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# ANNUAL REPORT *hold for sent*

OF THE

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## NEW JERSEY BOARD OF FISH

AND

## GAME COMMISSIONERS



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FOR THE

FISCAL YEAR COMMENCING JULY 1, 1928

AND ENDING JUNE 30, 1929

STATE OF NEW JERSEY  
BOARD OF  
FISH AND GAME COMMISSIONERS  
TRENTON

LETTER OF TRANSMITTAL

*To His Excellency, Morgan F. Larson, Governor, and Members of the Senate and General Assembly of the State of New Jersey:*

As required by law, we submit herewith the Annual Report of the work of the Board of Fish and Game Commissioners for the fiscal year covering the period from July 1, 1928, to June 30, 1929.

Very respectfully,

H. J. BURLINGTON, *President,*  
CHAS. F. HUNTER, *Vice-President,*  
LEWIS SPINKS, *Treasurer,*  
ALEX. H. PHILLIPS,  
GEORGE C. WARREN, JR.,  
HARRY M. ARMSTRONG,  
JAMES R. HENSLER,  
BENJAMIN W. COOPER,  
GEORGE S. McCARTY,

*Commissioners.*

**List of Fish and Game Commissioners Holding Office  
at the Date of This Report  
June 30, 1929**

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H. J. BURLINGTON, <i>President</i> .....	Montvale
CHARLES F. HUNTER, <i>Vice-President</i> .....	Palisade
LEWIS SPINKS, <i>Treasurer</i> .....	Jersey City
ALEX. H. PHILLIPS.....	Princeton
HARRY M. ARMSTRONG.....	Jersey City
GEORGE C. WARREN, JR.....	Summit
JAMES R. HENSLER.....	Toms River
GEORGE S. MCCARTY.....	Newfield
BENJAMIN W. COOPER.....	Moorestown

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WALTER H. FELL, *Secretary*

Office of the Board, State House, Trenton, N. J.

- DUNCAN DUNN, *Superintendent of Game Farms*, P. O. Hackettstown.
- MALCOLM DUNN, *Assistant Superintendent of Game Farms*, Forked River.
- CHARLES O. HAYFORD, *Superintendent of Fish Hatchery*, Hackettstown.

**\*List of Fish and Game Wardens Holding Commissions  
at the Date of This Report**

STRATTON, JAMES M., <i>Protector</i> .....	Long Branch
CUDNEY, HARRY E., <i>Assistant Protector</i> .....	Hackettstown
*MATHIS, HOWARD Z., <i>Assistant Protector</i> .....	Mount Holly
DAVISON, ARTHUR, <i>Assistant Protector</i> .....	Belmar
	(commenced July 1, 1929)
KELLEY, THOMAS, <i>Assistant Protector</i> .....	Jersey City
	(commenced July 1, 1929)

ASHWORTH, CHRISTOPHER .....	Sussex
BAILEY, JOHN B. ....	Washington
BAKER, EDWIN .....	Haleyville
BERNIUS, HENRY F. ....	Newton
*BOBERA, MICHAEL .....	Chatsworth
CARSON, ROY R. ....	Medford
COX, JOHN F. ....	Washington
*CREELY, AMOS (commenced July 1, 1929).....	Beach Haven
CROWLEY, HAROLD M. ....	Tuckerton
DACKERMANN, FRED H. ....	Elizabeth
EGGERT, JOSEPH S. ....	Perth Amboy
EVERNHAM, JAMES H. ....	Toms River
GRAHAM, JOHN W. ....	Swedesboro
HALL, FRED J. ....	Montclair
HALL, GERVAS I. ....	Salem
HILL, CHARLES C. ....	Somerville
HUGG, JOHN R. ....	Jamesburg
*LAWRENCE, HARRY R. ....	Newfoundland
LODER, WILLIAM B. ....	Egg Harbor City
LYELL, M. HOWARD (commenced July 1, 1929).....	Freehold
MIZELL, CHATHAM .....	Elmer
MOTTRAM, FRANCIS .....	Newfoundland
MURROW, THOMAS .....	West Berlin
NOLAN, THOMAS F. ....	Trenton
PARK, JOHN J. ....	White House Station
PAUL, GEORGE R. ....	Bernardsville
PHIFER, GEORGE W. ....	Millville
RUTH, ALBERT J. ....	Woodcliffe Lake
*SMALL, OTIS C. ....	Hammonton
*SMALL, WILLIAM H. ....	Englewood
STEEL, WILLIAM .....	Cape May Court House
TRELOAR, JAMES H., JR. ....	Pompton Lakes

**\*Changes since July 1, 1929:**

- HOWARD Z. MATHIS, residence, Collingswood.
- MICHAEL BOBERA, not on roster of wardens.
- AMOS CREELY, not on roster of wardens.
- HARRY R. LAWRENCE, residence, Mendham.
- OTIS C. SMALL, deceased.
- WILLIAM H. SMALL, residence, Teaneck.

# GENERAL

## PROGRESS STATEMENT

The following shows progress made by the State Board of Fish and Game Commissioners in the propagation and distribution of fish and game in New Jersey for the past two years against the two previous years.

### GAME DISTRIBUTION

	<i>Pheasants</i>	<i>Rabbits</i>	<i>Hungarian Partridges</i>	<i>Quail</i>
1925 to 1927.....	34,730	24,701	1,355	188
1927 to 1929.....	44,296	30,033	431	738

The above pheasant distribution for 1927 to 1929 does not include the number of pheasants hatched by the public from eggs furnished by this Department during the spring of 1929.

