONSERVATION THROUGH CONTACT WITH LIVING THINGS.....	
..... <i>Rodney S. Ellsworth</i>	299
GAME REFUGES, PRESERVES AND SANCTUARIES.....	
..... <i>Walter R. Welch</i>	307
RAMBLING THOUGHTS OF A PERVERTED BRITISHER.....	
..... <i>Capt. Percy R. Creed</i>	311
CALIFORNIA HALIBUT.....	
..... <i>G. H. Clark</i>	315
REVIEW OF A REPORT ON THE MIGRATION OF THE PACIFIC HALIBUT	
..... <i>Frances N. Clark</i>	318
SIZE AT FIRST MATURITY OF THE WHITE SEA BASS.....	
..... <i>Frances N. Clark</i>	319
THE SMALLER FISHING PORTS OF CENTRAL CALIFORNIA.....	
..... <i>Richard S. Croker</i>	324
EDITORIALS	330
DIVISION ACTIVITIES	354
LIFE HISTORY NOTES.....	367
COMMERCIAL FISHERY NOTES.....	369
HUNTING ACCIDENTS, 1929.....	371
REPORTS—	
Violations of Fish and Game Laws.....	376
Fishery Products, April, May, June, 1930.....	378
Statement of Expenditures	382
Statement of Income	384

THE EARLY HISTORY OF DUCK CLUBS IN CALIFORNIA

By M. HALL McALLISTER

In compiling facts as to the first shooting clubs of the state, as a preface it might be mentioned that the writer of this was born in October, 1861, at the old United States Arsenal at Benicia, California, which overlooks Suisun Bay, the winter home of countless thousands of wild fowl, and when the above noted happy event took place, a band of honkers or a flock of ducks must have been passing by for the said youngster to have been so thoroughly inoculated as he afterward proved to be as a follower of the sport of wildfowling.

In the late sixties and early seventies the masses of ducks and geese which collected every fall around Suisun Bay and the delta of the Sacramento and San Joaquin rivers were sights never to be forgotten. On one occasion in the fall of 1875, I was invited to join a party of army officers for a hunt in the Government yacht, *John Rogers*. We



FIG. 89. Cordelia Shooting Club, the first duck club in California, was organized in 1880. Charter members, left to right: T. Cary Friedlander, William McPherson, Edward F. Dent, M. Hall McAllister, Fred S. Butler, Ward McAllister, Jr., Charles W. Kellogg, William B. Bradford, Harry Babcock, John K. Orr.

sailed up Suisun Bay and up the Suisun and Cordelia sloughs and anchored for the night about where the railroad drawbridge (Cygnus) was afterward constructed.

As we were taking breakfast the next morning just after daylight, the yacht captain called down to us to come on deck for an extra-

ordinary sight. At an elevation of about 200 or 300 yards was a flock of widgeon which could be told by their whistling. The flight was about 100 yards wide, coming in a seemingly endless stream from over the western hills and heading northeast, and it took over fifteen or twenty minutes for them all to pass, reminding one of the flocks of wild pigeons which we read about in the eastern states.

Another fall, I saw an equally large flock of widgeon feeding on the new grass on the Suisun hills near the present Goodyear railroad station; they seemed to cover the sky when they took wing.

It was a common annual sight in the fall those years, just after daylight on the Suisun marsh, to see the entire sky practically covered with geese and ducks leading in all directions. No wonder the farmers

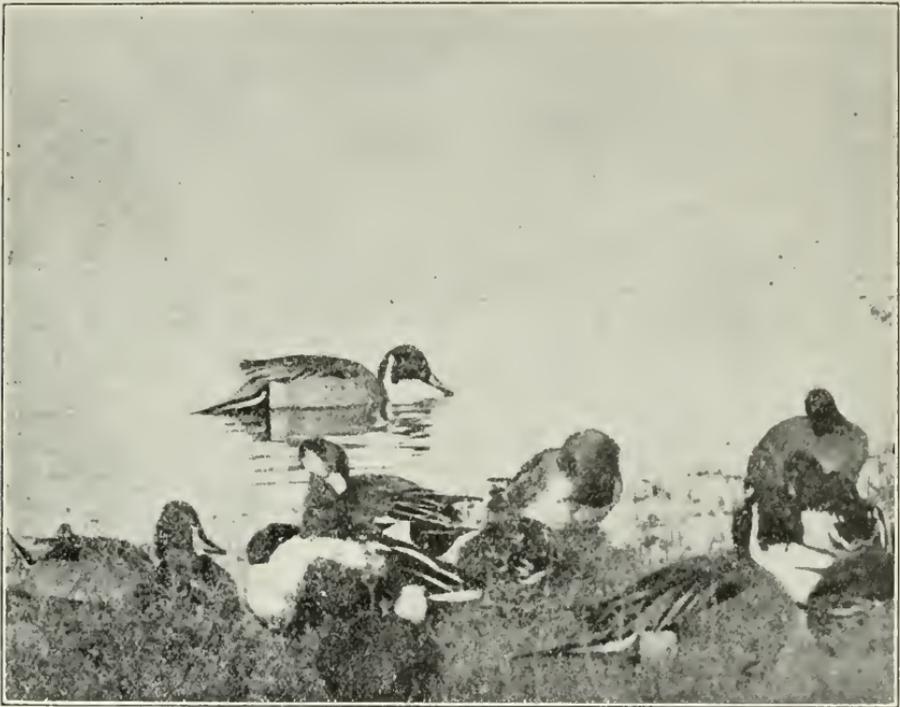


FIG. 90. Ducks enjoying the sun at Buttonwillow Lake, state waterfowl game refuge near Los Banos. Can you identify the widgeon, mudhen, mallard, shoveller and pintails? Photograph by E. S. Cheney, January, 1930.

insisted there be no law against shooting such hordes of wildfowl that raided their growing grain.

The organization of duck clubs in California was commenced when the Southern Pacific Railroad built across the Suisun marsh from Suisun to Benicia in 1878-79 and brought this wonderful sanetum of ducks and geese within a few hours of San Francisco and Oakland.

The whole marsh, practically 5000 acres, was owned by The Chamberlain Estate and the first lessees were the market hunters—Jim Payne and Seth Beekwith.

The railroad said they would make two stations, the Drawbridge, later named Cygnus, and Teal, so Payne and Beekwith located their

ark and the sloop yacht *Wave* at Teal Station and invited sportsmen for a day's shooting at \$5 per head.

In 1880 the first organized club was the Cordelia Shooting Club,* ten members, who leased from Payne and Beckwith the tract known as the string of ponds on the Frank Horan slough.

In 1881, the Teal Club was organized with ten members; they bought out Payne and Beckwith's lease and the whole outfit of arks, boats and decoys.

The Ibis Club, the same year, obtained a lease of the Hardland ponds; a club of three members being formed, afterward increasing to five shooters.

About 1890 the Joyee Island Club was organized with ten members purchasing the lower end of Joyee Island and building ponds and a fine club house.

About 1895 the Tule Belle Club moved from an old site on Sherman Island to the Drawbridge. They had ten members and the club received its name from a large luxurious house boat christened the *Tule Belle*. The memberships in this club were later all bought up by the late Herman Oelrichs and his estate sold it to the late William H. Harriman, who never shot there; it reverted to the Oelrichs Estate, who sold it to the present owners.

In 1906 the Chamberlain Estate sold their entire holdings to a syndicate headed by the late Frank Maskey, et al. That year a number of smaller clubs were formed, notably the Green Lodge at Cygnus by W. W. Richards; the Roos Club, which obtained the old Sixth Reach Pond on the Suisun Slough; the Hawley Club at the mouth of the Cordelia Slough; the Seymour Club, at the head of the Cordelia Slough which adjoins the old Cordelia Club grounds.

Since the advent of the automobile and the fast motor boat, every patch of ground where water, either salt or fresh, can be obtained is turned into a duck shooting club and it is no wonder the wild fowl are leaving California for Mexico or other more favorable climes.

Before closing this incomplete history of early day duck clubs, I might relate the story of the most unique "hunting parties" that every came to my knowledge.

They were given each fall by Captain Richard Floyd, the man who built the Lick Observatory on the summit of Mount Hamilton for the Lick trustees. He was a member of the Teal Club and he, with several of the other members with their wives, spent a week at Teal during the height of the shooting in October and November. A special French chef with extra servants went along and they also took with them the famous old time "Macaroni Band," an Italian orchestra that used to play on the Sausalito ferry. The men would take the morning shoot, the ladies of the party would go with the keepers for the afternoon hunt, and in the evening they had music and cards.

As in the old days, there were no limits on ducks, champagne and cards. These parties were long remembered and talked about.

* The first meeting of the Cordelia Shooting Club was held in the parlor of the Occidental Hotel in San Francisco. The late Charles W. Kellogg called those invited to join to order and proposed the taking over of part of the famous Chamberlain tract on the Suisun marsh in Sclano County. The leases were duly entered into, also a contract with the well-known Captain Charles Chittenden to hire his yacht, the yawl *Lolita*, which afterward was superseded by the yacht *White Wings*, and later by a large and commodious house ark.

The late Herman Oelrichs also gave his friends some enjoyable outings some of which I had the pleasure of attending. We always went and returned on a special train and there was no stint of the good things of life.

DUCK DISEASE CAUSED BY THE POISON OF THE BACILLUS BOTULINUS*

[EDITOR'S NOTE.—During October, 1930, Paul A. Shaw, toxicologist, and Dr. Hobmaier, pathologist of the Division of Fish and Game, visited Klamath Falls for further investigation of the duck disease. While there, E. R. Kalmbach, senior biologist of the U. S. Bureau of Biological Survey, told them of his experiments the results of which appear in a recent issue of *Science*.

The experiments reported in the following article by Dr. Hobmaier were conducted on the basis of this lead.]

By M. HOBMAIER

It is universally admitted that, in the conservation of the wild game birds in California, the nature and origin of the so-called duck disease is one of the most important problems at the present time. Everyone knows of the enormous losses caused by this disease. Many papers record the observations in the field and discuss at considerable length the probable causative factors, but the problem is still urgent.

Observations which seem to be of great interest have recently been made in the game laboratory of the Fish and Game Commission at the Hooper Foundation. The causative organism of the duck disease has been isolated for the first time in cultures which were highly toxic for mice and also for ducks both by feeding and by inoculation. The symptoms in the inoculated mice indicated that the cultures contained the poison of the *Bacillus botulinus*. All birds fed with cultures became sick. Only two of the ten fed birds recovered. It was also possible to reproduce the duck disease with the cultures prepared from the organs of the birds. They showed weakness or complete paralysis of the legs, the wings, and the *membrana nictitans*. Although the sensorium remained clear, the neck and the head were affected late in the course of the disease. The biological investigations proved that the poison responsible for these symptoms was *Closteridium botulinus* type C. The duck disease is therefore an intoxication due to the poison generated by an anaerobic bacillus which was found in different organs of naturally infected birds. In experimental work the disease could also be reproduced with *Closteridium botulinus* type A and occasionally with type B. Further investigations will show if only *Closteridium botulinus* type C or also type A are responsible for the naturally contracted disease.

So far deceased ducks have been received from Williams Lake, Tule Lake, and from a lake near Klamath Falls. In all these specimens the writer succeeded in isolating the causative organism of the duck disease, *Botulinus* type C.

The four types of botulinus organism generated highly toxic substances. The duck disease induced in normal birds by feeding of botulinus toxin was identical with the disease produced by feeding of botulinus material containing the microbe of the botulinus group. The duck disease is an intoxication with the poison of *Botulinus* C (perhaps A, B). It is the same disease as the so-called "limberneck of chickens."

The different types of botulinus affect all animals, including man, although type C intoxications have not as yet been reported in human

* Contribution No. 7 from the Game Laboratory, George Williams Hooper Foundation for Medical Research, University of California, San Francisco, California.

beings. Probably the birds acquire the disease by ingestion in a manner similar to that in man. The origin of the disease is food, contaminated with the toxin liberated by the organisms. The control measures so successfully instituted by Dr. K. F. Meyer in California have eliminated this danger. Through the studies of Church and Geiger it is known that the absorption of the botulinustoxin is facilitated by abrasions or defects on the skin and mucous membranes of the mouth and the intestinal tract. This fact has considerable bearing on the mechanism of the infection since the post mortems have shown that the birds very often suffer from stomach worms which cause extensive denudations of the stomach wall. The result is that the birds harboring stomach worms are more readily intoxicated by the botulinustoxin than those without the parasite.

Future studies must consider the factors responsible for the accumulation of botulinustoxin in definite localities. It is now understood why the disease is found in stagnant water and disappears in flowing water. The toxic substance is present in smaller quantities in flowing water and can not intoxicate the birds. In the stagnant water the pronounced increase in the amount of toxin is probably due to the effect of the carrion, which serves as a medium in which *Botulinus* grows and forms its poison. Birds dead from duck disease, cadavers of animals, insects, mollusks, and plants are potential sources for the spreading of botulinus organisms and consequently of the duck disease.

The sources of the dissemination of the disease have to be determined and means have to be found to destroy them. The control of the duck disease can be effective only if all the sources of the botulinus organisms are detected and eliminated. In this connection it may be mentioned that at the present time many birds and other animals have been found dead throughout the state. Therefore, it is of the greatest importance to find the reason for these mortalities. This is a problem not only for the chemist but for the pathologist as well. It is possible that a botulinus intoxication not infrequently may be the cause of the deaths among game animals.

Acknowledgment is made to Dr. K. F. Meyer and Dr. H. H. Heller for the preparation of pure cultures and identification of the toxin by neutralization tests.

ANGLING FOR STRIPED BASS

By CHARLES E. COLE

The striped bass (*Roccus lineatus*) is an anadromous fish with wonderful endurance and belongs to the sea bass family. This excellent game fish was originally distributed along the Atlantic coast from Florida to the St. Lawrence River and through its successful introduction has become quite abundant on our Pacific coast. Natural spawning and feeding grounds suited to its requirements have made this possible.

In the past few years, the striped bass has become a general topic among sportsmen. True, many persons have fished for bass for years, yet only in the last four or five seasons has the sport grown from a few hundred anglers well into the thousands.

In 1927, while fishing the Napa River Bay, I counted 103 boats, from what is known as the "Black Can" down to "The Towers," a distance of possibly two miles. To be very conservative, each boat would average two fishermen. In September of 1929, I counted nearly 200 boats, ranging from skiffs to elaborate schooners, some of

them costing many hundreds of dollars. This indicates the gain in the number and classes of people who have taken up the sport.

The increase is not alone confined to the area above, but applies to all sections of the bay proper, to its many smaller bays, and far inland along the Sacramento and San Joaquin rivers.

Through the courtesy of Pere Meakin, of Modesto, the following record of striped bass taken during 1929 in the San Joaquin and Stanislaus rivers has been secured. This offers positive evidence of the popularity of the sport. Only those fish weighing 20 pounds or over appear in the list. Yet, it is known that a large number were caught weighing up to 23 pounds of which there is no record. For instance, Mr. Philleo, during October, November and December, caught some 10 stripers weighing from 15 to 25 pounds in the San Joaquin River. No accurate weight record was made of his catches.

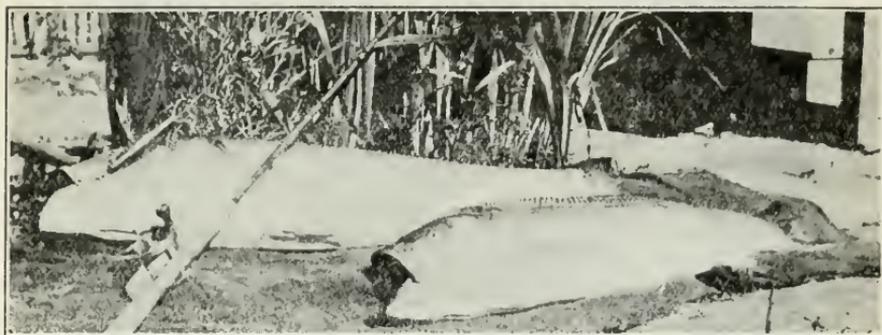


FIG. 91. The sport afforded in the battle with these game, striped warriors is attracting increasing numbers of enthusiasts. Fish caught by Christopher Monn, near Vallejo. Weights $44\frac{1}{2}$ and 33 pounds. Photograph by A. Lutenecker, 1928.

Name of angler	Weight of striper	Locality	1929 date
M. Munson	$24\frac{3}{4}$ lb.	San Joaquin River	March 2
V. E. Keller	21 lb.	San Joaquin River	March 7
Frank Hudson	23 lb.	San Joaquin River	March 10
Ben Tuxsario	$21\frac{1}{2}$ lb.	San Joaquin River	March 15
M. Scott	$26\frac{1}{2}$ lb.	San Joaquin River	March 17
Ross Mangum	$22\frac{5}{8}$ lb.	San Joaquin River	March 17
Ira Costuer	$49\frac{7}{8}$ lb.	San Joaquin River	April 14
Frank Merenda	$22\frac{3}{4}$ lb.	Stanislaus River	June 20
A. Benoit	$26\frac{7}{8}$ lb.	Stanislaus River	June 15
A. Benoit	23 lb.	Stanislaus River	June 15
A. Benoit	21 lb.	Stanislaus River	June 15

Fishing, like anything else, has its true followers. It also has a scattering few who are not true sportsmen. I have noticed this latter class become highly exasperated when undersized bass were hooked. Hotly yanking them off, I have seen them throw the injured fish ever so far, sometimes into the tules. Yet, these same individuals have but themselves to blame. They invited the small fish to strike their bait because they used very small hooks and, secondly, small bait. Often, they fish at a time or place when the small bass predominate. Personally, no matter what the season or place, I never use a hook smaller than a 7-0 and a piece of bait large enough to conform to such a hook, and only one. I have learned that I catch as many bass, and quite

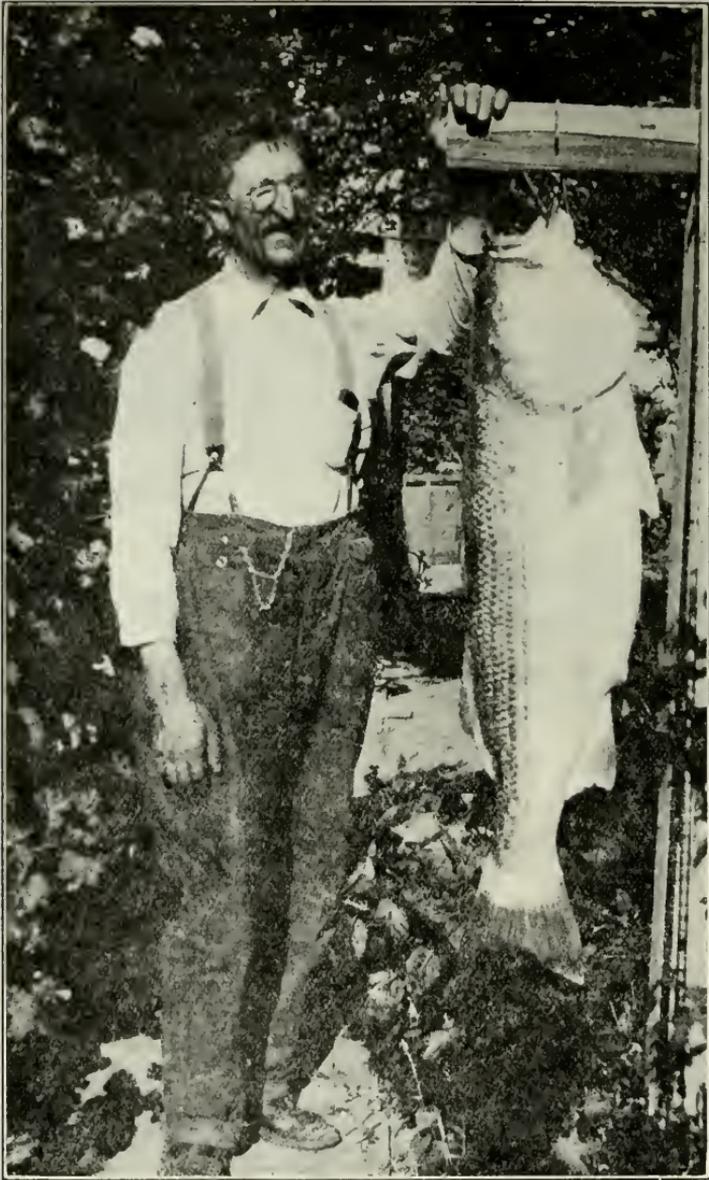


FIG. 92. A record striped bass for the season 1924. Weight $34\frac{1}{2}$ lbs. Caught by Christopher Monn, near Vallejo. Photograph by A. Lutenecker.

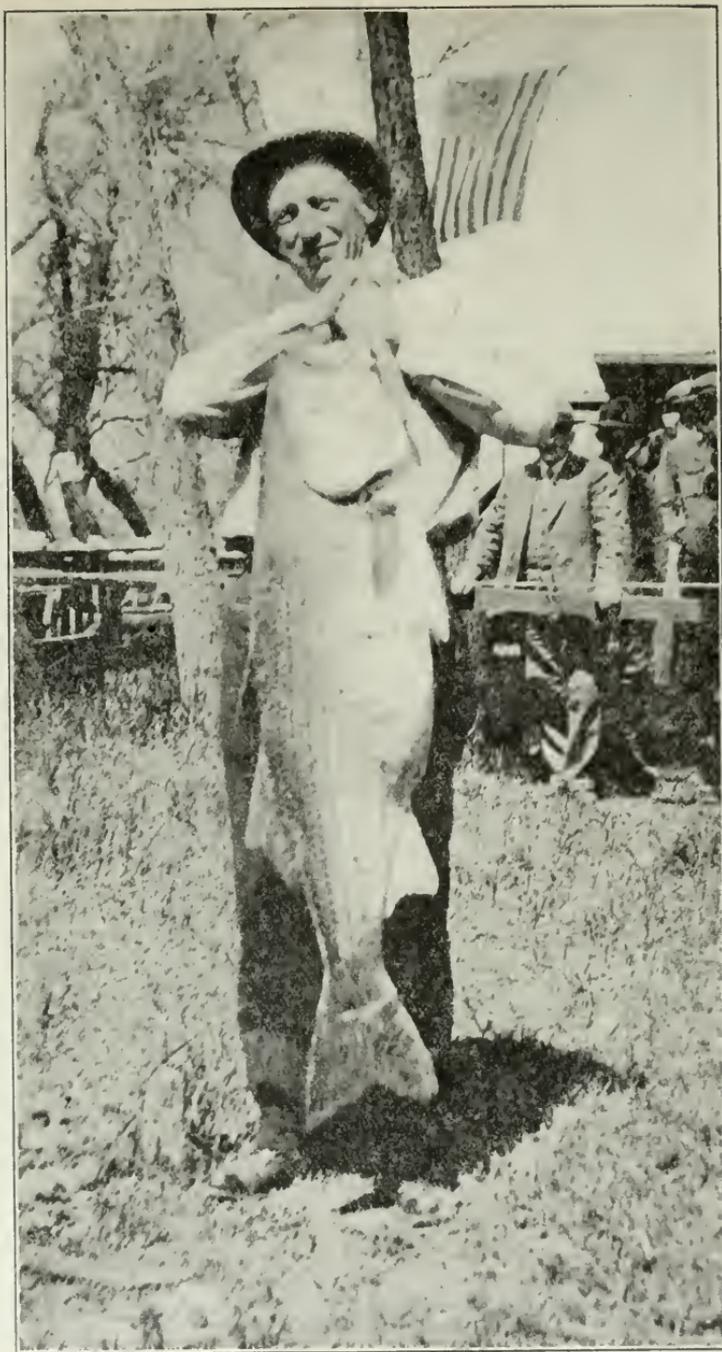


FIG. 93. Largest striper on record taken in local waters from Modesto in San Joaquin River. Weight 49 lbs. 4 oz. Caught by Ira Cotner, April 14, 1929. Photographed by Perc Meakin, Modesto.

often larger fish, as others with whom I fish who use two hooks. I am thoroughly convinced that when bass are running, one hook is plenty and if they are not running, one is too many.

It does seem absurd for a fisherman to curse his luck when he is using two small hooks with small bait, and is catching undersized bass (less than 12 inches). These "bait robbers," as they are commonly called, make the larger ones so why not protect them instead of destroying them? Why not be content with fewer fish and larger ones? I have returned home without bass and yet enjoyed my day's outing in the great outdoors with its unlimited fresh air and sunshine. I fish with many others like myself who never complain at not making a catch.

A great number of the older anglers use one hook with a sliding sinker, one which conforms to the weight of their rod. I believe this method the best for various reasons, the most important being the tension of one's line. The larger bass upon picking up the bait do not always hit and run, but seem to turn the bait around in their mouth, and if they feel tension, immediately drop it. A sliding sinker allows a bass to start his run with the bait without the drag of a heavy sinker. It allows the fisherman to hook him or the bass to become the victim of the barb from his own actions before he realizes there is something attached to the other end of it.

The use of the straight and offset hooks constitutes another method and this too is a matter of personal taste. There are arguments for and against both methods, each with much merit. Sometimes I use one and again I will try the other and have caught many bass on both.

In order to make more game out of the sport many striped bass anglers, in boat fishing, use light tackle. A short bait rod of the 3/6 type with reel to balance and a light cuttyhunk line will obviously give more sport to the battle with a game striped warrior than may be had with a heavy surf rod, a windlass for a reel and a young miniature lariat rope as a line.

The Monterey sardine is used in this section with, I believe, more success than any other lure. The oil of the sardine seems to have a great attraction for the striper. I have caught bass with as high as three heads, a crab and smaller pieces of sardines in their stomachs. It is often worthwhile to investigate the contents of the stomach, especially when the specimen is quite poddy. In such cases, generally, the stomach is well filled. Yet, the fish was looking for more. The appetite of a bass must be at times truly ravenous.

Methods of baiting are a matter of personal opinion. Many steak the sardine by cutting it into three or four pieces. They place it on the hook through the back, through the stomach part and just the opposite. The first mentioned is the better of the two, for the barb of the hook is then free. Whereas, running the hook first through the stomach then through the heavy portion of the back, results in the backbone of the sardine lying over the barb. This has a tendency to shield the barb and, unless the bass strikes hard enough to tear the bait, he is not so easily hooked.

Many anglers remove the backbone. When this is done, the chances for a catch are much better. Others slab or fillet the sardine. This is a very good method if the bait is put on in strips much after the fashion of pork rind. If a small portion is left dangling from the



FIG. 94. Large striped bass caught in San Joaquin River near Modesto by Carr Outland. December, 1929. Photograph by Perc Meakin.

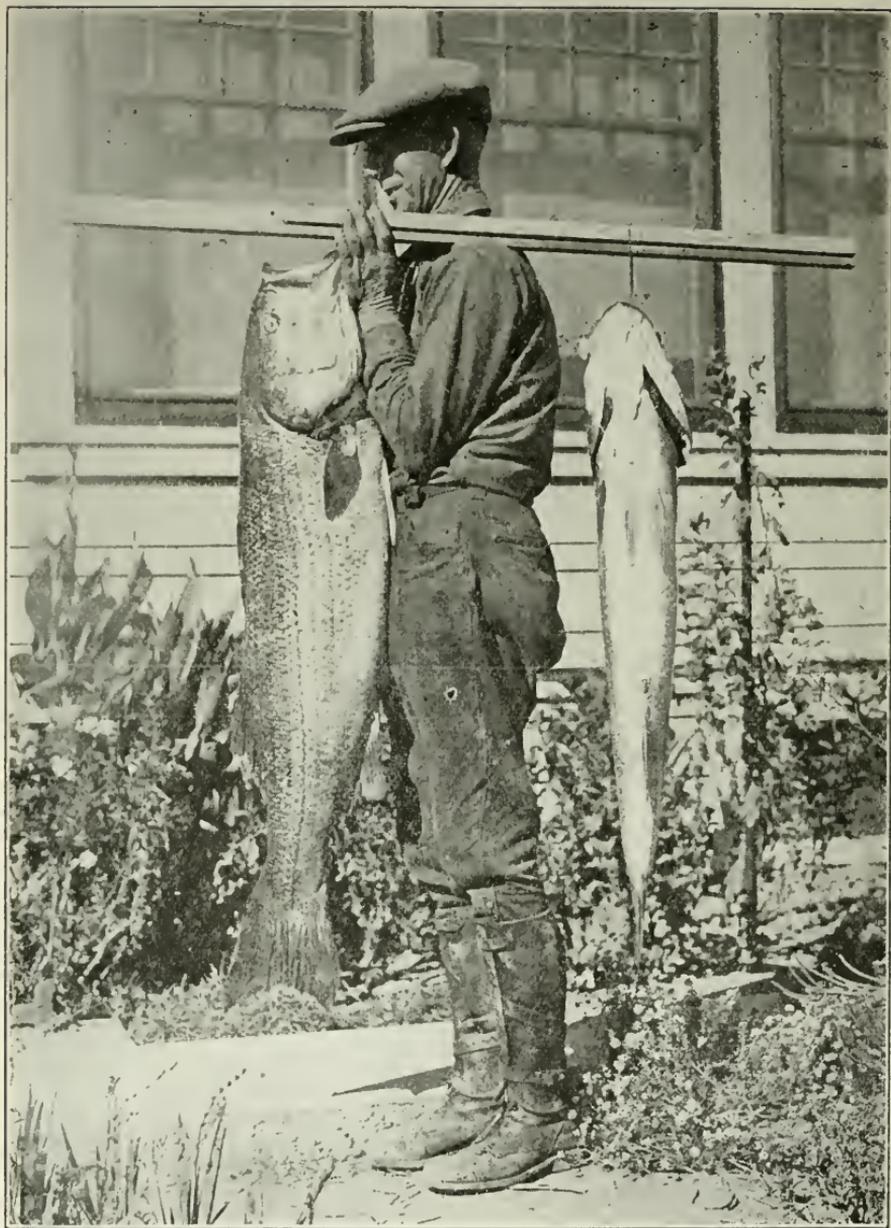


FIG. 95. Record striped bass caught in Salinas River, Monterey County, by R. J. Bruce, King City. October 30, 1924. Weights, $37\frac{1}{2}$ and 26 lbs. Length of largest, 3 ft. 11 in.

point of the hook in a tide, it gives the bait some action. When the bed of the fishing ground is of such nature that bait is not hidden when it settles my experience dictates that bait on the bottom catches the most fish.

It has been my observation, especially in the Napa River district, that the summer months have their run of small bass. These are followed in September by fish that range a little larger. The latter part of September and in October, the run comprises 3, 4, 5 and 6 pounders. By November the smaller bass leave and those averaging from 5 pounds to 8 and 10 pounds come in. Thus, the best fishing occurs through the winter months, prevailing until early spring.

During warm weather, when the low tides expose the mud flats to the sun, many large fish averaging from 18 to 20 pounds are taken while feeding on these flats at high tide. Larger fish have been taken on these warmed flats in water not over 18 or 20 inches deep. As the weather cools and the flats become chilled, bass seem to stay in the deeper water and fishing in the channels is better.

Narrow sloughs have been the havens of many a fine catch by trolling. The use of the spinner or plug, especially the "red head," has been the means of making many an angler happy. This plug has been a good "killer" for me.

In 1927, I made 40 fishing trips, caught 30 bass, 5 steelhead and 16 trout, all worth while. I mentioned this to show that those of us who fish regularly can make trips and come home without a catch.

In 1928, I participated in 48 trips and caught 67 bass, 2 steelhead and only 3 trout. The trout, however, were taken from Lake Madigan on a Blue Upright No. 12 fly, using a 6-foot taped 2-pound test leader, and weighed about 3 pounds each. The steelhead were taken along the Mendocino Coast on light trout tackle and with an automatic reel. All varied but little from 38½ inches in length and weighed 13 pounds each.

BLACK BASS FISHING TACKLE—USING THE RIGHT TACKLE IS MORE THAN HALF OF ANGLING PLEASURE

By EARL R. KAUFFMAN, Editor Pacific Sportsman Magazine

"Have you heard the story about * * *, no, not about the two traveling salesmen from Oshkosh, but one just about as time-worn * * *," the boy who, with a willow pole, common string and a bent pin, caught more fish than the city "sport" with a hundred dollars' worth of tackle.

Sure, we have all heard it and woe unto the man who attempts to tell it to us again. It may be true or may have been true some time or other in the dim dark past, but what of it?

Any angler who fishes with the proper tackle and really fishes for the most there is in it will have a whale of a good time just fishing. This is particularly true of casting a plug or artificial lure. Given a proper rod, a good reel and a silk casting line, there is real sport in just casting. Of course, the main incentive is to catch fish but there is joy in that indescribable sensation of expectancy which accompanies each successive cast of the confirmed lure rod "nut."

The real dyed-in-the-wool angler will never experience the slightest misgiving if he sees the proverbial farmer boy of fiction wending his way homeward with the alleged string of big ones taken on home-made tackle. Not he! He might try harder and have renewed hope of hooking on to one with his own choice of tackle but he wouldn't trade outfits nor would he materially alter his own chosen method.

We caught our first black bass in Cache Creek, Yolo County, California, nearly thirty years ago—in the days when there was year-around water down to the "sink." Our method was, what is sometimes known as "heave and hunt." Using a stiff bamboo pole, short stout line and usually an eyed hook without leader, we baited with minnows, hunks of carp, worms or most anything. Our response to a "bite" was to give a sudden and mighty heave—the idea evidently being to snatch the unfortunate fish out of and as far away from his natural element as possible, and quickly. But times have changed and we have changed with them—we use the modern tackle now and enjoy real sport.

The Black Bass Rod.

Black bass, like most any other kind of small game fish, may be taken on anything from a willow pole to a fairy fly rod. The type of lure to be used materially influences the kind of rod most adaptable.

Since the eminent sportsman-author, Dr. James A. Henshall, designed the original "bait casting rod" an interesting evolution has taken place until now we have the fairly standardized "lure casting rod" in extensive use. The Henshall rod was $8\frac{1}{4}$ feet long and followed more closely the fly rod than the present day lure rod. In other words, it was designed as a compromise between the too flexible fly rod and the too heavy and stiff bait rod then in use. The reel was placed above the hand grip and casting was done from the reel. The rod was stiff enough so as to allow for playing the fish with the reel to a certain extent but not entirely. It was not, however, stiff enough or short enough to allow for long casting with comparatively heavy lures. The rod was never popular.

Some years later a new type of rod came into being. This rod was known as the "Kalamazoo casting rod" and was an even more drastic design than the Henshall rod. This rod was, of course, built of laminated split bamboo, six or eight strip and its length was less than five feet over all. Designed with a rather heavy butt section and quick taper it lent itself readily to "side-swipe" or "underhand" casting. The fish was played almost entirely from the reel. This rod met with immediate success. No doubt, the ease with which anglers could cast greater distances and with accuracy was the answer.

As the wooden plugs and the "thousand and one" other artificial lures came into extensive use, rods also changed in design. They grew lighter in the tip and slightly longer for the lighter lures. The overhand method of casting was developed and it proved superior in nearly every respect to the side-swipe and underhand methods formerly used. Individuals made special designs and had special designs made for them. There was a mad scramble for something new and different. Distance casting and accuracy were the objects and they are prime elements in artificial lure fishing. Placing the lure where you want it is essential to working the likely places and avoiding snags,

banks and brush. Distance casting is merely a matter of territorial coverage—the more water you can cover the better are your chances for fish. But in most cases distance casting is a matter of personal pride or ego, if you will. Anyway, there's a lot of fun to be had from just casting.

The present day result of rod experiments has produced a six-foot rod with a light tip action. By merely a simple (?) wrist movement an expert can toss a half or five-eighths ounce plug a hundred or more feet. Unfortunately most of these rods are made in two or more pieces with stiff metal ferrules impeding their action and forming the proverbial "weakest link." Rods usually go at the ferrules due to water penetration into the glue joints and due to bending metal. The best rod is one piece—at least a one-piece tip. The butt section may be removable at the forward grasp without much, if any, sacrifice of strength and thus save a foot or so in handling length. The extent to which the automobile has become a common mode of travel for the angler has had a great tendency to popularize the one piece rod.

The Black Bass Reel.

As previously stated, the rod and reel play the most important parts in black bass fishing. Each compliments the other equally in importance. The "quad" reel is most common—that is a quadruple multiplying reel—one turn of the handle gives four turns of the spool. This is necessary in retrieving line when a fish makes a dash toward the angler. The tight line theory holds good for all game fish.

In casting from the reel the thumb plays the most important role. The backlash is the bugbear of the lure caster and it takes years of practice to prevent their frequent occurrence.

Many antibacklash reels have been placed upon the market and thousands of beginners have "fallen" for them. The mechanical contrivance which lays the line while reeling in cuts down the length of cast by ever so many feet. For night fishing they are a decided aid but out here in the west we do not fish for game fish at night. The man who learns to use a casting reel properly will develop a skill with attendant satisfaction never attainable by the use of an anti-backlash reel.

Lures for Black Bass.

There are literally thousands of artificial lures on the market—most of them described as "sure killers" for black bass. There are a few old reliables which we all use and with varying success depending on location and other contributory conditions. The pork rinds, the spinners, wobblers, divers, buck tails and all sorts of things. Many of these we presume to be designed to catch the customer regardless of their fish-taking qualities. However, the more we fish the more convinced we are that there is always room for improvement in methods and tackle. The fellow who follows the orthodox rules misses a lot of fun and there is always that chance that some new "Christmas tree ornament" will be the proverbial "killer."

"Fancy" Tackle.

We sincerely believe that "using the right tackle is more than half of angling pleasure." The mere pride of possession is in itself a great

deal. We have had more enjoyment in showing our tackle to some interested novices than in lots of fishing trips we have experienced.

There is no question but what the proper tackle will add infinitely to the angler's pleasure. Light, flexible rods, such as are only obtainable through the use of split bamboo; small, well-balanced "quad" reels, *without* antibacklash "do-jiggers" and light weight braided silk lines may appear to some as expensive. They are not expensive, they are economical tackle for they last for years and all during those years will give angling pleasures unobtainable through the use of anything else.

Good tackle is not by any means synonymous with expensive tackle. The most expensive tackle is often, and, we think, generally, in no way superior to the medium priced equipment. Up to a certain point you get what you pay for in usable tackle—after that medium point has been reached you pay for appearance—and sometimes you do not even get a superior finish.

FISH RESCUE AND RECLAMATION WORK

By GEORGE NEALE

One of the most forward conservation measures accomplished by the division is the rescue and distribution of the game and food fishes from areas where they have been stranded by reason of streams and



FIG. 96. Planting spiny-rayed fish in San Joaquin River near Tracy. These fish, including striped bass, catfish, shad and other types, were rescued from irrigation ditches. Photograph by E. S. Cheney, September, 1929.



FIG. 97. Rescue worker sorting fish out of seine in irrigation ditch near Tracy. Photograph by E. S. Cheney, October, 1929.

lakes overflowing their banks. This also includes rescue work in irrigation ditches, canals and bodies of water that become dry and where many millions of valuable food and game fish formerly perished.

A very large percentage of the rescued fish are of the spiny rayed tribe of fresh water game and food fishes, black and striped bass, crappies, calico bass, sunfish and several kinds of perch, catfish, etc., none of which can be or are propagated artificially as are trout and salmon.

None of the above named fishes are native to California. They were introduced from the eastern and middle western states and have taken a firm hold in their adopted states.

It is the habit of these species, with the exception of the striped bass, to leave the parent stream at the spawning period and enter the shallow sloughs, canals, ditches, lakes and pastures where spawning takes place. This usually occurs during the period of high water. When the water recedes, they, with their young, become prey to the numerous predatory birds and animals, if not removed.

In the seining operations, the parent fish, which are generally found with their young, are returned to the main bodies of water with about fifty per cent of the young fry. The surplus are used for distribution to other adaptable waters all over the state. By this plan of distribution a future supply is maintained and assured.

The four big streams, Sacramento and American or the Mokelumne and Cosumnes rivers, furnish 80 per cent of all the spiny-rayed fish

rescued and distributed to all parts of the state. These rivers form natural outdoor hatcheries which contain all the elements necessary for the welfare of the fishes.

The states of Illinois, Iowa, Indiana, Kansas, Minnesota, Nebraska, Wisconsin, South Dakota, Louisiana, Missouri, Michigan, Connecticut, Ohio, Oklahoma and a number of other states, not so favored by trout waters as is California, derive a large portion of their license revenue from these spiny-rayed fresh water game fishes. They specialize entirely upon the propagation of this tribe of fishes at a cost of from twenty-five to forty dollars per thousand.

These fish can not be stripped of their eggs as are trout, hence the necessity of the above named states creating seminatural or artificial outdoor propagating ponds in order to maintain the demand made by



FIG. 98. Pot hole in irrigation ditch near Tracy from which striped bass were rescued for transplanting in the Salton Sea. Photograph by E. S. Cheney, October, 1929.

the anglers. Many of these states expend a large amount of their income in the propagation of these fishes. Arkansas claims to maintain the largest acreage of propagating ponds in America—a series of ponds just completed cost this state about \$175,000. Illinois operates eleven seminatural ponds for spinous fish. This would indicate the value of these game fishes to these states.

During the biennial period ending July 1, this year, the Bureau of Fish Rescue of the division salvaged nearly 7,000,000 of these game fishes. Volunteer workers, alone, in the San Joaquin and Sacramento valleys, saved more than 400,000 fishes. Nearly 2,000,000 of these rescued were black bass.