The market value of game distributed 1927 to 1929 as shown above would be \$184,353.11.

### FISH DISTRIBUTION

	<i>Trout Over 6"</i>	<i>Trout Under 6"</i>	<i>Bass</i>	<i>Perch Fry</i>	<i>Shad Fry</i>	<i>Sunfish</i>	<i>Other Fish</i>
1925 to 1927... ..	548,880	1,406,710	244,250	140,000,500	40,000	607,600	96,159
1927 to 1929... ..	745,177	*647,450	475,600	203,200,275	3,808,000	984,750	114,678

The market value of fish distributed 1927 to 1929 as shown above would be \$359,421.17.

\*It will be noted that while the distribution of trout under 6" for the past two fiscal years is less than for the previous two years the distribution of trout over 6" was increased practically 200,000. We are concentrating on supplying more of the larger fish every year, which we find to give satisfactory results to the angler.

Included in the distribution of game for the fiscal year 1928-29 were 5,659 pheasants purchased at a cost to the Commission of..... \$20,364.40 and 14,921 rabbits at a cost of..... \$18,184.89

We also purchased for a new strain of blood and propagating purposes and sent to the Farms 1,335 pheasants at a cost of..... \$4,668.85

### CENSUS OF FISH, GAME AND VERMIN TAKEN IN 1926 AND 1927

	1926	1927
Pheasants .....	75,599	92,728
Rabbits .....	466,563	489,465
Grouse .....	11,919	10,113
Quail .....	68,246	76,681
Woodcock .....	12,241	9,915
Geese .....	4,841	6,980

Ducks .....	63,254	64,404
Trout .....	205,994	230,241
Bass .....	111,841	112,432
Pickerel .....	177,129	196,361
Cats .....	11,668	11,560
Weasels .....	4,352	4,679
Foxes .....	728	734
Deer .....	1,730	1,790

The estimated value in dollars and cents of the game and fish reported taken above in 1927 is \$1,250,000.00. This does not include fish and game taken by the farmer or property owner on his ground, who does not require a license.

To the hunter or fisherman the thrill of his sport is not so much the money value as the matter of pursuit, the testing of his skill against wild life and the opportunity to be out doors. However, the finances of hunting and fishing and the value of wild life make an interesting chapter. It appears that for the calendar year of 1927, the money return to the State from our wild life was \$7,501,027.23, divided as follows:

Market value of game and fish killed.....	\$1,250,000.00
Economic value of birds .....	1,282,458.13
Money return to the State Government for licenses..	279,144.10
Expended by sportsmen for outfit, etc.....	4,689,425.00

#### MARKET VALUE OF GAME KILLED

W. C. Henderson, Associate Chief of the U. S. Bureau of Biological Survey, Department of Agriculture, says that a number of states average seven cents per acre as the value of meat, fur and feather of wild animals and birds.

New Jersey from actual count shows that the meat value of fish, game and animals, not counting the fur amounts to \$1,250,000.00 or about 24 cents per acre, showing the rich wild life resources enjoyed by the sportsmen of New Jersey.

#### ECONOMIC VALUE OF WILD BIRDS AT TEN CENTS PER ACRE

The economic value of wild birds through food habits, destroying insects, of which game birds are a very small proportion, is great.

The breeding population of birds in the eastern states averages about one pair to the acre, and migratory species passing through a state at least equals this number, but as they are only in a territory about a month on each of their flights their value can be estimated at only one-third of breeding birds which are with us at least six months.

Take a nominal valuation of the service of one bird in the destruction of insects for a season, say ten cents, and in many cases it must be more than this; two birds each to New Jersey's 4,809,218 acres of land surface gives 9,618,436 breeding birds, and their economic value at ten cents each is

\$961,843.60. Adding one-third of that amount, \$320,614.53 as the value of migratory birds we have a grand total of \$1,282,458.13.

#### REVENUE TO STATE GOVERNMENT

In the calendar year of 1927 there were 189,931 hunting and fishing licenses of all kinds issued which gave the State a revenue of \$279,144.10. This amount contributed to the administration of the Board, and it must be noted that our Board does not receive any revenue from citizens who do not hunt or fish, and that the Board is self-sustaining on its income.

#### EXPENDED BY SPORTSMEN

New Jersey attracts thousands for its climate, scenery and salt water angling. No license is needed for angling in our tidal waters. It is believed to be conservative to estimate that the hunters and the fresh water fishermen will each expend on an average \$25.00 per year for guns, ammunition, fishing tackle, clothing, railroad, gasoline, guides, boats, board, etc. Excluding the 2354 woodcock hunters, who require a special license in addition to the regular license, we find on this basis that from the 187,577 licensees there was put in circulation \$4,689,425.00 in 1927.

#### COMMERCIAL 1929

"The Fishery Industries of the United States" published by the U. S. Department of Commerce for 1927 says the fishery and industries relating to the fisheries of New Jersey employed 6,000 persons in 1926 and the product of the fisheries was valued at \$6,254,264.00.

The proceeds derived from the sale of fish caught in pounds in New Jersey for the year ending December 31, 1928, was \$978,289.16.

The value of shad taken in the year of 1929 on the New Jersey side of the Delaware River amounted to \$93,721.00, an increase of \$24,963.00 over the previous year.