In addition to the rescue work, fish culturists have made analysis of the stomach contents of the spiny-rayed fishes in an effort to learn which of the species are most predatory. Also particular attention is given to the range of the spawning season. A record of overflowed lands, fed from waters that contain edible fish, is kept. A record is also kept of all fish from each body of water, where and when taken, their disposition, and the name of the owner or lessee of such land.

Land owners and farmers are offering full cooperation to the bureau in pursuit of this work.

CONSERVATION THROUGH CONTACT WITH LIVING THINGS

By RODNEY S. ELLSWORTH

Man depends primarily on natural resources for the raw materials which are converted into the necessities of life. When the inanimate resources, like gold and iron, coal and oil, are exhausted through continuous use, there is no power known at present which man has at his command to recreate these minerals and, thus, renew the store. Animate resources, on the other hand, are capable of reproducing themselves. As such, they do not represent a fixed supply. If rightly managed, they can be made to yield continuously. They, therefore, represent a natural heritage capable of being made perpetual. But any intense exploitation or over use will result in their depletion. For instance, once a species of fish, bird or mammal is depleted, once the natural increase is not sufficient to offset the natural drain, once the birth rate is overshadowed by the death rate, the resource ceases to be of lasting character. When gone, no commission, no time, no expense, no labor can restore an extinct species.

No opportunity should be lost to diffuse these truths among men. It falls to the lot of the educator whose special field is conservation to impress on the general public the handicaps future generations are under when the resources which make existence possible are impaired through reckless use and extravagant exploitation.

Methods accomplishing the objectives of conservationists are still in the "trial and error" stage. The most promising method has for its tools living things in their natural environment. It deals with realities. It has concrete live subjects for study and permits the forming of judgments by first-hand contacts. It does not require the acceptance of truth on faith, but on intimate personal experience.

It is now well understood that state and national parks have a function to serve other than being mere places of pleasant resort. It is generally realized that these outstanding bits of America's original domain are of unique educational value, because of the opportunities they offer for close contacts with nature.

It would be regrettable if California, so lavishly blessed with natural endowments, failed to make a higher use of her state parks. If they were wholly dedicated to recreation, those who visited them to find rest and quiet and to discover how to better regulate their lives from an understanding of the great plan of nature, would have no recourse but to wander aimlessly about in mute wonder, gaining what they could by means of self help.

Fortunately, visitors to the California State Redwood Park, in the Santa Cruz Mountains, have had an opportunity during the past five seasons to acquaint themselves with the significance of their surroundings. Through the foresight of Dr. Harold C. Bryant and at the solicitation of the Redwood Park Commission, the nature guide movement was inaugurated the summer of 1926. The success of the work caused a demand for its continuance by Colonel Charles B. Wing, who was appointed chief when the new Division of Parks was created. A joint educational project of the Division of Fish and Game and the Division of Parks, the program has for its main emphasis the conservation objectives of the two divisions supporting the project. It also reflects the grand goal of the Department of Natural Resources.



FIG. 99. More than 30,000 vacationists were reached with a message of conservation in California State Redwood Park during July and August, 1930. Photograph by Harry L. Bauer, August, 1930.

A large number of park visitors are not seriously interested in the welfare of living things in the wild before their visit to the park. In no real sense are they worshipping students of nature. Many are pleasuring motorists. Nearly all are well-intentioned, however. While enjoying the delights of outdoor contacts, they become susceptible to the beauty and wonder of life and are readily brought under the influence of a nature guide program. As a result, a great number who have given little consideration to the place of nature in civilization gain an appreciation for the treasures around them and come to have an understanding of the need for their preservation.

Addressing the Eighth National Conference on State Parks held in San Francisco, August, 1928, Dr. Bryant said, "Those prepared to handle field trips are difficult to find. Universities are turning out trained technicians, most of them too one-sided to make successful nature guides. A nature guide must have a background like that of the old type of naturalist who knew from field experience something about all the various forms of life, and added to this must be a background that will allow him to attach natural history to every day problems of the people."

To J. B. Newell and Emily Smith goes the honor and credit of pioneering the guide work in the California State Redwood Park. Both being graduates of the Yosemite School of Field Natural History came to the task well trained. Through overwork and its resulting burden, ill health, J. B. Newell resigned after three successful seasons. Miss Smith also requested to be relieved at the same time. Their places were filled by Harry L. Bauer and Nancy Yerkes who have conspicuously devoted themselves to the upbuilding of the program. When the new naturalists assumed their duties it fell the lot of the author to see that an element of continuity in the program was maintained and its significant aspects carried out. His was the joy, also, of bringing together materials requisite for the improvement of the service.

The attendance record shows that, almost from the outset, the number on the field trips has been surprisingly large. The popularity of the work is attested by the fact that few trips were made during the first three seasons with less than thirty persons. The average was more than a thousand a month. The personal touch on the trail is lost if the number of followers are too great to permit individual attention as occasion demands. During the past two seasons many parties of fifty and sometimes nearly a hundred, eager to learn, have trailed along with the guide. The grand total on regularly conducted trips, for 1930, reached 1890 in July and 1825 in August. These figures represent actual counts made of those whose interest was sustained to the end of the trip. They also show that the average is becoming larger for each trip each season and that the powers of the guides are being taxed in giving the essential personal element to the trail trip.

The secret of the program's appeal rests on the fact that it employs the method by which real knowledge is acquired. The experiences and sensations gained along the trails are the result of direct observation. The interpretations and conclusions reached come from the evidence of sense perceptions. The late Charles W. Eliot, who dominated American education for so long a period, is authority for the statement that, "the most important part of education has always been the training of the senses through which the best part of knowledge comes." The nature guide program is bound to be sound because it is based on a fundamental unit of education.

The visitor in observing with his own eyes the flowers and trees, birds and mammals of the park, in becoming a witness to their various activities and habits, gains a direct knowledge not based on information or belief of others, but on first-hand contact. He does not accept ready-made information. He admits as true the living evidence before him. He need not read in a book that deer when unmolested and protected in a game refuge respond by becoming quite tame. Every evening, he

can observe for himself the close-up spectacle of black-tailed deer being called out of the forest and fed in a trough before several hundred people.

Since man is still an animal in a great community of other animals, he is subject to the same influences and laws which govern the welfare of living things in general. It is difficult to over emphasize the immense importance of conveying to the general public a knowledge of the relationship which plants and animals bear one to the other. In a state park which represents a typical portion of the state's original domain, unspoiled and unimproved, a unique opportunity is afforded to gain a knowledge of the various factors which limit the numbers of species and affect their environment. An unrivaled opportunity is likewise available to observe how man interferes with the nice adjustment between living things and how species succumb before an excess of adverse conditions.

The fact must not be lost sight of that an understanding public is more in sympathy with park rules and regulations. The nature guide program, therefore, makes a direct contribution to a most vital phase of park administration.

The park officials seek to perpetuate the treasures within their keeping despite the horde of visitors seasonally milling about, trampling the vegetation under foot and interfering with the life concerns of the living exhibits. Even so extraordinarily resistant a plant as the redwood tree is not immune. Dr. E. P. Meinecke, pathologist for the United States Forest Service has shown in a report upon, "The Effect of Excessive Tourist Travel on the California Redwood Parks," the serious nature of the problem. Where visitors concentrate in wondering admiration year after year about the bases of the more celebrated and larger trees, the protective ground covering maintaining stable conditions in the soil and keeping it cool and fresh over the root spread of the tree, is destroyed. Continual packing of the soil interferes with the functions of the roots in satisfying the water requirements of the



FIG. 100. Black-tailed deer in game refuge in California State Redwood Park respond to protection by becoming quite tame. Photograph by Harry L. Bauer, August, 1930.



FIG. 101. Making friends with a black-tailed doe. California State Redwood Park. Photograph by Harry L. Bauer, August, 1930.

tree. This, in turn, leads to a water shortage and affects its food producing power.

Children, especially, constitute an enthusiastic, but unconsciously, predatory element. In their eagerness to sense the magnitude of the largest and oldest trees, they are in the habit of climbing about the burly outgrowths of their bases. The bark covering the living connections with the soil is gradually worn away and the vital tissues in the exposed area die off. When injury is heaped upon injury and the healing tissues destroyed almost as soon as formed, recovery is impossible.

Unfavorable living conditions and the elimination of functions which concern the whole life of the tree conspire to bring about an early decline. It is not necessary to take this on faith. Those who travel the trails can observe for themselves the various stages in the process. Here are concrete examples respecting man's influence on the plant life about him. The lesson which has been learned from these series of observations has a more salutary effect than any campaign of "don'ts," because the approach has been to win rather than to discipline.

The program provides two trail trips every morning, commencing at nine o'clock. Two or three afternoon walks are made, as occasion demands, and one all-day hike is given each week. Special children's

walks are regular features of the schedule. Many families from nearby towns and the interior valley of California repair to the park for the summer. A fertile field for work with children is, thus, presented. To take the fullest possible advantage of this opportunity, the walks are adapted to the needs and understanding of the children participating in them. They serve to give a constructive character to the child's vacation by instilling a fuller appreciation for living things.

Lectures, because of their formal features, during the evening entertainments have proven something of a problem. The audience is composed of all ages, from the very young to those in their declining years. Practically all occupations of life are represented. A lecturer imbued with the scientific spirit and devoted to learning very soon discovers that the audience can not be forced to listen to a labored discussion. The lectures, therefore, have been designed to serve in the highest degree to stimulate the visitor to inquire about his surroundings. They stir interest in the trail trips where the meat of the message of conservation can be subtly, but effectively, conveyed.

Visual aids are now fully employed and few lectures are given without motion pictures or lantern slides. For the first time in the history of the park a motion picture projector was installed in June, 1929. The pictures were so well received and so aided in popularizing the lecture feature of the program, that regular showings were continued throughout the season. During July and August, 1930, practically the entire library of sixty films of the Division of Fish and Game were displayed. Second showings were in obedience to requests and were many.

Lantern slides served to illustrate subjects not covered by the motion pictures. It was possible to assemble an excellent collection on all desired subjects by loans from the Save-the-Redwoods League and the United States Forest Service in San Francisco. The high quality and artistic merit of these colored slides won favorable, in fact, enthusiastic comment on every hand. But aside from their beauty, they lent such focus to the topics which they illustrated that the subject was imparted with completeness and finish.

Since the camp fire gatherings contain a majority of persons remaining three weeks or more and individuals who return year after year to the park, a diversity of subjects is necessary. Dissatisfaction is soon expressed when the same lecture is repeated too often. In the past, the preparation of new lectures carrying the same running theme of conservation and fulfilling the policy of the program has continually proved the most tasking feature of the work.

During the season of 1930, a grand total of 21 different lectures were given. Such a range was made possible because of the wealth of material available to be drawn from. Materials in the library of the Division of Fish and Game were extensively used. A list of questions was prepared at the end of the 1929 season. Answers were sought from some of the most eminent authorities. The returns proved a never-ending source of delight. Many answers threw a flood of new light. They came from the pens of those who had invaded the unknown and explored the deeper secrets of nature in their special field. Through C. L. Hill of the California Experiment Station, in Berkeley, a very complete set of answers was secured. These are

remarkable for their soundness and will be of lasting benefit. Newton B. Drury, of the Save-the-Redwoods League opened his storehouse and from this source much worthwhile material was obtained. Professor Emanuel Fritz of the University of California and many others out of their abundance made generous contributions.

The following announcement of the program the first week in August, 1930, contains a good cross-section of the scope of the work and may well serve to summarize further details:



FIG. 102. Helping children to become conservationists by contact with living things. Photograph by Harry L. Bauer, California State Redwood Park, August, 1930.

FREE WALKS OVER PARK TRAILS

Nature guides conduct parties daily over some of the beautiful and interesting trails in California Redwood Park. You can learn much of the trees, trails, forest and its inhabitants by going along some of them. Everybody is welcome. Your visit to the Big Basin may be greatly enriched by taking advantage of some of these free trips. Most of them are quite easy and none are strenuous. All walks start from the studio. Morning walks are at 9 a.m. and afternoon walks are at 2 p.m. This nature work is made possible by a cooperative arrangement between the DIVISION OF FISH AND GAME AND THE DIVISION OF PARKS OF THE DEPARTMENT OF NATURAL RESOURCES, STATE OF CALIFORNIA.

Monday:

Union Creek Trail, 9-11 a.m. Special bird walk. Trail beloved by many to be the most delightful and refreshing of the shorter trails in the park. Virgin forest, streamside association. Forest burned in forest fire 25 years ago; remarkable exhibits of recovery and new growth. Open meadow, Sempervirens Falls. Many flowers still blooming along the trail. Total distance about four miles.

The Trail Beautiful, 2-5 p.m. All agree the trail is well named. Deep woods, Maddocks cabin; home life and story of an early pioneer lumberman of the region. Changes since the coming of the white man.

California's Vanishing Wild Life. Camp fire, lecture, illustrated with lantern slides. Species destroyed in recent years; present status of wild life. Causes for depletion, unavoidable and avoidable. Views of extinct species and some candidates for extinction.

Tuesday:

The Redwood Trail, 9-11 a.m. World famous for its specimens of the coast redwood tree. A short, easy walk of about half a mile. Come and learn the secret of the great age and size of the Sequoia. The nature guide will call your attention to and explain many things you will miss if you do not go with him. Ask your questions and get authoritative answers.

The View Point, 9-11 a.m. Special walk for children. These are very beneficial for the little ones. Help them get started. Children should bring "treasure bags."

State Parks. Camp fire, lecture, illustrated colored lantern slides. The peculiar purposes and principles governing the wise use of state parks. Ethics and questionable practices. Views of California state parks.

Wednesday:

Berry Creek Falls, 9 a.m.-4 p.m. All day trip for adults. Children under 15 not allowed. The most popular and scenic of the longer trips. Route passes through an impressive and wonderfully forested region. View of lower and upper Berry Creek Falls and the Golden Falls. Return to camp via Sunset Trail, about 12 miles in all. Bring your lunch.

Union Creek Trail, 9-11 a.m. See Monday

From Hatchery to Creel. Camp fire, moving picture (3 reels). A portrayal of trout cultural operations in California.

Thursday:

The Cave and the Old Park Mill, 9-11 a.m. Typical virgin forest with "down logs" and decaying timber all in "a state of nature," contrasted with lumbered area outside park. History of the mill's operations. Geological features suggested by the cave. Game refuge signs and their significance.

Deer Trails, 9-11 a.m. Special children's walk. Tracking the deer over trails on the eastern ridge and observing their habits.

The Deer of California. Camp fire, lecture. Early status and present supply of deer. Reasons for success. Deer statistics. Diseases and mountain lions. Our part.

Friday:

Woodwardia Trail, 9-11 a.m. Along Opal Creek to Woodwardia Falls. Streamside rich in abundance and variety of flowers, ferns and water-loving plants. Many birds, especially that made famous by John Muir, the water-ouzel. Insect life; tourtret spiders. Newts, salamanders, snakes.

Forest and Forest Fires. Camp fire, lecture, illustrated colored lantern slides. California's forest resources. Value of forests; water conservation, lumbering, grazing, recreation. Causes of forest fires and extent of fire damage. Methods of prevention.

Saturday:

The Redwood Trail, 9-11 a.m. (See Tuesday).

Sunset Trail and Ocean View Summit, 9-11 a.m. Climbs basin through dense forest to chaparral covered ridges, from giant to elfin forest. Associated plants and animals.

Law Enforcement and Fish and Game Conservation. Camp fire, lecture, illustrated lantern slides. Theory and practice of law enforcement, safeguarding a breeding supply. How the take is regulated; seasons, bag limits, illegal methods. Penalties. The game warden as a friend and benefactor.

Sunday:

Redwood Trail, 9-11 a.m. Most impressive trail in park. Easy walk of half a mile viewing celebrated redwoods. The roots of wild life are in the forest. Let the guide show you what values they hold in store and why they deserve conservation.

The Trail Beautiful, 9-11 a.m. (See Monday).

Game Bird Propagation. Camp fire, moving pictures (2 reels). Activities at California's Game Farm where thousands of Chinese ring-necked pheasants and other game birds are reared for liberation in the game covers.

It is very remarkable how eager the average visitor is to view any sort of a display of rare or curious objects. Since the real museum in the park comprises the living exhibits, no object is gained in assembling and maintaining a collection under a roof. Many kinds of illustrative material having a decided educational value can be safely displayed without detracting from the grander living exhibit. In fact, the display can be made to serve the advantage of stimulating interest and opening the book of the trail side.

To this end the conspicuous and characteristic flowers of the forest, annuals and shrubs of the chaparral region and ferns of the streamside

are collected weekly and attractively exhibited on the porch of the club house in Governor's Camp. A neat label on each specimen conveys what is most important to the public. On the wall above, a number of accessory mounts in frames and under glass show mammal and bird subjects that may be seen in active life from the trail. Brief and telling inscriptions give information which the uninformed visitor would naturally wish to know, if he became interested in the species. During the past season, a handsome mount of redwood seed and seedling prepared by William Wirt and displayed through the courtesy of the Pacific Lumber Company, Scotia, California, illustrated the beginnings of the redwood tree and its development. The gratifying results which these exhibits have brought leads to a desire for further expansion. A cross-section of a large redwood log would prove a striking addition and of immense educational value.

Thus, by means of these displays and the evening lectures, the city dweller is induced to go out on the trail with a nature guide and learn first the beauty and wonder of the forest, then the life of its inhabitants and thereby gain the sympathy to preserve them.

GAME REFUGES, PRESERVES AND SANCTUARIES

By WALTER R. WELCH

In the name of civilization, man extends his hand to alter the surroundings of his earthly environment, and, as if frightened by his gesture, the timid creatures of the wild, and the beautiful wilderness itself, creeps and fades unobtrusively away into oblivion, there to remain forever.

The swift evolution of time will have its predestined way. The mark of its passing is borne on all things of nature. Nothing is immune from its ruthless ravages. *GONE is GONE.*

Nature's law is inexorable, inevitable, unavoidable.

Each thing in nature is a thing like only unto itself, and is not to be revived by some other likeness at a future time of regret or tardy realization of mistake.

Once let the strand of the life of any species of wild life be broken, then the irreparable mischief has been done for all time.

Witness the passing of the passenger pigeon, the heath hen, the buffalo, the tule elk, the antelope and the grizzly bear.

In summarizing a mental impression of this great state, California, the mind's eye is held to the exclusion of all else by the elaborate handiwork that has been wrought on a gigantic scale by the artistic hand of nature.

Let us give a moment's thought to this great state of the Golden West with an area of 158,297 square miles, which is equal to that of all of the New England states, with New York, New Jersey and Pennsylvania added, a state with a coast line of 1000 miles, a breadth of about 350 miles, and a population of well over 5,000,000 people.

A state with a mountain 14,500 feet above sea level, a valley 287 feet below sea level and climatic conditions that range from 134 degrees above to 32 degrees below zero.

Let us view the green forest wilderness—the blue waters of the ocean, bays, lakes and rivers overspread by sunny skies, and caressed by cooling breezes tempered by ocean fogs that blend in unison to perfect this land of “sunshine, fruit and flowers,” at one time inhabited by wild life in great abundance, and of many species, for the benefit of the health and happiness of the people.

What we have seen is not an illusion or vision, but a fact supported by the testimony of many living witnesses and by our pioneer forebears.

In the case of the wild life, its contact with the advances of civilization is all too well known.

Where, within the past decade, many species of wild life abounded in great numbers it has now been reduced to the verge of extermination, and to the citizens of the state now falls the weighty problem of its protection and restoration.

As the safe keeping of this sacred heritage, the wild game is entrusted to the people of the state. Can they find any justification in permitting it to be destroyed without making every possible effort for its protection and conservation?

In propounding the above question the word “game” is not used to denote merely those quadrupeds which are hunted by sportsmen, but the wild life of the forests, fields and streams in general.

In law all animals *ferae naturae* (of a wild nature) including quadrupeds, birds and fish are classified as “game” and that is the sense in which the term “game” will be used in this article.

Whole volumes, and many of them, have been written in answer to the important present day question of why and how to protect game, but we can only treat the subject in a somewhat limited way.

There are two ways of looking at the question: First, from the standpoint of the people who are fond of hunting, fishing and roaming through the forests and fields and along the streams for recreation and pleasure and who desire the game preserved for their own personal enjoyment; and, second, from the point of view of the scientist who is constantly searching out the secrets of nature which may be utilized for the benefit of mankind.

In law, as previously stated, it has been held that it is the duty of the state to preserve the game within its borders as a valuable natural resource held in trust for the benefit of all of the people of the state.

We may assume, then, that in this state, as well as in the United States, it is now the settled opinion of all well informed persons that the game of a state has a four-fold value to the people, as follows:

First, the value of birds to all of the people as insects, rodents and weed seed destroyers, thus preserving the forests and assisting the vegetable, fruit and other crop producers; second, the value of game animals, certain birds and fish as a food supply; third, the value of all game as an incentive and inducement to out-door life whereby man may recuperate his powers and renew his health; fourth, the value of all game in an economic and financial way to the state because of the tourist and sportsmen travel attracted thereby.

In addition to the above reasons for protecting game, it is generally conceded that the supply of wild game was handed down to us as a priceless heritage of nature to be used economically to supply our needs, and then to be passed on intact to our descendants.

With these ideas and views in mind, and in the hope of maintaining a supply of wild game within the state, the state has enacted laws regulating the time when, the manner and means by which, and the amount of game that may be taken, killed, caught and had in possession by the public.

While these laws have met with the general approval and support of the people of the state, it has been found that game laws alone, regardless of how well they may be enforced, are not sufficient to properly protect and maintain the supply of game and that it is essential for the protection and in order to maintain, if not increase, the supply of game within the state that game refuges be established.

All who have watched, perhaps at times impatiently, but always with deep concern, the rapidly changing conditions and the rapid decrease in the supply of game within the state are of one mind in regard to the above opinion.

The only question is which shall it be—federal and state owned game refuges, and a continuation of the American plan of free shooting or shall we adopt the European plan of well stocked private game preserves and shooting grounds under the control of wealthy sportsmen?

The subject of private game preserves is one demanding thoughtful consideration at this time.

Those who are interested in the protection and conservation of the rapidly disappearing supply of wild game for the public welfare look upon the advent of private game preserves with considerable suspicion.

While many think private game preserves would be a good thing, others, who have taken a long look into the future, are of a different opinion and consider them to be a growing menace to the governmental system of game protection as it is at this time practiced in the United States with the result that the question arises—do we want the European idea to become established in this country?

The theory of game protection in Europe practically amounts to this—protect and encourage by law any person who has sufficient wealth and inclination to propagate game and make it plentiful, and see to the interests of the public afterwards.

In this country, on the other hand, every person, rich or poor, is interested in and benefited by the protection of game and we acknowledge only one principle for the cause.

Here we are all united in the one view, and bend our efforts for the one purpose, viz, to protect and conserve the supply of wild game of the state for the common benefit of all of the people of the state and not for the benefit of any privileged few, nor in any particular part of the state.

As the need for present day game laws are well understood by the public in general, special comment upon them is uncalled for and general observations impossible.

The development, during later years, of legislation looking to game protection, however, can best be marked by comparison of the revised statutes of most any of the states today and those of twenty or even ten years ago.

The urgency and necessity of saving our wild game accounts for the numerous sections in our present day game laws.

If any one cause aside from increase in population to threaten the extermination of game can be fixed for the multiplicity of these sections in the game laws, it is bringing the game fields, forests and streams into almost instant accessibility by means of the automobile, paved highways and good roads leading into almost every section of the state.

Therefore, in order to save the supply of wild game from total extermination it is necessary that the laws provide for short open seasons, small bag limits, nonsale, the setting aside of tracts of land reserved to game upon which there will be no open season and the strict enforcement of these laws.

At the present time there has been established and located in various sections within the State of California, 41 state game refuges upon which there is no open season for game and upon which hunting and shooting is prohibited.

To supplement the work being done by the state to maintain, if not increase, the supply of wild game by establishing game refuges and game farms for the breeding of game birds in captivity, about 500 quail sanctuaries and game refuges have been voluntarily established by farmers and landowners on their lands which is proof conclusive that where forty years ago the preservation of wild game was regarded chiefly as a sentimental cause, of practical interest to sportsmen only, today that cause is not only actually sentimental, but it is intensely practical to farmers and land owners as well as sportsmen.

The value of wild game to the state is a subject by itself which gradually will be developed.

In order to be successful conservers of the remnant that is left of the once abundant supply of wild game to be found in this state, it is indispensable that we should know in brief the sad story of its past.

Patrick Henry spoke wisely when he said, "I know no way of judging the future but by the past."

Today the question is, shall we apply the lessons of the past to the problems of today?

It is natural for man to believe that the resources of nature are inexhaustible. The wish is father of the thought.

The theory is comforting because it helps to salve the conscience of those guilty of wantonly destroying wild game.

In the days of buffalo abundance the Cree Indians firmly believed that the buffalo herds issued from a great cavern in the earth and that the supply was quite inexhaustible.

We hold that the best friend of the sportsman is he who resolutely seeks to prevent sport afield and astream with gun and rod from becoming extinct through the failure of a supply of legitimate wild game.

As Mr. I. Zellerbach, president of our State Fish and Game Commission, has wisely stated: "The methods that must be applied to preserve the supply of wild game within the state and legitimate sport with gun and rod resembles a painful surgical operation."

No man in his senses desires a surgeon to perform half an operation because a complete operation would be doubly painful. We wish it done thoroughly, in order that the cure may be permanent.

On this basis the protection and preservation of wild life now requires strong and resolute action.

The patient (the sportsman) will many times wince and cry out, but we know that the only way to preserve and maintain the supply

of wild life is to enable it to breed and multiply at least as rapidly as it is being destroyed.

During the past thirty years, to go no further back, California has been meting out to its native game birds, the valley and mountain quail, a line of protection and treatment that has been wasteful and improvident.

Every person who is acquainted even with the rudiments of the habits and traits of valley and mountain quail knows full well that under real protection these birds become amazingly tame.

By this I mean that after two or three years of genuine immunity from shooting and other forms of molestation flocks of quail will elect to live along the borders of cultivated fields, in orchards and vineyards and around the barns and other buildings of the farmer and rancher.

If our native valley and mountain quail are decently treated, and sensibly protected and with the aid of state game farms, state game refuges and the establishment of numerous inviolate quail sanctuaries on the lands of the farmers, our native quail will come back quickly and so thoroughly that we will not need to look abroad for substitutes.

In short, the salvation of our wild life that is so rapidly vanishing can only be accomplished by game farms, refuges and sanctuaries, state and private.

Every person owning even a small tract of semiwild land can help the cause of wild life protection and conservation greatly by setting aside a part of the land as an inviolate game sanctuary.

Let everyone who is fond of the sport to be found afield or astream with gun or rod do his share to restore the balance which man has so rudely and persistently upset.

Let the waste areas become restocked with the bird and animal life of fifty years ago.

Let the forests, now still, echo with the whistle of deer, and the marshes answer to the quack of ducks, and the honk of wild geese. In the lakes and rivers let us witness the flash of leaping trout. From the hills and valleys let us hear the call of quail and from the farms let resound the choruses of myriads of song birds.

Then when the "red god" calls we can go and we will be a stronger, hardier and better race through our appreciation and enjoyment of the wild life we have helped to reinstate.

RAMBLING THOUGHTS OF A PERVERTED BRITISHER *

By CAPT. PERCY R. CREED

I feel that I come before you under a cloud because I am continually reading in your shooting literature about "the abuses of the European game system." When you are discussing progressive measures it is generally with the reservation that whatever is done you must not get involved in any methods imported from the Old World. You see, therefore, that I come before you with a discredited, if not vicious, past, as far as game is concerned!

When you talk about the European game system you seem to imply that as far as game is concerned there is a United States of Europe.

* Reprinted from *The American Field*, vol. 114, No. 31, August 2, 1930, pp. 99-100.

For all I know Ireland and Russia, Norway and Corsica may have the same game system, though I should not think that this is probable. You people on this side seem sometimes to forget that there are several different sorts of races and nations in Europe.

However that may be, let me say a few words about the game system in England, which is, of course, included in the "abusive" orbit. In England the game birds—pheasant, partridge and grouse—are owned by the landowner, whether his land is let to a tenant or remains in his own hands. The ground game—hares and rabbits—and the nongame birds—wild ducks, plover, pigeons, etc.—belong to the tenant or occupant of the land. In order to shoot game you have to take out an inland revenue license, which costs fifteen dollars. In order to kill nongame birds and ground game you have to take out a cheaper license, which costs two dollars.

In return for these licenses you receive from the government permission to shoot, but the government is not interested in what or where you shoot, provided that you obey the laws governing the taking of game. The result of this "abusive system" is a great deal of sport for those who can afford to have it and who care to spend their money on it. Those who do not shoot have the opportunity of buying a varied supply of palatable food at a moderate price. You could buy as many pheasants as you wanted this season for sixty cents a piece in the English markets. The landlord is satisfied. The farmer is satisfied. The public is satisfied. King George, who, by the way, is one of the best all-round shots in the world with gun or rifle at feather or fur, is very fond of shooting and raises a lot of game. It is a pretty safe bet that when King George is interested in a sport there is not much abuse connected with it. In a word, the English have the game system which suits them. That is a way they have.

Let me say a word here about the pheasant. The pheasant is only a sporting bird to shoot in artificial conditions. In England they drive the pheasants up to the guns over the tops of the tall trees in the coverts where the pheasants live. That is what constitutes a "rocketing" pheasant. If it were a case of hunting and flushing the pheasant nobody in England would be bothered to rear him. If you kill a flushed pheasant really you have only done what you ought to do and there is no thrill in this. If you wound him you have done what you ought not to do. And if you miss him you are disgraced. There is no sport here. Of course, I am speaking to sportsmen and not to "meat hunters." The latter may feel differently about it.

I know some of the sportsmen in Massachusetts who were the pioneers in introducing the pheasant into their state. They rue the day they made this mistake. The fact is that they did not understand the ways of the pheasant or they would never have brought him into their coverts. You have the finest sporting bird in the world, the ruffed grouse. I can imagine the ruffed grouse saying to you, "What do you mean by bringing that garish, noisy, conceited bird (the pheasant) with his immoral polygamous habits and his parasites into the coverts which are mine by inheritance? Take him away or I will leave you!" I heard a well known American scientist, who is a reliable witness, tell a story about the way pheasants behave in New York. It appears that in that state the hen pheasants who found themselves in the position of maiden aunts beat up their married sisters

on their nests. That is a nice sort of bird to introduce into Puritan New England! What were the immigration authorities thinking about to allow such "moral turpitude" to enter the U. S. A.?

Every Britisher when he first sees your college football immediately says: "Why don't these people play Rugby football? They would be magnificent Rugby players." It took me years to discover the answer to this question. The answer is that you prefer your own college football! Of course, one has to admit that this is not an entirely unreasonable attitude on your part. So if I should appear to suggest that you might have a different game system, I wish to admit your sovereign rights to have any system which you may prefer. At the same time, I remain in my heart hurt and even highly indignant that you should not think that British ways are the best. It is very difficult for the Britisher to believe that the system which he has worked out to suit himself should not be the best for everyone else. In his actions he is the most tolerant of mortals. "Live and let live" is his motto. But none the less in his heart he grieves over the perversity of those who can not see eye to eye with him. He does not often tell you so, but on this occasion I am making a full and frank confession. I am hurt, indignant, and mortified at your game system!

I rather remind myself at this stage of a comedian who used to give a talk on golf. His patter ran something as follows: "Ladies and gentlemen, I have lately taken to a game called 'golf' and I think that I can tell you all about it. For this game of golf you want first of all some sticks, a little white ball and a small boy. Having collected these, you go to a field or other open space. The small boy puts the little white ball on the ground. Sooner or later you hit the ball. If the boy finds the ball the same day that you hit it you have won the game!"

You are entitled to say, if you choose—and there will be no kick from me—that my knowledge of your game system is no greater than the comedian's familiarity with golf, so let us start fair.

I have had, through the courtesy of Dr. John C. Phillips, the opportunity to study the history of the Massachusetts Fish and Game Association, and a very interesting one it is. I suppose that you gentlemen know the whole story of your association since 1873! I will tell you how the picture looks to me. In fact, I will tell you the whole story of your present situation in five seconds, and you can time me if you like.

In 1637 the population of Massachusetts was 8641 souls. Today it is 4,500,000 souls.

It is enough to make any sportsman's mouth water to read the list of game, fur, feather and fish, with which nature stocked your great country. I believe that beyond doubt America was endowed by nature with a greater and more varied supply of fish and game than any other part of the world. But where and oh, where! are your passenger pigeons and your heath hens today? In museums. It is beyond comprehension that the destructiveness of man could be so appallingly efficient, so ruthlessly short sighted. However, there it is, and you with your vastly increased population are up against a very difficult problem. In this imperfect world when you are up against a problem, it is sometimes helpful to consider what not to do, especially if you are

doing it! The thing not to do is to rely on the state to provide you with game. You may have "inalienable" or any other sort of rights to free shooting, but you can not shoot the ghosts of heath hens and passenger pigeons.

You must accept the fact that shooting has become a luxury for those who can afford it and that it is not the part of a red-blooded sportsman to expect the state to provide him with this luxury for \$2.25 per annum. Let me here say that I am not unmindful of the "little" man who has a thin pocketbook. I am by temperament always on the side of the "under dog." The rich man can always look after himself. If the well-to-do sportsmen of Massachusetts will get together and take over suitable coverts, provide food and shelter for game, and kill the vermin, more game will overflow from their preserve onto the "open" lands than the state will ever raise.

Your state system is, curiously enough, a mixture of two things which the independent spirit of the American cordially and for very good reasons dislikes, paternalism and communism. The state owns the game which is romantically described as a "roving asset," here today and gone tomorrow, something like the weather. The state owns the game, the state raises the game, and the state sells the right to take its game—which is supposed to belong to all the people—to those who will pay \$2.25 per annum. If that is not a mixture of paternalism and communism, what is it? The proper function of the state would be to confine itself to passing and enforcing the necessary laws. If the sportsmen want game let them raise it and attract it for themselves.

You in America have a great faith in research, statistics, surveys and conferences. Words, theories and oratory will never raise one head of game. The chance of improvement lies in action and work. The raising and protection of game is in itself a most fascinating pursuit, quite apart from the size of the bag. I would sooner shoot one bird on my own place which had cost me effort, pains and money than half a dozen birds elsewhere. I am absolutely certain that you have only to get the taste of this in order to become fans for providing your own sport. The idea of sportsmen leaning on the state to provide them with game seems to me just as farfetched as it would be to expect the state to provide them with free football, free baseball or free golf. Shooting, once you have exhausted the native supply, becomes a luxury and the idea that anyone can enjoy a luxury for \$2.25 a year seems to me to be a joke. But then, you know, I am only speaking as a perverted Britisher!

Finally, if I may presume to offer a suggestion to you sportsmen who, of course, know your own business best, and who are fully entitled to do as you see fit, I would say, "If you want game, raise it and blow the expense!"

CALIFORNIA HALIBUT¹

By G. H. CLARK

In the early part of the year 1919, Elmer Higgins, now in charge of the Division of Scientific Inquiry of the U. S. Bureau of Fisheries, began an investigation on the life history of the California halibut (*Paralichthys californicus*). Many valuable data were collected and worked up for the Fish and Game Commission of California, but unfortunately never published, however the material assembled by Higgins at that time has proved of value as a basis for further protective measures.

Ten years after Higgins began his halibut work, in the course of a general survey of the fisheries of California,² it was noted that the California halibut landings for the state and catches recorded from Mexico were falling off rapidly. Experience has taught us to be careful of what total catch figures show; they may indicate depletion but again they may show a downward trend from a number of other causes.³ To determine the meaning of this decrease in total landings, an analysis of the catches of boats fishing for California halibut was instigated in the spring of 1929, and brought to its conclusion in the summer of 1930.⁴ The boat catch of the Los Angeles Harbor district was selected for the analysis, as it has a larger total landing of halibut at present than any other area, the data are quite complete and accessible, also it furnishes the least difficulty as to changes in type of gear used in the fishery and in fishing methods, than any other halibut fishing center. The boat catch analysis presented many problems that might necessarily arise in any analysis but they need not be discussed here except when they add clarity to this article.

Primarily, an analysis of individual boat catches denotes a unit of measurement, the catch per unit of effort expended. That effort may be gauged by the yield of a number of nets used in a given time; by the catch of a boat in an hour, day, half-week, week, month, or year; by the number of men engaged to land a certain amount of fish; or by other numerous measuring sticks that may fit a given fishery. Catch per month per boat for each year was the time unit selected to give the best and most accurate measurement of abundance for this fishery. Smaller time units were impossible because of the tendency of fishermen to remain on fishing grounds for longer periods of time, as the period from 1919 to 1929 progressed. No accurate records could be obtained as to the amount of time the gear was in the water fishing or as to the exact amount of gear used each time a layout was made. From all sources of information obtainable it was ascertained that from year to year fishing effort per boat had remained nearly constant except in the matter of fishing area. In the early years, 1919-1924, fishing was

¹Contribution No. 104 from the California State Fisheries Laboratory August, 1930.

²Bureau of Commercial Fisheries. Commercial fish catch of California for the years 1926 and 1927. Division of Fish and Game of California, Fish Bulletin No. 15, 1929.

³Craig, J. A. An analysis of the catch statistics of the striped bass (*Roccus lineatus*) fishery of California. Division of Fish and Game of California, Fish Bulletin No. 24, 1930.

⁴A complete detailed study of the California halibut fishery and the analyses of the boat catches with a discussion of the methods used will appear in bulletin form in the near future.

local, within a day's run of home ports, but of later years the fishing grounds have extended tremendously; the boats have gone to distant banks that might take a two to three days' run.

In figure 103 is presented a curve of the boat catch analysis of California halibut for the Los Angeles Harbor district for the period 1919 to 1929. It is the average catch per month per boat for each year. The curve was obtained by adding up the catches of each consistent halibut fishing boat (those fishing for two or more months of the six-month season, January to July) for each year, and dividing by the number of months fished by the boats that make up the total poundage. For instance if in a given year there are four boats whose total catch for the year totaled 50,000 pounds, and two of the boats fished three months each, while the other two each operated two months, the aggregate fishing time would be ten months. When 50,000 pounds had been divided by ten months the average catch per month per boat

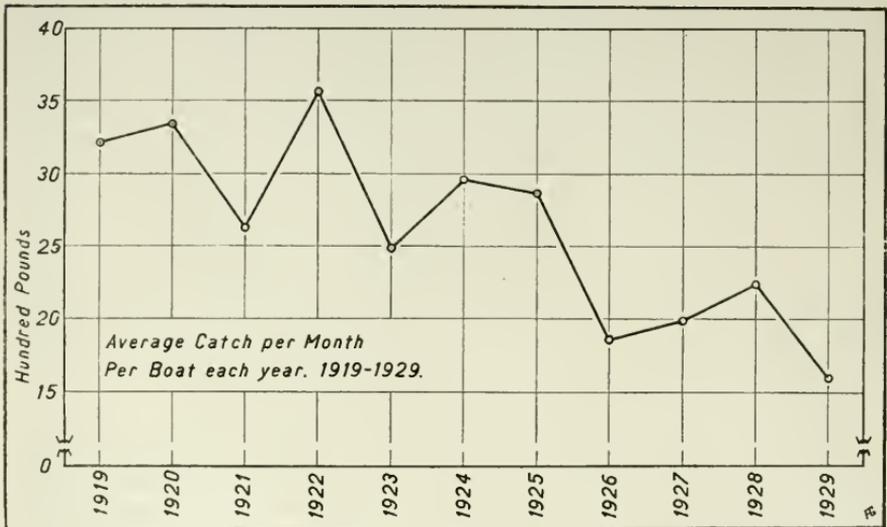


FIG. 103. The yearly average catch per month per boat for the Los Angeles Harbor district from 1919 to 1929.

each year would be 5,000 pounds. Then in the halibut data the average catch per month per boat is an index of the condition of the fishery for each year for it is based on all the available material, 35 to 50 boats each year.⁵

As will be noticed from the graph, the curve shows a considerable decrease, especially from 1924 onward. From the 1919 to 1923 actual points, there is a 22 per cent decrease, but from 1924 to 1929 there is a 46 per cent decline. Between 1919 and 1929 a 50 per cent drop occurred. This reduction of supply is alarming when we consider that the price and consequently the demand for this species has become greater as the years progressed. Actually we have calculated the availability of the fish to the fishermen, but when, as in this case, the fishing effort has not decreased the accessibility is synonymous with supply or abundance. It is time to remedy matters.

⁵ The effect of the size of period catches each year on the yearly average is almost negligible. There is not enough divergency from a normal year to cause a difference of more than a few pounds at any one point.

In the Los Angeles Harbor region halibut fishing is limited to trammel nets. The use of trawl nets has not been permitted since 1911 and possession of drags or trawls was prohibited in 1923. Aside from the protection afforded by the restriction of destructive trawl nets, a law enacted in 1915 provided that no halibut under 4 pounds could be taken. Later in 1921 this act was changed to read that not more than 50 pounds of halibut under 4 pounds each could be in one's possession at any time. Although these restrictive measures have been in force for a number of years the fishery has rapidly declined. More adequate protection is needed.

A usual prerequisite of intelligent legislation is some knowledge of a fishery and of the life history of the fish. From Higgins' early work on halibut, it was possible to determine some of the more important and useful facts of the life history of the California halibut. Let it be understood that the following information regarding the life history is not exact but only close approximations. California halibut mature and spawn from the last of February to the latter part of July, the greatest number of mature fish is found in May. The smallest mature fish are about 9 inches in size and the spawning fish roughly embody part of the three-year fish and all of the four-, five-, and six-year classes as well as the more advanced ages. The commercial catch is composed of all year classes: One-year-old fish range from 1 to 6 inches; two-year-old fish, 4 to 10 inches, three-year-old, 8 to 16 inches; four-year-old, 12 to 19 inches; five-year-old, 16 to 20 inches; and six-year-old fish, 18 to 22 inches. The size range of halibut over six years of age are indistinguishable for as the fish become older the age groups are less distinct and ranges in size overlap to a greater extent.

At spawning time in the early spring, California halibut come in from deep water to the shallow water, of two to five fathoms, near the coast. The fishermen make some of their largest catches during this period and always fish in shallow water at this time. After the fish deposit their eggs they migrate back to deeper waters to remain until their next spawning. The young undoubtedly stay in shallow water for a time then, when they reach a sufficient size, follow their parents out to sea.

It is hoped that more protection will be given the California halibut. These remarks have been presented toward that end and to aid those who make our laws. It is suggested that the total catch of this species be further curtailed through additional restrictive legislation. A closed season would seem most practical if applied during a portion of the spawning period, since the life history studies indicate that the halibut move into the better fishing areas at that time. Protection of immature fish by means of size limit and fishing gear, through the measures already in force, have proved valuable, although inadequate, but to insure a better catch over an extended period, further protection is necessary for the California halibut.

REVIEW OF A REPORT ON THE MIGRATIONS OF THE PACIFIC HALIBUT

(*Hippoglossus hippoglossus*)

By FRANCES N. CLARK

The first returns from a very comprehensive experiment in tagging Pacific halibut have recently been reported by Thompson and Herrington.¹ Although the returns are as yet incomplete, the high rate of recovery of tagged fish is astonishing and the conclusions drawn therefrom very clear and convincing. Especially is this true since a correction was made for the amount of fishing in a given area, thus eliminating the possibility that returns might be governed by the intensity of fishing and not by the actual dispersion of the fish. The paper is gotten up in a very readable manner and particularly helpful is the discussion of the significance of the tagging experiments in relation to the general program of the halibut investigation.

The results demonstrate extensive migrations of adult halibut in Alaskan waters, but show on the other hand that immature fish evince relatively little movement. Due to serious depletion very few mature halibut are taken on the southern banks and that section of the halibut fishery of the Pacific north of Cape Flattery, investigated by the authors, can be divided into two areas: (1) south of Cape Spencer on the Alaskan coast to Cape Flattery, characterized by predominately immature fish; (2) north and west of Cape Spencer to the end of the Aleutian Islands, still with a stock of mature halibut. In the southern area, during the four years which have elapsed since the first fish were marked in 1925, 37.4 per cent of the fish tagged have been recovered. These recoveries indicate that fish on the southern banks moved very little and such movements as did occur were random in nature. Of the recovered fish, 92 per cent moved less than 50 miles and 96 per cent less than 100 miles. The average movement on the southern banks was about 22 miles.

The recoveries of fish tagged on the western banks were less than in the southern area, however, returns were available from one fishing season only. In this season 7.8 per cent of the fish tagged were recovered. The fish tagged in this region were largely mature and the returns indicate extensive migrations. Only 14 per cent moved less than 50 miles and 29 per cent less than 100 miles. The average movement for the western banks was 250 miles.

Since in all tagging experiments the chances of recovery in any area are dependent on the amount of fishing, a correction was made for this factor and the chances of recapture were calculated on the basis of the amount of gear fished in each 60-mile section of the coast. The results of these calculations showed that in the southern areas, if fish had distributed themselves completely among the known banks, 6½ per cent should have been recovered in the area in which they were tagged. The actual returns were 88 per cent in the area of tagging. For the western banks 13 per cent were taken in the home area, as

¹ Thompson, William F., and William C. Herrington. Life history of the Pacific halibut. (1) Marking experiments. Report, International Fisheries Commission, No. 2, 137 pp., 1930.

compared to an expectation of $3\frac{1}{2}$ per cent. For the remainder of the western areas, the percentage of recovery corresponded approximately to the expected percentages if distribution of migrants had been complete and unlimited. Mature western fish migrated freely and extensively while immature southern fish did not.

The movement of the tagged fish in the western areas was westward and not southward. Only 5 per cent of the returns from fish marked beyond Cape Spencer were recovered in the intensive southern fishery.

From the returns of tagged fish the chances of survival were calculated for each year. On the southern banks the population is decreasing at a rate of about 58 per cent annually. While the calculations are only approximate these percentages indicate that a school of five-year-old fish would have few of its members left in the ninth or tenth year and yet half of the females are not found to be spawning until their twelfth year.

On the western banks the intensity of fishing is not as great but the returns from the tagging in this region were not sufficiently complete to allow estimates of the chance of survival.

The results of the tagging experiments will enable the International Fisheries Commission to enact regulatory measures based on a definite knowledge of the movements of the halibut and to determine the success of these regulations by a study of the intensity of the fishing as demonstrated by the percentage of survival shown by the returns of tagged fish.

SIZE AT FIRST MATURITY OF THE WHITE SEA BASS

(*Cynoscion nobilis*)¹

By FRANCES N. CLARK

Among fishes not canned but sold in the fresh trade only, one of the most important in the California markets is the white sea bass, a member of the croaker family. In a recent investigation of this fishery in the waters adjacent to San Pedro, Whitehead² found that the supply available to the fishermen had so decreased by 1928 that, to maintain the fishery, protective measures must be passed.

One such measure would be the enactment of a size limit sufficiently large to allow the fish to spawn for at least one or two seasons after reaching maturity before being captured by the fishermen. The passage of such a law presupposes a knowledge of the size of white sea bass at first maturity. To supply this information the following study was undertaken. Because of many difficulties encountered, the data are very inadequate and they are presented here only as a rough guide for protective legislation for the white sea bass.

One of the chief obstacles encountered in a study of the size at maturity of these fish, is that the major portion of the fish is cleaned on the fishing boats before the catch is delivered to the fish markets. To settle adequately the question of maturity, an observer would have to accompany the boats to the fishing grounds. The time consumed in such a

¹ Contribution No. 103 from the California State Fisheries Laboratory. August, 1930.

² Whitehead, S. S. Analysis of boat catches of white sea bass (*Cynoscion nobilis*) at San Pedro, California. California Division of Fish and Game, Fish Bulletin No. 21, pp. 1-26, 1930.

TABLE No. 1

Number and Percentage of Male and Female White Sea Bass Maturing at Each Centimeter of Length, Observed During the 1930 Spawning Season

Length, cm.	Number				Percentage maturing	
	Males		Females		Males	Females
	Immature	Maturing	Immature	Maturing		
23	1				0	
24						
25						
26	1				0	
27	1				0	
•						
38	1				0	
39						
40	2				0	
41	1		1		0	0
42			4			0
43	1		1		0	0
44			2			0
45	1		1		0	0
46	2		2		0	0
47						
48	3				0	
49			2			0
50	1	1	3		50	0
51		1			100	
52			1			0
53		1			100	
54	1				0	
55			1			0
56		1			100	
57	1		1		0	0
58	1	1			50	
59		1			100	
60		1		1	100	100
61	1	1	3		50	0
62	2	2			50	
63	1	1	1		50	0
64		1		1	100	100
65		2	1		100	0
•						
70		1			100	
71						
72		1			100	
73			1			0
74		2			100	
75		2			100	
76		1			100	
77						
78						
79				1		100
80				1		100
81						
82						
83						
84						
85				1		100
86				1		100
87						
88						
89						
90		1			100	
•						
99		1			100	
100						
100+				2		100
Totals.....	22	23	25	8		

study precluded this method for the white sea bass, since the work could be done only incidentally to the carrying out of several other investigations.

The observations were made at the San Pedro wholesale fish markets during semiweekly visits made in connection with other studies. Since the fishing boats have no fixed time of arrival, round fish at times were delivered after the observer had left the markets and many trips yielded no data. Again if more time had been available more frequent and longer trips to the markets could have been made and the number of fish examined increased thereby.

The first fish with maturing gonads were observed in early March and the study was carried on until the first of August when the spawning season was drawing to a close. Throughout this time measurements were made on 78 fish only, and the conclusions here drawn must be regarded as merely tentative. Measurements were made by laying the fish on a meter stick and reading the distance in centimeters from the tip of the lower jaw to the end of the longest lobe of the tail. Weights were obtained on the commercial scales used in the markets

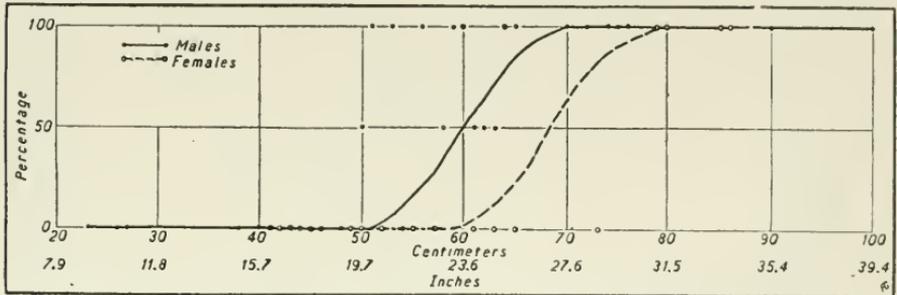


FIG. 104. Percentage of male and of female white sea bass maturing at each centimeter of length during the 1930 spawning season.

and read to the nearest quarter-pound. The state of maturity was determined by a gross examination of the gonad.

The results of this study are given in table 1 and figure 104. No males smaller than 50 centimeters or about 20 inches were found maturing. The smallest female with ripening eggs was 60 centimeters, 24 inches, in length. About 50 per cent of the males were maturing at this length, while 50 per cent of the females were not maturing at less than 70 centimeters, 28 inches. All fish larger than 75 centimeters, 29.5 inches, were maturing, and in spite of the scanty data we are probably justified in concluding that practically all white sea bass are mature at 80 centimeters, 31.5 inches.

The fish measured fell into three groups, smaller than 35 centimeters, from 35 to 65 centimeters, and larger than 70 centimeters. Individuals smaller than 35 centimeters were presumably one year old, and those between 35 and 65 centimeters probably two years old. If this surmise is correct, the larger males mature in their second year while very few of the females mature until their third year.

To relate the weight of white sea bass to their length, a weight-length curve is given in figure 105. The curve was fitted to the data by the method of averages from the formula $W = fL^x$, where W represents the weight in pounds at any length, L in centimeters. The value of f

was 0.000000542 and of x , 3.315. Sixty-centimeter fish averaged $4\frac{1}{4}$ pounds in weight, 70-centimeter individuals, 5 pounds, and 80-centimeter fish, 11 pounds. Probably 10 to 11 pounds marks the weight at which all white sea bass will be found maturing.

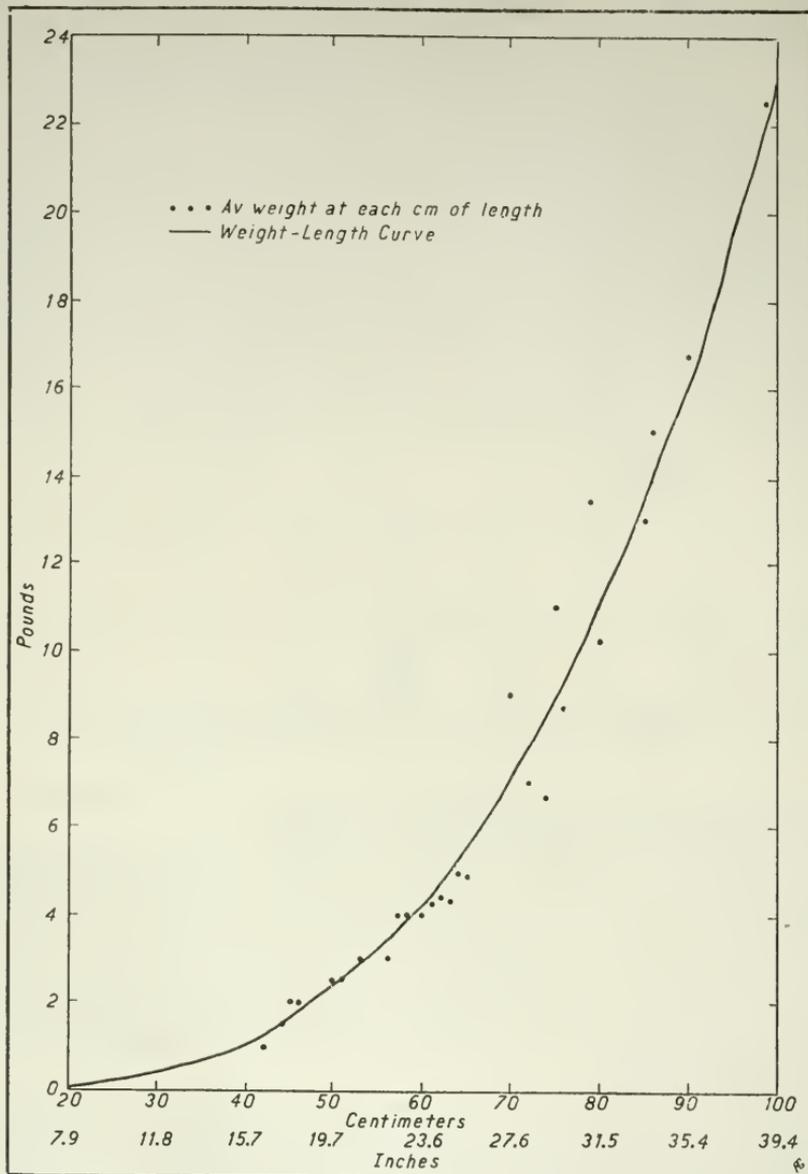


FIG. 105. Relation of weight to length of the white sea bass.

From the data at hand we may conclude that to assure all white sea bass at least one unmolested spawning year, all fish smaller than 100 centimeters, 39.5 to 40 inches in length, and weighing 23 to 24 pounds, should be protected from the fishermen.

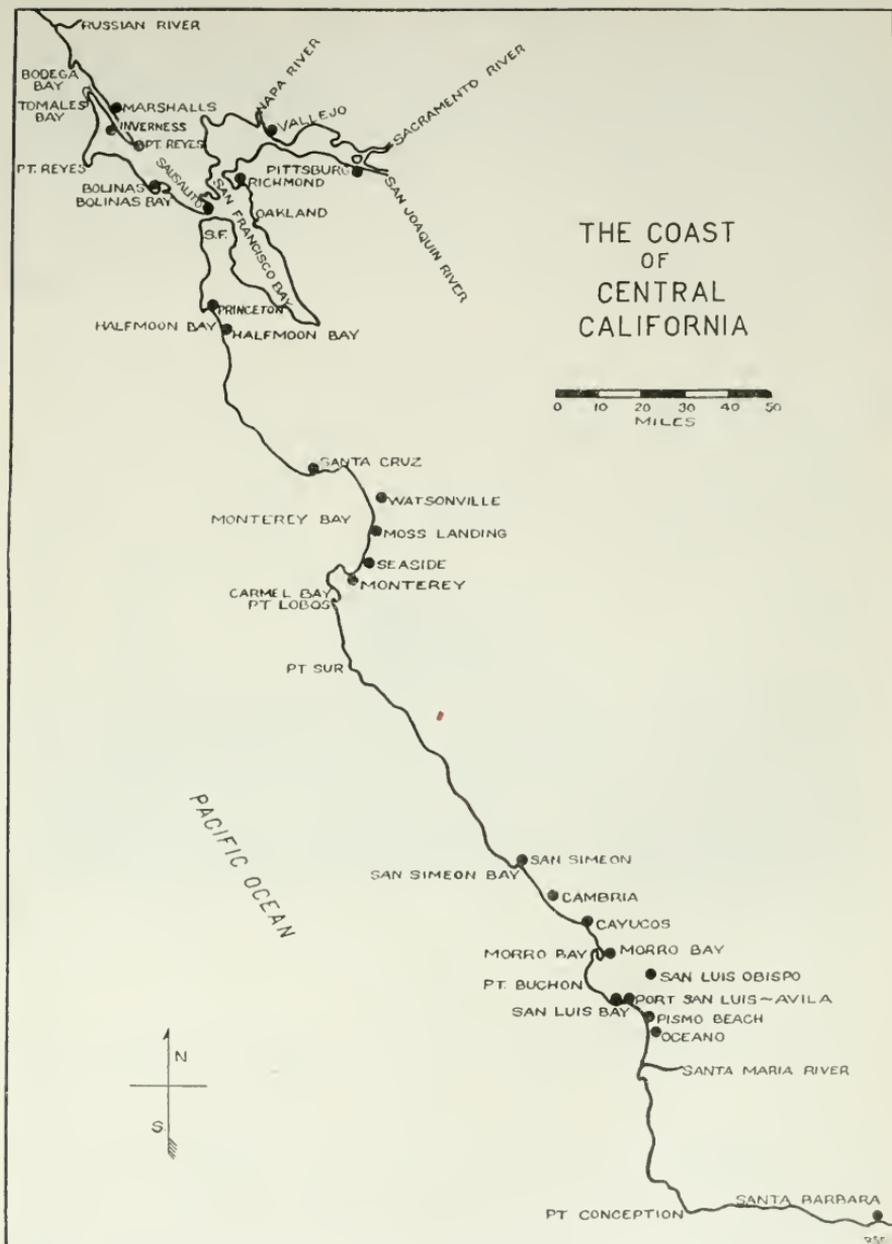


FIG. 106. Map of coastal central California. The names of bays and points are given on left of the coastline; and of towns, with the exception of Bolinas, on the right.

THE SMALLER FISHING PORTS OF CENTRAL CALIFORNIA¹

By RICHARD S. CROKER

Figuring but little in total catch records as compared with the more important fishing centers, but none the less a part of California's fishing industry are the picturesque little ports along the coast of Central California. From Inverness in Marin County to Avila in San Luis Obispo County, nearly every coastwise town has a few fishing boats and a fresh fish market. Those that have no semblance of sheltered harbor, such as Half Moon Bay, Cambria and a few others naturally do not support fishing fleets. But wherever there is anything like shelter or a stout wharf upon which to hoist boats during a storm, fishing boats may be found.

Along the coast between Point Reyes and Point Concepcion are the important fish ports of San Francisco, Santa Cruz and Monterey. A great deal has been written about these cities, so this article will confine itself to the lesser known towns where fish are landed.

Beginning with Tomales Bay, going southward, the first fishing towns encountered are Inverness and Marshalls on the west and east sides of the bay, respectively (see map, Fig. 106). Tomales Bay is the long, narrow, rather shallow estuary of Lagunitas Creek, emptying into the ocean just north of Point Reyes. Inverness is a quiet little village, awakening each summer to entertain vacationists. The town boasts of a yacht club, a boat works and several other wharves. At low tide the wharves are pretty well back on the mud flats. Inverness is on the county road four miles from the railhead at Point Reyes Station. Marshalls is a small town across the bay from Inverness. Until early in 1930, a branch line of the Northwestern Pacific Railroad ran through the town, but at present the county road is the only connection with neighboring towns. During the latter part of the nineteenth century Marshalls and nearby Hamlet were important fishing centers. In 1880 there were 18 sailboats fishing from the two towns. The fish were shipped to San Francisco. Overfishing in early days was one of the factors causing the fishery to sink to its present insignificance. The earthquake of 1906 modified what was formerly a rather deep body of water into a shallow bay, restricting the navigation of large boats and changing the environment of the fish.

On the mud flats along the east side of the bay, the cultivation from seed and harvesting of Atlantic coast oysters has been carried on for many years. Softshell clams, originally introduced from the East, are dug commercially. The flats, uncovered at low tide, are protected by rows of close-set stakes from the swarms of skates and stingarees that come in to feed at the turn of the tide. The bivalves are sold locally to some extent as well as shipped to San Francisco. According to the opinion of local residents the clam beds are beginning to show signs of depletion. At Inverness there are three salmon trollers, boats about 26 feet in length, that fish outside and deliver the salmon at Marshalls from which point they are shipped to San Francisco. One of these boats has recently been sold to fish up the coast at Noyo. There are a half dozen small boats fishing in Tomales Bay throughout

¹Contribution No. 95 from the California State Fisheries Laboratory. May, 1930.

the year for smelt and striped bass. They are towed from Inverness to the fishing grounds by a launch. Gill nets are employed for catching the fish in the bay. The fish are consumed locally for the most part. Summer visitors at Inverness catch considerable numbers of smelt, perch and striped bass for sport.

Several miles south of Point Reyes is the sleepy little beach resort town of Bolinas. The town is located at the entrance to Bolinas Lagoon in which shallow body of water large numbers of smelt, striped bass, perch, and crabs are caught by sport fishermen. Some of the residents make a little money selling smelt or crabs for local consumption. The smelt are caught from skiffs with hook and line. The crabs are taken from the wharf just inside the lagoon entrance or from skiffs with baited hoop nets. Several years ago I saw a man filling a couple of boxes with large saltwater perch he had caught with hook and line from the wharf. In answer to my questions he said he filleted the

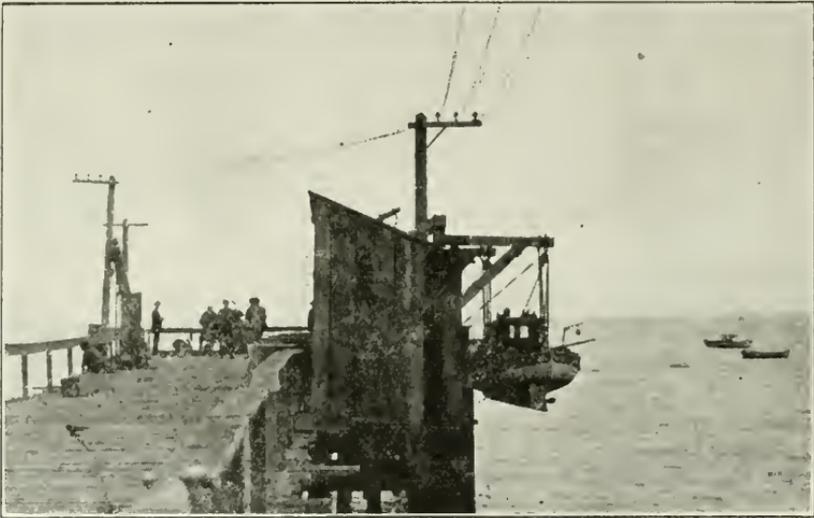


FIG. 107. Wharf at Princeton. Note boat on davits. Photograph by D. H. Fry, Jr., April 18, 1930.

perch and sold them to second rate San Francisco restaurants where they were served as fillet of sole. As elsewhere along the Marin and Sonoma County coast, San Francisco boats fish offshore in Bolinas Bay into which the lagoon opens.

Passing over Sausalito, Pittsburg, Oakland and the other bay and river towns, and leaving San Francisco behind, the next fishing town is Princeton in San Mateo County. Princeton is at the northern end of the bight known as Half Moon Bay and is famous for its artichokes. The town, which is on the coastline highway, is very small but boasts of two rather long wharves running out into the bay from the sandy beach. Just off the wharves, sheltered from the northwest by a point of land, but at the mercy of the southwesterlies lies the fleet of fishing boats. It consists of eight power boats, 26 to 30 feet long, of the typical salmon trolling type, broad beamed with flaring clipper bow. One of them is kept safely from storms on davits at the end of one of the wharves. The



FIG. 108. Cayucos from the pier. The shed at the left was formerly a cannery. Photograph by R. S. Croker, April 16, 1930.

boats are used for catching rock cod and perch with set lines and crabs with baited hoop nets. Salmon are caught by trolling in the bay during the summer. The fish are sold locally and in nearby towns. In addition to regular commercial fishing the boats are chartered to pleasure parties for salmon and rock cod fishing. Perch and smelt are caught from the wharves by pleasure fishermen.

The next town where fish are landed commercially is Santa Cruz which is of major importance and consequently will be omitted from this article. Late in the nineteenth century Soquel and Aptos, five and ten miles, respectively, from Santa Cruz were more important as commercial fishing towns than their larger neighbor but their importance in this line has dwindled to nothing with the rise of Santa Cruz.

Along the shores of Monterey Bay between Watsonville and Seaside, several varieties of clams including Pismo clams are dug commercially. From 1919 to 1926, inclusive, a shore whaling station was operated spasmodically at Moss Landing.

At Point Lobos on Carmel Bay, an abalone cannery, supplied with abalones from down the coast, operated until 1927. About 1913 the exportation of canned abalone was stopped, and the growth of the fresh abalone market has all but driven the canned product out of the domestic market. There was formerly a whaling station on Carmel Bay.

A rocky and forbidding coastline extends southward from Point Lobos, offering scarcely any haven to storm tossed boats for eighty miles. Rock cod and abalone boats operate along this formidable coast nearly as far south as Cayucos, but they all deliver their loads at Monterey.

The village of San Simeon on the bay bearing the same name but known to early Spanish explorers as the Bay of Sardines, is now a part of the Hearst Estate. From 1865 to 1890 Portuguese whalers carried on operations from here, rendering the whales at a crude plant near the present village.

The first town south of Monterey where there is any commercial fishing at present is Cayucos in San Luis Obispo County. The town faces on a sandy beach from which a wharf extends into an open roadstead. There is scarcely any shelter, so that Cayucos must be considered a fair weather port only. The town is connected by good roads with other towns in the county. Two power boats fish off Cayucos and make deliveries consisting for the greater part of rock cod and flat fish. There is some pleasure fishing from the wharf.

Until abalone drying was prohibited in 1915, this industry flourished, being carried on mainly by Japanese. During the war a cannery was built for packing abalones and sardines. Because of the absence of a good harbor and the lack of resident help the venture failed. The cannery operated on and off from 1916 to 1920, inclusive.

From Cayucos down the coast to Morro Bay there extends a wide sandy beach from which Pismo clams are taken both by amateur and commercial diggers. Those dug commercially find their way into the restaurants and markets of San Luis Obispo County.

Morro Bay is a good small boat harbor. It is protected by a sand bar that leaves but a narrow entrance to the rather shallow bay. The huge bulk of Morro Rock stands guard over the bay and acts as a landmark visible for miles. The town of Morro Bay is primarily a resort or week-end town strung along the shores of the bay and the ocean and extending back into the hills. It is connected by paved road with San Luis Obispo. There is a fish market on the wharf where the fish caught by local boats are sold or shipped to San Luis Obispo. The boats land the fish right at the wharf at high tide. When the tide is low, the greater part of the bay is transformed into a mud flat. Boats coming in at this time must land their catches on the beach just inside the entrance to the bay. Skiffs are used to carry the fish ashore. There are four boats fishing from Morro Bay. The largest of these, a 45-footer, is used for taking out pleasure fishing parties. The others are



FIG. 109. Morro Rock across the bay. Note the fishing boat at the left. Photograph by D. H. Fry, Jr., April 16, 1930.

used for commercial fishing only. They are 26, 35 and 37 feet long, respectively. One fishes for smelt with gill nets. The others use long lines, with about 600 hooks to the line, for catching rock cod, flatfish, yellowtail, and barracuda. Some mackerel are caught with short lines of one hook each. Because of the swift currents, the usual practice of leaving set lines for rock cod can not be followed. One of the two lines is trolled, touching bottom, in 100 to 450 feet of water until fish are found. Then it is buoyed and left for the half hour it takes to set the other line. The hooks are baited with pieces of fish. Sport fishermen catch yellowtail, rock cod, flatfish, and barracuda with bait, and in addition take smelt and mackerel by trolling with small spoons.

Avila and Port San Luis are separated by the estuary of San Luis Obispo Creek. Although petroleum is stored in tanks above Avila, the oil and freight dock is at Port San Luis and the fish wharf is at Avila. The two towns are on the shore of a somewhat sheltered bay where only a narrow beach separates the steep hills from the water. Avila pier is the gathering place for many sport fishermen, especially during the summer. Perch, mackerel and smelt are to be

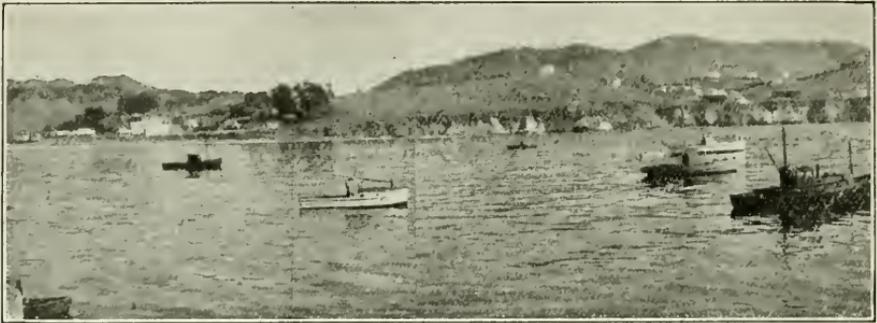


FIG. 110. Avila from the wharf. Photograph by R. S. Croker, November 18, 1929.

caught with hook and line, while crabs can be taken with baited hoop nets. Some ten or twelve fishing boats make Avila their home port. These consist of launches of from 25 to 35 feet in length. In addition there are over a dozen skiffs, some of which are used for rock cod fishing as well as acting as launch tenders. Several of the power boats are used for taking out pleasure fishermen. The others fish for white sea bass and smelt with gill nets and for rock cod with long set lines. Mackerel and flatfish are sometimes taken by the set lines. Sardines caught in small gill nets are used for baiting the rock cod lines. The fish caught off Avila are sold in the markets of the town and in San Luis Obispo, and are also distributed throughout the county by fish wagons. The Pacific Coast Railroad and a paved highway connect Avila with San Luis Obispo. A whaling station was located at Whaler's Point near Port San Luis during the latter part of the nineteenth century.

A few miles down the coast from Avila is the well known Pismo-Oceano Beach where amateur and commercial diggers gather Pismo clams. The beach towns of Pismo and Oceano are the bases for clam digging operations. In former years the clams were unbelievably abundant, but the lack of foresight of the early diggers and more par-

ticularly the carelessness of tourist diggers have caused them to become greatly reduced in numbers, necessitating protective legislation regarding bag limits, minimum size limits, closed areas, and shipping. A clam cannery was operated at Pismo Beach from 1902 to 1914. The cannery was forced out of business when the decreasing numbers of the clams made bag limits necessary. At present the commercial yield is utilized by restaurants in Pismo Beach and other towns in San Luis Obispo County. By far the greater number of clams is taken by amateur diggers who come by the thousands from all over the state to get them. At present the clams are practically restricted to the sand bars near low tide mark so that a drenching in the surf is invariably a part of the digging. The clams are located by probing or scraping with long handled forks or rakes, and as they are near the surface of the sand they are easily uncovered.

The Pismo-Oceano Beach extends several miles below the town of Oceano. Between here and Point Concepcion there are no commercial fishing towns, so that this beach really marks the southern limits of the area covered in this account.

There are vast quantities of fish yet to be taken from the waters off the coast of central California. The amounts caught in the vicinity of San Francisco, Santa Cruz and Monterey give some idea of the size of the fish population. There is no reason to believe that these large numbers of fish are not duplicated off Morro, Avila, Princeton, and other places. The new road being built along the coast between Monterey and San Simeon will open a new region to homeseekers and vacationists. With the advent of greater population, roads and harbors will be improved, in addition to the formation of a new market. Although their fishing history may not be on a par with that of their larger rivals, the future of the smaller towns undoubtedly holds great promise.

CALIFORNIA FISH AND GAME

A publication devoted to the conservation of wild life and published quarterly by the California Division of Fish and Game.

Sent free to citizens of the State of California. Offered in exchange for ornithological, mammalogical and similar periodicals.

The articles published in CALIFORNIA FISH AND GAME are not copyrighted and may be reproduced in other periodicals, provided due credit is given the California Division of Fish and Game. Editors of newspapers and periodicals are invited to make use of pertinent material.

All material for publication should be sent to Leo K. Wilson, 510 Russ Building, San Francisco, California.

JANUARY 19, 1931

To give guidance to the desire to preserve wild life resources for future use and benefit is an almost imperial prerogative.

EDITOR'S POLICY

In assuming the task of acting director of the Bureau of Education and Research I find that I also, automatically, become the editor-in-chief of division publications. These publications include CALIFORNIA FISH AND GAME, a quarterly magazine telling of the developments of the Division of Fish and Game from time to time, and which is delivered to the general public upon request, and free of charge; *Teachers' Bulletins*, an instructive publication compiled as demands warrant, on various subjects appertaining to our out-of-doors, and for use in California schools; *Leaflets* of an educational nature, designed for distribution of miscellaneous character and touching on various subjects in our work; *Game Bulletins*, prepared by various scientists and naturalists on our staff and which are published as material develops, and *Fish Bulletins*, handled mainly by the Bureau of Commercial Fisheries as contributions from the California State Fisheries Laboratory at Terminal Island, and which pass through our hands.

As all materials issued from this division are absolutely reliable accounts based on pure fact, of a scientific nature and entirely free from fictional influences, I have planned no radical changes at this time in the general makeup of the works. I wish to announce that I will endeavor to maintain the same high standard of policy as that established by my predecessor.—LEO K. WILSON, editor.

CHANGES IN PERSONNEL

The past quarterly period has wit-

nessed some very important changes in the personnel of the division.

First, there was the appointment of the new commissioner in the person of Mr. C. R. Bell. He was selected to fill a vacancy created by the resignation of Mr. George B. Clarkson.

Mr. Bell was asked to served by Governor C. C. Young only after a careful survey had been made of available conservationists in the southern part of the state. He is a fish and game student and enthusiast of the first order. Mr. Bell has long been identified with constructive out-of-door ideas in his section of the state and his appointment to a commissionership is bringing in expressions of approval from those interested in the field.

A second change has to do with the acting directorship of the Bureau of Education and Research in the division. Under our most modern practices of thought, this bureau is one of the most important links in the conservation of our natural resources. Scientists and naturalists now realize that the cooperation of a people on a problem can only be gained fully through educational processes.

Dr. H. C. Bryant, former director of the Bureau of Education and Research, resigned in June to become assistant director of National Park Service in charge of Education and Research with headquarters at Washington, D. C. Although his departure was considered a great loss to the State of California, he had been identified with the division for sixteen years, his superiors realized that his new field offered him much greater opportunities and he was pledged unanimous support from this section of the country.

The commissioners selected Leo K. Wilson to become the acting director of the Bureau of Education and Research. Wilson is a native Californian; he was born in the town of Davis, and has been acquainted with our out-of-door problems ever since he was old enough to hunt in our fields and marshes. He is a graduate of the University of California and has a wide acquaintance with men interested in all phases of the problem of conservation. Prior to Wilson's appointment as acting director he was connected with the bureau in the capacity of publicity director.

Earl Soto succeeded Wilson and is now handling all publicity for the division in the Bureau of Education and Research. Soto, an experienced newspaper man and a sportsman, is well fitted for the position.

**DR. M. HOBMAIER, DIVISION
PATHOLOGIST**

Dr. M. Hobmaier, professor of comparative pathology, arrived in San Francisco during September from Germany. He will be pathologist for the Division of Fish and Game, Bureau of Education and Research.

One of the great works which will immediately be taken up by Dr. Hobmaier will be the study of duck diseases. He will also make a study of diseases of other birds and fish.

The doctor was formerly professor of pathology at Borpat, Astoria. He made a world wide reputation in his field.

during the past several years than the present duck limit controversy. Although the Division of Fish and Game has made a ruling on this important subject there seems to be a great deal of misunderstanding in hunting circles as to what law will be upheld, the federal or the state regulations.

The Division of Fish and Game will enforce the state law which declares that the lawful limit on ducks will be 25 per day, per hunter, 25 in possession and 50 ducks per week. The state law could not be changed for the coming season.

The federal regulation reads that the

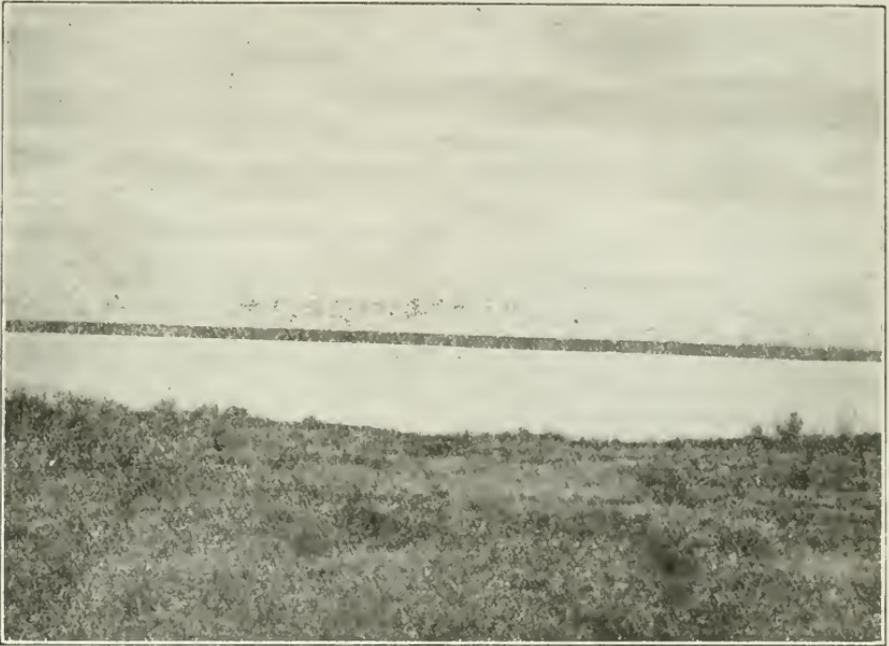


FIG. 111. Hundreds of ducks alighting on Big Buttonwillow Lake, on state waterfowl game refuge near Los Banos. Photograph by E. S. Cheney, December, 1929.

After Dr. Henry Van Roekel, pathologist, resigned from the division last year to accept a position in the east, Dr. Karl F. Meyer, director of the G. W. Hooper Foundation of Medical Research, made a thorough canvass of the field and recommended that the services of Dr. Hobmaier be secured.

In addition to his duties with the Division of Fish and Game he will be associate professor of comparative pathology at the Hooper Foundation and will assume his duties immediately.

THE DUCK LIMIT PROBLEM

No other problem has created as much discussion and confusion for sportsmen

duck limit, per hunter, throughout the United States shall be 15 birds per day and a possession limit of 30.

It has been suggested that since there is an apparent shortage of ducks, and since the hunter wishes to remain on the safe side of the question, perhaps the following course is the best to pursue: comply with that part of the federal law which calls for a daily limit of 15 birds, with that part of the state law which allows 25 in possession, and that part of the state law which sets a limit of 50 ducks per week.

It must be remembered that the federal regulation has higher power than the state act. Therefore, the hunter should

divide his attention between the state and federal rulings and obey the state law at all instances except where it is interceded by the federal act.

Practically the same controversy arises over the goose limit. The state regulation allows 8 per day and 8 possession, while the federal regulation limits the bag to 4 per day and 8 possession.

Because of the migratory character of the ducks—they claim neither country nor continent—it was ruled that the government should practice protective measures where such measures were necessary.

It has been stressed by competent scientists and naturalists that ducks have fallen off approximately 50 per cent in hatching activities during the past brooding season. This condition was caused mainly by droughts, it was said, and the droughts causing a shortage of food naturally caused a shortage of birds.

From many localities the report was heralded that the ducks were as plentiful as ever and that there was no necessity for a federal cut in the bag limit. Naturalists explained this condition by the fact that since the drought caused a shortage of feeding ponds—many freshwater lakes and ponds became dry—it also caused a greater concentration in the places where food existed.

There is not a single duck in many localities that formerly harbored thousands of birds, it was pointed out. To shoot them indiscriminately in the localities where they have found food will mean a lesser number to return to the nesting grounds for next season.

At the opening session of the seventy-first congress, a lengthy report from the Department of Agriculture was read, and the following excerpts were taken from that record: "Under section 3 of the Migratory Bird Treaty Act of July 3, 1918, the Secretary of Agriculture is authorized to determine 'when, to what extent, if at all, and by what means' migratory birds may be hunted, captured, possessed, etc., and to adopt regulations to carry out such determinations, which become effective when approved by the President.

"The Bureau of Biological Survey, which is directly in charge of the administration of the Migratory Bird Treaty Act and the regulations thereunder, has for three years been conducting extensive investigations and observations on the present status of our migratory game birds, particularly the ducks, geese, and brant so popular with the American wild-fowl hunter. The information gathered as a result of this

work indicates definitely that the ducks and geese have not been holding their own."

At the same session, the second hearing on the amendment of the Migratory Bird Treaty Act, W. T. Hornaday, representing the Permanent Wild Life Protection fund, said: "The Biological Survey can not by any human possibility enforce a migratory bird treaty all over the United States with 22 game wardens."

Later during his address he said: "I think that the 15-bag limit can just as easily be enforced as 25, and I will tell you why: In the first place, it depends upon the psychological viewpoint of the individual. I must say that in all these years I have had dealings with sportsmen and sportsmen's bodies, not only thousands but tens of thousands and hundreds of thousands of them, I have a profound belief in the honesty and sincerity of the vast majority of American sportsmen."