The increase in shad is no doubt due to so many shad fry planted by the Fish and Game Commission, 3,808,000 having been planted in the past two years from our Shad Hatchery at Pennsville.

#### LICENSES ISSUED

1927.....	189,931 (including Special Woodcock License)
1928.....	194,738 (including Special Woodcock License)

#### PROSECUTIONS FOR VIOLATION OF THE FISH AND GAME LAWS

1927 .....	912
1928 .....	948

#### FISH AND GAME LEGISLATION IN 1929

Chapter 22, Approved April 1, 1929, reduces daily bag limit on woodcock from 6 to 4, sora from 50 to 25 and Wilson snipe from 25 to 20, to conform to Federal regulations.

Chapter 23, Approved April 1, 1929, makes close season on female English or ringneck pheasants until April 1, 1934.

Chapter 24, Approved April 1, 1929, fixes the season on woodcock from October 15 to November 14, both dates inclusive, instead of from October 1 to November 30; also closes the season on greater and lesser yellow legs, to conform to Federal regulations.

Chapter 82, Approved April 15, 1929, provides for the issuance of a special license to hunt woodcock from October 15 to November 9.

Chapter 25, Approved April 1, 1929, makes a closed season on wild turkey until April 1, 1932.

Chapter 30, Approved April 1, 1929, makes optional with the Board of Fish and Game Commissioners the wiring and posting of signs on game refuges leased by the Board.

Chapter 132, Approved April 22, 1929, makes a closed season on ruffed grouse for one year in Warren, Sussex, Morris, Passaic and Bergen counties.

Chapter 186, Approved April 23, 1929, repeals the act prohibiting the taking of eels in the seaside creeks, bays and thoroughfares, including Tuckahoe river and its tributaries in the townships of Dennis and Upper, in the county of Cape May, with any fyke, pot, net or seine from August 1 to December 1.

Chapter 219, Approved April 29, 1929, increases the Board of Fish and Game Commissioners from 7 to 9 members.

Chapter 238, Approved April 29, 1929, authorizes the Board of Fish and Game Commissioners to issue licenses for vessels to take fish other than menhaden in the Atlantic Ocean with shirred or purse seines, otter or beam trawls, at a distance beyond two miles from the coast line. License fee \$50.00. Penalty for violation \$1,000.00. Menhaden licenses to be taken out as heretofore.

Chapter 334, Approved May 6, 1929, prohibits the sale of any black or Oswego bass, except for propagating purposes, and prohibits their importation into or exportation from the State for commercial purposes.

### THE PRESENT AND FUTURE

The thought of fish and game as an asset to a State as a commodity of economic value may be said to be fairly new. Their worth for food, recreation, attracting tourists, together with the service of birds destroying insects, aggregate annually to many millions dollars in our country, and in preceding pages there are interesting figures showing the money value of fish and game to this State. Not many years ago only little attention was given by the people at large to conservation of wild life, but they are now growing alert to the fact that no longer can a fish and game crop be left to chance. For continued production it must be studied the same as any other crop. Growth in population, agricultural development, with the clearing out of natural cover for game, improved hunting and fishing equipment, increased number of hunters and fishermen, easy access by autos and good roads to nearly every spot bearing wild life, severely contribute to change old time conditions. It is the task of this Board to meet the changes which have rapidly come upon us. We believe that these problems are being solved. It goes without saying

that there is more fish and game in the State than for years, and that without the progressive policies of the Board for several years past, hunting and fishing within our borders today would practically be a memory. With two modernly managed game farms and unsurpassed fish hatchery, wise laws and efficient warden service, the purchase of both birds and fish in large quantities, with special reference to securing new blood, big things unquestionably are being done for the sportsmen.

The Commission each year is flooded with ideas from sincere devotees of outdoor life for changes in the laws. Purely local conditions often dominate their opinions, and the State in its entirety is lost to sight. Of late years the Board has acted on the policy that the constant changing of the laws, except where necessary, met with poor response from the legislators and the great body of sportsmen, and caused confusion among the law abiding. It is safe to say that if the Board and Legislature listened with action on the many suggestions, that most of our laws might be changed over night. Every idea presented to the Board, however, has been given careful consideration in the light of the greatest good to the greatest number, and the Commissioners take no little pride in the thought that they are engaged, not only in producing valuable dividends to the hunter and fishermen of today, but are conserving our wild life for future generations.

The Board held several conferences with hunters and fishermen during the year, when there were interesting discussions of conditions. It is to be noted that as the result of such conferences there arises a better understanding among those participating. There are many problems which seem simple of solution in the matter of the underlying principle, but when the State's interests are viewed as a whole, the means at the hands of the Board and the conflicting interests, there are numerous difficulties to be overcome. At the beginning of one conference it was apparent that there was a feeling that the Board was not doing all it should do, but at its conclusion the visitors were undoubtedly impressed with the fact that the Commissioners were alive to all the situations, and the Commissioners were extended a vote of thanks for their interest and action in true conservation.

### ORGANIZATION

At the organization meeting held December 11, 1928, the Board re-elected its former officers, viz.: H. J. Burlington, Montvale, President; Dr. Charles F. Hunter, Palisade, Vice-President, and Lewis Spinks, Jersey City, Treasurer.

Commissioner Alexander H. Phillips, Princeton, succeeded himself for a term of five years, which term will expire November 26, 1933, having been reappointed by Governor Moore. Benjamin W. Cooper Moorestown, Burlington County, and George S. McCarty, Newfield, Gloucester County, became Commissioners, each having been appointed by Governor Larson for a term of five years, expiring April 30, 1934, in accordance with the 1929 law increasing the membership of the Board from seven to nine.