Paul G. Redington, chief of Bureau of Biological Survey, Department of Agriculture, in the course of his remarks, said: "In the administration of the Migratory Bird Treaty Act we need sound public sentiment in favor of the observance of the law and a willingness on the part of sportsmen and conservationists generally to observe all the restrictions that are necessary to the preservation of wild fowl."

Irving Brant, representing the Associated Sportsmen of California, and the Permanent Wild Life Protection Fund, read the following report of a duck census made in this state: "On the Pacific coast the handwriting is so plain on the wall that scores of the strongest partisans of the 25 limit confess they are getting no birds and that the bottom seems to have fallen out of the supply. I know of numberless instances where members of exclusive clubs have given up their shooting for the reason they can not bag more than a couple of birds per gun on grounds where any average shot could secure limits without the least difficulty heretofore.

"Two years ago I freely predicted that at the end of 10 years we would have no duck shooting worthy the name in California. It now appears we are reaching the end of the rope with startling rapidity."

Many other leaders in wild life conservation addressed congress on various phases of the problem.

SPORTSMEN OBSERVE DUCK LAWS

The United States Bureau of Biological Survey has only 25 game conservation officers to enforce the federal regula-

tions on migratory birds, about one man for every two states.

State game departments can cooperate when state laws coincide with the federal regulations but the new bag limit regulations put in effect for the present season, are at variance with the laws of many states. The new federal daily limit on ducks is 15 and on geese four. The state daily duck limit exceeds the federal limit in 26 states and on geese in 42 states.

In view of the almost helpless condition of the federal enforcement arm all good sportsmen should lend their active support to the federal and state authorities to secure general observance of the law.

It is only in areas of concentration that excessive bags are apt to be shot, and sportsmen can prevent that by proper organization and vigilance.

Conservation groups have united to ask the next congressional session for sufficient funds to double the force of federal game protectors.—American Game Protective Association.

IN MEMORIAM

On June 9, 1930, Deputy George Oscar Laws came to the end of a long, honorable and useful career. He died as he wished still devoted to the great and important task which had occupied over a quarter of a century of his life. He leaves a memory that will ever be respected.

Deputy Laws came of old pioneer stock. He was born in Junction City, Trinity County, California, May 16, 1856, of an esteemed pioneer family. His boyhood days were passed in the vicinity of Junction City. While the mining excitement was at its height, he attended the local school. Like most young men of the county, he turned to mining, unable to resist the lure of the yellow metal. He prospered for a time, gaining a reputation as a skillful miner, and then removed to South America to seek his fortune.

Broken in health, he returned to Trinity County. While regaining his strength, he became attached to the California Fish and Game Commission, serving on its auxiliary force as an unsalaried assistant. This was in the days before the Hunting License Act went into effect and the commission was laboring under the handicap of insufficient funds. Hide hunters had destroyed great numbers of deer in Trinity County and were still operating on a grand scale. The public at this time was far from being sympathetic accord with the policies and objectives of the Fish and Game Com-

mission. Residents of the mountain districts resisted restrictions. They were yet under the influence of the pioneer viewpoint that natural resources were inexhaustible.

A man in such circumstances had to be absolutely fearless. A timid officer would not go far; an overbearing one would prove detrimental to the cause. So well had assistant Laws succeeded in the "breaking in" process, that when funds permitted the appointment of a regular deputy for Trinity County, he was among the first to be considered.

Appointed February 1, 1908, Deputy Laws rendered faithful and honorable



G. O. LAWS

service totaling nearly thirty years. He never used his badge to cover up the transgressions of a friend or a person of influence. Fair and just in his dealings, he did not overlook a flagrant violation to enforce a frivolous or petty disregard of the law. He was tireless in carrying out his duties. Discouragement never daunted him. If it were necessary to work in the most difficult country in Trinity County and to be for weeks far from human habitation or aid, he did not shirk his official responsibilities. His upright character and faith in the task he was engaged in won the respect of the violator and enabled him to build up an appreciation for the mammals and birds which he sought to protect.

Deputy Laws passed away in his seventy-fourth year. For some time he had suffered from an enlargement of the heart and shortly before his death had been

taken to the Woodland Clinic for treatment. The funeral was largely attended, many residents of outside towns being present to testify the prominent place which the deceased held in the life of the county.

The *Weekly Trinity Journal* in concluding its obituary of June 14, says: "A good citizen has left us. May his sleep be peaceful in the county he loved, in the country he had helped to build." And those who will work along without him conserving a public trust, might well add that his faithful service is a source of inspiration and his record a mark worthy of emulation.—R. S. ELLSWORTH.

DROUGHT AND DUCK SEASON

Because of the drought, recommendation was made to shorten the duck shooting season by the International Association of Game, Fish and Conservation Commissioners in convention at Toronto, Canada. The recommendations were sent to the United States Department of Agri-

culture, which has jurisdiction over migratory birds through the Bureau of Biological Survey, and to the Canadian Game and Fisheries Department.

A survey of the nesting grounds in Canada, where 85 per cent of the wild ducks are raised, shows that only 50 per cent of the usual annual hatch was hatched this year. Lack of water was cited as the major cause for the small hatch, according to the various Provincial game commissioners.

The ducks that fly out of Canada on their annual flight South this year will face a grave problem throughout the winter because of the drying up of thousands of lakes, ponds and streams.

Although fall rains may fill many of these watering places the drying up of them killed aquatic duck foods. Roots that may remain alive will not sprout again until spring. The ducks will face a food shortage, so sportsmen and other nature lovers should prepare now to feed the flights of ducks, geese and other migratory birds.



FIG. 112. Deputy G. O. Laws about to leave Weaverville on a patrol trip of Trinity County, 1911. His horse, "Babe," killed in 1913 while on duty for the Fish and Game Commission, had patrolled 30,000 miles of mountain country.

SANCTUARIES ASSURE A FUTURE FOR STATE BIRD

Now that the California valley quail (*Lophortyx californicus*), by a large majority of the votes cast by thousands of people, has been selected and declared to be the state bird of California, the sportsmen of the state should have another reason to unanimously support the efforts to rehabilitate this bird within the state. This most beautiful, gamest of our native game birds, and a species found nowhere else in the world, has brighter prospects of an assured future.

Aside from the protection afforded by state law which prohibits the trapping or sale of any quail at any time and provides for a daily bag limit of 15

their lands, embracing approximately 500,000 acres upon which, it is said, there are some 400,000 quail. In area the sanctuaries range from an acre or so to several hundred acres.

In Lake County alone upwards of 50 separate quail sanctuaries have been established through the activities of volunteer deputies, totaling 9260 acres. On September 1, 1930, there were estimated to be 8796 quail inhabiting these newly closed areas. Volunteer deputies in many other counties are equally as active.

It is believed that by encouraging land-owners to voluntarily set aside part of their lands as quail sanctuaries upon which no hunting or shooting will be allowed, and by assisting them in properly



FIG. 113. Lake Almanor. This section of the lake is favored by anglers. Photograph by E. S. Cheney, May, 1929.

valley quail and a weekly bag limit of 30, and further provides, with the exception of district 1 $\frac{1}{2}$, that the month of December shall be the open season for quail shooting, constructive steps are being taken to establish numerous small inviolate quail sanctuaries throughout the state through the medium of the 550 volunteer deputies of the division, and the cooperation of the members of the various fish and game protective associations and clubs who are sponsoring the appointments of these deputies within the state.

Though this movement is barely under way, already much progress has been made. About 400 sanctuaries have been voluntarily established by land owners on

posting these sanctuaries against hunting and shooting, coupled with the efforts that will be made by the California Fish and Game Commission for the establishment of state quail refuges upon which quail will be propagated and from which quail may be distributed into the game fields of the state, and with the hearty cooperation and support of the people in these matters, every acre of the millions of acres of suitable quail habitat within the state will, within the next few years, become satisfactorily restocked with valley quail. California's state bird, from the nucleus of wild quail already in the game fields of the state, will thus be reinstated in small measure

to the abundance the old timers love to tell about.

While the efforts being made to introduce exotic species of game birds are receiving favorable support and commendation, as a matter of state and local pride, every effort should be made to reestablish native game birds.

The introduction of foreign species into the game covers of the state, so to speak, is an experiment. We do not know and we can not hope to know without a trial how the new environment will affect these exotic birds, or what the result will be, but we do know that our native valley quail is a bird of beauty and that it is one of the gamest birds in the world. We also know that no species of game bird will respond more quickly to protection or afford more sport with gun and dog than will this little "plumed knight of the chaparral."—WALTER R. WELCH.

CALIFORNIA WILDS IN MINIATURE

There is little doubt but what the display of the Division of Fish and Game at the State Fair this year was the finest and most interesting exhibit in the great pavilion. If permissible, it would have taken a first prize—being a state exhibit this was impossible.

This exhibit represented a panorama of a California mountain scene. Entrance was made through the open door of a "log cabin."

Once inside, the scene unfolded to the observer as though looking through a huge window. A fresh, artificial lake contained many species of game fish and skirted the edge of the cabin. Beyond this, in painted relief, there appeared mountains, streams, a fish hatchery, wardens and other conservation workers, camp fires and a beautiful lake. It all gave a very realistic idea of our great wilds.

Several waterfalls tumbled boisterously into the artificial lake and many deer appeared to graze in secluded spots along the landscape. The painted lake reflected the pale blue sky above.

The lighting effect was excellent. Through skillful manipulations of varicolored lights the spectacle of fading day and breaking morning was enacted to perfection. A great, round moon cast a shimmering path of light over the lake. By some skill of the operator, banks of threatening storm clouds were made to pass over the summit of a mountain range in the distance—one could almost feel the chill of the oncoming storm. The painted waterfalls back in the re-

mote ledges were also brought into life through the medium of lights.

Exit was also made through a cabin door. It has been estimated that every one of the 350,000 persons who entered the grounds visited the exhibit of the division at least once. Scores of persons visited the exhibit several times.

Rather than burden a pleasure-seeking public with a succession of dry, colorless, statistical exhibits, the managers tried to appeal to the nature-loving interests of the people. They succeeded admirably.

PROPAGATE BLACK BASS

Eighty cans of black bass were recently shipped to the Izaak Walton League at Palo Verde and Blythe.

These young fish were planted in natural rearing ponds along the Colorado River by the members of the league. At the proper season, when the fish have attained a good size, they will be planted in the main stream.

The rearing ponds have been developed by the league and will prove to be of great value in the propagation of black bass.

Another shipment of ten cans, about three hundred fish, was shipped to Wagas Lake, near Lancaster, for planting.

CONSERVATION PROBLEMS

There is no problem of public interest quite as complex today as that appertaining to our natural resources. Scientists and other great thinkers are quick to recognize this fact. To the ordinary individual who is more or less interested in our out-of-doors, many primary facts are not taken into consideration, with the result that we have a great variety of biased opinions with which to contend.

A phase of the problem is dealt with, in an interesting manner, in the July issue of the *New Mexico Conservationist*, a fish and game periodical issued by our sister state, and a portion of the article is quoted here:

"Probably no other department of state government deals with a problem having so many and diverse angles as does the Game and Fish Department. Our charge is the successful administration of a multitude of separate species of living mammals, birds, and fishes, each having its own peculiar habits and ecological requirements, and distributed over a tremendous area of country embracing six of the seven life zones to be found on the North American Continent. Some species have adapted themselves, through

force of necessity, to two or more types of environment, so that it does not necessarily follow that one kind of management is applicable to all the individuals of even one species.

"Then, too, the physical characteristics of the state are slowly but constantly changing under the use of the natural resources by man, with the result that management must step into the breach left open by the tardiness of the natural processes of evolution, and attempt to either supplant species which are not able to readily withstand the onslaughts of civilization with others which are better adapted to the current conditions, or else to nurse the native species along until they have developed a greater degree of tolerance.

"As an illustration, the character of our mountain streams has changed so radically due to erosion that our native black-spotted trout is no longer adapted to by far the greater part of them. While there is no doubt that this trout would eventually adapt itself to the changed conditions, it would take a long time, and in the meantime we stock the stream with species which have evolved under those conditions, and can tolerate them.

"The pronghorn antelope, a purely plains dwelling animal originally, and almost incredibly numerous, faded out rapidly before the advance of civilization. But the process was checked before the point of actual extermination was reached, and through careful husbanding of the remnants we are allowing the species to orient itself and discover that it can live in broken and wooded country where food and security conditions are better, and even in close proximity to man in agricultural regions.

"The further we go into wild-life management the more obvious it becomes that no rigid, state-wide system of control can be even passably successful. All of the factors which must be considered vary too widely within the state boundaries, and the resource must be managed on the basis of smaller units. There are places within the state where the law which decrees that one buck deer may be killed between November 10 and November 20 represents the very acme of scientific management; in others it is an absurdity."

Of course this article was written for the state of New Mexico with New Mexico problems in view, but surely the summarizing character of the material will make it applicable to almost any locality where conservation is a featured interest. It must be remembered that

California is a long state, and wide, and it is possible to find snow or deserts within our confines at all times of the year. Therefore let it be said that any constructive idea that has to do with the great out-of-doors can find ready application here at home.

FARMERS' AID SOLICITED

The former indifference of many agriculturists and fruit growers to the presence and welfare of upland game birds on their holdings is giving place to a very keen interest in such species. This inclination deserves encouragement, not only from the possibly selfish standpoint of the hunter but because the abundance of such game in any community lends a charm to farm surroundings and a district which all residents will appreciate in time and will be free to admit. No exception can be taken by the sportsman if the landowner prohibits the killing of game harbored on his holdings, for even in that instance a considerable number of birds will eventually wander off and aid in restocking adjoining lands. It should be generally recognized that the farmer's interest in game is a prime requisite in any restoration movement and that he should be made acquainted with the economic, sporting and aesthetic angles that lend a value to its presence. If you can prove this to him and do not arouse the suspicion that your sole object is to provide shooting for yourself and others at his expense he undoubtedly can be interested in game restoration.—*Associated Sportsmen*, August, 1930.

WHEN MAN MUST REDUCE NATURAL ENEMIES

Man must reduce (not exterminate) certain natural enemies of birds: (1) when he attempts to rear poultry or game birds in excessive numbers; (2) when, because of the disturbance of the biologic balance caused by extensive agricultural operations, he needs to increase the number of insectivorous birds beyond what the land naturally would support; (3) when the most sagacious natural enemies of birds, like the fox and the crow—their own enemies having been reduced or exterminated by man himself—take advantage of the extra protection and food afforded them in civilized communities and thus become too numerous and too destructive; (4) wherever man hunts and destroys wild game he may also reduce somewhat the numbers of the enemies of the game and thereby relieve the game of a part of the pressure brought to bear against its in-

crease. In all such cases discrimination must be used, and it is unsafe to reduce too far the numbers of any but the most powerful predatory animals.—*The Natural Enemies of Birds*, by Edward Howe Forbush, Boston, Mass, p. 16.

SALTON SEA BASS

Striped bass seem to be holding their own in the Salton Sea.

This sea, forty-five miles in length and fifteen miles wide, was formerly a barren water. Fish culturists made various tests of the geographical characteristics of the district, temperatures and the saline content of the water. Data thus gathered prompted a strong recommendation for the introduction of striped bass.

Two car loads of the fish—five thousand bass of from four to six inches in length—were then introduced. Close observation is being made on the welfare of these bass and, so far, no reports have been made of unfavorable conditions.

This is one of the most important experiments in fish introduction into waters of like character ever recorded. The experiment is being watched from all parts of the country.

REMOVE SANDBAR

Construction work on a rock jetty which will prevent the formation of sand bars at the mouth of the Navarro River, Mendocino County, has just been completed at a cost slightly in excess of \$4,500. The jetty causes the water of the river to rush through a smaller channel and thus carry the sand far out to deep water.

The decision to build the jetty was made after it was discovered that salmon and steelhead were prevented from entering the river during the spawning season. The contract was let by the Department of Public Works on recommendation of the division.

CLOSE SHASTA RIVER

Two major reasons were involved in the closing of a portion of the Shasta River to anglers last July.

First, Dr. J. O. Snyder, of Stanford University, is conducting a scientific investigation for the state in regard to the salmon run in the waters of the Shasta River. Counting racks have been placed and other necessary equipment is assembled. Anglers working in the river would be a severe hindrance to the doctor in obtaining accurate results. It will take several months to complete this scientific study.

And a second reason involves highway construction work which is being done

down the Shasta River Canyon. Hundreds of workmen are camped in the canyon and with fishing privileges open it would cause an abnormal catch of fish. Not only that but anglers are apt to become injured if allowed to work through the canyon during construction work.

Sportsmen in the northern part of the state are giving full cooperation in the handling of the problem. A telegram from Captain S. R. Gilloon, of Mount Shasta, read as follows: "Sportsmen in favor of closing Shasta River until work finished."

The part of the river closed includes that portion extending from a point one-quarter of a mile above the power dam of the California-Oregon Power Company to the junction of the Klamath River.

BLACK BASS IN FEATHER RIVER

Sportsmen who fish in the Feather River will soon find an abundance of small-mouthed black bass. For the past year members of the Feather River Rod and Gun Club have been working with the state in an effort to bring about the planting of this type of fish. It is only lately that they have been able to announce their success.

As a first step in the work the members of the gun club secured exclusive rights to a large pond or reservoir near the city of Oroville. This pond had been created by a large dredger years ago so it was necessary to do a large amount of work to make it receptive for the rearing of baby fish. The work not only embodied the cleaning of the pond but it was necessary to construct suitable inlet and outlet streams to insure fresh, cool water from the river.

While this work was being completed a crew located about 1500 small-mouthed black bass in the Salt Spring reservoirs in Calaveras County. These were netted, placed in fish cans and taken to the Oroville ponds.

Under the care of the gun club members these fish will be reared to a proper size and planted in the Feather River. When planted the Feather River will be one of the finest bass fishing streams in the entire state.

TRUE SPORTSMAN

The true sportsman always (1) procures a hunting license in compliance with the law, (2) never takes any game out of season, (3) does not exceed the bag limit, (4) always leaves some for the other fellow, (5) always cooperates with the warden in seeing that the game and fish laws are properly enforced, (6) feels it his duty to all good sportsmen

and to the state to report violations to the proper authorities, (7) believes in keeping faith with his fellow sportsmen and holding up the hands of those who administer the conservation laws, (8) joins the game and fish protective association in his county, and if one does not exist, he fosters its organization, (9) he never dynamites or poisons a stream for fish, (10) if he catches a small game fish he immediately returns it to the water, (11) when he catches enough he quits, (12) he encourages the ideals of sportsmanship in his weaker brother, and by precept and example hopes to win him, (13) he will leave a fair portion of the game which he has bagged with the housewife of the landlord who permitted him to hunt.—“Sportsman vs. Game Hog,” *Alabama Game and Fish News*, October, 1929, p. 8.

SUCCESS IN FISHING

Some of our fishermen who read the reports from various sources, as to the conditions of fishing in the various streams, return home to announce that such reports are exaggerated; that they haven't had any success.

They forget that a part of the success in fishing rests with the angler. No matter how good the fishing happens to be, unless there is a certain amount of skill on the part of the operator, there will be no limit to report.

It is quite true at this time of the year low water in the streams and hot weather mitigate against fishing. But, just the same, you must know your stuff if you expect to land the wary trout.—Harry B. Smith, in the *San Francisco Chronicle*, August, 1930.

NO TAHOE FISHERMEN

Lake Tahoe fishermen were not as numerous this season as in former years.

This lake was once known as one of the greatest fishing waters in the state but years of heavy fishing have reduced the supply of cutthroat trout, native to the lake, to a minimum. It has been suggested that sportsmen and those interested in lake fishing cooperate in the planting of millions of steelhead—such a plan will insure good sport to the angler while the native fish are given a chance to multiply.

Many of the old time lake fishermen worked the streams. Fish planted in these cold waters several seasons ago from the state hatcheries gave the anglers plenty of good sport.

The few who took the trouble to go to Black Lakes and other isolated bodies of water found some very good fishing.

Because of the heavy drain on the stream fish this year every effort is being made to plant sufficient “fingerling” trout to insure good angling for the seasons to come. If sportsmen will exercise proper care in fishing the streams there will never be any cause for complaint because of a shortage.

CAVE-DWELLING MAGAZINE

When an issue of the CALIFORNIA FISH AND GAME leaves this office on its way to a subscriber it is about the last that we ever see of the magazine. Of course we often hear about reading material and pictures in the issues but as far as the magazine itself is concerned, it rarely, if ever, finds its way back into the pages of succeeding copies.

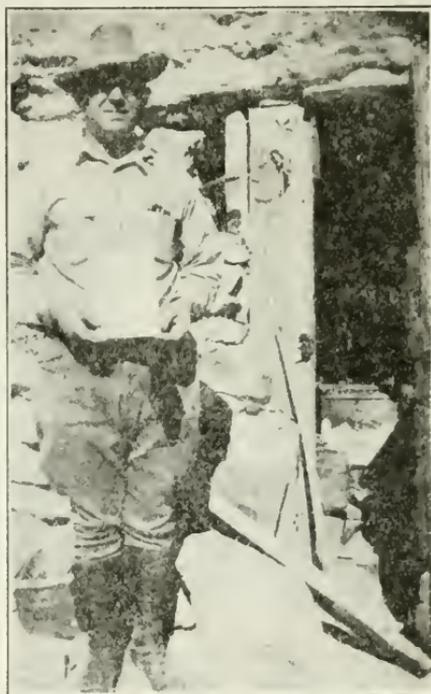


FIG. 114. Copy of CALIFORNIA FISH AND GAME found in cave near Colorado River, Imperial County. Photograph by R. J. Little, July, 1930.

But fate, or luck, or whatever you want to call it has made a rare exception of the case. By some act of curiosity, a traveler prowled in an old secluded cave on the Colorado River and found a copy carefully tucked away in a protected spot. It was dated April, 1928.

Just how this “tramp” copy happened to travel to this hidden spot will probably always remain a mystery, but the

journey, nevertheless, has brought the "vagabond" a certain distinction. Its picture appears on these pages where it will be duly bound and filed, along with its scientific surroundings, for posterity.

And I suppose that some mention should be made of the broad-framed individual who is acting as the human easel for this distinguished periodical, but, in truth, no one hereabouts seems to know his name. Therefore, let it be a fitting climax to say that Mr. John Doe kindly volunteered his services while the photographer squeezed bulbs, or pulled levers, or did whatever picture men are supposed to do with a camera whenever they get a subject "nailed down."

MILES PER DEER

How many miles is your car getting per deer? This may sound like a ridiculous question but have you ever stopped to consider the important part that hunting plays in the industries other than those connected with your immediate outing equipment?

It is a difficult task to arrive at any reasonable figure on this problem because of the excessive automobile travel in this state. However, at the main office of the California Division of Fish and Game in San Francisco a method has been devised, through the checking of deer tags, whereby a fairly accurate account can be given of the fellow who got the deer. The figures are based on a complete report of last season.

In tabulating maps at the division it was noted that hunters from southern California traveled to all corners of the state in a search of the antlered tribe. Hunters from the northern part of the state traveled no farther south than Inyo, Kern and Los Angeles counties.

With the hunters of the south showing the largest and widest percentage of travel this account has to do with their problem.

First, there were 21,222 deer legally killed last year in California. Figures show that of this number 10,135 bucks were bagged by local residents in their respective territories. Los Angeles hunters bagged 2199 animals thus leaving 8888 deer for the rest of the state.

The report is too lengthy to give a full account per county of the deer taken by Los Angeles hunters; therefore just a few representative figures have been taken.

Los Angeles hunters bagged one deer in Alameda County, with a round trip estimate of 900 miles. In Tulare County they bagged 273 bucks at 350 miles per animal. Modoc County registered 46

deer at 2000 miles per animal. For Siskiyou there is 71 deer at 1800 miles; Nevada County 6 deer at 1100 miles; Plumas County 42 bucks at 1500 miles; Mendocino County 50 deer at 1200 miles; Riverside County 101 deer at 200 miles; San Diego County 8 deer at 300 miles; Orange County 16 deer at 150 miles, and Los Angeles County 656 deer at 100 miles per animal.

It will be noted that the mileage figures quoted are estimated for round trips. These figures do not represent the numbers of Los Angeles hunters who actually participated in hunting in the counties recorded; for instance one deer killed in Alameda County represents one hunter, although there may have been several or dozens from the south who hunted that territory but did not meet with success.

It can be seen at a glance that a large sum of money is expended each season not only for oil, gas, tires and other accessories but also for food and shelter along the route.

For those who like to juggle with figures perhaps the above data will be the means of opening a new field for interesting calculations. Perhaps as it stands it may stimulate the imagination of the reader and bring realization that there is more to this hunting and fishing game than merely grabbing a gun or reel and disappearing into the mountains.

SAVE YOUNG TROUT

Quick work on the part of a field deputy and State Highway Commission workers in the high Sierras saved the lives of thousands of baby trout in the Truckee River in July.

Workers on the highway division were heating 7000 gallons of crude oil preparatory to pumping into tank trucks when the liquid ignited. The flaming oil quickly boiled over the edge of the bank and spread over more than an acre of ground.

By the use of fire extinguishers, ditches and hastily made levees the flames were controlled. However, a new problem developed when it was discovered that a large quantity of the oil was flowing toward the river.

The men hauled tons of dirt and succeeded in building a dam high enough to prevent the oil from reaching the waters of the river.

Millions of "fingerling" trout have been planted in this river during the past seasons and it is regarded as one of the finest fishing waters in the state. Not a single fish was lost because of the accident.

CLOSED MOUNTAIN ROAD

Hunters were not allowed to use the French Meadows road this season. Extreme fire hazards caused the government to close the district.

The French Meadow district lies along the middle fork of the American River. Although it is in a game refuge many hunters have used the roads and trails in former years to get to legitimate hunting country.

In order not to create a hardship on those who figure in going through that territory the next few months, an appeal was made to all sportsmen requesting

mobile accident statistics show that there is really more danger in hitting a small object than colliding with something large and firm—a smaller object tends to veer an automobile to one side or the other while a large firm object has a tendency to bring the machine to a dead stop.

It has been suggested that signs be placed in the districts where the young deer abound. This plan has been tried once before and proved a failure.

MUST SHELTER GAME BIRDS

Game birds can not be expected to



FIG. 115. Male wood duck. Photograph by E. S. Cheney, September 1, 1930.

them to inquire about the status of a prospective hunting district before embarking on a trip.

DEER DANGEROUS TO CARS

Young deer are proving to be a severe hazard to automobile drivers in certain sections of the California mountains.

Many fawns have been found dead and injured along the mountain roads. Some of the animals have been run down during the day but the majority of the accidents have happened at night.

Skid marks near the scene of some of the tragedies show that the automobiles narrowly averted going over the grade into the creek bottom below. Auto-

"come back" unless they are provided with nesting shelter. Sportsmen must encourage farmers to leave cover for quail, grouse and pheasants during the nesting season if they would enjoy shooting and prevent disappearance of the birds on intensively cultivated farms.

An example of what a little cover will do, even for prairie chickens, is reported by Sam G. Anderson, president of the Minnesota Game Protective League. Anderson says that near his home is a farm on which about five acres has been permitted to lie idle and "go back" to native prairie chicken conditions. On this little patch prairie chickens nest and rear their young every year during the

ebb and flow of the species. This little prairie chicken oasis is in a game refuge so the birds are not shot off and they persist from year to year solely because of the bit of natural nesting cover left for them. Anderson voices the opinion that the preservation of a few acres of natural prairie growth on each section of land with reasonable protection of the birds, would perpetuate the species throughout its natural range.—American Game Protective Association.

WATER GAME BIRDS

Upland game birds in sections of southern California are protected from water shortage by Los Angeles County. The humane work is being done in the section north of Mojave along the city's aqueduct.

With the permission of the Los Angeles Department of Water the aqueduct was tapped where it runs through the draws and canyons. A small pipe carries the water for a short distance to an artificial waterhole, and the flow is regulated by a shut-off valve.

The game birds have been quick in locating these waterholes in this arid region and several coveys of mountain quail have been observed—there were from 20 to 100 birds at some of the watering places. Flocks of mountain quail and hundreds of doves have been noted from time to time at all of them.

WOOD DUCKS—HOW TO DISTINGUISH THEM

A marked increase of wood duck has been noted in California during the past few years. This species has been protected by law everywhere since the adoption of the migratory bird treaty, and the good results have been apparent in many parts of the country.

One warden reports that at least 5000 wood ducks congregated on Lake Almanor in the northern part of the state last fall and remained there until the lake froze over.

Another concentration is reported from the Butte Creek section, where several thousand wood ducks were said to have wintered.

This comeback is remarkable in view of the extreme scarcity of the species when first given protection.

Although hunters have been very conscientious in seeking to protect this bird, many reports have been made that wood ducks have been killed because the sportsman did not know how to distinguish them from other birds.

Four main points distinguish this bird from other species; these include method of flight, their whistling flight when

leaving the water, the general color makeup of the bird, and a characteristic foolhardiness.

Wood ducks move their heads constantly from side to side while in flight, as though peering at some object beneath. The wings make a peculiar whirr and whistling sound when the birds rise off the water and this sound carries very distinctly for a long distance. The birds are beautifully colored, the under part of the body being white; and the highly colored crest, topknot and cheeks can be easily distinguished when the birds are at rest on the water. It is not difficult to approach to within gunshot of the wood duck, the bird being naturally very tame, and when rising off the water they will often fly directly over the hunter at a low altitude.

If a hunter once becomes acquainted with the characteristics of these birds he need never make a mistake while on a hunt. It has been said that the wood duck is the most beautiful of all our waterfowl, if not all other American birds.

BLUE JAY

How about the blue jay? Is this "garrulous clown" of the California fields and woods as big a cannibal as he is pictured to be?

Last year the Department of Agriculture published in its *Year Book* a paper on "The Blue Jay and Its Food," by Prof. F. E. L. Beal. In the course of his investigations, Professor Beal secured testimony from scores of observers, and examined the stomachs of 292 blue jays. The oft-repeated charge of nest-robbery and murder brought against the jay was thoroughly investigated, and on this point Professor Beal declares there is a great discrepancy between the testimony of field observers and the results of stomach examinations. "The accusations of eating eggs and young birds are certainly not sustained, and it is futile to attempt to reconcile the conflicting statements on this point, which must be left until more accurate observations have been made." Of the whole 292 stomachs examined, only 2 contained the remains of the birds, and only 3 contained egg shells from the eggs of wild birds; but 11 contained shells from the eggs of domestic fowls.

That the blue jay does occasionally rob the nests of other birds and, once in a great while, devour a young bird, there is no room to doubt; but the actual harm done in this way should not be overestimated. Professor Beal determines the amount of insect food eaten by the jay

each year as 23 per cent of the whole—vegetable food 75.7 per cent, and miscellaneous animal food at 1.3 per cent. The stomachs examined came from 22 states and territories, and Professor Beal's conclusion is that "the blue jay certainly does far more good than harm." The bulk of the vegetable food consumed by the bird is corn, and the loss of it is made good, ten times over, in the destruction of noxious insects and mice.

"I have never before heard of a blue jay impaling anything on a thorn, as is the well known habit of the northern shrike or butcher bird."

WOOD TICK

Those who like to spend their time in the great out-of-doors need no introduction to our old "friend" the wood tick. There is an interesting article on these insects in the *Official Record*, a periodical published by the United States Department of Agriculture. The following article was taken from the August issue and was written by F. C. Bishop, in charge of Division of Insects Affecting Man and Animals, Bureau of Entomology:

"The season of wood tick abundance is nearly ended, but some scattered specimens may be seen in late summer and early fall.

"It is not easy to control wood ticks, because the young tick—known as seed ticks and nymphs—feed upon many wild animals and birds, and the adult ticks—the ones that attack man—infest the larger domestic animals, particularly dogs. The adult ticks also fill themselves with blood on the larger wild animals, such as foxes and ground hogs. The large slate-gray ticks often seen attached to dogs are the engorged females. They become filled with blood in a comparatively short time—six to eight days. They then release their hold on the animal and drop to the ground, where they crawl under dead grass or other debris for protection. In a few days they begin to deposit small brownish eggs; a single female lays from 4000 to 7000 or more. Twenty to thirty days later the eggs hatch into small six-legged ticks, commonly called seed ticks. These little ticks crawl up the grass and weeds and await the coming of a suitable host to which they can attach themselves. If they succeed, they insert their beaks, fill with blood in four or five days, then drop off, molt their skins, and gain additional pairs of legs. They are now called nymphs. The nymphal tick has habits similar to those of the seed tick, attach-

ing itself to an animal or bird, filling with blood in four to six days, and again dropping off and molting the skin, thus attaining the adult stage.

"Many ticks spend the winter in the adult stage and with the first warm spring days make their appearance and are ready to attack animals or humans. Seed ticks, nymphs, and adults are all long-lived. In any of these stages they may live from six months to nearly a year. The period of fasting depends on the life of the tick in finding an animal upon which to feed. The change from seed nymph to adult can take place only after a full meal of blood, and the female can not lay eggs without first engorging with blood.

"The life history of the wood tick, or American dog tick, suggests methods of control. Elimination from an area of small wild animals, such as ground squirrels and rabbits, tends to reduce the number of ticks. Clearing out underbrush not only makes conditions less favorable for development of the ticks, but also aids in reducing the number of wild-animal hosts. It is important to prevent adult ticks from engorging on dogs and other animals, as they are prolific breeders. To prevent breeding it is necessary to remove all ticks from the dogs at least every six days. They should be crushed or dropped into kerosene oil. With pet animals the removal may be done by hand, although one can not be sure of discovering all the ticks on long-haired animals. The same method of control is somewhat applicable to horses and cattle if only one or two animals are infested. The ticks may also be killed by dipping the animals in any of the standard tick-destroying mixtures, such as the arsenical dips used against the cattle ticks in the south or the coal-tar creosote dips. Care is necessary to select dips manufactured by reliable companies, and to make dilutions according to directions on the container.

"The question is often asked, what should be done to protect one's person from ticks? High-topped shoes, laced over the trousers, or well-fitting leggings, help to keep off ticks. However, ticks will crawl up clothing to the neck and attack at the edge of the hair. Kerosene oil may be applied to clothing as a repellent, but it does not give complete protection. After exposure to ticks, it is advisable to examine the body carefully and remove any ticks. Pull them off carefully to avoid breaking off the mouth parts in the skin. The tick bite may be disinfected by dipping a sharp

round toothpick in tincture of iodine, and working it into the hole the tick left."

SMALL-MOUTHED BASS IN LAKE

More than eight hundred small-mouthed bass have been planted in Baldwin Lake, near Folsom. These fish will be developed in the lake and then will be planted in suitable streams at the proper season.

Similar fish that have been planted in the lake heretofore have done so well that it seemed advisable to increase the supply.

In a report on Baldwin Lake conditions it was revealed that the smaller fish "have so much good protection and feed in the shallow flats that they are immune from the depredations of the larger bass. There is also so much deep water and feed in other parts of the lake that the large fish develop easily."

Baldwin Lake was acquired by the division some time ago for the purpose of maintaining fish-rearing ponds in the district. It is proving itself to be an excellent location, according to sportsmen who are interested in the work.

By planting fish of various sizes in the lake at this time, sportsmen will be assured of a good supply of fish to plant in the streams next season instead of waiting for three years.

MONTH-OLD PHEASANTS

Month-old Chinese ringneck pheasants from the Yountville Game Farm were exhibited at the 1930 State Fair held in Sacramento in August. This is the first time in the history of the state that pheasants as young as this have been exhibited at the State Fair. The game farm exhibit, which was situated near the main entrance gate, also contained California quail, Chukor partridges, Hungarian partridges, turkeys and other wild birds.

PARTRIDGES IN CALIFORNIA

Hungarian partridges have shown such an aptitude for California climate and feeding conditions that the division has purchased 600 birds in Czechoslovakia. The birds will arrive in New York harbor this coming November and will be rushed immediately to this coast.

The partridges will be given a chance to rest in the large pens at the Yountville Game Farm before being liberated. With the aid of sportsmen the birds will be planted in sections particularly suited to their kind.

These birds are slightly larger in size than our own California mountain quail. They are exceedingly fast on their feet, are extremely wild and, according to

sportsmen, are second to our state quail from a game standpoint.

It will be the third planting of partridges in the past few years. Before being liberated in this state, the birds were studied thoroughly as to their habits and food requirements. It was learned that they feed almost solely on insect life and create little or no crop damage.

According to authorities it is almost impossible to raise these wild-natured birds in captivity. If properly introduced into selected territory the birds readily adapt themselves to their new conditions. They multiply very fast if given a chance.

Various sportsmen and sporting organizations throughout the state are very much interested in the introduction of these birds and are giving full cooperation to the work. Many of the hunters declare that the propagation of a good wild bird of this kind will not only afford excellent sport in season but will prevent a concentrated assault on the birds already established. In other words, the hunters will be so scattered by a diversified field that all our game birds will have a chance to multiply in safe numbers.

It is interesting to note that Hungarian partridges liberated in New York state two years ago by the state conservation department are increasing rapidly. They stand the cold winters well and coveys ranging from a dozen to fifty birds have been reported. There is no open season on these imported birds.

DEAD TREES AND CONSERVATION

Dead trees hold a very important place in the conservation of our wild life, according to reports from several bird societies throughout the country.

These trees provide homes and hiding places for many of our insectivorous birds. Birds are known to migrate from one locality to another in order to find suitable nesting places in hollow stumps and limbs.

By proper planning the dead trees can be made to give artistic value to the land as well as suitable bird havens. Climbing vines can be grown to cover the barrenness of the trees and excessive limbs can be removed.

DROUGHTS MAKE ALL SUFFER

If breadlines expected in rural sections this winter should be added to the breadlines of the urban centers, a recent survey shows that the resulting queues of sustenance seekers would not only extend for quite a few more urban blocks—

they'd extend to the forest, to window ledges, to hedges, fields, hollows and chance hiding places.

For this was a survey conducted by the American Game Protective Association, to learn what damage the drought has done to the food supply of upland game, especially quail and pheasants.

Findings prove that wild life has suffered along with the farmer in loss of food crops, and that the cold winter months would surely bring disaster to game in many areas if it were not for timely aid being planned by state game commissions and cooperating organizations in the zones affected.

Though the area where the situation facing upland game is serious it is not so widely spread as might be expected. Several state departments are already making surveys and preparing to tide their game birds over the winter by the systematic feeding of grain.

It has been discovered that when man suffers vicissitudes of weather the birds and animals do not escape. The weather that damages crops also delays the maturing of berries and such plants as ragweed, partridgepea and beggarweed, on the seeds of which many birds live during the winter.

Strangely enough, however, birds of few sections may even profit from the drought and business depression. The state game department of West Virginia reports that farmers expect to leave a lot of grain unharvested in the fields, while other departments are considering the feeding of wheat, the price of which has been lowered by market conditions. The game commission of Indiana has decided on wheat and is arranging with sportsmen's organizations to feed birds in the habitats affected by drought in the southern portion of the state.

Virginia felt the drought severely and has called upon all interested parties in making a thorough survey of game conditions. Missouri's state department alone distributed 88,000 pounds of feed last year. This year the department is organizing a force of feeders among farmers, rural route mail carriers, boy scouts, agricultural students and hunters.

Tennessee has called on sportsmen and farmers for assistance in caring for the bird life, and Oklahoma is making special arrangements for feeding on its refuges. The trend of reports indicates that this will be a good winter to remember your friends of the woods and fields as well as of the streets and cities.—American Game Protective Association.

CARS DESTROY GAME

Automobiles are responsible for the destruction of game animals in California in more ways than one.

Hunters not only use these speedy "horses" for quick transportation from the cities to the game retreats but the machines themselves become destructive agencies when carelessly handled. Thousands of game are run down in a year's time. Many animals fall a prey to blinding headlights.

Reports from several counties show that many deer have been killed or crippled this season by careless automobile drivers. Many of these animals drag themselves to secluded spots and die lingering deaths.

Figures furnished by the National Automobile Club show that there are approximately 185,000 miles of road and highway in this state where drivers can speed fast enough to run down game.

Motorists can prevent the useless slaughter of much of our game if they will drive carefully.

TRAPPING LICENSES

With the coming of the winter months many trappers of fur animals are getting their equipment in order and are inquiring as to the trapping seasons and regulations in California. There is no closed season for trapping in districts 2, 2½, 3, 4, 4½, nor is it necessary to procure a license to trap in the above-named districts.

Those who apply for trapping licenses should be sure to mention the fish and game districts in which they are going to trap. Records show that many requests come in for trapping licenses and when the trappers receive them they suddenly discover that they are working in an open district and that their credentials were unnecessary.

LICENSEE TO PROTECT FISH

The invasion of the Pacific Northwest by hydroelectric development endangering the salmon run has resulted in regulations on the part of the United States Bureau of Fisheries. The conditions for the protection of the fish have been embodied in the following license:

During construction of the project, the licensee shall provide for the free passage of migrating fish both up and down stream by means of temporary fishways, fish diverters, or otherwise in a manner satisfactory to the Secretary of Commerce.