### WARDENS' SERVICE

Warden Howard Z. Mathis, Mt. Holly, who had acted as temporary

assistant protector from February 15, 1928, to fill a vacancy, was appointed to the position permanently, following a Civil Service promotional examination, which was taken by ten wardens, and went on duty August 15, 1928.

Michael Bobera was appointed warden for Burlington County to fill a vacancy caused by the promotion of Warden Mathis to Assistant Protector, and went on duty March 1, 1929.

M. Howard Lyell was appointed warden for Monmouth County, to fill the vacancy caused by the promotion of Warden Arthur Davison to be Assistant Protector, to go on duty July 1, 1929.

Amos Creely was appointed warden for Ocean County, to have particular charge of Barnegat Bay, to go on duty July 1, 1929.

The Board has given considerable thought to the opportunities for violations in Ocean County, a large territory heretofore covered by two wardens, and it was found that an additional warden was necessary.

Transfers of wardens were ordered as follows:

Warden Lawrence from Newfoundland, Morris County, to the vicinity of Mendham, Morris County.

Warden Ruth, from Morris County to Bergen County.

Warden Mottram, from Bergen County to Morris County.

With the growth of the commission it was found that two assistant protectors were not sufficient for the supervisory and other work required, and the Board appointed from the Civil Service list Warden Arthur Davison, Belmar, and Warden Thomas Kelley, Jersey City, as assistant protectors, to go on duty July 1, 1929, in accordance with the act of April 3, 1928.

The Assistant Protectors have been allotted to counties for supervision of the wardens as follows:

- 1st District, Mr. Cudney—Sussex, Warren, Hunterdon and Morris Counties.
- 2nd District, Mr. Kelley—Passaic, Somerset, Union, Essex, Bergen, Middlesex and Hudson Counties.
- 3d District, Mr. Davison—Monmouth, Mercer, Burlington and Ocean Counties.
- 4th District, Mr. Mathis—Camden, Gloucester, Salem, Cumberland, Atlantic and Cape May Counties.

### CLOSER WARDEN SUPERVISION

Before going on duty the assistants were called into conference with President Burlington and detailed instructions were given to them. The assistants will be held to strict accountability for the wardens' patrol work, control of vermin, proper feeding of birds in bad weather, prompt collection of penalties from magistrates, prompt remittances of hunting and fishing licenses, condition of State property—autos, boats, etc., and checking up expenses of maintenance of autos. In the past through lack of adequate supervision the wardens have acted too much as individuals rather than as men in touch with a superior officer, which was due largely to the great territory to be covered by only two assistant protectors.

The assistant protector for the first district will also supervise the distribution of fish from the Hackettstown Hatchery, the assistant for the second district will supervise the distribution of game and eggs from the Rockport Game Farm, the assistant for the third district will supervise the distribution of game and eggs from the Forked River Game Farm, and the assistant for the fourth district will supervise the cruiser "H. J. Burlington".

All distribution of fish and game will be made following instructions from the Chief Protector to his assistants.

A circular letter was sent to all wardens and employees that they must keep their work free from political control and shall not devote their time in promoting the interests of political candidates, that they should confine their political interests to casting their ballots on election days, that the fish and game interests are for members of all parties; that should any employee wish to seek an elective office a leave of absence without pay must be obtained, and that the Board would not permit its employees to hold any elective or appointive office for which cash or other valuable remuneration was attached.

In order that there should be no misunderstanding regarding what the Board expected of the wardens, they were called to meet the Board to hear an address prepared by Commissioners Warren and Phillips, which was read by President Burlington.

The address recited that the Board had observed with considerable concern a lack of real interest in their work by certain wardens, that the Board was determined that the wardens' service shall be 100% efficient; that some of them were doing splendid work, but the Board believed they could do still better. The Board was willing to let them make a fresh start, but if there were any who did not propose to meet the Board's expectations it would be better for them to resign, as the Board proposed to dispense with the services of every warden who does not measure up to the standard.

President Burlington before reading the prepared address spoke generally on the efficiency desirable from the wardens; Commissioner Phillips spoke on the necessity of wardens patrolling remote places, and Commissioner Armstrong said the wardens could do much to interest farmers in planting grain for game and obtaining from them information as to violations.

The Board made an investigation as to any time which wardens might give to affairs other than in the performance of duty. The law says that "each of the said wardens when appointed shall give his entire time to the duties prescribed for wardens, and they shall not be engaged in any other business or occupation". The wardens were informed that the Board demanded the wardens' undivided interests under penalty of dismissal.

### VERMIN CONTROL

For two years past the Board has given special study to vermin control. With the increase of game there is also an increase of predatory animals. Vermin must be constantly kept down at our game farms for their successful

operation, and it would follow that the same should be done in the State which is bearing valuable game.

Warden Joseph S. Eggert, Perth Amboy, won a prize of \$100.00 offered by the Board to a warden for the best paper suggesting a plan for vermin control. The Board was appreciative of papers submitted by Wardens Park, Hugg, Paul, Baker, Phifer, Mizell, Carson, Nolan, Steel and Kelley.