The licensee shall, without cost to the United States, construct, maintain, and

operate in connection with said dam, fishways, electrical stops or other diverters above and below the dam, and other device or devices to safeguard fish life and propagation in accordance with plans to be approved by the Secretary of Commerce, and shall make such minor modifications of the original installation as may be subsequently necessary in order to improve its operation in a manner satisfactory to the Secretary of Commerce.

The licensee shall operate the project works so that the average flow past the plant during any day shall not be less than the minimum daily flow of record to that date, and the daily regulation of such flow shall be such as not to interfere with prospective developments below the dam site, with fish life, or with navigation.

The licensee shall maintain a flow of water over the crest of the dam, preferably adjacent to the fishways, sufficient to permit the passage of migrating fish downstream at all times.

It is stated that no bond is required to assure the above provisions being carried out.—*Pacific Fisherman*, November, 1929.

FUR-BEARING ANIMALS

In comparing the catch of fur-bearing animals taken in the wild state we are struck with the general falling off in the number of standard pelts such as otter, marten, mink, fisher and red fox. This is compensated for to a marked degree by the returns from over twelve hundred fur ranches with capital investment of over four million dollars producing pelts and live stock to the value of over one million dollars. Every encouragement should be offered to further extend this policy of fur farming, which in time should include all varieties of fur-bearing animals.—*69th Annual Report, Department of Lands and Mines, Province of New Brunswick*. "Chief Game Warden's Report," 1929.

DOGS—SORE FEET

A good sport always cares for his dogs first! During most of the year the hunter generally keeps his valuable hunting dogs in small yards or pens. This causes the dog's feet to become tender. When the hunting season opens and the scene suddenly transforms to the wild, rough country, there is but one inevitable result—sore feet.

Here is a remedy that has been recommended to the division for the care of dogs' feet: Warm one pint of pine tar and add to it two cupfuls of tannic acid. Mix well. Paint the bottoms of the dog's feet with the preparation and sprinkle

dry sand over it to assist in drying. If hunting in a rough country paint the feet every night. If the pads are worn thin, paint them both night and morning, and it is advisable to apply the mixture before the dog has his first run. Long hair around the dog's feet should be cut close before the first application.

PARASITE STUDY IS INTRICATE

The influence of parasites, both external and internal, upon wild life has been shown to be of importance. Moose and deer are at times killed by ticks, snowshoe rabbits and jack rabbits suffer severely from tapeworm cysts, and of late there have been rather important discoveries made relating to the internal parasites of grouse, some of which, it is believed, were introduced with the importation of foreign birds. We have still much to learn regarding the parasites of wild life, and the study is so intricate that it can only be successfully carried out by fully equipped specialists.—*The Canadian Field-Naturalist*, April, 1930.

GAME BIRDS AND POULTRY DISEASES

"Do not feed game birds with domestic poultry," is a warning contained in a new leaflet, "Winter Feeding of Birds," issued by the Michigan Conservation Commission.

Game birds are most susceptible to poultry diseases, as has been proven by the grouse-breeding experiments of Dr. Allen of Cornell University. They should be kept off ground contaminated by chickens.

The report reads: "Food should be placed in shelters regularly that the birds will make it a habit to frequent the feeding places. Quail feeding stations should be close together—one feeding station to each 40-acre tract.

"Prairie chickens range from one to five miles, and feeding stations should be provided in counties where this splendid game bird is found.

"Pheasants will leave a section where food is not plentiful, and will seek good feeding grounds elsewhere."

PREVENT SMOTHERING OF FRY

The superintendent of the Springville (Utah) station reports that a number of troughs of black-spotted fry showed a tendency to work toward the foot screens in the troughs during the night, with consequent loss from smothering.

It is stated that this difficulty has been overcome by leaving electric lights burning at the foot of the trough during the night. The instinct of the fry to work

away from the bright light overcomes the tendency to be washed to the foot of the trough.—*Fisheries Service Bulletin*, No. 181, June 2, 1930.

WHAT SOME PHEASANTS EAT

A column entitled Field Notes in *Conservation and Industry*, a monthly publication of the North Carolina Department of Conservation and Development, contains the following item: "A. G. Gordon, president of the Winston-Salem Chapter of the Izaak Walton League of America, calls attention of farmers and sportsmen of North Carolina, where efforts are being made to introduce ring-neck pheasants, to results of the examination of the diet found in the gizzards of 25 of these birds in Pennsylvania.

"Examination of the birds failed to support charges that they were damaging crops. Only one instance revealed corn and in this case, in addition to five grains of corn, eleven destructive beetles including the cucumber bug were found in a gizzard.

"One of the most interesting gizzards examined revealed a content of forty-seven worms of one inch in length, three earth worms, two potato bugs, one butterfly, sixteen beetles, thirty-two wood worms, one grasshopper, two spiders and a quantity of weed seeds. Another check of a pheasant gizzard showed more than 400 chickweed seeds and a dozen beetles."

BIRD'S NEST MAKES BEE'S NEST

The bee family, without doubt, constitutes one of the most interesting as well as useful members of the insect tribe. Their habits of life create a study that commands the interest of the keenest students of the great out-of-doors. In the September issue of *The Canadian Field-Naturalist* there appears an interesting story entitled, "Bumblebee Occupying Oriole Nest," by Arthur Gibson, Dominion Entomologist, which gives an account of an unusual hive discovery.

"In January last I received from Mr. Arthur R. Athey, of Canton, Ontario, an old nest of the Baltimore oriole which had been appropriated by the common bumblebee, *Bremus fervidus* (Fabr.). The nest was found, about 16 feet from the ground, in an elm tree. With its contents it was forwarded to Dr. T. H. Frison, of Urbana, Illinois, an authority on wild bees and their nests. In reporting upon this unusual nesting site, Dr. Frison stated:

"I have carefully searched the comb for remnants of bees which might lead to the determination of the insect originally making the comb. I am glad that

I have found sufficient material to make a positive identification of the species involved. Since you request some information which might be adapted for use in one of your Canadian publications I include a few remarks pertinent to the subject.

"The finding of colonies of bumblebees in the nests of birds and other queer places has been the subject of frequent anthropomorphic outbursts both in America and Europe. When we analyze the requirements of a good nesting site from the point of view of a bumblebee queen, the utilization of a bird's nest for a colony site presents no factors differing from the common use of a mouse nest for the same purpose. Any place which affords protection from sunlight, rain, etc., and provides soft materials which can be used to cover the comb, is a potential site for a bumblebee colony. There is no difference to certain species of bumblebees between a good nesting site in a hanging oriole's nest and a mouse nest in a discarded shoe in a pasture. The difference is purely due to the human point of view. Bumblebees do exhibit certain preferences regarding their nesting sites but these differences deal with such ecological factors as a preference for woodlands versus the prairies, terrestrial strata versus subterranean strata, etc.

"The remnants of six workers and two males were found in the nest debris. All the workers and one of the males belonged to the species *Bremus fervidus* (Fabr.). The other male is a specimen of *Bremus impatiens* (Cress.). Both of these bumblebees are common throughout southern Ontario, and one of them—*fervidus*—has a distribution from British Columbia to Nova Scotia. An examination of the contents of eight cocoons containing fully developed bees further proves that this comb was produced by a colony of *Bremus fervidus*.

"The presence of a male of *Bremus impatiens* in the upper part of the comb is explained as simply a case of a male entering the nest of another species. This frequently happens and the same species (*impatiens*) has been found in the hive of the common honeybee. No doubt these visiting males, which are not bound by home ties like the females, are attracted to the nests of other species by their odor. Although I have published records to the effect that queens of certain species of bumblebees will upon occasion invade the recently established nests of other species, kill the queens originally starting the nests, and produce mixed colonies, such was not the case in the present instance.

"A count of the empty and full cocoons in this nest reveals that this colony produced approximately one hundred and fifty bumblebees; a medium-sized colony for this species of bumblebee. No traces of inquilines or social parasites were found in the nest debris."

"Apparently few definite records are available in North America regarding the use by bumblebees of old nests of birds for the purpose of establishing colonies."

BIRDS SANCTUARIES ON GOLF COURSES

Golf courses can be made to serve bird conservation purposes as well as giving open air exercise to the club members, according to a recent booklet published by the National Association of Audubon Societies under the title of *Golf Clubs as Bird Sanctuaries*.

There are many advantages to such a plan, the booklet states, and one of the most important is the increasing and protecting of birds that are enemies to agricultural pests. Most of these species feed largely on weevils, worms, beetles, noxious weed seeds and other factors that work against agriculture, trees, and natural growth of all descriptions.

It will not require a vast amount of capital or labor to create such sanctuaries because the land is already under close supervision. It will be necessary, however, to see that the birds are assured protected nesting places and a dependable source of food and water.

Very much interest is being displayed in our bird life by golfers on courses where a sanctuary is being maintained. It is proving an additional point of interest rather than an inconvenience to the game.

FREE HUNTING LICENSES IN PENNSYLVANIA

An order was recently placed by the Pennsylvania Game Commission for 119,999 special deer licenses, 99,999 of which will be paid licenses costing \$2 each. The remaining 20,000 licenses will be free licenses, available to landowners wishing to hunt upon their own property. The paid licenses will be issued direct from the offices of the Game Commission at Harrisburg. The free licenses will be issued by the district game protectors. Licenses to kill antlerless deer will not be issued before the October meeting of the board, as at that time consideration will be given to any petitions presented. When the board decides the counties to be opened, the matter will be advertised in two newspapers of the counties

affected, once a week for three consecutive weeks. Application for licenses should not be made until after the board decides the counties to be opened, for these licenses will be good only in the counties to which they apply. Before applying for a special paid deer license a hunter must be possessed of a regular resident hunter's license.—*The American Field*, September 13, 1930.

QUAIL EXPERIMENT

More than 6000 Mexican quail have been released this year in various counties of North Carolina by the Department of Conservation and Development, according to reports. Bird distribution has been practiced for three years. No report of the results is available as yet.

This practice is frowned upon by many experts. They declare that quail are unusually susceptible to climatic changes. To transplant the birds from Mexico to another climate weakens the stock and leads to disease epidemics, it is contended.

In California the birds are raised in the locality where they are to be liberated—stock from the particular locality is also used for propagation; this rule is followed as closely as possible.

It is interesting to note in a bulletin from Alabama that they are having quail disease troubles in that state. Whether the trouble is occurring among birds that have been imported into that state, or from the scions thereof, is not known here.

BIRD SANCTUARY IN MICHIGAN

There is a very good story in the September issue of *Aviculture* on the W. K. Kellogg Bird Sanctuary now in the process of development in the state of Michigan. The story was written by G. H. Corsan and tells of the many difficulties faced by those who are creating such an institution in the northwest.

In the opening paragraph, Mr. Corsan says: "The place is now finished, as I predicted in 1927 it would take me three years to complete it. Mr. Kellogg has had a full score of buildings erected. Californians may wonder why I have so many buildings, but here in Michigan we occasionally have temperatures as low as 25 degrees below zero; also over two feet of snow on the level. Then, too, it is a very windy section, so that we require plenty of good shelters for the comfort of our birds. One duck building is 60 feet by 40 feet. It contains a swimming pool 40 feet by 10 feet. Another duck building has a cement pool 60 feet long by 6 feet wide. The large swan building has a running water pool

20 feet by 8 feet. Four large winter pens are used for the different breeds of peafowl. There is a good sized pen for California valley partridges (he probably means valley quail). There are two huge pheasant sets, each having 24 pens. Each pen is 6 feet wide, 6 feet high and 80 feet long, 6 feet of this length being inside shelter. These two sets are on slopes over gravel pits and so well drained that they should last, unpolluted, for a century."

The story continues:

"There is a large granary which is divided into three large sections and these are again subdivided into a score of sections for the different grains and foods.

"At very great expense, some fifty thousand dollars to be exact, Mr. Kellogg has run a causeway across the southwest corner of Wintergreen Lake and made it a huge pen for show purposes where the specimens of the 25 varieties of wild geese, 7 varieties of swans and 14 varieties of wild ducks may be seen at close hand by visitors. For our lake and swales are so large that they contain many hiding places and though Mr. Kellogg has provided a half dozen powerful glasses, some as high as 42 power, for our visitors, yet the visitors prefer to see the birds close by rather than afar off. And often we will have two hundred visitors on our lake shore at a time, with more coming and going, and all can not use the glasses."

The story tells that Mr. Kellogg is more liberal in the treatment of students than any other educational institution in the world. It also explains how every effort is being made and every experiment tried to cause the birds to multiply.

"We breed great quantities of our imported wild waterfowl and upland game birds and pheasants. These we sell or exchange for the rarer pheasants or wild waterfowl.

"Gradually we are acquiring a wonderful collection of the world's best and only in France and England are there any better collections of pheasants than ours. While Scotland and California have better collections of the world's wild ducks than we have, yet for geese and swans ours will surpass Holland's best."

Mr. Corsan then tells of the great labor connected with the developments of rough land into productive areas. He also mentions the problem of planting trees and says that, so far, he has achieved 100 per cent success. Many of these trees and bushes contain foods and berries for the birds.

In conclusion, the story tells of 60 acres of woodland which has been tightly fenced and which is devoted exclusively to "our almost extinct northern wild turkeys." The turkeys are being bred in great numbers according to the writer, and are by far the best flock left in that section of the country.

TIMBER FOR GAME PROTECTION

A survey of timber land has been made by the Minnesota forestry service to determine the best forestry replanting for food and shelter for deer and ruffed grouse, according to Grover Conzet, forestry commissioner, in a report to the American Game Protective Association news service. Mr. Conzet said his departmental survey found that a mixture of poplar, cedar, spruce, and birch is the most satisfactory. In the reforestation program of the state forestry service this type of forest will be planted in the near future to insure cover and protection for Minnesota's wild life.

GAME FARMS SUCCESSFUL

The new game farm established by the Minnesota Game and Fish Department near Madelia less than a year ago has been successful in its operation. The game farm, 160 acres of land completely inclosed by a vermin-proof fence, was stocked with 300 breeding Chinese ring-neck pheasants. Since then more than 6000 young birds have been reared and placed in the field, and about 2000 eggs shipped for hatching, according to a report to the American Game Protective Association news service. George Packer, superintendent of the farm, said that 74 per cent of all eggs set hatched and of these, 69 per cent were transferred to the field.

PENNSYLVANIA ACQUIRES LANDS

The largest purchase of lands for state forests and game refuge purposes ever made in Pennsylvania was consummated in January after negotiations extending over a year. The area acquired exceeds 122,000 acres, purchased at \$3 an acre, the total cost, including survey and other acquisition expense, being in excess of \$400,000. The land was all purchased from one lumber company and distributed in eleven counties. It will be allocated, 70,226 acres to the department of forests and waters, and 51,845 acres to the state game commission for refuges and public shooting grounds. Pennsylvania already has thirty-five primary and seventy auxiliary game refuges, each surrounded by state-owned public hunting grounds,

with a total area, including both sanctuary and shooting grounds, of 259,826 acres. The recent acquisition will bring the total acreage of state-owned land devoted to game to 311,671 acres.—*The American Field*, April 12, 1930.

HUNTING-DOG HINTS

Share the contents of your canteen with your faithful dog. He is the fellow who is doing most of the work by routing the game out of the brush and retrieving the same for you. Your dog covers miles over all sorts of country while you walk a comparatively short distance. When thirsty his efficiency is not only impaired but his indomitable hunting spirit may lead him to serious physical injury. Also see that he has a comfortable place in which to sleep—proper care will bring you golden results in faithful service.

PRUSSIAN BIRD AND WILD-FLOWER LAWS

New and uniform protective laws for birds and wild flowers have been enacted by Prussia, revising and replacing the old codes that obtained in the various provinces of the state, which were frequently at variance with each other. The new laws specify what game birds may be hunted and when, they list thirteen "outlaw" species that may be killed without restriction at any time and they give all the rest of the bird population the benefit of an absolute closed season.

During the proper open seasons the following birds may now be hunted in Prussia: Wild ducks, wild geese, osprey, most of the quail family, sandpiper, curlew, snipe, gulls, terns and pigeons. Outlaw birds include several hawk species, all crows, sparrows, grebes and herons. Certain birds, like ospreys and kingfishers, that are protected generally, may still be shot if necessary for the protection of fish ponds.

There will be no more bounties paid for the destruction of predaceous birds. Bird lime and traps or other devices for catching or injuring birds must not be used, and birds must not be hunted with the aid of artificial lights.

Certain wild animals that destroy birds, but also prey on troublesome rodents to an even greater extent, are given absolute protection. Notable among these are wildcat, pine marten, mink and dormouse.

The new list of prohibited plants contains thirty names, mostly of species which have been subjected to destructive collecting by dealers. In some cases very common and popular wild flowers, such as lily-of-the-valley, snowdrop and hep-

atica, may be gathered for bouquets, but their roots or bulbs not be disturbed.—*Science*, Vol. lxxii, No. 1861, Aug. 29, 1930, p. xiv.

MUSK OXEN

A very interesting experiment is to be tried in Alaska with musk oxen, according to the August number of the *Official Record*, a publication of the United States Department of Agriculture. The article reads as follows:

"An order for a herd of 30 musk oxen, to be obtained in Greenland, has been placed with an experienced collector by the Bureau of Biological Survey, pursuant to the appropriation of \$40,000 for establishing an experimental herd of these animals in Alaska. From New York, where they will be delivered, the oxen will be shipped under the care of a representative of the Biological Survey, via Seattle, Wash., to Fairbanks, Alaska. In this territory a large inclosure has been set aside by President Hoover for investigations of reindeer and musk oxen. The new herd will be cared for by men familiar with the peculiar problems of feeding, breeding, and management of animals under Alaskan conditions.

"This action marks the culmination of efforts put forth through several years to acquire a herd of musk oxen for experimental purposes, with a view of their domestication and utilization in Alaska. Such action has been advocated by many interested individuals, as well as by the territorial legislature.

"Musk oxen, says the Biological Survey, resemble small buffalo, and are the most truly arctic of all large mammals of North America. Prior to about 1800 they existed in goodly numbers in northern Alaska, but are now entirely extinct there, as a result of indiscriminate killing by explorers, traders, and natives using rifles instead of the primitive bows and arrows formerly their only weapons. They have persisted in limited numbers in northern Canada, eastern Greenland, and some of the Arctic islands, and are protected in Canada on several reservations established by the government.

"Musk oxen on exhibition in zoos in New York and Washington have proved to be gentle and easily tamed. Musk-ox meat, when properly dressed at the right time of the year, is of excellent quality, resembling beef and buffalo meat. Information obtained from range investigations by Biological Survey indicates that the forage of the treeless Alaskan plains where musk oxen once roamed is suitable for them. Musk oxen kept in captivity

have thrived on hay and on carrots and other root crops. Hence their domestication in Alaska is thought to be possible. Their introduction there will restore a meat-producing animal that can utilize natural forage and cultivated foods different from those consumed by reindeer, the Biological Survey believes."

WHAT TO DO WHEN LOST

What would you do if you suddenly discovered that you were "lost"? Every year produces its crop of "lost persons" and in some cases the experiences lead to fatal results.

A clear head will find itself. If everyone remembered this, there would be fewer reports of persons lost in the mountains and forests, according to U. S. Forest Service rangers.

Merely being out of sight of others in a strange forest gives many a man the creeps—a natural feeling but a dangerous one. Never yield to it. In the mountains the grip of panic is too often the grip of death.

"Finding oneself when lost is the test of a man," says a veteran of the Forest Service who has seen men, women and even children save themselves by sheer pluck and presence of mind. Loss of mental control is more serious than lack of food, water, clothing or possible proximity of wild animals. The man who keeps his head has the best chance to come through in safety.

The following helpful rules are worth remembering:

1. Stop, sit down and try to figure out where you are. Use your head, not your legs.

2. If caught by night, fog or a storm, stop at once and make camp in a sheltered spot. Build a fire in a safe place. Gather plenty of dry fuel.

3. Don't wander about. Travel only down hill.

4. If injured, choose a clear spot on a promontory and make a signal smoke.

5. Don't yell, don't run, don't worry, and above all don't quit.

If caught out toward nightfall, the traveler is urged to find a shelter quickly—a ledge, a large boulder or a fallen tree—clear a space of ground and build a fire. If without a blanket, he may build his fire in a deep hole, cover 6 inches of hot coals with 6 inches of earth and sleep on this. Failing fire, one should use leaves and branches to shelter himself as best he can. A boy lost on a southern California mountain peak this summer spent three nights safely in this manner.

Signal fires are the quickest way to attract attention. Build them in an open spot cleared of all flammable material so that the fire won't spread into the forest. In the daytime throw green branches and wet wood on the blaze to make a smoke. The eagle eye of the Forest Service fire lookouts or the observers in forest patrol planes or commercial ships may spot your smoke. But it is difficult for an observer in a plane to see a lone man in the forest, so the lost person must use ingenuity, and the signal smoke is the best method of attracting attention.

A word from the forest rangers to the new camper, hiker or vacationist:

It is better to carry a clear head on your shoulders than a big pack on your back. Yet in going alone into the forest it is well to go prepared to get lost. A fish line and a few hooks, matches in a waterproof box, a compass, a little concentrated food, and a strong knife carried along may save a lot of grief. A gun may help as a signal, seldom for game.

A thinking man is never lost for long. He knows that surviving a night in the forest he may awake to a clear dawn, and readily regain his location. His compass may be useless because of local magnetic attraction, but he may know what kind of vegetation grows on the shady and what on the sunny side of a ridge. He knows that streams going down and ridges going up do not branch. He knows that wild food which sustains animals may be eaten sparingly; that he will not die of hunger as quickly as of thirst; that he must remain where he is or push on to some definite objective, but not to the point of exhaustion; that someone will be looking for him, and strength in that knowledge makes the hardships easier.

Keep the old brain in commission, and the chances are you will come out of the woods on your own feet.

POLLUTION PROBLEMS AND DUCKS

Only one duck in 10,000 is alive today in districts where waterfowl foods have been contaminated by oil, salt water and sewage pollution, according to W. L. McAtee of the U. S. Biological Survey. This estimate is based upon an investigation of a wild fowl breeding area 300 miles square in Back Bay, Virginia, and Upper Currituck Sound, North Carolina, that is being despoiled by salt water reaching the fresh water through the Albemarle and Chesapeake Canal.

"There are not now 100 wild geese or swan where there were 1000, not one duck

where there were 10,000 during the time when the food supply for the birds in this region was at its best," Mr. McAtce said.

This condition has national application. Many of the finest fresh water areas are being polluted by the dumping of oil, sewage, and trash from factories into fresh water streams, rivers, ponds and lakes throughout the country.

Not only are waterfowl and fish foods contaminated but fish life is destroyed, surveys show.

This condition is not true of California. The large concerns in this state are co-operating with the Division of Fish and Game to keep the rivers, bays and streams free from polluting agencies.

WOMEN EXCEL WITH ROD AND GUN

While women may not have hung up as many records with the rod and gun as men, they were ardent conservationists decades before man allowed them to vote—campaigning to save the trees and planting flowers around their homestead dwellings, according to Mrs. Frank M. Warren, chairman of the committee on water and waterways of the General Federation of Women's Clubs.

"I think that the women of America are perhaps more interested in retaining the beauty of our lakes and streams and rivers than in any one other thing. Women are greatly interested in the preservation of our wild flowers and also in the reforestation of our country. In almost every state some program of great scope is under way, and American women are playing an important part in bringing these conservation measures to a successful conclusion," Mrs. Warren said.

That women gunners and anglers are on an increase throughout the United States is shown by fishing and hunting license figures compiled by the American Game Protective Association.

It is not an uncommon sight to see women casting for trout or bass. Numerous reports come to the association of women who have bagged specimens of the biggest game to be found. Some of the most successful game breeders in this country are women.

The ideal of conserving our national resources—our wild life—must be taught in the home and school. Without the help of the American mother and the teacher in the schools, conservation remains but a vague and impractical thought while the child is maturing without the inspiration that comes from a knowledge of the outdoors, trees, flowers

and wild life. The lack of such knowledge among adults as well as school children is appalling.

CONTROL ENGLISH SPARROWS

Where English sparrows become too numerous in a locality it is often necessary to control them. Economical and effective methods of controlling these birds where they become overabundant are described in a leaflet, 61-L, "English Sparrow Control," just issued by the U. S. Department of Agriculture.

Recent studies of the food habits and economic status of the English sparrow under present-day conditions show that the adult birds are essentially vegetarian. More than 96 per cent of their food is mixed feed, various grains, weed seeds, and garden products. The nestlings subsist largely on insects, but the beneficial work the sparrows do in catching bugs lasts for only 10 or 12 days, after which the young become quite as vegetarian as the adults.

Methods of control outlined in the new leaflet include the following: Destroying nests and eggs; shooting; trapping—by means of nest-box or other types of traps described and illustrated; and poisoning with a strychnine-grain bait, directions for the preparation and distribution of which are given.

"Though poison," says the leaflet, "is an economical and effective weapon in controlling English sparrows, its use is fraught with certain dangers. For this reason sparrows should be poisoned only by persons fully aware of the danger to poultry, livestock, and other farm animals from the careless handling of poisoned baits. Poisoning English sparrows in sections abounding in native seed-eating birds should be avoided, since carelessly exposed poison baits might endanger beneficial birds, many of which are protected by state and some by federal laws."

Copies of the new leaflet, 61-L, may be obtained free on request to the U. S. Department of Agriculture, Washington, D. C.

MIGRATORY BIRD REFUGES

The new migratory bird refuges that are being established by the federal government are to consist for the most part of bodies of water and their immediate borders, suitable for the various game species, and will include a minimum of ordinary upland types of country. This statement is made by officials of the Biological Survey, of the United States Department of Agriculture, which will administer the new refuges to give support

and further effect to the migratory bird treaty between the United States and Great Britain (acting for Canada). The five families of game birds protected by the treaty are defined as waterfowl, cranes, rails, shorebirds, and wild pigeons.

The Migratory Bird Conservation Act passed by congress in 1929 is designed to protect migratory game birds through the establishment of refuges for them. These game species are for the most part inhabitants of bays and shores, lakes and marshes. In spite of this, many recommendations of upland localities have been made to the Biological Survey by land-owners and others as suitable for examination and purchase for refuge sites.

The Biological Survey states emphatically that such tracts can not be purchased. With reference to the areas that are desired, in water, marsh, or in some cases swamp, the bureau explains that so far as practicable preference will be given to tracts of 20,000 acres or more in extent; though especially desirable smaller tracts will be considered.

Other things being equal, lands obtainable at the lowest prices will be given

primary consideration. The purchase program will extend over a period of ten years and it must not be expected that a large number of refuges can be established immediately. The areas to be obtained under the migratory bird conservation act are for inviolate sanctuaries, and no lands are being acquired for public shooting grounds.

The five families of game birds for which the refuges are being established, as will be noted from the following groups, are almost wholly marsh and aquatic species. They comprise (a) the Anatidae, or waterfowl, including brant, wild ducks, geese, and swans; (b) the Gruidae, or cranes, including little brown, sandhill, and whooping cranes; (c) the Rallidae, or rails, including coots, gallinules, and sora and other rails; (d) the Limicolae, or shorebirds, including avocets, curlews, dowitchers, godwits, knots, oyster catchers, phalaropes, plovers, sandpipers, snipe, stilts, surf birds, turnstones, willet, woodcock and yellowlegs; and (e) the Columbidae, or pigeons, including doves and wild pigeons.

DIVISION ACTIVITIES

Bureau of Patrol

H. H. Ninas was transferred to San Francisco and Ray E. Jesse was employed August 28th with headquarters at Santa Maria.

Captain Walter B. Sellmer, in charge of the San Francisco Bay patrol and Marin County, resigned on June 21st in order to work on his campaign for sheriff of Marin County.

Raymond Diamond was transferred from Crescent City to Weaverville, and John F. Hurley was stationed at Crescent City.

Opening of the various hunting seasons during the past three months caused an increase in the number of arrests over the previous quarterly period. During June, July and August a total of 602 cases were handled by the patrol forces of the Division of Fish and Game.

It was necessary to employ an additional fish planting assistant in place of Leon Talbott, who was accidentally injured on June 30th.

It has been reported by Deputy Ed Glidden, of San Diego, that the wood ibis

are increasing in District 43, which comprises San Diego and Imperial counties. He counted fifteen wood ibis feeding in shallows on upper end of Lower Otay Lake and seven wood ibis breeding near Pala in San Luis Rey River.

Walter R. Welch, captain in charge of volunteer wardens, attended a meeting of the volunteer deputies of Santa Cruz County, in June, held at the Chamber of Commerce in Watsonville. This meeting was held in conjunction with the Pajaro Valley Fish and Game Protective Association, and was attended by the regular and volunteer deputies of the county, also by the president and secretary, and several members of the association. All who attended the meeting expressed a deep interest and a desire to cooperate in the work being done by the division for the protection of fish and game.

During the month of June the volunteer deputies, in addition to their work in the fields and along the streams for the enforcement of the fish and game laws, have been active in interesting farmers and land owners in establishing

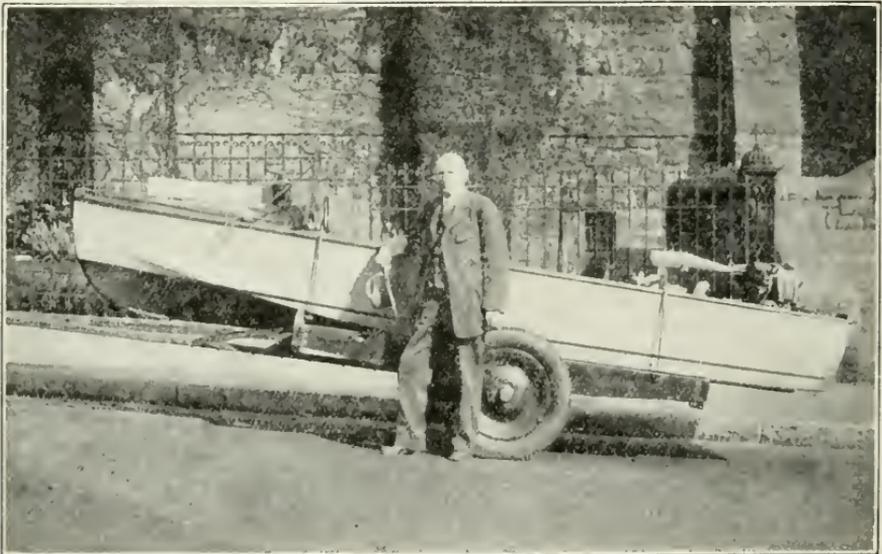


FIG. 116. New patrol boat *Walter Welch* purchased and used by volunteer wardens on San Francisco Bay. Photograph by E. L. Macaulay, April, 1930.



Fig. 117. Twelve Gambel quail were released from this trap by deputies R. J. Little and C. Savage near Indio, Riverside County, February, 1930. The violator was apprehended and fined.

quail sanctuaries, with the result that a great many of such sanctuaries have been established in all parts of the state.

As an indication of the interest being taken by the volunteer deputies in the quail sanctuary plan, Deputy H. B. Schalehli, of Lower Lake, Lake County, has established 44 sanctuaries in his locality. These sanctuaries contain a total of 8168 acres of land, upon which there are, at this time, approximately 8106 adult valley quail. Deputy Schalehli reports that these quail have not been disturbed this year, that they paired off well this season and that they have brought forth large broods of young birds.

Quail shooting will be afforded upon about 40,000 acres of land that surrounds these sanctuaries.

Deputy W. F. Cross, of Palo Alto, has established a quail sanctuary in the vicinity of the Uvas Dam, in Santa Clara County. In order that the quail on this sanctuary may have ample feed, Mr. Cross has installed two self-feeding hoppers, and has furnished the owner of the land with 100 pounds of wheat, 100 pounds of cracked corn, 100 pounds of whole barley and intends to add a sack of Milo with which to feed the birds.

In order to bring about better cooperation among the volunteer deputies, it has

been deemed advisable to form volunteer deputy districts of the following counties: Napa and Solano, Alameda and Contra Costa, and San Francisco and San Mateo. Captains were assigned, in July, to direct the activities of the deputies in each district.

One of the principal activities of the volunteer deputies during the past six months, aside from the enforcement of the fish and game laws, has been to assist in the effort being made by the division to reestablish the supply of native quail within the state by urging farmers and ranchers to set aside part of their lands as inviolate quail sanctuaries. In this movement the deputies have enjoyed the cooperation and support of the people and the press in general, and have met with remarkable success. As the result of this movement, up to the end of July about 300 quail sanctuaries were established and posted with warning notices in the northern part of the state, and a few in counties south of the Tehachapi Mountains.

Particularly noticeable among the activities of the deputies along these lines are those of the volunteer deputies in the following counties: San Joaquin, 30 sanctuaries containing 6740 acres, 1320 quail and 34 pheasants; Lake County, 51 sanctuaries, 9178 acres, 9106 quail;

Napa, 25 sanctuaries, 3380 acres, 2018 quail.

A summary of the activities of the volunteer deputies, as shown by their monthly reports received between January 1 and July 1, 1930, shows that aside from patrolling many thousands of miles of fields, streams, coast lines and bay shores, they have checked 7368 hunting licenses, 18,876 angling licenses, made or assisted in making 262 arrests for violations of the fish and game laws, in which cases fines in the amount of \$6,580 have been imposed.

On August 28th a meeting of the volunteer deputies of Alameda, Contra Costa, San Mateo and San Francisco counties was held at the council chambers of the Alameda city hall, Alameda.

The meeting was held for the purpose of discussing the establishment of quail sanctuaries and to outline a system for a campaign of predatory bird and animal control to be conducted by the volunteer deputies on such quail sanctuaries and refuges as may be established in the above mentioned counties.

The meeting was attended by about twenty-two volunteer deputies and officials of various clubs located in Alameda county.

All problems appertaining to the sanctuary method were discussed and full cooperation was pledged by all those present.

At the present time, August, there are about 350 quail sanctuaries covering approximately 450,000 acres of land and upon which, at this time, there are about 100,000 valley and mountain quail.

Reports received from the volunteer deputies during the past two months indicate that the quail have bred well this season—that the broods of young birds are large, and that in many sections the birds have raised second broods.

From present indications it is quite evident that upwards of 500 quail sanctuaries will be established by the opening of the quail season on December 1st, this year, and that as a result of the establishment of these sanctuaries, 1931 will witness a decided and noticeable increase in the supply of quail throughout the state.

Bureau of Fish Culture

The number of fish planted by the twenty-eight hatcheries for the year up

to August 31st totaled 29,996,096. The trout planted include Loch Leven, German Brown, eastern brook, steelhead, Rainbow, black spotted, large lake and golden. The salmon included quinnat, silver and Atlantic fishes. The total number of fish left on hand is 10,705,301.

The total number of eggs and fish already disposed of, and on hand to date is 40,701,397.

George A. Coleman reported that an investigation of fish dying in Lake Almador revealed that the trouble was due to the bad condition of the water combined with gases in the water from exhausts of motor boats with a new type underwater exhaust. A special report has already been rendered.

A further biological survey was made of Donner Lake. The food conditions in the lake were exceptionally good at the time. There seems to be more fish from five to seven inches in length in the lake this year than have appeared before.

Little Donner Creek is full of young trout, two to three and one-half inches long, which might be from this year's planting or from the natural run of the creek. The slough at the mouth of the creek is full of young minnows. There are no red-sided suckers in the stream or slough at present.

A preliminary survey was made of both Upper and Lower Echo Lakes to determine general conditions. The bottoms of both lakes are very largely solid rock, hence very little plant life can become fixed except in crevasses or depressions in the rock which will allow decaying matter to settle. The red-sided sucker from eight to twelve inches in length was found in the passage way between the two lakes, where they hide under logs and fallen limbs. We tried to catch some but found it impossible.

A trip was made to Verdi, Carson City, Reno and the vicinity of Virginia City, Nevada, to locate possible supplies of water plants and Copepods in the irrigating ditches for planting in the lakes of the Desolation Valley and Echo Lake region. These were located in several places and could be obtained free of charge.

A study was made of the red-sided sucker in Taylor Creek and several other creeks tributary to Tahoe. The large suckers have all gone into the lake and disappeared. Dissection of twenty or more specimens from three to five inches in length showed them to be insect eaters,

living at the time on large black wood ants.

Fishing in Lake Tahoe was reported good at the opening of the season. About the middle of July, however, there was a very warm spell of weather and immediately the fish stopped biting and none could be had by fishing from the wharves or from small boats fishing in shallow water. Trips in launches to deep water resulted in catches of Mackinaw, six to ten pounds, and occasionally a steel-head or native trout.

Besides the regular hatchery activities of cleaning ponds, painting hatchery troughs, making repairs and other improvements, the distribution of game fishes in state trucks continued during the past three months.

During the month of August, actual construction work on roads and camp commenced, preparatory to the construction of the racks to be used for the collection of salmon eggs in the Pit River near Hagen Flat. This project is under construction by the Pacific Gas and Electric Company as part of their agreement in lieu of fish ladders on power dams constructed in the Pit River. The entire cost of this construction will be paid for by the Pacific Gas and Electric Company. A. E. Doney of the Bureau of Fish Culture will be detailed for duty to supervise and advise on the work.

During the period the chief of the Bureau of Fish Culture, accompanied by George Neale, investigated ponds and reservoirs in northern Nevada county and in the American River region near Folsom for the purpose of finding a body of water suitable for the propagation of the small-mouth black bass. The ponds and reservoirs near Nevada City and North Bloomfield were found not suitable for the purpose as the pits in the old hydraulic mines contain too many boulders and depressions which would prevent the use of seines in catching up the fish when it became time for transplanting.

Baldwin Lake, about five miles from Folsom, the property of the North Fork Ditch Company, was found to be an ideal place for the propagation of small mouth bass. The lake contains approximately twenty-seven acres, and the physical conditions of the water, shoreline, etc., appear to be ideal for habitat of small-mouth bass. Arrangements have been made with Mr. Jordan, the manager, for

the use of this reservoir for a period of years.

Bureau of Commercial Fisheries

The outlook for the coming sardine season is not as cheerful for the canners as it was a year ago. Canned sardines are very low in price. Sardine oil and meal are also low in price. It was reported that during the month of June there were 200,000 cases of sardines at Monterey that were unsold. It was also reported that the amount on hand in southern California probably exceeded the Monterey amount of unsold by a considerable figure—this was probably due to the fact that the season in the south ran a month and a half later than in Monterey.

Japanese and other fish oil has been coming in and sells at 30 cents a gallon, including the duty. This has forced the price of the California sardine oil to a similar figure.

At Monterey there is not as much being done in the way of remodeling plants as usual. It is reported that due to the very low price of oil, there will not be the usual incentive to reduce large quantities of sardines.

The fish canners of the state held several meetings during June for the purpose of enlarging the old Sardine Canners Association so as to take in the new Tuna Packers Association, as well as the canners of mackerel. As a result, a new organization has been formed to be known as the California Fish Canners Association. It is expected that all fish canners will come into the organization. B. Houssels has been chosen president and Thomas A. Morrissey has been made general manager. Roy E. Ludlum is to act as secretary. The purpose of the organization has been stated to be: unification for strength, study of markets, improvement of pack government cooperation and research.

Last month we reported the favorable decision of the three federal judges in the action where the fishermen's association sought to restrain the Fish and Game officials from enforcing the salmon law. The plaintiffs in the action have appealed to the U. S. Supreme Court. The title of the case is: *Noack vs. Zellerbach*.

In the case of *The People vs. Stagnaro*, which was an action to prevent fishermen

from using drag nets in bays in District 18, no decision has been given.

On June 27th, in the action of the Santa Cruz Fishermen's Union to restrain the officials of the Division of Fish and Game from enforcing the salmon trolling law, there was a hearing before Judge Lucas at Santa Cruz to determine if the temporary restraining order now existing shall be permanent. Our case was argued by Eugene D. Bennett; that of the fishermen by Assemblyman Bert Snyder of Santa Cruz. The judge will not make a decision for some time.

The new patrol boat *Bluefin* was put into service early in June and it was found she behaved in a very satisfactory manner. She has a speed of over ten knots and handles well in rough weather.

The *Albacore* was put on the ways to undergo repairs which it was estimated will cost \$2,600.

On June 16th, E. C. Scofield and M. J. Lindner, carrying on investigations of sardine and mackerel spawning, made a trip offshore on the *Bluefin* to a point in the California current two hundred miles from San Pedro and thence in a zigzag course in and out from shore, to Monterey. Sardine eggs and sardine larvae were found at all of the stations made on the trip. Of special interest was the finding of sardine eggs only a few hours old at a point 85 miles west from Point Sur, Monterey County, and 200 miles off San Pedro. The station 200 miles off San Pedro was well out in the California current where the water was several degrees colder than in the inshore spawning area within the islands. This find is expected to throw light on the problem of why, in southern California, we have two sizes of sardines within the first year group, as worked out by H. C. Godsil at San Diego.

Paul Bonnot accompanied the *Bluefin* on her return trip from Monterey, and took a census of the sea lions from Pedros Blancos Point south. It is now the breeding time of the sea lions, and as they are hauled out on their own rookeries it is the best time to take a census. He found that since taking the census two years ago, the herds on the islands near Santa Barbara have greatly reduced in numbers. On San Miguel Island, he found that some hunter had killed most of the herd. Twenty-five dead bulls were counted. All but three of these were Steller sea lions, which are not protected

by law. The three California sea lions were, of course, killed unlawfully. Only a few California sea lions were left of the herds on Santa Barbara and Anacoppa islands. They have either been captured or killed by men who have been catching them for museums and zoos. The present law protecting California sea lions can not be enforced unless it is amended to prohibit possession without a permit.

The racks in the lower end of Shasta River were completed about June 15th, and Merrill W. Brown and Carleton Rogers have been employed to work under Dr. J. O. Snyder's direction in taking a census of the salmon and trout entering the river, as well as to make a complete survey of the stream and to make a study of the success of natural spawning. A study will also be made of the movement downstream of the young salmon and trout, both in the Shasta and Klamath rivers. Rogers is to collect data at Requa during the salmon run at the cannery.

No albacore have been taken so far this season in southern California and fishermen are making no great effort to find them. The amount of albacore imported from Japan is increasing each year.

The commercial catch of bluefin tuna is quite erratic. Occasionally there is a year when they appear in rather large numbers, but as a rule the fishermen fail to find them in numbers. During June of this year there has been an exceptional run of these fish. They were first discovered and taken in Mexican waters during the fore part of the month, and later in the month taken off the coast of California. An analysis of the bluefin catch per unit of fishing effort does not show that the bluefin tuna are being overfished.

Late in June the crew of the *Bluefin* gathered about 900 pounds of green abalones at Santa Cruz Island, while a census of the sea lions was being taken, and planted them on the Santa Barbara breakwater. A few black ones were also planted.

According to Associated Press dispatches, the Treasury Department on June 27th rescinded its order directing customs officials to assess duties on fish brought in by alien boats from beyond the 3-mile limit. Collector W. B. Hamilton is quoted as saying that the order was

not put into effect for "we could not watch every fishing boat and measure its distance from the shore while it was taking in fish."

An attempt was made by the Monterey cannery to postpone the opening of the sardine season from August 1st to September 1st, to enable the packers to dispose of their sardines. All the canners did not agree, however, and the K. Hoyden Company and San Carlos Canning Company started operations in the first week of August.

Sardines have been plentiful but the quality has been poor, due to what they

quantity of shad. These fish were new to the Indians, as they never caught anything like them in the Klamath River before. It is reported that after cooking the fish they did not like the smell and were afraid to eat them. These fish were no doubt in the river for the purpose of spawning, and it may be that they have established themselves in that river, just as they have in Coos River, Oregon, and the Columbia—from the original plants made in the Sacramento River.

The following extracts are taken from the report of the State Fisheries Laboratory on mackerel: "We have now com-



FIG. 118. Shad fishermen taking shad out of drift gill nets. Photograph taken near Pittsburg by E. S. Cheney, in April, 1929.

term "green feed." The fish appeared to be rather soft although they carried a remarkably high percentage of oil. Due to poor quality, the canners held the fishermen strictly to the minimum boat limits, as they did not care to receive more than their contract called for. Prior to the opening of the season, an \$8 per ton price was agreed upon. It was also agreed by the canners that they would not employ outside boats as they did last year.

Deputy Ed Clements, of Klamath, reports that the Indians at Weitchpec, during the last part of May, caught a large

pleted one year of sampling the cannery catch of mackerel. This work has been hampered for the last three months by the irregular deliveries at the packing plants. The mackerel canning industry has not lived up to its promise of development as shown in 1928 and 1929, probably the chief reason being that a similar pack of sardines in tall round cans has cut into the canned mackerel sales. The size records we have already collected indicate considerable fluctuation in fish sizes, but until our data are analyzed we can not determine the significance of these fluctuations."

Permission was given to the San Carlos Canning Company at Monterey to take another twenty tons of sardines, in order to make a further test of the experimental deodorizing plant being tried out at the reduction plant of the above company. The fish were held three days, until decomposition was well advanced, and then, after cooking, the fish were run through the dryer at a temperature of 218 degrees; about 40 degrees above the maximum commercial requirement. The experiment took place on July 7th and was considered entirely successful by observers.

Bureau of Education and Research

Nearly 61,000 persons attended lectures by division representatives during the fiscal year ending June 30th. These lectures were given in all sections of the state and included schools, colleges, fraternal organizations, luncheon clubs and many other organizations. It is estimated that several million people received information about our fish and game through the medium of the radio during the year.

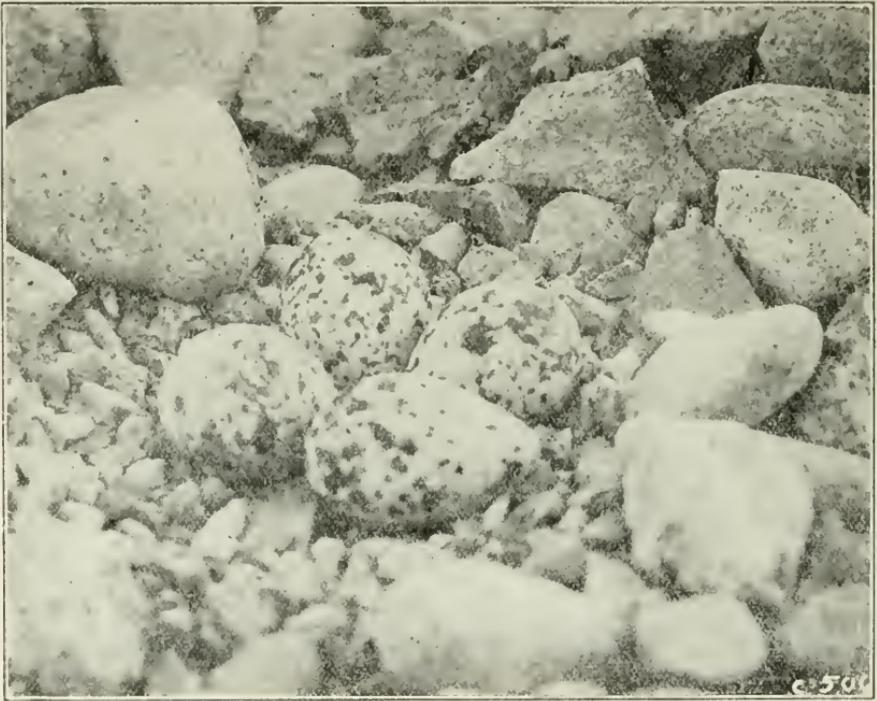


FIG. 119. Eggs of killdeer. Note Nature's excellent method of disguise. Photograph taken on state waterfowl game refuge near Los Banos by E. S. Cheney, May, 1930.

It appears that the method used is a patented electrical process in which 420,000 volts are used to produce ozone in a tunnel through which the fumes are passed. The ozone is supposed to destroy or neutralize the obnoxious gases, and the only odor emanating from the plant was the agreeable odor of ozone. The cost of installation was \$2,000 and its operation will cost \$1.08 per day. This process costs about the same for installation and maintenance as chlorine gas, which has proven successful at two San Diego plants during the past two years.

E. S. Cheney, division photographer, during a trip to southern California in June, secured many excellent scenes of deep sea fishing—taking of barracuda, bonita, etc. He also secured additional scenes of waterfowl at the Los Banos refuge.

He also made a trip up into Humboldt County in an endeavor to secure pictures of the Roosevelt elk. His trip was a success and he secured some excellent data that will prove a valuable record in years to come.

Practically all of the deer damage work

for June has involved the testing of various repellents. Work has been done in both orchards and vineyards, the Napa Valley and the country in the immediate vicinity of Geyserville being the principal fields of activity.

In Napa County, to protect young prune trees, naphthalene flakes were placed in small bags made of cheesecloth, using two tablespoonfuls to each bag, and one was hung on each tree. The ground at the base of each tree was raked over. Since the date of application of flakes there has been no further damage, although fresh tracks have been observed.

In another part of Napa County creosote-soaked rags were placed on the trees—also bags of gum asafetida. Since the time of placing, June 19th, no damage has been reported.

On June 1st, at Atlas Peak, a mixture of whale oil soap and liquor cresolis was applied on vines. No damage was observed until June 26th and 27th, when the mixture was applied again, as deer were starting to work; damage, however, being only slight.

The following territories were checked by E. L. Sumner, Jr., in his work on predatory animals: Mt. Hamilton range, Howell Mountain refuge, Pope Valley, Berkeley hills and vicinity. Most of these places proved impracticable due to the poisoning operations by Biological Survey men. Work was done on the Los Banos refuge wherein the relations of predators to marsh nesting birds was studied. Also further work was done at the quail preserves recently set aside in San Diego County, where a comparison of "controlled" area with an area where no control of predators is practiced.

A Quail Bulletin by Donald McLean, field naturalist, was sent to the printer during the month of June. This is to appear in the game bulletin series, in which there is only one publication issued some time ago.

W. H. Shebley and George Neale have compiled most of the necessary data for the trout and spiny-rayed fish bulletin, which is now in the process of being compiled. As soon as the plates are available, we will be able to start publication of this work.

New books and publications received by Bessie W. Kibbe, librarian, during the month of June, include: Problems of Bird Migration, by A. Landsborough Thomson; Handbook of Birds of West Africa, by George Latimer Bates; Life

History of North American Diving Birds, by Arthur Cleveland Bent; My Friend the Black Bass, Harry B. Hawes; Tales of Fresh Water Fishes, Zane Grey, and Wilderness of Denali, by Charles Sheldon.

Many miscellaneous laws and reports were received, as well as publications from various organizations.

Educational work in the California State Redwood Park, Santa Cruz County, resumed its fifth season in July. Again, the service proved very popular. The message of conservation and protection was carried to more than 30,000 vacationists. The evening lectures at campfires designed to impress the intelligent and wise use of fish and game resources reached a total of 14,250 persons for July, and of 12,050 for August. Attendance on the trail trips broke all previous records. The grand total of contacts made was 16,236 in July and 13,825 in August.

The project was carried out by Nancy Yerkes and Harry L. Bauer, both competent, conscientious and painstaking workers. Rodney S. Ellsworth supervised and saw to the smooth running of the program.

During the month of July, the lecture work was reduced to a minimum because of the fact that schools were closed and service clubs suffered from the vacation period, and audiences at their gatherings were very small.

During July Leo Wilson and Donald McLean attended a meeting called by the Chamber of Commerce in Willows, during which meeting the damage done by mudhens and blackbirds was under discussion. McLean gave a short talk on the subject.

Deer damage investigations for the month of July, conducted by Gordon H. True, Jr., have consisted almost wholly of experimental work with repellents.

On the first of the month, the vineyard of G. Luchese, at Yountville, was resprayed with whale oil soap and liquor cresolis. Guadino vineyard, at Atlas Peak, had been resprayed a few days previously. An inspection of the vineyards of the Colonial Grape Products Company revealed an appalling amount of damage. Many other vineyards on Spring Mountain are suffering to the same extent.

On July 12th a visit was made to Geyserville, where the use of naphthalene on the Haub ranch, and creosote rags and asafetida at C. R. Miller's ranch,

are all proving successful. It was necessary to renew the naphthalene and redip the creosote rags. The asafetida had retained its repellent properties.

A considerable length of time was spent with E. D. Rodgers of Swanton, Santa Cruz County, who complained of deer damage on his ranch. So far it has been possible to greatly reduce the amount of damage by spraying with the whale-oil soap liquor cresolis compound, though it will take some more time to produce conclusive results.

Since a report was received that the county in which the Los Banos Refuge is located was conducting a campaign

ators and the populations upon which they prey.

Members of the bureau of education made a trip to Clear Lake during July to investigate the cause of the death of such large numbers of fish. The following conclusions were reached:

1. That it is a condition that has been going on for a great many years.
2. That death is due to natural reasons and not to pathological or accidental cause.
3. That seining or dynamiting these fish would be an utter impossibility.
4. That it is a problem for the State Board of Health or some other agency

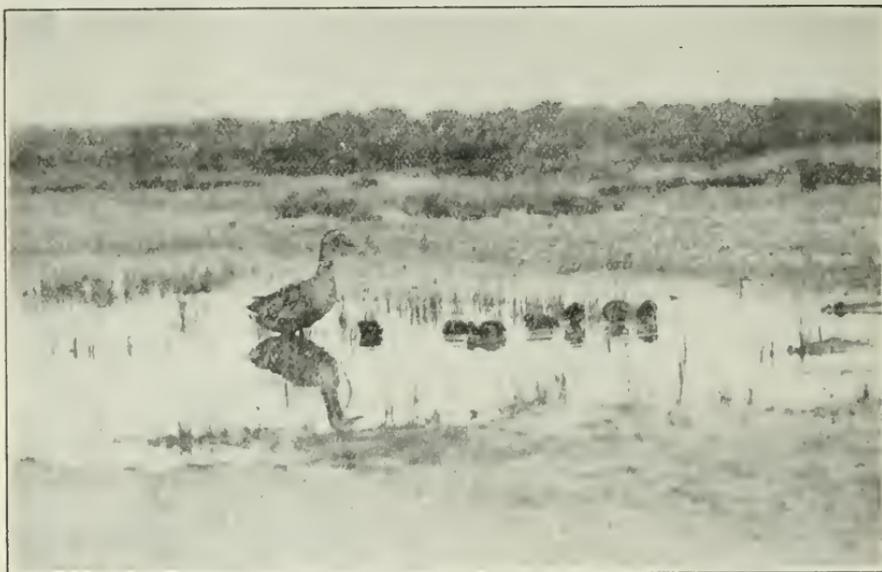


FIG. 120. Mallard with her ducklings in a pond on the state waterfowl game refuge near Los Banos. Photograph by E. S. Cheney, May, 1930.

against ground squirrels, and was ready to commence work on the refuge lands, E. L. Sumner, Jr., spent the month of July on the refuge. Since it seemed highly undesirable to scatter poison of any sort on territory which had been set aside as a refuge, and since compliance with the law required eradication of the squirrels, it was necessary for the Commission to undertake the work of control itself. The most practical method was found to be gassing the burrows after an extensive survey of the refuge lands. The knowledge of animal populations as they exist on the refuge which has been gained by the survey warrants the writer in choosing this territory for a series of experiments on the interrelations of pred-

other than the Division of Fish and Game.

5. That if all the carp in the lake were to die, both sportsmen and resort owners would be very well pleased.

A trip was made to Panoche Pass and Mendota to investigate a report of quail dying due to bad water. It was found that this was an exaggerated report without foundation in fact.

Some time was spent in looking over the area in which antelope are supposed to still be present—that is, north of Panoche Pass. However, no conclusive evidence other than rumors was obtained,

that there were still some left in a former herd.

Work was started in July on the cataloging of all pamphlets in cases now filed in the library. Since each pamphlet requires about five cards in order to prepare a thorough cross-index of the shelves, this task will require quite a few months to complete.

During August, 1051 books were catalogued, and it was estimated that about 10,000 magazines and pamphlets are to be accessioned.

With the opening of the schools, the demand for motion pictures during August increased considerably. Five reels were sent of the National Rifle Matches, held at Camp Perry, Ohio.

Many conferences were held with officials of motion picture companies regarding the practicability and expense of installing sound equipment.

In August, E. L. Sumner, Jr., took censuses of predatory animals on the Los Banos Refuge for the purpose of comparison with censuses planned for the future in order to test results of exterminating predatory animals in this area. Predatory animals, particularly coyotes, have been numerous, and their activities were studied in detail.

Census of quail was taken on the Jamul Ranch area in San Diego County. The Scripps place, in San Diego County, was also inspected, but no census of quail was made.

Paul Shaw continued his duck disease studies in the field. Laboratory equipment was set up as well as experimental pens in which healthy ducks were placed, and attempts made to reproduce the disease in them by force feeding. Those experiments conducted at the Century Gun Club, near Pond, and at Tule Lake, furnished a certain amount of information.

Considerable amount of work was done with "deer damage" sprays during August by Gordon H. True, Jr., on the property of E. D. Rodgers, Santa Cruz County. An automatic flash gun was also used on his property, but no definite report as yet on results has been submitted. Repellents were also used on the ranches of William Ryder, Mrs. J. M. Pearson, and E. L. Williams, in Santa Cruz County.

True also made an investigation of the relation of citrus fumigation to game birds in the vicinity of Visalia. The reports of the seriousness of the damage were found to have been exaggerated.

Donald McLean, field naturalist, made a trip to San Diego County during August, where he inspected the water conditions in quail sanctuaries and took censuses to see if they had increased during the summer.

A large flock of some thirty condors, the largest bird in North America, was discovered by McLean in the Tehachapi country.

The bureau issued Leaflet No. 3, "California's Restoration Program," which was distributed at the state fair. This leaflet is attractively illustrated and many thousands were given out.

More than 200 names were added to the mailing list for CALIFORNIA FISH AND GAME during August. All these requests were received by mail.

Bureau of Finance

During the first part of June the 1930 series of deer tags was received. There were 150,000 tags for like amount and these were immediately checked and distributed to the various branch offices, county clerks and agents throughout the state. The amount distributed to the branch offices was \$45,000; to county clerks \$54,050, and to agents \$4,150—a total of \$103,200.

The total sales by the Division of Fish and Game and county clerks on the 1930 series of angling licenses for the period ending June 30th was \$65,336. This amount, together with the \$162,396 held in bond deposits as of June 30, totals \$227,732. This is an increase of approximately \$27,000 over the amount received on the 1929 series as of June 30th that year.

This year a number of the county clerks did not distribute licenses in their counties and the distribution was made direct by our offices. Therefore, it is possible that approximately \$6,000 of the sales of this year's series would be equivalent to a like amount of sales by the county clerks on the 1929 series and which amount would not have been remitted until later in the year—this would reduce the actual amount of increase as of June 30th to about \$20,000 or \$21,000. This does not necessarily mean that the total

sales for this year's series will exceed the 1929 sale by that amount, although it is safe in predicting that the increase will be about \$15,000.

The amount of fish packers' tax received by the Division for the 81st fiscal year was \$202,396.07. The amount received in the 80th fiscal year was \$175,-805.85. This shows an increase in the 81st fiscal year of \$26,590.22.

The amount of fines received in the 81st fiscal year was \$84,872.40. This is a decrease of approximately \$2,000 from the amount received in the 80th fiscal year.

It will be noted that the total income by the Division for the 81st fiscal year was \$1,431,786.19. The total income for the 80th fiscal year was \$1,402,317.38. This shows an increase in the 81st fiscal year of \$29,468.81.

Bureau of Game Refuges

Lion hunters, outside of our own, did not have a great deal of success during the month of June. Our hunters secured nine out of fourteen reported. These were taken in the following counties: Santa Barbara, Los Angeles, Lake, Tehama, Tulare, Mendocino and Mariposa. Hunter Charles W. Ledshaw in Los Angeles killed three lions. Jay Bruce, on June 29th, killed a lion that, on the night of the 27th, had killed 15 sheep.

Information has been secured from all the counties, except Nevada, relative to the amount of money used in the control of predatory animals annually. A summary of this information shows that 25 of the counties contribute in excess of \$52,000 to the State Department of Agriculture and the Biological Survey for their work in control.

The largest amount was contributed by Mendocino, \$7,483.19. Ten counties paid out in lion bounties \$6,320, in sums ranging from \$5 per scalp in Shasta County to \$75 in Los Angeles County (females only; males \$50), San Bernardino and San Diego counties.

Twelve counties paid out \$43,429 in bounties on coyotes and wildcats, most of the amount, possibly \$41,000, being paid on coyotes.

Only five counties paid on wildcats. Coyote bounties range from \$2 in Amador County to \$15 in Glenn and Colusa coun-

ties. Wildcat bounties range from 25 cents in Amador County to \$7.50 in Colusa County.

In Madera County a 5-cent bounty is paid on blue jays—only \$3.75 was paid out. Jack rabbits draw 8 cents in Tehama County—2258 rabbits were turned in for bounty. In Del Norte County a 10-cent bounty is paid on gophers—the surprising number of 22,900 were paid for.

In Modoc County sheep men contribute \$800 to coyote control. In Santa Barbara the Fish and Game Protective Association pays \$15 for lions killed in the county. The Deer Creek Livestock Association in Tulare County pays \$10 for lions killed in certain areas. In Kings County there has been \$300 in coyote bounty fund for two years, but during that time not one single claim has been filed.

Only fourteen counties do not pay or contribute bounties—they are Alpine, Fresno, Imperial, Inyo, Mono, Orange, Plumas, Riverside, San Benito, Santa Clara, Santa Cruz, Sierra, Tulare, and Ventura. Information is not available as to the amount spent by the State Department of Agriculture and the Biological Survey in predatory animal work, but it amounts to a considerable sum.

Reports from half of the trappers operating only in fish and game districts 1, 1½, 1¾ and 4¼, approximately half of the area of the state (the other districts were removed from the provisions of the trapping license act of the last session of the legislature), show a cash return for the furs taken amounting to \$86,185.55. Actual cash returns were possibly twice this amount. The value of furs this year is 25 per cent less than the year before and the catch was 30 per cent less. All told, the hunters of predatory animals have a considerable sum of money to draw from.

County bounties and contributed funds.....	\$104,422 02
Secured for pelts.....	86,185 55
State lion bounties.....	8,450 00
	\$199,057 57

Add to this the sum spent by other state and federal agencies, organizations, etc., and that received by trappers not reporting, and trappers under the age of 18, and by trappers working in a part of the state where no license is required, and the total sum will probably exceed half a million dollars.

On June 30th of this year 325 game breeders' licenses have been issued. The San Francisco office turned out 147 licenses and the Los Angeles office, 178.

At the Los Banos Refuge Miller and Lux have constructed the ditches conveying water to our boundary, as provided for in the purchase agreement. Little water was available during the month on account of repairs that were being made to headgates that required drying of certain ditches, but a good head is in at the present time. Water conditions are satisfactory. Quite a number of local ducks may be seen.

During the month of July only six lion bounty claims were filed. One other skin

against 6439 for 1929. An increased kill was expected as there was one more Sunday in August this year than occurred in 1929, and we know that more deer are killed on Sunday than any other day in the week.

According to general reports, however, there has been considerable additional deer country closed to hunters over that closed last year. This is particularly true in Santa Clara County, where it is said that 50 per cent less deer country is open this year than in 1929. The condition of the deer is generally very good.



FIG. 121. Young black-necked stilt several days old. State waterfowl game refuge, near Los Banos. Photograph by E. S. Cheney, May, 1930.

was sent in but was held until the claim is filed. This is against 19 for the same month last year, and an average of 9.8 for the past 18 years. For the first six months of the year 175 claims were filed, which is considerably in excess of the average of 147 for the past 18 years.

With the opening of the deer season on the first of August in districts 2, 2½ and 3, deer tags commenced coming in. Incomplete tabulation for the month shows a heavier kill than for a like period last year. The month's report shows that 6734 deer have been taken this year, as

Taxidermists report that deer heads left with them, so far this year, have been larger than those they received last year. From all reports received there is no scarcity of deer in the districts that have opened.

During August, 17 claims for mountain lion bounty were filed. Five of these were taken by our regular hunters. This figure shows an increase of five more than the number of lions taken for a like period last year. The lions were taken in the following counties: Santa Barbara, 3; El Dorado, 3; Tuolumne, 2; Shasta, 2;

Monterey, 2; and one each in Santa Clara, Colusa, Lake, Ventura and Mendocino.

August reports show that there is now a good head of water at the Los Banos refuge—there is now almost as much acreage under water as there was during the entire last season. Many hundreds of ducks are on the refuge at the present time, mostly sprig, but there are also a considerable number of mallards and other local nesting birds, cinnamon teal and redheads. No geese were reported at this time.

The wisdom of the policy of no grazing on the Los Banos refuge has been proven by the increased vegetation. Water plants, particularly wapato, are showing up in all parts of the refuge. As soon as practical we will secure species of plants that are not found in that region that are known to be good duck food, particularly wild millet, which we believe will prove our best introduced plant.

Bureau of Game Farms

The total number of birds hatched at the Chino and Yountville game farms for the season ending June 30th, were 9490. The Chino, or Los Serranos farm, planted 300 birds in the San Bernardino section, and was preparing to release more during June.

The same system of incubating and brooding is being used at both farms. Part of the birds are incubated and brooded with domestic hens and the others by electric incubators and brooders. The latter method is proving interesting from many angles. From the results at both places we believe we are fully justified in saying that this is the coming method and within a very few years will be universally used.

The first important item of interest is the elimination or control of disease. We find that few men of the present day know anything about the handling and treatment of domestic hens. For this reason disease is hard to control and costs many dollars in actual cash and more dollars in time.

On the other hand everyone seems to know more or less about electricity, and they take an interest in the working out of electrical brooding. The actual hours of labor are lessened and that is in keeping with the trend of the times. We find that electrical concerns, because of the extra business that it will bring to them,

are willing to share the burden of working out the proper equipment.

We also find that other states and organizations are becoming interested in this way of rearing game birds. In the interest of all concerned we are passing on to these organizations the results of our work to date. We have been comparing notes with such men as Mr. Coleman, Virginia, the man who has probably raised more bob-white quail by electricity than all others combined. A check showed our methods were very similar, and the results we have had so far this year on valley quail compared favorably with the results he has made with bob-white.

In addition to quail we have successfully brooded turkeys, pheasants of every kind, guineas and the Chukor partridge.

Bureau of Hydraulics

An inspection of portions of Plumas and Lassen counties was made during the month of June, covering all phases of the bureau's activities.

Violators of water pollution laws were brought before the courts where warnings were given and substantial fines imposed.

The superior court of Ventura County fined an oil company \$1,000 for oil pollution. This fine was suspended, but the company was warned that another such offense on their part would draw a very severe sentence.

A highway construction crew at Truckee had an oil spill and fire, but due to the prompt action of a Division deputy commissioner and the road workers, no oil escaped into the Truckee River.

John Spencer, director of the bureau, attended a convention of the American Shore and Beach Preservation members in the month of July at Long Beach. This is a national association interested in the beaches and their fullest use by the people.

Screens have been placed at the pump intakes of the pumps installed in Lake Tahoe by the Nevada interests; the entire installation being temporary and for this season's use only.

A dam on Smithneck Creek, Sierra County, was partly removed so that no obstruction will be offered to migrating fish.

Oakland waterfront was inspected and found, in general, in good condition.

LIFE HISTORY NOTES

HUNTING ELK FOR THE MARKET
IN THE FORTIES

A mounted head of California valley elk (*Cervus nannodes*) treasured by Carl Dresel, of Sonoma, California, recalls the former abundance of this valley-loving species in Sonoma County. The antlers have a spread of forty-one inches with eight points on either side. More impressive, however, is the fact that the animal was killed by a pioneer elk hunter. Christian Wise was engaged in the business of supplying wild game to a growing San Francisco market during the forties. He was in the habit of adding spice to his activities in the bay region by hunting big game in Sonoma County. The elk in question was one of three killed of a band of eleven which the hunter jumped in Buena Vista Canyon near the present site of Buena Vista in 1847. Elk were so common in the region that not much skill was required to secure them in numbers. But meat hunters had little encouragement in those days. Wild game secured relatively distant from a market spoiled. Until roads and communications were established and a demand had grown to sufficient proportions to make such hunting a profitable business, few elk were killed for meat. Elk were prized for the quality of lard rendered from their flesh and were often taken for this purpose, as well as for their hides, during round-ups along with cattle.—Rodney S. Ellsworth, 510 Russ Building, San Francisco, California, June 6, 1930.

DOE HAS ANTLERS

One of the most puzzling problems that scientists and naturalists have neglected to solve to a degree of exactness is to ascertain the cause of the antlered doe in the California deer family. Every season brings its small quota of confirmed reports on the bagging of such animals by hunters.

It is a well known fact that the females of the caribou and reindeer families possess antlers. The does of the two main types of California deer—mule deer and black-tail animals—habitually do not grow such protective protuberances. Why a very few of our native animals should thus bolt their natural family instincts is, perhaps, a condition well worth deeper study and greater enlightenment.

Several ideas and theories have been

offered which have to do with the primary sex characteristics of the mammals, but nothing absolutely definite has been discovered yet at this office.

On August 2, this year, a four-point, black-tail, antlered doe was bagged on Mason Ridge, northeast of Mt. Hamilton, by Leslie L. McClay of Route 3, Box 692, Norwood avenue, San Jose. The animal was secured at 7 o'clock in the morning. The antlers were in the velvet, 15 inches in length, and had a 15-inch spread. The hunter noticed that the ears were unusually large and upon examination he discovered that he had bagged a doe.

McClay immediately reported the incident to I. L. Koppel, deputy fish and game commissioner, who also conducted a personal examination and confirmed the report. The hair coat was colored in the usual reddish brown of the species at this time of year and the animal was estimated to possess the unusual weight of 160 pounds.—Earl Soto, 510 Russ Building, San Francisco, California, October 1, 1930.

MOTHER DOES KNOW BEST

At the lower end of Belden Bar, on the North Fork of Feather River, only a stone's throw from the Western Pacific Railroad on the east side, and the same from the Utah Construction Company's old wagon road on the west side, there is located in the river a small island of approximately two or three acres. This island has for a number of years been known to miners, stockmen, forest officers and railroad section men to be a fawning ground for a number of black-tail deer.

Practically speaking, it is only an island in the low-water season of the year. It is partially covered with a growth of alder, willow, river-grass, weeds and tule, which affords a hiding place as well as some feed for the deer.

During the first week of July, 1930, I saw three does of the black-tail species on this island, and, after seeing them several times, I noticed that one was only a yearling. A few days later, I saw three young fawns with the two older does. The fawns looked to be only three or four days old. After seeing the newborn fawns appear with their mothers, I knew that the old does had come to this island for the purpose of fawning and rearing their young in safety from the coyotes, cats and other wild animals that

prey upon them. On two occasions, I witnessed one or the other of the old does chasing the yearling doe around over the island. When the yearling doe got too near the fawns their mothers would run after the intruder with ears turned back, hair ruffled, mouth open and with stamping hoofs.

The river channel on the west side of the island can be forded by the does without swimming. On several occasions I have noticed the does at the water's edge, but never have seen them ford this channel. There is a well-beaten deer trail from the river channel where the deer would ordinarily cross it to go to the Ranger Station pasture and garden spot near by which produces plenty of alfalfa, red and white clover, along with some garden vegetables, peaches and apples from the trees, and last but not least, strawberry vines with the strawberries on them, to serve the appetite of these old doe deer.—Harvey Abbey, U. S. Forest Protective Assistant, Tobin, California, August 14, 1930.

AN ETHNOLOGICAL WOODRAT'S NEST

While exploring a small cave in search of bats in Sand Canyon, a few miles

southeast of Tehachapi, I peered into a small, steep, dark side cavern about 18 inches in diameter. I was startled at first by what I saw, but a second look put aside any idea of a snake, for it turned out to be an ancient basket olla, or jug, coated on the outside with pitch. I carefully extracted it from the cavity, which it nearly filled, in order not to injure its structure.

As I brought it out I discovered that a large hole had been eaten into one side of it by rodents and the interior was half filled with a woodrat's nest plus a considerable amount of refuse and a cone of the pinyon pine (*Pinus monophylla*), a species that is not found nearer than a mile or more.

This interesting find was only the beginning, as a few minutes later, I found a cavity in the rock in which pitch had been melted to be used in lining the inside and outside of these baskets. This pothole was undercut in such a way as to allow a fire to be built beneath it and thus heat the pitch.

The basket is to become the property of the California Academy of Sciences. It is probably a thousand years old or more.—Donald D. McLean, San Francisco, California.

COMMERCIAL FISHERY NOTES

N. B. SCOFIELD, Editor

STUDIES IN MACKEREL PUBLISHED

A paper of considerable importance to the canning industry of southern California is entitled, "The Commercial Packing of California Mackerel," by O. W. Lang and R. S. Fellers (University of California Publications in Public Health, 1929, 1, No. 5, pp. 295-305). It comes from the Hooper Foundation of Medical Research, Laboratory for Research in the Fish Canning Industries, aided by grants from the California Division of Fish and Game. Since mackerel has taken such a meteoric rise to popularity, the paper is of much importance.

The authors discuss the history of the industry, modes of fishing and how this affects the size of fish, and the canning procedures found most advantageous in their experiments. Recommendations are made for the length of time fish may be safely held over before packing for butchering, cleaning and brining, for the optimum weight for filling the cans; for the time of precook and sterilization. A list of six references is appended.—Genevieve Corwin Wheeler, California State Fisheries Laboratory, August, 1930.

AN ENGLISH VIEW OF FISHING

An interesting book came in an interesting way to the Library of the California State Fisheries Laboratory a few weeks ago. Some correspondence had been carried on with Mr. William Radcliffe, of Upper Deal, Kent, England, in regard to his book, "Fishing from the Earliest Times," and in the course of the exchange of letters he sent an auto-graphed picture of himself fishing on his river in Norway, and the interesting information that he and his cousin, Mr. Wilson, in 1924 caught 1352 salmon and grilse in 51½ days, using the dry fly only. In this day of quickly broken world's records, this is unusual since it has stood for six years. Mr. Radcliffe also sent the book mentioned above, which bears the title, "Fishing, Its Cause, Treatment and Cure" (London, Philip Allen, 1925, 137 pp.), by H. T. Sherringham, since 1903 editor of the English sporting journal, *The Field*. The humor is heightened by the droll cartoons of G. E. Studly, two of which are the chapters on cause and cure, the visual method being quite equal to a chapter of explanation.

Mr. Sherringham's sly thrusts at the foibles and troubles of anglers are delicious. The "angler's needs" range from money (!) to a friend with motor car "who may be trusted with the landing net when he has done his other work." The "excuses" are well catalogued and adapted to every emergency from being caught poaching to coming home with an empty basket. "Miseries" and "The Truth" are ably handled, especially the latter, which gives admirable advice for adaptation of the fisherman's story to his audience.

The chapter on "Keeping Small Fish" reveals that in England the streams are privately owned and the owner makes his own regulations as to minimum size, a fact that makes a valuable loophole for the fisherman. Many other sportive thrusts can be thoroughly appreciated only by the devoted fisherman. The "Perils" discussed range from a bull to ants "which busy themselves in making fair-seeming seats for anglers but these seats * * * are for show, not for use * * * A few minutes of rest and meditation are dearly purchased at the expense of a frantic undressing in the teeth of an unsympathetic east wind. And the ants do not mind the east wind. The seats that they provide should be left to sluggards." "British Freshwater Fishes" is a list of real and pseudo-ichthyofauna, the latter illustrated by the solemn Latin name given to The Shoe, *Calceus antiquus*: "Up to a certain age its processes are uncinatate, but this is not a very reliable character, as the hooks disappear in mature specimens."

Perhaps the most ridiculous humor of the book is contained in the collection of graphs at the back, made with the skill of an expert draftsman and appearing to convey scientific facts but representing such things as: "Diagram to show length of line cast by dry-fly man on certain parts of the Test and Itchen." The "actual curve, imagined curve and narrated curve" start at the same point but rapidly diverge in the order named, with the narrated curve soaring off the top of the graph. We would say this little volume is a valuable antidote for anglers who take life too seriously.—Genevieve Corwin Wheeler, California State Fisheries Laboratory, August, 1930.

WOLF FISH FOUND ON HUMBOLDT BAY BEACH

On Humboldt Bay beach, on May 1, 1930, two fishermen found a strange fish, about four feet long. Not being able to identify it, a picture was taken and sent to the office of the division of Fish and Game at San Francisco, where it was identified as a wolf fish (*Alepisaurus aesculapius*). The wolf fish is a rare deep sea form. It has no scales and the air bladder is absent. The skeleton is feebly ossified. The long slender body tapers gradually from the head to a small forked tail fin at the end. The dorsal fin is very high and extends along the back for three-quarters the length of the fish. Behind this sail-like dorsal fin is a small flesh-like second fin, like the adipose fin in the salmonoid fishes. The color of the fish on the back is a dark gray, while underneath it is silvery and iridescent. Along the lateral line is a row of small translucent spots which are probably phosphorescent under normal conditions. The long jaws are supplied with long, fang-like teeth, suggesting a wolf.

Nothing is known of the life history of the wolf fish. Only very rarely does a specimen come to hand, forced to the surface of the sea by some natural cause in the depths. Specimens have been obtained along the Pacific coast from Alaska to California. There are four or five species of the wolf fishes in various parts of the world.

Deep-sea fishes are able to live under a tremendous pressure by having all the cells of the body filled with fluid at the same pressure as the surrounding water. When they are forced to come to the surface, the outside pressure is removed and the cells may be said to explode, causing the fish to either disintegrate altogether or to become a jelly-like mass.—Paul Bonnot, 510 Russ Building, San Francisco, August, 1930.

A BIBLIOGRAPHY OF THE TUNAS

The California State Fisheries Laboratory of the Division of Fish and Game

of California has announced the publication of Fish Bulletin No. 22, "A Bibliography of the Tunas," by Genevieve Corwin. This bulletin definitely clears up the disorder that has prevailed in the literature on these great mackerel-like fishes. Since the earliest times, man has taken and eaten the tuna. Beginning with the ancient Greeks, scholars of all the civilizations have tried to solve the baffling problems of the life histories of the several species. Their writings have been published in nearly every language and scattered all over the world, some to be lost, some to be buried almost hopelessly. No one knew how much had been written about the tunas until Miss Corwin published her bibliography. She has been at work for the past two years, going to thirteen important libraries throughout the United States and consulting several bibliographers, so that practically every paper on tuna could be included.

The articles are listed by authors and periodicals and cross-indexed by subject matter. Brief synopses are given and the most important papers are marked so that one will waste no time looking up papers of slight value. Not only scientific articles, but those dealing with commercial fishing and canning methods and presenting catch statistics are included in the bibliography. Sportsmen will be interested in the references to angling and conservation. Most useful to the many scientific workers who are not conversant with the wide range of journals listed is the section giving the full names of all the periodicals abbreviated in the authors' list. The bibliography is not only of inestimable value to scientific workers the world over, but can well be a model for future bibliographies on other groups of fishes.

The bulletin, known as Fish Bulletin No. 22, is now ready for distribution. Anyone interested in the subject may have a copy free of charge by writing to the California State Fisheries Laboratory, Terminal Island, California.

HUNTING ACCIDENTS, 1929

Number of persons killed.....	27
Number of persons wounded, not killed.....	88
Number of self-inflicted accidents	
Fatal	14
Nonfatal	51
Number of accidents inflicted by others	
Fatal	13
Nonfatal	37
Occurred while hunting large game (deer, bear, etc.)	
Fatal	4
Nonfatal	10
Occurred while hunting small game	
Fatal	11
Nonfatal	46
Occurred while hunting unknown game	
Fatal	12
Nonfatal	32
Number injured or killed in mistake for game or other wild creatures, if known:	
Killed	3
Wounded	1

HUNTING ACCIDENTS, 1929—KILLED

Name	Shot by	Date, 1929	Locality	Circumstances
Ambort, Joseph (15)	Self	July 10	Morena Mesa near Old Town	Hunting rabbits. Leaped from car to shoot animal, gun discharged.
Antonovich, Tony (9)	Brother	Jan. 29	Southwest of Durham	Attempting to shoot skunk. In excitement, brother accidentally discharged rifle.
Bell, Fred H.	Self	April 7	Near Montebello	Dropped gun on ground, causing it to discharge.
Cunco, Colombo	Theodore Woster	Nov. 7	Calaveras County	Mistaken for a bear.
Drews, Rudolph (17)	Richard Malone	Mar. 24	Laguna Beach	Squirrel hunting. Companion accidentally discharged gun as he turned to reply to remark of Drews.
Giannoni, Luigi	Self	Aug. 16	Humboldt County	Slipped, accidentally discharging rifle.
Harrington, Elmer (45)	Another hunter	Aug. 9	Near Stonyford, Colusa County	Mistaken for a deer when deer hunting.
Harry, Robt. Horace (15)	Companion	Sept. 5	Mountain View	Return from dove hunting. Companion left car and in cranking it, gun slipped from against windshield and was discharged.
Heryford, A. Milton (40)	Joseph Ganim	Sept. 29	Belle Cow Mine, 15 miles southwest of Ono	Companion demonstrating gun, accidentally discharged.
Kingsworth, Mrs. Archie (26)	Self	Nov.	Near Lancaster	Removing shotgun from machine, accidentally fired.
Mallett, Arthur	Self	Oct. 14	Oakley	Gun believed to be accidentally discharged while rabbit hunting.
Narecheschi, Silvio	Self	Sept. 18	Near Ukiah	On coon hunt, while sitting in tree, gun fell, discharging bullet.
Nolan, Virgil (17)	Self	July 31	12 miles west of Newman	Preparing for opening of deer season. Boy fell, rifle discharged.
Peck, Edward (22)	Alfred Clark	Aug. 25	Near Trunfo	Mistaken for deer while deer hunting.
Radley, Roy (13)	Harold Williamson	Nov. 24	Tules at Seaside Lake	Returning from duck hunt. Williamson's gun accidentally discharged. Trigger believed caught on tules.
Reibli, Fred (17)	Self	Dec. 2	Near Santa Rosa	Quail hunting, gun discharged when he fell.
Robertson, C. W. (8)	Brother	Dec. 26	Near Valley above Escondido	Accidentally shot.
Smith, Charles	Companion	Aug. 12	16 miles southeast of Palmdale	"Empty" gun discharged. Preparing to go rabbit hunting.
Snow, Robert D.	Self	Aug. 6	12 miles northeast of Cloverdale	Gun accidentally discharged when victim fell.
Stick, Louis (15)	Self	April 8	San Luis Obispo	Returning from hunting trip in machine. Stepped out to let companion out and on getting in again hit shotgun, which discharged.
Utt, Lewis J.	Self	Mar. 2	Near San Felipe, Lower California	Dove hunting. Gun discharged while crawling through fence.
Van Noy, Chester S. (32)	Self	Jan. 24	Near Dinuba	Apparently gun discharged while he was crawling through a fence.
Vasary, Joseph (36)	Frank Morreale	Oct. 6	Temescal Canyon	Returning from deer hunting, slipped and gun fell.
Vierra, Paul (33)	Self	Sept. 7	1½ miles from Weed	Dove hunting. In lifting gun from ground, twig caught trigger, causing it to discharge.
Waldschmidt, Wm. (10)	W. T. Bowman	Mar. 9	In the desert	Gun accidentally discharged.
Wason, Thomas F. (38)	J. de Rosear	Oct. 23	Near Alpine	Companion accidentally knocked gun to floor. Both shells exploded.
Whitecomb, Clard (21)	Self	Dec. 11	Lake Hodes	Duck hunting; gun discharged as Whitecomb stepped into boat and brushed against the gun.