In January each warden was instructed to take a gun with him in his car and at every opportunity kill foxes, weasels, unprotected hawks, and owls which prey on game. They reported they killed to June 30th the following: 14 foxes, 103 crows, 211 cats, 24 dogs, 87 hawks, 17 weasels, 3 owls, 9 skunks, 1 opossum, 18 snakes and 1 woodchuck.

There were 836 foxes reported killed by hunters in this State in the fiscal year of 1928-29, and 734 in the previous year.

#### VERMIN CONTROL EXPERT EMPLOYED

In April the Board employed Rev. Noel J. Allen, Alexandria, Va., for a three months' period as an expert in vermin control, and the continuation of his services is under consideration. He had conducted vermin control campaigns in Virginia under the Virginia Game Protective Association, and later as a lecturer and vermin control expert for Virginia State Department of Inland Fisheries, with the result that thousands of predatory animals were killed.

In this State his activities consisted in investigating the vermin situation, giving lectures in schools and to various societies and instructions to wardens and farmers. On the Keppler farm in Sussex County he gassed and sealed 92 animal dens, which remained sealed. At Duke's Park, Somerville, 797 crows were killed, and it is estimated that half as many were cut off by loss of eggs through the death of nesting crows. On May 27th his crow call at Duke's Park gathered in the presence of witnesses at one point in the Park from 150 to 200 crows, and on June 29th he reports it was impossible to call up more than two or three crows at any one point, and in many cases none came. A large proportion of the wardens have been instructed in the calling of crows, the use of poison gas for ground vermin and other forms of vermin control. He addressed 51 town and country schools, leagues and clubs, speaking to 3,200 in Paterson High Schools, 14,750 in the Jersey City schools and 2,600 in the Trenton High School. He broadcasted a radio address under the auspices of the Passaic Chapter of the Izaak Walton League. The newspapers of the State gave publicity to his work, and Mr. Allen put up hundreds of large posters and distributed 5,000 sheets of hand bills, setting forth merits of the crusade.

#### PUBLIC HUNTING AND FISHING GROUNDS

The Board regrets that the Legislature did not pass the bill introduced by Honorable Dryden Kuser, of Somerset County, increasing the resident hunting and angling fee from \$1.65 to \$3.25. It was provided in the bill that one-third of each license fee received by the State should be used by the Board for the acquisition, development and maintenance of areas of land, water, or

land and water, for use as public hunting and fishing grounds and game refuges, the one-third portion of the fee netted to the State to be kept in a separate fund known as "Public Shooting and Fishing Grounds Fund". With additional funds which the bill would have given, it was proposed to enter extensively in the matter of the control of predatory birds and animals, to give an increased warden service and more effectively to take steps for the abatement of pollution of our waters.

The bill easily passed the House of Assembly, but met with objection in the Senate. It was vigorously supported by the New Jersey Conservation League which represents sportsmen's associations in all parts of the State.

Attention has been called previously to the matter of gunning points on our bays being owned privately by clubs and individuals, with the result that there are not many places left where the public can hunt water wild fowl. This situation was reflected in a bill introduced by Hon. Thomas M. Gopsill, Monmouth County, authorizing the Board out of its funds to construct small islands in the inland tidal waters, the islands not to exceed 2,000 square feet in area, and to be opened to public hunting during the open seasons. These islands could be readily constructed by pumping or dredging, sodded, and concrete boxes installed. There is no doubt but that such islands would be popular with duck hunters and a few could readily be built each succeeding year. Although the measure failed of legislative support, yet the Board feels, that in a short time as the absence of public hunting points is stressed, legislation of this kind will be finally enacted.

#### FEDERAL REFUGES IN NEW JERSEY

We were notified by Paul G. Redington, Chief of the U. S. Bureau of Biological Survey, that his department in making a survey of lands in all parts of the country desirable for Federal migratory bird refuges desired our cooperation in locating sites in New Jersey. The Bureau had in mind an area in Barnegat Bay and another in Salem County.

Commissioner Hensler was appointed a Committee of the Board for the Barnegat Bay area and Commissioner McCarty for the Salem County area.

The sites will be considered under authority of the Norbeck-Anderson law enacted by Congress, which was approved February 18, 1929, and which it is claimed is one of the most important wild life conservation measures written on the statute books of any nation. The law is intended to supplement the Migratory Bird Treaty Act of 1918. Authorization is made for \$75,000.00 for use in preliminary surveys. In 1930, \$200,000.00 will be available and in 1931, \$600,000.00, for surveys and acquisition of lands. For six years following 1931 an annual appropriation of \$1,000,000.00 is authorized. At the close of this period it is believed sufficient areas will have been procured. Annual appropriations of \$200,000.00 are authorized thereafter to pay the cost of maintenance of refuges.

It is said the law virtually guarantees to all generations of Americans to come an undiminished share of a marvelous heritage of bird life which nature has bestowed on our country.

## TO SIMPLIFY LAW AFFECTING INLAND COASTAL WATERS

In the interest of simplifying our laws, the Board is on record as favoring a law to prohibit all netting in the inland tidal waters of all counties bordering on the Atlantic Ocean, except gill nets and fyke nets 30 fathoms long with three inch mesh, which may be used from November 1st to May 31st, and to prohibit the use of gill nets at all times in the Atlantic Ocean within one-half mile of the coast line, but providing that hauling seines may be used for the taking of herring only from March 1st to May 31st, and provided that all pickerel, perch and other fish caught in said hauling seines shall be returned to the water without injury. The Commission believes that the enactment of such a law will not affect the commercial fishermen.