HUNTING ACCIDENTS, 1929—INJURED

Name	Shot by	Date, 1929	Locality	Circumstances
Ameral, Victor (25)	Self	Dec. 2	3 miles north of Fort Bragg	Quail hunting. Gun discharged as he was crawling through wire fence.
Anderson, F.	Self	Dec. 8	Near Oakdale	Goose hunting. Rifle accidentally discharged.
Arellano, Tony (18)	John Cho	Feb. 2	Fresno County	Gun accidentally exploded.
Ashford, Raymond (14)	Self	Oct. 6	Sutter Basin	Shotgun slipped while alighting from automobile and in endeavor to recover it, it exploded.
Bacigalupi, Jack	Self	Aug. 28	Near Los Gatos	Rabbit hunting. Fell 8 feet, gun discharged in fall.
Barter, Walter (21)	Self	Sept. 2	Pine Canyon	Deer hunting. Tripped in crawling through fence, discharging gun.
Benedict, Harold (14)	Self	Dec. 8	Del Norte County	Duck hunting. Drawing gun over edge of boat, heard it click. Realizing danger, threw it from him, but it caught and fired.
Bergman, Jack (17)	Self	Dec. 19	Frazier Mt. Park, near Bakersfield	Quail hunting. Attempted to shake a loose shell into place in gun barrel and it discharged.
Bird, Clarence (13)	Companion	Nov. 3	Near Stockton	Handed gun to companion, who dropped it while pulling hammer back. Impact discharged gun. Rabbit hunting.
Boone, Lloyd (13)	Self	Oct. 29	Near Oroville	Hunting, stumbled and shotgun accidentally discharged.
Brackett, Lester	Self	Dec. 2	Near King City	Trigger on gun cocked, caught his hand, causing a wound.
Brown, Herman	Companion	Dec. 8	Fresno County	Quail hunting.
Carpenter, W. M.	Self	Oct.	Near Glendale	Returning from hunting trip, gun in back seat of car accidentally discharged.
Chapman, Roy (12)	Self	Dec. 29	Nereed County	Out trapping, gun accidentally discharged.
Clayton, Guy (29)	Self	Sept. 26	Near McCloud	Quail hunting. Put gun in truck and in so doing, it discharged.
Collard, H.	Self	Dec. 9	Near Sonora	Deer hunting. Other hunter fired at bird, but hit Collard.
Coppinger, Francis (7)	Self	Dec. 2	Near Turlock	Hunting. Gun accidentally discharged.
Cramer, Howard (13)	Brother	Dec. 9	Near Chico	Crawling and gun of brother accidentally discharged.
Dawes, Theodore (15)	Companion	Oct. 25	Near Manteca	Hunting. Companion stumbled and gun accidentally discharged.
Dezenzite, A.	Self	Sept. 9	Santa Cruz County	Dragging gun behind him; inexplicable how gun happened to go off.
Dieter, Melvin	Companion	Dec. 6	South of Litchfield	Quail hunting. Shot when Dieter unexpectedly stepped in front of friend's gun.
Disbar, A.	Self	Feb. 21	Sacramento County	Hunting rabbits. Accidentally shot his thumb off.
Donato, Joe	Self	Oct. 11	Near Manteca	Shooting a rabbit in his vineyard when shell in shotgun exploded.
Duncan Samuel (12)	Silvio Massenti	Dec. 2	Near Petaluma	Quail hunting. Cleaning gun after hunt. It accidentally discharged.
Ehert, Roy (32)	Self	Sept. 2	Near Merced	Dove hunting. Putting gun away when it discharged.
Ehott, Frank	Self	Feb. 26	Near Woodland	Gun accidentally discharged.
Enzenauer, Louis	Self	Dec. 5	Near Santa Rosa	Quail hunting. Stopping over to pick up quail and gun fell and discharged.
Franchest, Pasqual	John Haussman	Dec. 5	Near Sebastopol	Quail hunting.
Freese, Tony (13)	Self	Dec. 21	Tomasas Bay	Accidentally shot himself.
Fuzalessa, Tony (16)	Self	Oct. 21	San Mateo marsh	Duck hunting. Pushed gun in mud, clogging barrel. When fired, shotgun exploded.
Gellich, Geo. (17)	Self	Aug. 6	Portola, San Mateo County	Dropped rifle, causing it to discharge.
Gomez, Earl	Self	Oct. 17	Near Crockett	Deer hunting. Coming down hill, held gun in back of him as he jumped down incline; twig caught trigger and gun discharged.
Hamilton, R. H.	Self	Oct. 23	Near Lancaster	Rabbit hunting. Gun accidentally discharged.
Haupt, Paddy (12)	Self	Nov. 13	Near Windsor	Unable to explain how gun was discharged.
Hearp, Eugene (24)	Self	Aug. 10	Near Bakersfield	Shoving gun up incline it discharged.
Hendrix, Lyle (16)	Brother	Aug. 29	Near Buena Park	Hunting rabbits. Brother following, fell, discharging gun.
Howe, Wm. (35)	Self	Oct. 1	Sunset Beach	Duck hunting. Running to retrieve duck, gun accidentally discharged.
Jacob, Chas. (14)	Edward Crocker	Nov. 15	Near Richmond	In reloading, companion's gun exploded.

HUNTING ACCIDENTS, 1929—INJURED—Continued

Name	Shot by	Date, 1929	Locality	Circumstances
Jewarch, H. (14)	Self	July 11	Monterey County	Hunting rabbits. Accidentally shot hole through middle finger.
Jones, Clyde	Self	Sept. 19	Near Kernan	Deer hunting. Went to fire at signal, gun exploded.
Jones, J. T.	Companion	Dec. 6	Near Red Bluff	Quail hunting. Jones unexpectedly walked in front of companion's gun as he fired.
Jones, Melvin (18)	Self	Nov. 30	Near Berkeley	Trigger caught on twig while crawling through underbrush.
Keenan, John (62)	Self	Feb. 19	San Rafael	Shooting hawk. Believed to have tripped.
Krumines, C. (20)	George McCarthy	Jan. 14	Solano County	Duck hunting. Unexpectedly stood up and shot of hunter grazed his head.
Lange, Wm. A.	Companion	Dec. 1	Fresno County	Hunting quail in vineyard when companion fired, unable to see Lange, who was in line of fire.
Lazzari, John (15)	Self	Sept. 12	Vine Hill Dist., Contra Costa County	Hunting blackbirds. Climbed fence, dragging gun, barrel foremost, behind him when it discharged.
Lobenber, Chas. (9)	Companion	Nov. 3	Near Alameda	Playing on beach, gun accidentally discharged.
Lowery, Geo. (22)	Companion	Sept. 24	Near Orville	Deer hunting. Rifle carried by companion accidentally discharged as Lowery walked in front of it.
Martinez, Manuel	Self	Sept. 3	Near Petaluma	Dove hunting, rifle discharged accidentally.
Medley, J. R.	Self	Dec. 4	Near Clovis	Quail hunting. Accidentally shot himself.
Meissner, Geo. L.	Companion	Oct. 13	Near Lodi	Duck hunting. Gun of companion accidentally discharged.
Meloni, Julio	Father	Nov. 14	Near San Francisco	Shooting rats. Bullet glanced, hitting son in head.
Nerts, Leonard (11)	Dee Hess	Nov. 15	Near San Carlos	Boy aiming to shoot when other boy walked into the line of fire.
Miller, Mary (40)	Robt. Atagnaro	Dec. 30	San Francisco	Boy shooting at birds, one shot broke window, hitting Mrs. Miller.
Mitchell, Wendel (16)	Self	Oct. 7	Near Sonora	Pistol in pocket discharged.
Morsoni, Joe	Self	Aug. 15	Jamesburg District	Deer hunting. Rifle placed against rock, fell and fired.
Newton, Thomas A. (23)	Tony Borzone	Dec. 21	Sutter Basin	Duck hunting. Newton unexpectedly stood up in blind and Borzone's gun fired a charge, simultaneously with Newton's rising.
Oldfield, Harold (17)	Joe Baker	Sept. 7	Kern River Canyon	Rifle accidentally fired.
Pearls, Lloyd (16)	Daniel Sands	Oct. 8	Near Encanto	Gun accidentally fired.
Pendergrast, Elmer	Frank Augusta	Dec. 1	Near Rio Linda	Gun accidentally fired.
Parooti, Gino (15)	Companion	Sept. 8	Berkeley Hills	Rabbit hunting. Sighted animal, companion fired without noticing Parooti in way.
Potter, R. E.	Self	Feb. 24	Near Alturas	Rabbit hunting. Gun accidentally discharged.
Purdy, Thomas	Self	Oct. 15	Near Angels Camp	Returning from deer hunt, accidentally fired gun which he thought was unloaded.
Rasore, Louis	Antone Barbagelata	Dec. 29	Near Madera	Quail hunting. Gun accidentally shot, injuring Rasore.
Rea, Joe	Self	Jan. 1	North of Ukiah	Quail hunting. Gun accidentally discharged.
Richardson, Frank (16)	Self	Dec. 27	Near Oakland	Gun accidentally fired.
Rickard, Douglas (16)	Self	Feb. 18	Near Richfield	Hunting rabbits. Fell and discharged gun.
Rivard, Alfred	J. W. Crews	Aug. 5	Bartlett Mountain, Lake County	Accidentally discharged while loading.
Roberson, Curtis (8)	Brother	Dec. 10	Near Escondido	Gun accidentally fired.
Robinson, Edwin (16)	Self	May 27	Near Sonora	Rabbit hunting. Put gun in car, hammer hit door, causing it to discharge bullet.
Salvador, De Leon (17)	Self	Jan. 22	Near Los Alamitos	Gun accidentally discharged.
Sands, Wren	Self	Dec. 2	Near King City	Fell, causing gun to discharge.
Schroder, Geo.	Ronald Gordon	Sept. 2	San Mateo County	Hunting squirrels.

Speedy, W. F.	Companion	Willows	Hunting geese. One goose shot by member of party fell on gun, which discharged, shot hitting Speedy.
Stone, F. M. (22)	Self	Lake Hodges, San Diego County	Duck hunting. On getting out of boat, slipped on mud and gun discharged.
Stott, Walter (14)	Self	San Francisco County	Examining gun, it discharged.
Surryhayne, Geo.	Self	Giant, Cal.	Duck hunting. Leaving blind, companion handed him gun, which he took muzzle foremost and it exploded.
Trauger, Dan	Companion	Fresno County	Hunting quail in vineyard. Companion fired shot unable to see Trauger, who was in line of fire.
Usher, James (14)	Unknown	Near Custine	Hunting ducks. Shot fired by hunter across pond, hit water, glanced off and landed in boy's eye.
Walfrom, Walter (15)	Douglas Mills	Pasadena	Gun accidentally discharged.
Walters, I. M. (21)	Self	Mt. Diablo	Crawling through wire fence. Shell struck stone in front of him, causing pieces of stone to enter eye.
Weleb, Roy	Self	Yolo County	Running with rifle in hand, tripped and fell, discharging rifle.
Willard, Mrs. J.	Companion	Yolo County	Deer hunting. Mistaken for deer.
Williams, Fred	Unknown	Near Madera	Deer hunting. His dog, mistaken for mountain lion, fired at and shot hit Williams.
Wilson, Tanner (13)	Chas. Griffen, Jr.	Santa Cruz County	Griffen boy followed Wilson, and his gun was accidentally discharged.
Worley, Mrs. J. B.	Self	Cuyamaca Lake	Duck hunting.
Wrinke, Noah (18)	Self	West of Dodd Springs	Stooping over, revolver dropped accidentally, causing it to discharge.
Young, Andrew	Unknown	Magalia region	Deer hunting and bullet fired by unknown hunter wounded Young.

REPORTS

FISH CASES

April, May, June, 1930

Offense	Number of arrests	Fines imposed	Jail sentences (days)
Angling License Act; violations of.....	93	\$2,120 00	10
Abalones; small; overlimit.....	57	1,050 00	
Barracuda; small.....	9	220 00	
Bass, striped; small, overlimit.....	22	635 00	
Bass, black; small.....	12	205 00	
Bass, calico; closed season.....	1	25 00	
Clams; small; overlimit.....	61	1,435 00	180
Crabs; small.....	5	155 00	
Crawfish; undersized.....	1	25 00	
Commercial Fishing License Act; violations of.....	25	375 00	20
Crappie, perch, sunfish; overlimit.....	34	840 00	
Grunion; closed season.....	2	40 00	
Lobsters; closed season.....	4	140 00	
Nets; seines.....	19	1,795 00	79
Fishing near mouth of stream, dam.....	13	150 00	25
Salmon; closed district.....	2	50 00	17
Shad; overlimit.....	6	30 00	
Trout; closed season.....	86	1,775 00	
Sturgeon; closed season.....	1	20 00	
Young fish.....	1	100 00	
Illegal fishing apparatus.....	20	555 00	
Pollution of state waters.....	8	200 00	
Totals.....	482	\$11,940 00	331

GAME CASES

April, May, June, 1930

Offense	Number of arrests	Fines imposed	Jail sentences (days)
Hunting License Act; violations of.....	10	\$180 00	2
Deer; closed season; killing does, fawns.....	23	800 00	580
Ducks; closed season.....	1	5 00	
Doves; closed season.....	5	150 00	1
Non-game birds; killing of.....	7	60 00	
Pheasants; closed season.....	1	150 00	
Pigeons; closed season.....	5	250 00	
Quail; closed season.....	4	100 00	
Rabbits; closed season.....	4	85 00	
Shorebirds; killing of.....	4	50 00	
Firearms in refuge.....	3	75 00	
Bird net; possession of.....	1	40 00	
Shooting from automobile.....	1	10 00	
Totals.....	69	\$1,955 00	583

SEIZURES OF FISH AND GAME

April, May, June, 1930

Abalone.....	200	Sturgeon, pounds.....	12
Barracuda, pounds.....	1,214	Sunfish, perch, crappie.....	655
Bass, striped.....	167	Trout.....	1,706
Bass, striped, pounds.....	14	Illegal fishing apparatus.....	11
Bass, black.....	130	Deer meat, pounds.....	160
Carp.....	1	Deer.....	10
Catfish, pounds.....	232	Doves.....	5
Clams.....	1,449	Ducks.....	14
Crabs.....	334	Pigeons.....	19
Grunion, pounds.....	56	Pheasants.....	1
Lobsters, pounds.....	44	Quail.....	6
Salmon.....	8	Rabbits.....	9
Shad.....	55	Shorebirds.....	5
Smallfish, pounds.....	50	Guns.....	1

Sole.....	1,977	23,500			221	465	2,061,967	408,072	53,725
Spitfall.....									
Striped Bass.....		1,397	13,220		60,645	137,316	18,462		
Swordfish.....							6,674		
Tomcod.....									
Tuna—Bluefin.....									
Tuna—Yellowfin.....									
Turbot.....		205					560		
Whitebait.....	54,838	29,427	17				20,972		2,925
Yellowtail.....									
Miscellaneous.....	659	615			148	698	2,047	4,638	418
Mackerel—Spanish.....									
Total fish.....	1,196,615	285,307	244,356	21,008	315,081	1,391,203	3,941,954	1,066,825	1,174,596
Crustaceans:									
Crabs.....	127,408			48			605,432	4240	795
Shrimps.....				140,865			303,750		
Spiny Lobsters.....									
Mollusks:									
Abalones.....									1,005,070
Clams—Cockle.....				29,663					
Clams—Mixed.....	3,396			505					1,432
Clams—Pismo.....							7,242		25,279
Clams—Softshell.....				18,477		4,880	3,698	1,057	300
Cuttlefish.....		4,454					69,630		
Mussels.....									
Oysters—Eastern.....				31,062					
Oysters—Native.....				8,398					
Squid.....									
Totals.....	1,227,419	289,761	244,356	249,996	315,081	1,396,083	4,932,706	1,078,132	12,821,145

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

- 1 1/4 dozen.
- 2 dozen.
- 141,190 shell oysters.
- 25,293 dozen.
- 316,500 shell oysters.
- 10 dozen.
- 74 dozen.

CALIFORNIA FRESH FISHERY PRODUCTS FOR THE MONTHS OF APRIL, MAY AND JUNE, 1930—Continued
Compiled by Division of Fish and Game, Bureau of Commercial Fisheries

Species of fish	San Luis Obispo, Santa Barbara, Ventura	Los Angeles	Orange	San Diego, Imperial	Total	Fish from south of the International Boundary brought into San Pedro.	Fish from south of the International Boundary brought into San Diego.	Total fish from south of the International Boundary brought into California.
Anchovies		6,970		3,900	126,740		83,797	132,330
Barracuda	106	1,066,249	38,975	472,378	1,577,708		38,523	132,330
Bonito		66,063	5,127	219,024	290,445		12,017	86,724
Carp		300			15,243			
Catfish					95,243			
Cultus Cod	2,081	522			252,254			
Flounders		378	11	43	190,767			
Grayfish	9,120	80,725	16,080	29,905	138,020	100		100
Hake					39,185			
Halibut	80,702	108,266	10,361	17,474	349,377	4,576	38,151	42,727
Hardhead					3,223			
Herring	4				7,074			
Kingfish		66,993	553	597	111,073			
Mackerel	52	2,180,692	207,786	117,401	2,721,355			
Mackerel—Horse		43,226			46,748			
Mullet	304		156	4,086	4,546	80		80
Perch	658	13,356	226	39	37,188	400		400
Pike					519			
Pompano		448	43	116	897			
Rock Bass	4,523	60,538	30,567	60,422	156,066			
Rockfish	13,450	593,536	10,393	360,506	2,031,919	3,732	7,791	11,543
Sablefish		1,718	453		411,821			
Salmon		6			1,892,729			
Sandabs		3,552			195,073			
Sardines		38,866	250	969,117	1,673,890			
Sculpin	120	9,520	1,457	3,649	14,900			
Sea Bass—Black	605	16,213	4,154	26,978	47,950			
Sea Bass—White	7,759	267,876	1,777	21,620	296,420			
Shad					39,309			
Shad—Black					18,386			
Shad—Rose					63,905			
Sheepshead	363	5,227	311	1,259	7,160			
Skates	555	4,854	3,225	135	365,933			
Skipjack					719,631			
Sneek	15,084	81,490	119	2,359	77,914	165		165
					267,725	96,361	1,039,837	1,136,198
							685	685

Sole	100,083	14,395	2,762	647	2,667,128		
Splittail					687		
Striped Bass					231,040		
Swordfish		5,858	440	50,503	56,801		
Tanocod					6,674		
Tuna—Bluefin		4,475,246		130,440	4,605,686	3,954,182	472,296
Tuna—Yellowfin						1,690,265	6,252,075
Turbot					765		
Whitebait	55				108,234		
Whitefish	53	19,514	401	30,712	50,680		50,680
Yellowtail		49,698	79	194,927	244,704	703,474	930,249
Miscellaneous	83	49,646	378		59,875	49,914	54,813
Mackerel—Spanish						5,454	11,419
Total fish	236,065	9,332,245	336,054	2,718,537	22,259,846	6,789,488	7,879,849
Crustaceans:							
Crabs		12			634,236		
Shrimps					444,615		
Spiay Lobsters							92,524
Mollusks:							
Abalones	10,451				1,018,521		
Clams—Cockle		6,125			35,788		
Clams—Mixed					3,901		
Clams—Purse	23,270				24,702		
Clams—Softshell					30,599		
Clams—Tulefish					34,498		
Mussels					300		
Oysters—Eastern					100,692		
Oysters—Native					8368		
Squid					10,621,372		
Totals...	269,780	9,338,382	336,054	2,718,537	35,217,438	6,789,488	7,972,373

* 26,426 dozen.

* 457,090 shell oysters.

14,761,891

INDEX TO VOLUME 16

A

Abalone, 163, 326, 327; conservation laws provide ample protection for, 13-15; in California, 15-23; are sometimes planted, how, 76-77, 185; in demand, 185-186.

Abbey, Harvey, mother does know best, 367-368.

Acanthocybium, 77.

Accident, hunting, 371-375.

Achison, Henry, 162.

Act, Hunting License, 55.
Migratory Bird Conservation, 353.
Migratory Bird Treaty, 62, 159, 177, 259, 260, 332.
McSweeney-McNary Forestry Research, 261.

Adams, William C., 158.

Agnes, S., 125, 126.

Airplanes and game, 62.

Alabama Fish and Game News, 339.

Albacore, 38, 251, 358; off Oregon and Washington coasts, 76.

Albacore, 36, 71, 120, 358.

Alepisaurus acculapuis, 267, 370.

Alice, 136.

Allen, A. A., 346.

Alosa sapidissima, 77.

American Field, 85, 252, 348, 350.

American Fisheries Society, 47.

American Forests and Forest Life, 64.

American Game, 86.

American Game Conference, 157, 159, 177.

American Game Protective Association, 47, 56, 57, 64, 158, 178, 252, 333, 345.

American Legion and conservation, 52.

American Wild Fowlers, 47, 252.

Anchovy, 130, 131.

Anderson, Anton Jr., 247.

Anderson, E. C., 3, 4.

Anderson, Sam G., 341.

Andresen, August H., 163.

Angling for striped bass, 286-293.

Animal, fur-bearing, California's take of, 164; predatory, economic value of, and birds to be studied at state university, 171-172.

Antelope, 307; season in Wyoming, 85.
Prong-horned, 256, 337.

Antler, female deer has, 82-83; doe has, 367.

Appalachian Forest Experiment Station, 179, 261.

Arkansas builds mammoth fish hatchery, 85.

Armstrong, W. H., 205; in memoriam, 46-47.

Ashlock, W., 138.

Associated Press, 358.

Associated Sportsmen, 52, 168, 176, 337.

Associated Sportsmen of California, 52, 182, 246, 332.

Association of North Central Game Commissioners, 159.

Astacus gambeli, 213.
Klamathensis, 214.
leuciscus, 214, 215, 216.
nigrescens, 213.
troubridgi, 214.

Atherinopsis affinis affinis, 130.
californicasis, 130.

Atkinson, Lee, 68.

Audubon Association of the Pacific, 166.

Austin, Oliver L., Jr., 179, 261.

Automobile Club of Southern California, 60, 61, 74.

Avery, Carlos, 47.
Aviculture, 348.
Avocet, 353.

B

Babeock, Harry, 282.

Babeock, John P., halibut—some facts about the king of the banks, 39-42.

Bacillus botulinus, duck disease, caused by the poison of the, 285-286.

Badc, August, 48; feeding young pheasants and quail, 227-230.

Badger, 164; and the fur trade, 61-62.

Baggan, Captain, 76.

Bagnall, S. B., 70.

Bailey, LeRoy, 69.

Bait, Montana bars salmon eggs, as, 54; minnows as, 246.

Banding, bird, experiment, the latest, 169; gives valuable information, pheasant, 176.

Barnes, C. J., severe winter threatens Plumas county deer, 82.

Barnum, Oscar L., breeding habits of mule deer, 184.

Barracuda, 189, 328.

Barrett, E. G., 69.

Barrett, L. A., 48.

Bass, 113, 115, 117, 118, 352.
Black, 114; in Feather River, 338; fishing tackle—using the right tackle is more than half of angling pleasure, 293-296; propagate, 336.

Black sea, 251; caught in Monterey bay, 268.

Calico, 297.

Rock, 251.

Salton sea, 338.

Small-mouthed, in lake, 344.

Striped, 44, 50, 163, 165, 167, 296, 297, 298, 325; popularity of, fishing, 53; introduced in Salton sea, 51; the age of, 248; angling for, 286-293.

White sea, fish bulletin No. 21, a recent publication on, 188; (*Cynoscion nobilis*) size at first maturity of the, 319-323.

Bauder, C. S., game conservation in southern California, 211-212.

Bauer, Harry L., 300, 301, 302, 303, 305, 361.

Beal, F. E. L., 342.

Bear, 42, 164.
Brown, 258.
Grizzly, 258, 307.

Beaver, 164, 258; mountain, subject of new bulletin, 64-65.

Bee nest, bird's nest makes, 347.

Bell, C. R., 252, 330.

Bennett, Eugene, 48, 241, 358.

Benoit, A., 287.

Bent, Edward F., 282.

Berkeley Rod and Gun Club, 72.

Bernsten, J., 77, 145, 269.

Berry, S. S., 21.

Bibliography, abalone, 22; crayfish, 216; of the tunas, 370.

Bigelow, H. B., 37.

Bill, American Eagle, 257.
House No. 7994, 163.
Predatory Animal Control, 257.
Senate No. 2908, 163.
Upper Mississippi Wild Life, Fish and Game Refuge, 256.

Bingham Oceanographic Laboratory, 39.

- Biological survey, of the lakes, reservoirs and streams of San Diego County, 111-118; of Clear Lake, Lake County, 221-227.
- Bird, Audubon pictures and leaflets for bird study, 64; banding experiment, the latest, 169; to be studied at state university, economic value of predatory animals and, 171-172; on the farm, experiments on, increasing, 171; state, sanctuaries assure a future for, 335-336; nest makes bee's nest, 347; sanctuary on golf courses, 348; sanctuary in Michigan, 348-349; and wild flower laws, Prussian, 350.
- Game, importations of, 171; suitable for naturalizing, not all foreign, 259-260; must shelter, 341-342; water, 342; and poultry diseases, 346.
- Bird Lore*, 64.
- Birge, Dr. E. A., 84.
- Bishop, F. C., 343.
- Black bass fishing tackle—using the right tackle is more than half of angling pleasure, 293-296.
- Black, H. E., 69.
- Blewett, W. C., pheasants nest in Arroyo Grande Valley, 265.
- Bluebird, 171.
- Western, 166.
- Bluefin*, 244, 358.
- Bluegill, 113, 114, 116, 117.
- Blue Jay, 364.
- Boat, halibut, 76; mackerel, 77; sardine, lost, 77; types, Japan studies fish, 78; new speed, 169; new commercial fisheries patrol, 186; new patrol, 244.
- Bobo, Perry E., 180.
- Bonita, 251.
- Bonnot, Paul, 72, 258; abalones in California, 15-23; Alaska red salmon investigated, 55-56; report on the relative merits and demerits of purse seines vs. lampara nets in the taking of sardines, 125-130; the California whitebait fishery, 130-136; some notes on the food of seals and sea lions, 191; crayfish, 212-216; wolf fish found on Humboldt Bay beach, 370.
- Boone and Crockett Club, 178.
- Bordner, John, 84.
- Bradford, William B., 282.
- Brant, 353.
- Black, on Tomales Bay, 265.
- Black Sea, 266.
- Brant, Irving, 332.
- Bremus fervidus*, 347.
- impatiens*, 347.
- Bronkhorst, L., 217, 218.
- Brown, Merrill W., 358.
- Brownlow, O. P., fish planting in the high Sierra in 1929, 8-12.
- Bruce, Jay, 364.
- Bruce, R. J., 292.
- Bryant, H. C., 2, 47, 72, 242, 300, 301, 330; Colorado River trout captured in Imperial County, 183; deer in Sacramento Valley, 265.
- Buffalo, 307.
- Bullard, F. A., 8, 9, 10, 11, 12, 69.
- Bullard, Ray J., 79.
- Bulletin, mountain beaver subject of new, 64-65.
- Bundeck, J. L., 69.
- Bureau of commercial fisheries, 13, 18, 70-71, 72, 121, 125, 139, 180, 187, 262, 330.
- Education and research, 2, 47, 71, 73, 171, 181-182, 330, 331, 360-363.
- Finance, 73, 180-181, 262, 363-364.
- Fish culture, 1, 2, 3, 70, 159, 181, 262-263, 356-360.
- Fish rescue and reclamation, 167, 298.
- Game farms, 74, 182, 263, 366.
- Game refuges, 73, 182, 262-263, 364-366.
- Hydraulics, 74, 182, 366.
- Patrol, 68-70, 180, 263, 354-356.
- Plant Industry, 171.
- Publicity, 73-74.
- Burke, John, 247, 262.
- Burleigh, Thomas D., 179.
- Burnham, Major F. R., 203.
- Burnham, John G., 47.
- Burro, 189.
- Burro deer in California, 119-120.
- Burton, I. O., 68, 70.
- Bustard, 260.
- Butler, Fred S., 282.
- C
- Cabrilla, 189.
- Cahn, Alvin R., 54.
- Cain Irrigation Company, People vs.*, 74.
- Calamus brachysomus*, 234.
- Calder, James A., 183.
- California Academy of Sciences, 53, 263.
- California Audubon Society, 166.
- California bluefin tuna, 231-233.
- California Conservationists, 246-247.
- California Fish Cannery Association, 357.
- CALIFORNIA FISH AND GAME, 16, 38, 76, 112, 190, 191, 212, 242, 330, 339.
- California Fish and Game Commission, see Division of Fish and Game.
- California fish and game wardens today and yesteryear, 204-210.
- California game breeders, 248.
- California halibut, 315-317.
- California Sea Products Company, 54.
- California State Fisheries Laboratory, 23, 52, 180, 189, 217, 248, 271, 272, 330, 359, 370.
- California State Redwood Park, 300, 303, 305, 361.
- California whitebait fishery, 130-136.
- California wilds in miniature, 336.
- Cambarus blandingsii acutus*, 212.
- clarkii*, 212.
- Camp Fire Club of America, 178.
- Canadian Field Naturalist*, 346, 347.
- Canadian Fisherman*, 39.
- Candle fish, 132.
- Cannery, European, studied, 52.
- Capercailzie, 260.
- Carey, Henry R., 63.
- Caribou, 258.
- Carnegie Institution, 36.
- Carp in ponds, 53-54; tai and, 234-237.
- Casey, J. S., 71.
- Cat trap, new leaflet tells how to make a, 261-262.
- Civet, 164.
- Ringtailed, 164.
- Wild, 164.
- Catch of California, the commercial, 271-272.
- Catfish, 296.
- Census, Pismo clam, 187.
- Century Gun Club, 363.
- Cervus nannodes*, 367.
- Cetorhinus maximus*, 150.
- Chamois, 259.
- Checchetti Ranch, 265.
- Cheney, E. S., 55, 72, 74, 80, 81, 157, 164, 165, 173, 175, 241, 242, 263, 282, 296, 297, 331, 335, 341, 359, 360, 362, 365; the new Los Banos refuge, 164-165.
- Childers, Lee, 68.
- Chione fluctifraga*, 250.
- Chronicle, San Francisco*, 339.
- Chute, Geo. Roger, seen kow a regal soup stock, 23-25; Japan studies fish boat types, 78; the hilly-iron returns to Monterey Bay—shark fishing recommendations on a harpoon basis, 143-152.
- Claberg, W. H., 70.
- Clam quarantines lifted, mussel and, 169-170; need protection, additional, 250.
- Pismo, 163, 327; census, 75-76; census, 187; large, 189-190.
- Softshell, 324.

- Clark, Frances N., 272; Pismo clam census, 75-76; salt water perch in the San Pedro fish markets, 139-143; proportions of king and queenfish in the San Pedro wholesale fish markets, 187-188; large Pismo clams, 189-190; relation between cod and herring catches in the Danish Baltic Sea, 190; review of a report on the migrations of the Pacific halibut (*Hippoglossus hippoglossus*), 318-319; size of first maturity of the white sea bass (*Cynoscion nobilis*), 319-323.
- Clark, G. H., 51, 271; depletion of southern halibut probable, 77-78; California salmon for 1929, 267; salmon spawning in drainage canals in the San Joaquin valleys, 270; California halibut, 315-317.
- Clark, M. S., 72.
- Clarkson, Geo. B., 173, 330.
- Clear Lake, Lake County, a biological survey of, 221-227.
- Clear Lake Park Company, 221.
- Clements, Ed., 262, 359.
- Club, plants more than a million trout, 161-162; may be operated, regulations under which commercial duck, 173; duck, in California, the early history of, 281-285.
- Cordelia Shooting, 82, 284.
- Fresno Sportsmen's, 8.
- Hawley, 284.
- Ibis, 284.
- Joyce Island, 284.
- Scymour, 284.
- Teal, 284.
- Tule Belle, 284.
- Cod, 148; and herring catches in the Danish waters of the Baltic Sea, relation between, 190.
- Rock, 326, 327, 328.
- Cole, Charles E., angling for striped bass, 284-293.
- Coleman, George A., 51, 181, 262, 356; results of feeding experiments with trout fry, 1-8; biological survey of the lakes, reservoirs and streams of San Diego County, 111-118; a biological survey of Clear Lake, Lake County, 221-227.
- Columba fasciata fasciata*, 243.
- Commercial fishery notes, 75-78, 185-191, 267-272, 369-370.
- Committee, on game refuges, governor's advisory, 46; wild life, enlarged, 47; national on wild life legislation, 48; on wild life resources of the U. S. Senate, special, 255-257.
- American Wild Life, 47.
- Conference, American game, 47.
- Conner, Geraldine, 271.
- Connolly, Willis, 69.
- Conservation, laws provide ample protection for abalones, 13-15; American Legion and, 52; automobile and, 60; research, and control activities of the Bureau of Biological Survey, 65-66; in Wisconsin, 84; in other states, 84-86; in southern California, game, 211-212; through contact with living things, 295-307; problems, 336-337; dead trees and, 344.
- Conservation and Industry, 347.
- Convention, joint, considers problems of international importance, 47-48; of Associated Sportsmen, 48-49; 23rd of the International Association of Game, Fish and conservation commissioners, 58; employees, 157; volunteer wardens hold, 241.
- Coot, 61, 353.
- Corbina, gulf, 189.
- Mexican, 189.
- Sealy-finned, 189.
- Corsan, G. H., 348, 349.
- Corwin, Genevieve, a correction, 191; the French mackerel fishery, 217-221.
- Cory, J. R., 68.
- Costner, Ira, 287.
- Coyote, 164, 259, 364.
- Crab, 163, 187.
- Crane, 353.
- Little brown, 353.
- Sandhill, 353.
- Whooping, 353.
- Crappie, 113, 114, 115, 297.
- Crayfish, 212-216.
- Creed, Percy R., rambling thoughts of a perverted Britisher, 311-314.
- Cress, W. F., 355.
- Cressey, F. E., 183.
- Crivello, O., 269.
- Crocker, A. P., 169.
- Crocker, R. S., 232, 236; unusual fish at San Pedro, California, 77; herring in Carquinez Straits, 188; the smaller fishing ports of central California, 324-329.
- Crow, 337, 350.
- Curlew, 350, 353.
- Curry, Alan G., in memoriam, 246.
- Curry, Allen, 69, 262.
- Curwood, James Oliver, 42.
- Cusk, 148.
- Cynoscion nobilis* size at first maturity of the white sea bass, 319-323.

D

- Dado, S. H., 72.
- Daniels, Frank, 83.
- Davidson, C. E., 165.
- Davidson Investment Company, 165.
- Davis, James, 48.
- Deer, 43, 44, 206, 259, 348; kill for 1929, 49; tags, importance of, to science, 49-50; western, new danger threatens, 57; severe winter threatens Plumas County, 82; female, has antlers, 82-83; Pennsylvania studies, 84; kill statistics, 90-101; California's, 162; damage to be investigated, 167; non-proof fences for, 172; hunters deteriorating, are? 249; hunters bag 3428
- Kaibab, 251; mountain lions not wholly responsible for loss of, 253; in Sacramento Valley, 265; miles per, 340; dangerous to cars, 341.
- Albino, 205.
- Black-tailed, 302, 366.
- Burro, in California, 119-120.
- Mule, breeding habits of, 184.
- Rocky mountain mule, 119.
- White-tailed, 84.
- Deer Creek Live Stock Association, 364.
- De La Montanya, H., 63.
- Del Mar Company, 71.
- Deudragapus obscurus siccar*, 79.
- Department of Marine Fisheries, 159.
- Public Health, 170.
- Public Works, 338.
- Deputy issues information cards, 251.
- Volunteer, 174.
- Dialogue on fish and game protection, 42-45.
- Diamond, Raymond, 354.
- Di Giorgio Farna, 243.
- Dinsdale, L. W., 68.
- Disease, duck, caused by the poison of the *Bacillus botulinus*, 285-286; game birds and poultry, 346.
- Division activities, 68-74; 180-182, 262-264, 354-366.
- Division of Fish and Game, J. S. 12, 18, 36, 37, 39, 47, 49, 51, 55, 63, 76, 112, 121, 139, 146, 152, 158, 160, 167, 168, 169, 171, 172, 174, 175, 182, 185, 209, 243, 244, 245, 248, 251, 271, 285, 305, 310, 330, 331, 336, 340, 358, 362, 363.
- Alaska, 62, 258, 259.
- Arkansas, 85.

- Colorado, 85.
 Massachusetts, 84, 85, 158.
 Michigan, 84, 86, 346.
 Minnesota, 349.
 Montana, 51, 54.
 Nevada, 162.
 Pennsylvania, 348.
 Virginia, 47.
 Washington, 47.
 Wisconsin, 86, 176.
 Wyoming, 85, 178.
- Division of Insects affecting man and animals, 343.
 Parks, 300, 305.
 Scientific inquiry, 315.
 Weights and measures, 71.
- Doe, John, 340.
 Doe knows best, mother, 366-367; has antlers, 367.
 Dog—sore feet, 346; hints, hunting, 350.
 Doney, A. E., 357.
 Donham, Cliff S., 157.
 Dormouse, 350.
 Dove, 163, 353.
 Western mourning (*Zenaidura macroura marginella*) in California, migration of, 183.
- Dowitcher, 353.
 Dray, J. R., 70.
- Duck, 58, 165, 248, 259, 350, 353; name of, change, 60; swans do not damage, food plants, 66; Michigan studies, foods, 84; who is going to enforce the bag limit on, 159; in San Diego County, 167-168; clubs may be operated, regulations under which commercial, 173; wild, wild rice for, 201-204; situation, a sportsman's view of, 248-249; disease, 252; disease caused by the poison of the *Bacillus botulinus*, 285-286; limit problem, 331-332; laws, sportsmen, observe, 332-333; season, drought and, 334; pollution problems and, 351-352.
- Bluebill, 61, 168.
 Canvasback, 168.
 Golden-eye, 168.
 Mallard, 248, 362.
 Merganser, 61.
 Pintail, 58, 168, 169; longevity of, 60.
 Ruddy, 168.
 Sheldrake, 61.
 Widgeon, 168.
 Wood, 248, 341; how to distinguish them, 342.
- Duckless Wednesday, Wisconsin favors, 86.
 Dude Wranglers Association, 178.
 Dunlap, C. W., 181.
 Dunn, H. H., 56.
- E
- Eagle, bald, seek protection for, 163-164.
 Early history of duck clubs in California, 281-285.
 Ecology, 54.
 Economic value of predatory animals and birds to be studied at state university, 171-172.
 Editor accepts new post, 242.
 Editor's policy, 320.
 Education vs. force, 63-64.
 Egg, salmon, Montana bars as bait, 54.
 Trout, large, gives record number of, 250-251; Loch Leven, collection of, 178-179.
- Eigenmann, Carl H., 53.
 Eliot, Charles W., 301.
 Elk, 263; thriving in Shasta County, 82; Colorado opens season on, 85-86; protection, problem for, 178; wanted—a home for, 253-254; for the market in the forties, hunting, 367.
 Tule, 307.
 Elliott, T. G., 68, 70.
- Ellsworth, R. S., 72, 361; grouse respond to protection, 79; female deer has antlers, 82-83; conservation through contact with living things, 299-307; in memoriam, G. O. Laws, 333-334; hunting elk for the market in the forties, 367.
- Elupei pallasii*, 130, 131, 188.
 Emerick, Walter, areas closed to hunting, 158.
 Enea, G., 268.
Engraulis mordax namus, 130, 131.
 Estill, Nina Simmond, 2.
 Evermann, Barton Warren, 53.
 Everson, William, 188.
Excalfactoria lineata, 171.
 Expenditures, statement of, 87-88, 193-194, 278-279, 382-383.
 Experiment, results of feeding, with trout fry, 1-8; on increasing birds on the farm, 171.
- F
- Farley, John L., 48, 68, 157.
 Farrell, Edward, 69.
 Fawn, it is unlawful to kidnap, 166.
 Feather River Rod and Gun Club, 338.
 Feeding young pheasants and quail, 227-230.
 Fernald, R. G., 157, 173, 244.
Field, The, 369.
Field and Stream, 178.
 Fish, planting in the high Sierra in 1929, 8-12; a dialogue on, and game protection, 42-45; cases, 90, 192, 273, 376; collection secured, 53; at San Pedro, California, 77; boat types, Japan studies, 78; hatchery, Arkansas builds mammoth, 85; a shocking, tale—electrocuted tuna easily landed, 136-139; markets, salt water perch in the San Pedro, 139-143; survey proposed, western, 172; refuges in Wyoming, 179; markets, proportions of king and queen fish in the San Pedro wholesale, 187-188; Mexican, in San Pedro markets, 189; restoration, the cost of, 245; bulletin No. 19, 27, No. 20, 271; catch of California, the commercial, 271-272; rescue and reclamation work, 296-299; licensee to protect, 345-346.
- Fish and Game Commission, see Division of Fish and Game.
 Fisher, 164.
Fisheries Service Bulletin, 179, 347.
 Fishery, products, California fresh, 102-105, 196-199, 274-277, 378-381; the California whitehail, 130-136; Russia comments on California's commercial, 190; the French mackerel, 217-221.
- Fishing, striped bass, popularity of, 53; shark, recommences on a harpoon basis—lily-iron returns to Monterey Bay, 143-152; 1930, streams closed to, 160-161; resources, methods of conserving, 186-187; luminescent, 237-240; sardine, at San Diego, 268; for Monterey sardines, change in, 269-270; sardine, industry, 270; tackle black bass—using the right tackle is more than half of angling pleasure, 293-296; ports of central California, the smaller, 324-329; success in, 339; an English view of, 369.
- Flatfish, 328.
 Flicker, 171.
Florida, 269.
 Floyd, Richard, 284.
 Flycatcher, crested, 171.
 Follett, W. I., 72.
 Food, pheasant, study of, 58-59; duck, swans do not damage, plants, 66; Michigan studies duck, 84.

Forbush, Edward Howe, 338.
Forest, Gunnison, 57.
Foster, Ben, 69.
Fox, 337.

Gray, 164.
Kit, 164.
Red, 164, 258.
White, 258.

French mackerel fishery, 217-221.
Friedlander, T. Cary, 282.
Fry, D. H., Jr., 231, 232, 271, 325, 327;
canning of mackerel during sardine
season at San Pedro, 189.
Fry, results of feeding experiments with
trout, 1-8; prevent smothering of,
346.
Fur, badger and the, trade, 61-62; seal
crop, 62; worth more than \$4,500,000
shipped from Alaska in 1923, 258;
bearing animals, 346.

G

Gallinule, 61, 353.
Game, a dialogue on fish and, protection,
12-45; law abstracts, 51; saving the,
58; airplanes and, 62; will codify,
laws, 84-85; cases, 59, 192, 273, 376;
confiscated, 163; begun, winter feed-
ing of, 168-169; birds, importations
of, 171; conservation in southern Cali-
fornia, 211-212; breeder, California,
248; refuges, preserves and sanctu-
aries, 307-311; cars destroy, 345;
protection, timber for, 349.

Game farm, successful, 349.
Los Serranos, 74, 162; dedicated, 165-
166, 182.
Yountville, 165, 250, 263.

Geary, L. E., 180, 186.
General Federation of Women's Clubs,
352.

Genyonemus lineatus, 187.
George William Hooper Foundation for
Medical Research, 1, 2, 52, 285, 331.

Gerrhonotus aluhunga, 76.
Gibson, Arthur, 347.
Gilbert, Charles H., 55.
Gilkey, Chester E., 144, 146, 147, 151.

Gillespie, Annie, 271.
Gilloon, S. R., 338.
Giske, Howard, 76.

Glenn Colusa Irrigation District, People
vs., 244-245.

Glidden, E. H., 59, 68, 183, 250, 354.
Godsil, H. C., 358; sardine fishing at San
Diego, 268.

Godwit, 353.
Golden Gate Park, 51.

Goose, 58, 350, 353.
Bay, 61.

Brant, 61.
Cackling, 164.
Canada, 61, 164.

Eskimo, 61.
Gray, 61.
Hutchins, 61, 164.

Reed, 61.
Ross snow, 165.

Gordon, A. G., 347.
Gordon, Seth E., 47, 58.

Graying in California, Montana, 51.
Grebe, 350.

Grey, Zane, 185.
Grinnell, George Bird, 47.
Grinnell, Joseph, 172.

Gross, A. O., 84.
Gross, E. B., Company, 71.

Grouper, 189.
Grouse, 312, 346; respond to protection,
79.
Red, 260.
Sand, 260.

Grunion, 132.
Gull, 350; sea, aid, farmer, 57.
Gyger, James, 69.

H

Haddock, 148, 187.
Hake, 148.

Halfhill Company, 71.
Halibut—some facts about king of the
banks, 39-42; depletion of southern,
probable, 77-78; California, 315-317;
Pacific (*Hippoglossus hippoglossus*)
review of a report on the migrations
of the, 318-319.

Haliotis assimilis, 21.
corrugata, 20.
cranchoidii, 15, 20.
fulgens, 18.
gigantea, 21.
rufescens, 15, 19, 20.
wallatensis Stearns, 19.

Hamilton, W. B., 358.
Hang Far Low, 32, 35.

Harder, Jacob, 69.
Harkin, J. B., 47.

Harriman, William H., 284.
Harrison, R. W., 70.
Hatchery, fish, Arkansas builds mam-
moth, 85.

Brookdale, 3, 5.
Cold Creek, 159.
Fall Creek, 181.

Fort Seward, 3, 4, 5, 6.
Kings River, 8.
Mt. Shasta, 3, 5, 70, 112.

Mt. Whitney, 3.
Tahoe, 3, 4, 5.
Hawes, Harry B., 256.

Hawk, 350.
Hays, Robert, 50, 51.

Heath, Harold, 13, 14, 16.
Heath hen, 307, 314.

Heller, H. H., 286.
Henderson, W. C., 178, 260.

Henry, Patrick, 310.
Herms, William B., 167.

Heron, 350.
Herrick, E. J., 86.

Herring, 130, 131; lake, 187; in Carquinez
Straits, 188; catches in the Danish
waters of the Baltic Sea, relation be-
tween cod and, 190.

Herrington, William C., 318.
Hibbard, C. W., 267.

Higashi Fish Company, 268.
Higgins, E., 125, 315.

Hiller, Stanley, 62.
Him Yick Lung Company, 33.

Hippoglossus hippoglossus, review of a
report on the migrations of the Pacific
halibut, 318-319.

Hobmaier, Dr. M., division pathologist,
331; duck disease caused by the
poison of the *Bacillus botulinus*, 285-
286.

Hollywood Gun Club, 73.
Holmes, H. B., 125.

Holmes, S. J., 212.
Hooper, George Williams, Foundation for
Medical Research, 1, 2, 52, 285, 331.

Hoover, 76.
Hoover, Theodore, 168.

Hopkins Marine Station, 76; hydrobio-
logical survey of, 35-39.

Hornaday, W. T., 332.
Houssels, B., 357.

Hovden, K., Company, 71, 358.
Howell, A. Brazier, 54.

Hubbs, Carl, 76.
Hudson, Frank, 287.

Huey, Laurence M., additional clams need
protection, 250.

Hummingbird, Anna, 166.

Hunter, J. S., 48.

Hunter, 180.

Hunting, is free, doomed in America?
157; areas closed to, 158; regulations
for 1930-31 approved for Alaska,
trapping and, 258-259; observance of
game laws essential to future, 260-

- 261; licenses in Pennsylvania, free, 348; dog hints, 350; accidents, 371-375.
- Hurley, John F., 354.
- Hydrobiological survey of the Hopkins Marine Station, 35-39; 120, 121.
- Hyperprosopon agassizi*, 140.
- argenteum*, 142.
- Hypomesus olidus*, 131.
- pretiosus*, 130, 131.
- I
- Ibex, 259.
- Idaho, 269.
- Imperial Fisheries Institute, 78.
- Importations of game birds, 171.
- Income, statement of, 88, 195, 280, 384.
- In memoriam.
- William Herring Armstrong, 46-47.
- Edward D. Ricketts, 160.
- Alan G. Curry, 246.
- G. O. Laws, 333-334.
- Insect, help wanted in protecting wild life from, 66-67.
- International Association of Game, Fish and Conservation Commissioners, 47, 58.
- International Fisheries Commission, 319.
- International Pacific Salmon Federation, 262.
- Izaak Walton League of America, 47, 74, 159, 178, 182, 246, 336, 347.
- J
- Jacksnipe, 163.
- Japan studies fish boat types, 78.
- Jay, blue, 342-343.
- Jensen, Aage J., 190.
- Jessee, Ray E., 354.
- Jetty work progressing, 244.
- Jewfish, 251.
- Jolly, Theodore, 262.
- Jonkers, Paul, 86.
- Jordan, David Starr, 53, 150.
- Jost, William P., 48.
- Journal*, 60.
- Journal of Mammalogy*, 63.
- K
- Kalmbach, E. R., 257.
- Kamurie, T., 269.
- Kauffman, Earl R., black bass fishing tackle—using the right tackle is more than half of angling pleasure, 293-296.
- Keller, V. E., 287.
- Kellogg, Charles W., 282.
- Kellogg, Remington, 54.
- Kellogg, W. W., bird sanctuary, 348.
- Kibbe, Bessie W., 361.
- Killdeer, 360.
- King, Harry, 69.
- Kingfish and queenfish in the San Pedro wholesale fish markets, proportion of, 187-188.
- Kingfisher, 350.
- Kings River Canal and Irrigation Company, 182.
- Kipp, Duane H., 179.
- Klamath River, sportsmen defend, 52.
- Knot, 353.
- Koppel, I. L., 367.
- KRF, 72.
- L
- Lake Miraflores, 62, 63.
- Lake States Forest Experiment Station, 179, 261.
- Lam, Hock F., 33.
- Lamb, Frank, 248.
- Lambson, G. H., 3, 6.
- Langford, K. K., 69.
- Lansing, 54.
- Law, conservation, provide ample protection for abalone, 13-15; game, abstracts 51; will codify game, 84-85; enforcement, cooperation in, 170-171; necessary, 176; beneficial effect of federal, 178; essential to future hunting, observance of, game, 260-261.
- Lawyer, George A., 47.
- Ledshaw, Charles W., 364.
- Legendre, Morris, 257.
- Leighton, F. W., 49.
- Leicconi, Henry, 69.
- Leopold, Aldo, 47, 177.
- Lewis, J. C., 3, 4, 6.
- License, the proposed tourist angler, 245-246; loaning of decried, 246.
- Deer tag, 262.
- Hunting, 169; in Pennsylvania, free, 348.
- Trapping, 345.
- Lick Observatory, 284.
- Life history notes, 79-83, 183-184, 265, 266, 366-368.
- Lily-iron returns to Monterey Bay—shark fishing recommences on a harpoon basis, 143-152.
- Limit, who is going to enforce the bag, on ducks, 159.
- Lindley, Albert, 49, 241.
- Lindner, Milton, 145, 150.
- Lindner, M. J., 38, 358.
- Lindner, Milton J., luminescent fishing, 237, 240.
- Lindner, M. J., and E. C. Scofield, preliminary report of the early life history of the California sardine, 120-124.
- Lions, mountain, not wholly responsible for loss of deer, 253.
- Little, Robert J., 68, 70, 339, 355.
- Lizard fish, 77.
- Lloyd, Hoves, 58.
- Lobster, 163.
- Lois*, -s., 136, 138.
- London, Taylor, 157.
- Lophortyx californicus*, 166, 335.
- californicus vallicola*, 166.
- gambeli*, 166.
- Lorenz, 268.
- Love, Charles R., elk thriving in Shasta County, 82.
- Lucas, John, 69.
- Luchese, G., 361.
- Ludlum, Roy E., 357.
- Luminescent fishing, 237-240.
- Lutenegger, A., 287, 288.
- Lyons, S. J., 262.
- M
- Mabel, 77, 145, 269.
- Macaulay, E. L., 8, 48, 354.
- Mackerel, 37, 71, 77, 238, 328, 359; during sardine season at San Pedro, canning of, 189; Spanish, 189; French, 217-221; published, studies in, 369.
- Mackie, W. W., wild rice for wild ducks, 201-204.
- Maddox, Coburn F., a shocking fish tale—electrocuted tuna easily landed, 136-139.
- Mangum, Ross, 287.
- Marshall, John, 3.
- Marten, 164.
- Pine, 163, 350.
- Martin, Irving, 241.
- Martin, purple, 171.
- Maskey, Frank, 284.
- Massachusetts Fish & Game Protective Association, 313.
- Mathesen, Charles, 69.
- Mathews, N., 37.
- Maur, M. E., 36.
- Mayflower, 186.
- McAllister, M. Hall, 266; black brant on Tomales Bay, 265; the early history of duck clubs in California, 281-285.
- McAllister, Ward, Jr., 282.

- McAtee, W. L., 259, 351.
 McClay, Leslie L., 367.
 McClymonds, A. E., 57.
 McDermott, Forrest, 68.
 McDonald, Raymond E., 61.
 McLean, Donald D., 262, 361, 363; desert mountain sheep of Inyo mountains, 79-82; the burro deer in California, 119-129; an ethnological woodrat's nest, 368.
 McLellan, A. D., 73.
 McNary, Charles L., 256.
 McPherson, William, 282.
 McWhinney-McNary Forestry Research Act, 179.
 Meakin, Pere, 287, 289, 291.
 Meinecke, E. P., 302.
 Merenda, Frank, 287.
 Merganser, *see* duck.
 Mershan, William B., 177.
 Metzgar, Dr. Jan., 254.
 Meyer, K. F., 1, 2, 52, 285, 286, 331.
 Michigan, studies duck foods, 84; requires permit for introduced species, 84.
 Migration, of the western mourning dove (*Zenaidura macroura marginella*) in California, 183; of the Pacific halibut (*Hippoglossus hippoglossus*), review of a report on the, 318-319.
 Miller, C. R., 361.
 Miller and Lux, 365.
 Miner, A. D., 68.
 Mink, 61, 164, 258, 350.
 Minnesota and Wisconsin cooperate, 85.
 Minnow, as bait, 246; seines, illegal, 246.
 Mojarros, 189.
 Montana, bars salmon eggs as bait, 54.
Montana Wild Life, 53, 54.
 Monterey Fish Products Company, 71.
Monthly Survey, 61.
 Moody, Alden, 68.
 Moose in New Zealand, 86.
 Morris, Joe, 63.
 Morrissey, Thomas A., 357.
 Mountain lion, 164.
 Mt. Ralston Fish Planting Club, 161.
 Mudhen, 61.
 Muehlen, A., 112.
 Mullet, white, 189.
 Munson, M., 287.
 Museum of Vertebrate Zoology, 172.
 Musk Oxen, 350-351; refuge safeguarded, 179.
 Muskrat, 164.
 Mussel and clam quarantines lifted, 169-170.
 Mussolini, Benito, 52.
- N**
- Nagato*, 76, 185, 269.
 National Association of Audubon Societies, 64, 164, 348.
 National Automobile Club, 345.
 National Committee on Wild Life Legislation, 163.
 National Game Survey, 177.
 National Park Service, 172, 178, 330.
 National Park, Yellowstone, 172.
 National Rifle Matches, 71, 363.
Natural History Museum Bulletin, 184.
Nautilus, 15.
 Neale, George, 165, 167, 357, 361; fish rescue and reclamation work, 296-299.
Neptune, 76.
 Neptune Fish Products Co., Inc., 2.
 Net, lampara, in the taking of sardines, report on the relative merits and demerits of purse seines vs., 125-130.
 Dip, 133, 134.
 Surf, 131, 133, 135.
 Neustadt, J. H., 176.
 Newell, J. B., 301.
 Newsome, J. E., 157.
New Mexico Conservationist, 336.
 New Zealand Native Bird Protection Society, 62.
 New Zealand, moose in, 86.
 Nidver, H. B., 72, 186.
 Ninas, H. H., 354.
Noack vs. Zieherbach, 257.
 Norbeck, Peter S., 163, 256.
Nothura maculosa, 171.
Nocturn, 139.
- O**
- Oakland Striped Bass Club, 72.
 Ober, E. H., 168.
Odocoileus hemionus eremicus, 119.
 Oelrichs, Herman, 234.
Official Record, 343, 350.
 Oivany, Captain, 76.
Oncorhynchus tshawytscha, 51, 177.
 Opossum, 161; taken at San Diego, 183.
 Oreb, T., 269.
 Orake, 347.
 Orlock, 166.
 Orr, John K., 282.
Osmorus attenuatus, 131.
Ovalichthys, 131.
 Osprey, 83, 350.
 Otter, river, 164.
Outdoor America, 58, 86, 176.
Outdoor Life, 179.
 Ox, musk, 350-351; refuge safeguarded, 179.
 Oyster, 187; catches, 353.
- P**
- Pacific Coast Railroad, 328.
 Pacific Fisherman, 54, 346.
 Pacific Gas & Electric Company, 74, 357.
 Pacific Improvement Company, 263.
 Pacific Lumber Company, 397.
Pacific Sportsman, 169.
 Paladini, A., Company, 76, 185.
 Palometa, 189.
 Panzarotti, 132.
Paphia staminea, 250.
Paralichthys californicus, 315.
Parargyrops edata, 234.
 Parasite study is indicated, 346.
 Partridge, 312; in California, 344.
 Chukor, 174, 344, 366.
 Hungarian, 171, 174, 252, 259, 260, 263, 344; received another shipment of, 250.
 Payne, Y. T., 166.
 Peafowl, Indian, 260.
 Pearson, Mrs. J. M., 363.
 Peck, C. R., 69.
 Pegler, Ernest, albacore off Oregon and Washington coasts, 76.
 Pennsylvania, studies deer, 84; acquires lands, 249-250.
People vs. Cain Irrigation Company, 74.
People vs. Glenn-Colusa Irrigation District, 244-245.
People vs. Stagnaro, 357.
Peralta, 63.
 Perch, 113, 116, 118, 297, 325, 326, 328; salt water, in the San Pedro fish markets, 139-143.
 Pike, 187.
 Surf, 77.
 Permanent Wild Life Protection Fund, 332.
 Personnel, changes in, 330.
 Petri, Frank, 266.
 Pettit, Fred, 47.
 Phalarope, 353.
Phanerodon atripes, 77.
furcatus, 142.
 Pheasant, 163, 248, 259, 312, 349, 355, 366; study of, foods, 58-59; propagation in two states, 85; Michigan has good hatch, 86; planted in Modoc County, 162-163; banding gives valuable information, 176; and quail,

- feeding young, 227-230; seek better protection for, 252; nest in Arroyo Grande Valley, 265; month old, 344; what some eat, 347.
- Brown-eared, 260.
- Cheer, 260.
- Elliot's, 260.
- Golden, 260.
- Japanese, 260.
- Lady Amherst, 260.
- Mongolian, 174.
- Reeves, 260.
- Ring-necked, 259, 260, 266, 349.
- Phillips, J. B., 237, 240; how abalones are sometimes planted, 76-77, 185; sardine boat lost, 77; wolf fish captured at Monterey, 267-268; large black sea bass caught in Monterey Bay, 268; 1929-30 season disastrous for Monterey sardine fleet, 268-269; change in fishing for Monterey sardines, 269-270.
- Phillips, John C., 47, 313.
- Photopolus, Gust, 69.
- Pigeon, 350, 353.
- Band-tail, cause damage in vineyard, 243.
- Passenger, 307, 314.
- Wood, 260.
- Pilenburg, A. H., 60.
- Pittman, Key, 256.
- Pittsburg Evening Dispatch*, 53.
- Planting fish, in the high Sierra in 1929, 8-12.
- Plover, 353.
- Poison of the *Bacillus botulinus*, duck disease caused by the, 285-286.
- Pollock, 118.
- Pollution problems and ducks, 351-352.
- Pompano, Mexican, 189.
- Poolsen, Sam, 69.
- Post, Fred, 69.
- Pratt, George D., 64.
- Preliminary report of the early life history of the California sardine, 120-124.
- Presho*, 76.
- Pritchard, H. I., 157.
- Proctor, Jim, 70.
- Promotion News Bulletin*, 60, 62.
- Protection, conservation laws provide ample, for abalones, 13-15; a dialogue on fish and game, 42-45; grouse respond to, 79.
- Public Opinion*, 58.
- Pugh, P. B., 82.
- Pyle, A. L., 70.
- Q**
- Quail, 163, 248, 346, 355, 363; California, elected as state bird, 166; refuges urged, establishment of, 166-167; valley, hunters find scarce, 173-174; feeding young, and pheasants, 227-230; refuges basis of experiment, 244; refuges urged, 249-250; experiment, 348.
- Button, 171.
- California Valley, 335.
- European, 260.
- Gambel, 355.
- Mountain, 169, 311.
- Valley, 169, 311, 349.
- Quarantines, lifted, mussel and clam, 169-170.
- Queenfish in the San Pedro wholesale fish markets, proportion of kingfish and 187-188.
- Quinn, I. T., 47.
- Quinnat, 180.
- R**
- Rabbit, Cottontail, 163.
- Jack, 364.
- Raccoon, 164.
- Radeliffe, Lewis, 186.
- Radeliffe, William, 369.
- Radio, KRE, 72.
- Rail, 333.
- King, 61.
- Sora, 353.
- Rambling thoughts of a perverted Britisher, 311-314.
- Ranch, Haslam, 120.
- Rathbun, Sam, 47.
- Redington, Paul G., 47, 65, '66.
- Reduction, menace of floating plants, 62-63.
- Refuge, game, first purchased, 46; game, survey of, in other states, 48; the new Los Banos, 164-165; establishment of quail, urged, 166-167; fish, in Wyoming, 179; musk ox, safeguarded, 179; basis of experiment, quail, 244; quail, urged, 249-250; game, preserves and sanctuaries, 307-311; migratory bird, 352-353.
- Clear River Marsh migratory bird, 48.
- Breckenridge game, 263.
- Los Banos, 46, 362, 363, 365, 366.
- McIlhenny, 169.
- Tule Lake bird, 48.
- Regulations under which commercial duck clubs may be operated, 173.
- Reitell, Charles, 64.
- Report, 87-105, 193-199, 273-280, 376-384; of the early life history of the California sardine, 120-124; on the relative merits and demerits of purse seines vs. lampara nets in the taking of sardines, 125-130.
- Research, conservation and control activities of the Bureau of Biological Survey, 65-66.
- Resource, fishing, methods of conserving, 186-187.
- Results of feeding experiments with trout fry, 1-8.
- Review, of a report on the migrations of the Pacific halibut (*Hippoglossus hippoglossus*), 318-319.
- Rich, Willis H., 55.
- Richards, W. W., 207, 284; here's the proper term to apply, 169.
- Richfield Oil Company, 165.
- Ricketts, Edward D., in memoriam, 160.
- Rights of the amateur sportsman, 107-111.
- Riley, Ray L., 165.
- Robalo, 189.
- Robertson, A. Willis, 47.
- Robertson, John McB., migration of the western mourning dove (*Zenaidura macroura marginella*) in California, 183.
- Roccus lineatus*, 286.
- Rodgers, E. C., 362, 363.
- Rogers, Carleton, 358.
- Roncador, 189.
- Royall, J. B., 47.
- Ryder, William, 363.
- S**
- Salema, 189.
- Salmo irideus*, 168.
- pleuriticus*, 183.
- shasta*, 168.
- Salmon, 38, 70, 326; bulletin published, 51-52; Montana bars eggs as bait, 54; and trout, new studies planned on, 244; for 1929, California, 267; spawning in drainage canals in the San Joaquin valleys, 270; Alaska red, investigated, 55-56; Atlantic, 181; more for California, 159.
- Chinook, 77.
- Quinnat, 70, 181.
- Salt water perch in the San Pedro fish markets, 139-143.
- Salton Sea bass, 338; striped bass introduced in, 51.

- San Carlos Canning Company, 359, 360.
 San Clemente, whaling off, 54.
 Sanctuary, assure a future for state bird, 335-336; bird, on golf courses, 348; in Michigan, 348-349.
 Sandanger, P., 268.
 Sandbar, remove, 338.
 Sanderson, E. V., 62.
 San Diego County, biological survey of the lakes, reservoirs and streams of, 111-118.
 San Diego Marine Construction Company, 180, 186, 244.
 San Diego Museum of Natural History, 183-184.
 San Diego Union, 55, 167.
 San Diego Water Impounding System, 167.
 Sandpiper, 350, 353.
 San Juan, 268.
 San Xavier Company, 71.
Sardina caerulea, 131.
 Sardine, 37, 38, 63, 70, 131, 237, 238, 290, 357; scarcity of small, 75; boat lost, 77; California, preliminary report of the early life history of, 120-124; report on the relative merits and demerits of purse seine vs. lampara nets in the taking of, 125-130; season at San Pedro, canning of mackerel during, 189; fishing at San Diego, 268; fleet, 1929-30 season disastrous for Monterey, 268-269; change in fishing for Monterey, 269-270; fishing industry, 270.
 Sardine Cannery Association, 357.
 Sargo, Mexican, 189.
 Saturday Evening Post, 248.
 Save-the-Redwoods League, 304.
 Schaefer, Max M., 148.
 Schalchli, H. B., 355.
 Scheffer, Theodore H., 65.
 Schneider, J. C., 262.
 Schultz, Leonard, 76.
 Science, 53, 54, 84, 179, 350.
 Scofield, E. C., 36, 37, 38, 248, 358, and M. J. Linder, preliminary report of the early life history of the California sardine, 120-124.
 Scofield, N. B., 244; conservation laws provide ample protection for abalones, 13-15; commercial fishery notes, 75-78, 185-191, 267-272, 369-370; new commercial fisheries patrol boat, 186.
 Scofield, W. L., 187, 271, 240; scarcity of small sardines, 75.
 Scott, M., 287.
 Screen case in court, important, 244-245.
 Scripps Institution of Oceanography, 36.
 Scudder, Hubert B., 48.
 Sea lion, 358; protected in Alaska, 190-191; some notes on the food of seals and, 191.
 Seal, fur crop, 62; and sea lions, some notes on the food of, 191.
 Seale, Alvin, Montana grayling in California, 51.
 Sears, A. W., 69.
 Season, antelope, in Wyoming, 85; elk, Colorado opens on, 85-86; at San Pedro, canning of mackerel during sardine, 189.
 Seeley, Captain, 139.
 Seen Kow, a regal soup stock, 23-35.
 Seizures, of fish and game, 89, 192, 273, 377.
 Sellmer, Walter B., 63, 72, 354; a dialogue on fish and game protection, 42-45; in memoriam, William Herring Armstrong, 46-47.
Scrippus politus, 187.
 Severin, H. C., 58.
 Shad, 77, 130, 187, 296, 359.
 Shark, bull, 137, 138; fishing recommences on a harpoon basis—the illy-iron returns to Monterey bay, 143-152.
 Shasta river, close, 338.
 Shaw, Paul A., 2, 72, 363.
 Shebley, W. H., 2, 51, 361.
 Sheep, desert mountain, of Inyo mountains, 79-82.
 Shocking fish tale—electrocuted tuna easily landed, 136-139.
 Shrimp, 187.
 Sibeck, Charles, 180.
 Sierra, fish planting in the high, in 1929, 8-12.
 Silva, Guy, 136.
 Size, at first maturity of the White sea bass (*Cynoscion nobilis*), 319-323.
 Skin, worth more than \$4,500,000 shipped from Alaska in 1929, 258.
 Skipjack, see tuna.
 Skogsberg, Tage, hydrobiological survey of Hopkins Marine Station, 35-39.
 Skunk, 164.
 Sausser, T. F., 183.
 Smaller fishing ports of central California, 324-329.
 Smelt, 131, 326, 328.
 Jack, 139, 132.
 Surf, 130.
 Smith, C. S., 55.
 Smith, Emily, 301.
 Smith, Harry B., 339.
 Snapper, black, 189.
 Silver, 189.
 Striped, 189.
 Snipe, 350, 353.
 Snyder, Bert, 358.
 Snyder, J. O., 244, 338, 358.
 Soto, Earl, 330; doe has antlers, 367.
 Southern Pacific Company, 172, 283.
 Spargo, William, 82.
 Sparling fowl, 61.
 Sparrow, 350.
 English, 171; control, 352.
 Spencer, John, 366.
Spinichus starksi, 131.
thaleichthys, 131.
 Sports *Afield*, 62.
 Sportsmen, associated, convention of, 48-49; advocate full regulatory powers, 49; creed, 52-53; defined Klamath River, 52; the rights of the amateur, 107-111; what is a, 177-178; view of the duck situation, 248-249; true, 338-339.
 Stagnaro, People vs., 357.
 Stanford, Lucina, 37.
 Stanley, A. J., 265.
 Stanovich, A., 268.
 Starling, European, 171.
 State bird, California quail, selected as, 166.
 State Fair, 336.
 State Highway Commission, 340.
 Stearn, R. E. E., 15.
 Steedhead, 37, 262.
 Steen, E. P., 163.
 Steinhart Aquarium, 51.
Stenolepis gigas, 268.
 Stevenot, Fred G., 48, 157, 165, 241.
 Stilt, 353.
 Black-necked, 365.
 Stinnett, James L., 250.
 Stockton Record, 241.
 Stream, closed to fishing, 1930, 160-161.
 Sturgeon, 187.
 Summer, E. L., Jr., 172, 182, 263, 361, 363.
 Sunfish, 297.
 Survey, agricultural settlement in Canada and waterfowl, 58; biological, of the lakes, reservoirs and streams of San Diego county, 111-118; a biological, of Clear Lake, Lake county, 221-227; proposed, western fish, 172.
 Swan, 165, 353; do not damage duck food plants, 66.

Swordfish, photographed, 56; be protected, should the, 185.
Synodus lucioceps, 77.

T

Tahoe fishermen, no, 339.
Tad, 189; and carp, 234-237.
Talbot, L. O., 354.
Talbot, W. S., 169.
Teal, cinnamon, 168.
 Brown-winged, 61, 165.
Tern, 350.
 Arctic, 179.
Texas Company of California, 73.
Thalichthys pacificus, 131.
Thelon Game Sanctuary, 178.
Thompson, W. P., 19, 20, 120, 121, 318.
Thynnus thynnus, 231.
Tiamaou, 171.
Tireia stultorum, 75, 189.
Tocichthys clivicus, 140.
Toms, Webb, 68, 112.
Tonkin, George, 48, 169.
Totuava, 23, 189; by trains, transporting, 186.
Touring Topics, 74.
Trap, new leaflet tells how to make a cat, 261-262.
Trapping and hunting regulations for 1930-31 approved for Alaska, 258-259.
Trout, 54, 160, 112, 113, 114, 163, 352; results of feeding experiments with, fry, 1-8; club plants more than a million, 161-162; Colorado river, captured in Imperial valley, 182; controversy, experimental test of size of, 244; planned, new studies on salmon and, 244; tagging report, Michigan, 254-255; gives record number of eggs, large, 250-251; save young, 340.
 Black-spotted, 70, 356.
 Brown, 118.
 Cutthroat, 70, 339.
 Eastern brook, 70, 356.
 German brown, 70, 356.
 Golden, 8, 9, 10, 11, 12, 70, 356.
 Loch leven, 10, 70; eggs, collection of, 178-179, 356.
 Rainbow, 8, 70, 116, 356; travels 140 miles in 60 days, 61.
 Steelhead, 70, 116, 163, 173, 175, 356; Washington protects, 86.
True, Gordon, Jr., 167, 182, 361, 363.
Tule Belle, 284.
Tuna, 71, 75, 251; electrocuted, easily landed—a shocking fish tale, 136-139; a bibliography of the, 370.
 Bluefin, 358.
 California bluefin, 231-233.
 Skipjack, 71.
Tuna Packers Association, 357.
Turkey, wild, 72, 344, 366.
Turnstone, 353.
Tuxsario, Ben, 287.
Two Brothers, 146, 147, 149, 269.

U

Umberto, Nobile, 125.
Unglish, W. E., the chukor or partridge, 174.
United States Arsenal, 281.
United States Bureau of Biological Survey, 47, 62, 159, 169, 172, 177, 178, 179, 183, 243, 255, 257, 258, 259, 260, 261, 332, 334, 350, 351, 352, 353, 361, 364; research, conservation and control activities of the, 65-66.
 Entomology, 57, 67, 343.
 Fisheries, 36, 39, 52, 62, 85, 159, 172, 186, 191, 255, 262, 315; experimental stations, 2.
United States Coast and Geodetic Survey, 36.

United States Department of Agriculture, 65, 66, 67, 84, 159, 179, 255, 257, 259, 260, 261, 332, 343, 352.
 Commerce, 255.
United States Forest Service, 157, 162, 163, 172, 178, 241, 251, 261, 302, 304, 351.
University of California, 36, 167, 171, 172, 182, 212, 330.
 Cornell, 346.
 Harvard, 36, 261, 179.
 Pennsylvania, 64.
 Stanford, 13, 16, 37, 38, 39, 76, 150, 244, 262, 338.
 Washington, 261
 Yale, 39.
Urtica dioica, 133.
Utah Construction Company, 366-367.

V

Van Roekel, Henry, 2, 331.
Violator, fined \$2,000, 86.
Vlahov, M., 269.
Vogelsang, Charles A., 157.
Volunteer deputies, 263.
Von Arx, Victor, 69.

W

Wahoo, 77, 189.
Walcott, Frederic C., 256.
Walford, Lionel A., tad and carp, 234-237.
Waller, L. W. T., Jr., 71.
Walton, Izaak, 51.
Ward, L. T., 69, 180.
Warden, California fish and game, today and yesteryear, 204-210; game, lose lives doing duty, 247-248; volunteer, hold convention, 241.
Warren, Mrs. Frank M., 352.
Waterfowl, agricultural settlement in Canada and the, survey, 58; bag limit reduced, 159; collect lethal doses of spent shot, shallow-feeding, 257-258.
Wave, 284.
Weasel, 164.
Weekly Bulletin, 170.
Weekly Trinity Journal, 334.
Weems, Ray O., 47.
Weisser, Julia, 183.
Welch, Walter R., 48, 70, 72, 157, 166, 242, 354; the rights of the amateur sportsman, 107-111; California fish and game wardens—today and yesteryear, 204-210; game refuges, preserves and sanctuaries, 307-311; sanctuaries assure a future for state bird, 335-336.
Walter R. Welch, 169, 354.
West Coast Fisheries, 187.
West, George E., 4.
Western Association of Game Commissioners, 159.
Western Bird Banding Association, 183.
Western Out-of-Doors, 57, 246.
Western Pacific Railroad, 367-368.
Whale, royal decree saves, 54-55.
Whaling off San Clemente, 54.
Wheeler, Genevieve Corwin, studies in mackerel fishing, 369; an English view of fishing, 369.
White, Stewart Edward, 248.
White Wings, 284.
Whitefish, 187.
Whitehead, S. S., 188, 271, 319; California bluefin tuna, 231-233.
Wild cat, 164, 350, 364.
Wild life, in forests, biologists to study, 179, a national policy adopted, 177.
Wild rice for wild ducks, 201-204.
Willet, 353.
Williams, E. L., 363.
Williams, W. G., 189.
Wilson, Leo K., 330, 361; editor's policy, 330.
Wing, Charles B., 300.
Wireless, 76.
Wirt, William, 307.

- Wisconsin, science aids conservation in, 84; and Minnesota cooperate, 85; favors duckless Wednesday, 86.
- Wolf, 259.
- Wolf fish, captured at Monterey, 267-268; found on Humboldt bay beach, 370.
- Woodcock, 353.
- Woodrat nest, an ethnological, 368.
- Wood tick, 343-344.
- Wren, house, 171.
- Wueste, R. C., 112.
- Y
- Yankee Jim Allotment, 184.
- Year Book, 342.
- Yee Sing Chong Company, 34.
- Yee, Stephen, 34.
- Yellowtail, 189, 251, 328, 353.
- Yerkes, Nancy, 301, 361.
- Yosemite School of Field Natural History, 301.
- Yoshia, K., 69.
- Young, C. C., 165, 330.
- Young, Sanborn, 48.
- Z
- Zellerbach, I., 47, 49, 157, 165, 173, 241, 244, 310.
- Zellerbach, Noack vs., 357.
- Zenaidura macroura marginella* in California, migration of the western mourning dove, 183.

O

Bureau of Commercial Fisheries

BUREAU OF PATROL

L. MACAULAY, Chief of Patrol-----San Francisco
 P. Alfred, Assistant Chief of Patrol-----San Francisco
 S. Bauder, Assistant Chief of Patrol-----Los Angeles
 Walter R. Welch, Captain, In Charge Volunteer Wardens-----San Francisco

SAN FRANCISCO OFFICE

W. J. Black-----San Francisco
 L. Bundoek-----Hollister
 L. Bundoek-----Oakland
 S. Clark-----Niles
 K. Duncan-----Concord
 E. Holladay-----San Jose
 M. F. Joy-----San Francisco
 William F. Kaliher-----Monterey
 McPherson Lough-----Palo Alto
 Forrest J. McDermott-----Santa Cruz
 C. R. Peek-----San Francisco
 Fred Post-----Salinas
 J. C. Schneider-----King City
 J. P. Vissiere-----Watsonville

H. WILLARD-----Sacramento Office
 E. I. Hiscoc-----Nevada City
 Nelson Poole-----Sacramento Office
 Albert W. Sears-----Placerville
 Chas. Slbeck-----Sacramento Office
 R. L. Sinkey-----Woodland

M. LIPPINCOTT

-----Eureka
 Scott Feland-----Fortuna
 Wm. J. Harp-----Arcata
 John Hurley-----Crescent City
 Ed. Clements-----Klamath
 J. Yates-----Eureka
 Ray Diamond-----Weaverville

GILLOON

-----Mt. Shasta
 R. Love-----Redding
 Bruce Hammack-----Yreka
 A. A. Jordan-----Alturas
 Fred Starr-----Macdoel

J. CARPENTER

-----Maxwell
 Roy W. Anderson-----Orland
 Lee Atkinson-----Arbuckle
 Harry N. Brittan-----Red Bluff
 W. Dinsdale-----Yuba City
 Taylor London-----Oroville
 A. D. Miner-----Gridley
 A. J. Stanley-----Chico

D. DONDERO

-----Lakeport
 Earl Caldwell-----Covelo
 Ovid Holmes-----Fort Bragg
 Geo. N. Johnson-----Napa
 Earl Macklin-----Ukiah
 R. C. Marshall-----Willits
 A. Mitchell-----Point Arena
 K. J. Ransdell-----Calistoga

HENRY LENCIONI

-----Santa Rosa
 F. H. Groves-----Cloverdale
 E. Vox Arx-----Sebastopol

SEPH H. SANDERS

-----Truckee
 J. O. Fisher-----Susanville
 W. I. Long-----Westwood
 E. Mercer-----Portola
 T. Schumacker-----Quincy

J. E. NEWSOME

-----Newman
 H. E. Black-----Madera
 C. L. Brown-----Mariposa
 C. L. Gourley-----Gustine
 L. W. Longeway-----Sonora
 Geo. W. Magladry-----Modesto
 R. C. O'Connor-----Merced
 H. I. Pritchard-----Atwater
 R. A. Tinnin-----Newman

J. O'CONNELL

-----Stockton
 C. M. Bouton-----San Rafael
 Wm. A. Clark-----Vallejo
 Alvin Granstrom-----Ryde
 Wm. Hoppe-----Walnut Grove
 Bert F. Laws-----San Rafael
 Geo. R. Smalley-----Tracy
 Lee Straight-----San Rafael

E. W. SMALLEY

-----Hanford
 F. A. Bullard-----Reedley
 Ray C. Ellis-----Fresno
 H. S. Vary-----Coalinga

O. P. BROWNLOW

-----Visalia
 A. R. Ainsworth-----Taft
 Lester Arnold-----Bakersfield
 Ray J. Bullard-----Porterville
 Vernon R. Sutton-----Kernville
 Roswell C. Welch-----Tehachapi
 E. C. Vail-----Dinuba

LOS ANGELES OFFICE

R. E. Bedwell-----Ventura
 Frank A. Carrillo-----Brawley
 C. S. Donham-----Escondido
 Walter R. Emerick-----Santa Paula
 E. H. Glidden-----San Diego
 J. H. Gyger-----Perris
 T. R. Jolley-----Idyllwild
 K. K. Langford-----Victorville
 R. J. Little-----Banning
 W. C. Malone-----San Bernardino
 Webb Toms-----San Diego

L. T. WARD

-----Santa Barbara
 W. C. Blewett-----Arroyo Grande
 Walter Goff-----Paso Robles

E. H. OBER

-----Big Pine
 A. F. Crocker-----Bridgeport
 W. S. Talbot-----Bishop
 J. W. Thornburg-----Markleeville
 C. J. Walters-----Independence

LARUE F. CHAPPELL

-----Pasadena
 W. E. Adkinson-----El Toro
 E. A. Chan-----Long Beach
 L. W. Hare-----Santa Ana
 R. J. Sadler-----Venice
 C. Savage-----Ontario
 C. L. Towers-----Los Angeles

Launch Patrol

M. Bouton-----Launch "Quinnat," San Rafael
 A. Clark-----Launch "Hunter," Vallejo
 Wm. Hoppe-----Launch "Rainbow," Walnut Grove
 Stockton-----Launch "Walter R. Welch," Stockton
 Clements-----Launch "Silver-side," Klamath

Captains indicated in capitals.

CALIFORNIA STATE PRINTING OFFICE
SACRAMENTO, 1930

E. R.