The proposed law is the same as that now affecting the waters of Great Bay, Manahawkin Bay and Little Egg Harbor Bay. If the proposed law were passed it would repeal 26 existing laws, some of which have been on the statute books for fifty years.

At present practically each body of water from Sandy Hook to Cape May is covered by a different law.

## FEDERAL MIGRATORY LAW SEASONS

In July, 1928, the U. S. Department of Agriculture issued a regulation fixing the season for woodcock in New Jersey from October 15 to November 14, both dates inclusive. There was some confusion among hunters respecting the season as the Board's publications giving the season as October 1 to November 30 based on the New Jersey law had been published. While our wardens could only make arrests for violations under the State law, yet the U. S. regulation for the shorter season was generally obeyed. The 1929 Legislature fixed the season and bag limit to conform to the Federal law, viz., October 15 to November 14, with a daily bag limit of four.

The Legislature, also to conform to the Federal regulations, closed the season on greater and lesser yellow legs.

## AIRPLANES FOR VIOLATORS

1129  
The Board has under consideration the study of use of airplanes for patrol work. It has been suggested that an airplane, with the vast distances it could patrol, would strike terror to violators in that persons out illegally hunting and fishing could be detected and radio and other communications could inform the nearest warden of the violations. The great expanses of the Atlantic Ocean, Barnegat Bay, Delaware River and Bay, Raritan and Sandy Hook Bays it is claimed could be covered to great advantage as compared to the boat patrol, and remote inland territory could be most carefully watched. Moreover, any violator in case of the use of airplanes, would never be certain that the flying machine near him would not be the Board's airplane scouting for violators.

## APPRECIATIONS

The following explains itself:

State of New Jersey,  
Executive Department,  
December 6, 1929.

*Gentlemen:*

I have read with interest the Annual Report of your commission and wish to take this opportunity of complimenting you upon its excellence.

May I also, at this time, commend your board upon the fine work it is doing for New Jersey. I am impressed by the heart interest of the members of the board, which is so apparent as one reads this most interesting and commendable report.

I desire to thank you on behalf of the State for the service which is so freely and efficiently rendered.

Very truly yours,

A. HARRY MOORE,  
*Governor.*

Board of Fish and Game Commissioners,  
State House.

The Ontario Government Game Fish Committee, Wm. J. R. Harkness, Secretary, visited our Hatchery, and later they wrote us a very complimentary letter, expressing their surprise to learn of the excellent system of control of temperatures of the cultural ponds, which permitted control within a few degrees of what was desirable; that the ponds and equipment were of the latest type and the whole plant was run on the most efficient basis.

At the June meeting of the Board it was noted that Protector James M. Stratton had been in the continuous service of the Fish and Game Commission for 30 years, and further it was believed he was the oldest Protector in point of service in the United States. A resolution passed by the Board recited the Board's appreciation of Mr. Stratton's services, and that "In all this time he has given his best to the State, which has involved unflagging interest in his duties which have been performed with rare tact, courtesy and judgment". The Board recognized him as one distinguished in his line of service. The Commissioners personally presented Mr. Stratton with a handsome watch.

The American Game Protective Bulletin gave publicity to our activities in an article headed "New Jersey Commission functions efficiently to replenish streams and game covers". Details of our operations were set out. The article stated that the Board carried on its administrative work for the purpose of supplying a maximum of fish and game, and added:

"New Jersey also has an extraordinarily successful fish propagating plant. For a number of years the policy of producing a maximum number of adult fish for planting has been followed, which policy has met with the enthusiastic approval of the anglers of the State. Excellent fishing resulted immediately following the inauguration of that policy".

The Newark Evening News recently published the following:

"The State Fish and Game Commission has been doing remarkable work in providing fish and game for the sportsmen in the face of handicaps such as exist in few, if any, of the other states which can be classed as sport-producing. \* \* \* It has blazed the way in the stocking of the trout streams and its results have attracted universal commendation \* \* \*".

#### RECOGNIZING OWNER'S RIGHTS

Excellent results have been reported respecting the linen posters which the Board has put up the past few years, calling attention that streams had been stocked by the Board and that if fishermen and hunters lighted fires, left refuse around, parked their cars indiscriminately or damaged property in any manner the State would discontinue stocking, that property owners' rights should be considered and that sportsmen should ask to hunt and fish when the same is necessary. In one instance known to the Board a vast area of property has been kept open which at one time the owners threatened to close because of the action of hunters and fishermen, and inspection of this area during the year showed that the hunters and fishermen had been very careful to observe the warning.

#### DISCRETIONARY POWERS

There is a strong sentiment throughout the country that administrators of fish and game interests should be authorized to have discretionary powers which would operate to permit them to close a season in dry weather when there might be danger from forest fires from hunting, postpone the season for a period if weather conditions affected game or fish, to open a season earlier when there was an abundance of game, or close it when game showed signs of depletion or during conditions of disease, to close and reopen waters for fishing, to permit vermin destruction in certain cases, to allow shooting when damage is done to crops, and to fix bag limits, sizes, etc.

We have inquired into this matter, but are informed by the Attorney General that under the New Jersey Constitution it is beyond the power of the Legislature to delegate to any Board or Commission of the State the power to prescribe any rule or regulation under which the citizens of the State may be subject to a forfeiture, and that those who violate the provisions of the fish and game laws subject themselves to fines, in default of which they may be imprisoned.

#### BUTTONS

The Board, following bids presented to the Purchasing Agent, awarded a contract for the 1930 supply of license buttons, the cost to be \$5,276.44.

When the license button system was adopted for the year 1928, it was thought by its supporters that it would result in a large increase in the number of licenses. While the Board was not entirely convinced of such a claim, yet it was willing to give it a trial.

The increase in licenses in 1928 over 1927 was 5,092. The average increase each year for four years in licenses without the button had been 14,265.

Our wardens were instructed in case of a person who does not have in his possession while hunting or fishing the proper license and button, to demand the production of the missing requirement by mail or otherwise, and that if this is not done to make prosecution. The Board has in mind the loaning of a license button to persons who have not taken out the regular license.

#### PROSECUTIONS

During the fiscal year ending June 30th there were 968 prosecutions for violation of the fish and game laws, 940 resulted in convictions, 28 acquitted and in 40 cases where circumstances seemed to require, sentence was suspended on payment of costs. In default of payment of penalties 20 persons were committed to the county jail for periods of ten to ninety days. Eighteen cases were appealed to the Common Pleas Court, and 62 hunters' and anglers' licenses were revoked after the offenders were convicted of violating the act; 17 guns were confiscated from aliens.

The above number of prosecutions is 20 in excess of 1927-28 in which year there were 948 prosecutions.

In September eight persons were arrested in Atlantic County for violations of the deer act. Each defendant was convicted on two charges and penalties of \$1,600.00 were collected. During October five persons paid \$480.00 for illegal possession of song birds. In December one person paid \$300.00 for possession of two fawns and one doe deer. In August, in the vicinity of the Highlands four persons operating beam trawls were fined \$800.00, two persons paid a penalty of \$200.00 for possession of short lobsters and the crew of the cruiser "H. J. Burlington" released illegal size lobsters from several lobster retaining cars, whose owners they were unable to discover.

The following shows the number and kind of arrests during the year:

Fishing without license .....	149
Hunting without license .....	109
Firearms in the woods .....	74
Procuring wrong license .....	68
Dog running at large .....	64
Sunday gunning .....	56
Hunting ducks after sunset .....	39
Possession of game and birds out of season .....	34
Possession of wild deer .....	34
Possession of protected birds and animals .....	26
Alien Firearms .....	25
Possession of song birds .....	25
Possession of illegal missile .....	25
Hunting deer illegally .....	24
Possession of undersized fish .....	23
Automatic Gun .....	22
Possession fish in closed season .....	18
Illegal net fishing .....	17
Trapping without license .....	14
Using more than three hooks .....	12
Trapping out of season .....	11
Hunting while in auto and with lights .....	10
Loaning license and button .....	9
Spearing fish .....	8

Refusing to show license .....	7
Killing song birds .....	6
Possession of short lobsters .....	6
Pennsylvanians fishing on Sunday .....	5
Stealing traps .....	5
Hunting in tracking snow .....	4
Illegal duck hunting .....	4
Using beam trawls .....	4
Hunting in closed season .....	3
Hunting without woodcock license .....	3
Polluting streams .....	3
Using set lines .....	3
Drawing off waters .....	2
Mutilation of deer .....	2
Failure to report fox .....	2
Hunting while intoxicated .....	2
Placing screen across stream .....	1
Fishing at night .....	1
Using more than 2 rods in Delaware river .....	1
Shooting muskrat .....	1
Failure to report deer .....	1
Setting snares .....	1
Selling game .....	1
Using pole traps .....	1
Possession of terrapin .....	1
Hunting from motor boats .....	2

968

#### WARDENS' ARRESTS

The arrests of the year proportioned among the wardens follow:

John W. Graham .....	114+
Roy R. Carson .....	56+
John R. Hugg .....	56
James H. Evernham .....	53+
Deputies .....	53
Thomas F. Nolan .....	50+
Thomas Murrow .....	48+
George R. Paul .....	45+
Chatham Mizell .....	39
W. H. Small .....	35+
H. R. Lawrence .....	30+
Fred J. Hall .....	30
Arthur Davison .....	29+
Henry Bernius .....	29+
John J. Park .....	28
James F. Treloar .....	27+
Fred S. Dackermann .....	26+
Harold Crowley .....	20+
Charles C. Hill .....	19
Howard Z. Mathis .....	17+
Joseph S. Eggert .....	15+
Edwin Baker .....	14+
Chris. Ashworth .....	14+
Otis C. Small .....	13+
William Steel .....	13+
William B. Loder .....	11+
State Police .....	11

18

Michael Bobera .....	11+
G. I. Hall .....	11
George W. Phifer .....	10+
John F. Cox .....	8
Albert J. Ruth .....	7
W. E. Young .....	6+
Frank Mottram .....	5
Thomas Kelley .....	3
John B. Bailey .....	½

968

#### RECEIPTS, LICENSES, FINES, ETC.

The amount received by the State Treasurer during the fiscal year on account of Hunters' and Anglers' License Act of April 9, 1914; also acts of April 14, 1915, juvenile licenses, and March 11, 1922, woodcock licenses, was \$286,502.20.

There were 2069 woodcock licenses issued at \$2.00 each, making receipts therefrom \$4,138.00.

Licenses to steamers and sailing vessels to take menhaden with purse nets within the three mile limit of our coast during the fiscal year were \$2,325.00. For the calendar year ending December 31, 1928, there were 15 steamers and 16 sailing vessels licensed to take menhaden.

Licenses to vessels to take fish other than menhaden with purse seines and beam trawls at a distance oceanward beyond two miles from the coast line aggregated \$1,300.00, there being 26 licenses issued.

For the fiscal year there were issued 340 breeders' licenses at \$5.00 each, total \$1,700.00, to persons to keep in their possession English and Mongolian pheasants, mallard, black and wood ducks, raccoon, Canada geese, ruffed grouse, rabbits, squirrels, quail and deer in a wholly enclosed preserve.

The aggregate of fines collected for violations of the fish and game laws for the fiscal year amounted to \$27,152.50.

On account of licenses for the operation of fish pounds in the Atlantic Ocean and Sandy Hook Bay the receipts during the fiscal year were \$5,350.00. For the calendar year ending December 31, 1928, there were 123 licenses granted, 101 for the Atlantic Ocean and 22 for Sandy Hook Bay.

Under the law which allows a citizen above the age of 10 years and below the age of 14 to hunt when provided with a special hunting license, and when accompanied by a holder of regular license above the age of 21 years, there were 161 licenses for the fiscal year, the receipts being \$161.00.

Under the law prohibiting aliens to be possessed of firearms, 17 guns were confiscated.

#### CARS, BOATS

We are operating 7 trucks and 28 Ford cars, 10 Chevrolet cars and 2 Buick cars. During the year we bought 14 new Ford cars, 11 of which were replacements, and 3 were Ford coupes for use of assistant protectors and Forked River Farm.

We also operated 12 power boats, 12 row boats and 2 canoes.

19

## RECEIPTS AND EXPENDITURES

An analysis of the receipts and expenditures during the fiscal year follows:

Receipts	
Hunters' and Anglers' Licenses, County Clerks' checks to State Treasurer, Chapter 152, Laws 1914.....	\$282,203.20
Board's checks to State Treasurer:	
Chapter 320, Laws 1915 (Juvenile).....	161.00
Chapter 125, Laws 1922 (Woodcock).....	4,138.00
	\$286,502.20
Other Licenses:	
Food Fish.....	\$1,300.00
Menhaden.....	2,325.00
Pounds.....	5,350.00
Breeder's.....	1,700.00
	\$10,675.00
Fines and Penalties:	
Chapter 247, Laws 1911.....	\$27,152.50
Chapter 96, Laws 1922 (trespass)....	1,090.50
	28,243.00
Sales:	
Farms and Hatchery.....	\$1,898.99
Sundries.....	1,609.67
	3,508.66
	42,426.66
	\$328,928.86

Expenditures	
Personal Administration, Commissioners.....	\$749.02
Wardens' Salaries.....	68,263.31
Wardens' Expenses, including stocking.....	16,718.78
Office Expenses.....	10,827.54
Publicity and Assistant to Treasurer.....	1,180.00
Printing, Stationery, etc. (office furniture—typewriters).....	9,920.15
Legal Expenses (court costs and services).....	1,009.87
Salaries for crew of boat "H. J. Burlington".....	5,225.00
Gasoline and oil for boat "H. J. Burlington".....	393.41
Maintenance of boat "H. J. Burlington".....	3,159.47
Gasoline and oil for autos, boats, farm and hatchery.....	9,114.74
Tires and tubes for autos and trucks.....	2,474.36
Maintenance for autos and boats.....	5,536.00
Purchase of autos and boats.....	4,838.09
Postage, telephone, telegraph and insurance.....	3,296.69
Maintenance Forked River Farm.....	22,625.05
Equipment Forked River Farm.....	903.69
Extra help, Forked River Farm.....	40.50
Additions and improvements, Forked River Farm.....	564.17
Maintenance, Rockport Farm.....	19,713.82
Equipment, Rockport Farm.....	1,316.53
Extra help, Rockport Farm.....	554.83
Additions and improvements, Rockport Farm.....	1,166.16
Maintenance, Fish Hatchery.....	69,263.39
Equipment, Fish Hatchery.....	3,037.03
Extra help, Fish Hatchery.....	13,199.28
Additions and improvements, Fish Hatchery.....	6,630.81
Maintenance, Shad Hatchery.....	1,109.77
Purchase of game and fish.....	33,076.37
Miscellaneous Expenses.....	3,493.49
	\$319,401.32
Less Refund (Valla check).....	4,825.00
	\$314,576.32
Bills outstanding.....	\$10,701.94

## PUBLICITY

Continued growth and popular interest in hunting and fishing finds the newspapers and many magazines devoting an increasing amount of space to these subjects. This department has furnished news-letters dealing with seasonable subjects, to an average of 500 publications a month. Assistance has also been furnished special writers in preparing articles dealing with fish and game conditions in New Jersey. Moving pictures supplied by the Commission played an important part in giving the public a keener appreciation of the range of sport in this State and of the State's work in conservation and development of fish and game. Commissioners and wardens have appeared before clubs and other organizations in different parts of the State and their talks on these subjects have found a ready interest. The department's moving picture equipment is being augmented from time to time, showing the range of sports throughout the seasons. Films of 16 mm. are now available at only the cost of transportation to organizations throughout the State. A new set of standard size films is in the process of preparation. At state and county fairs during the year, exhibits of live fish or game have been centres of popular educational interest.

## GAME

### GAME DISTRIBUTION

The total game distribution for the year was as follows:

18,337 pheasants, 12,678 being liberated from our farms and 5,659 purchased from dealers; and 14,921 rabbits.

Detailed information respecting the hunting seasons will be found below:

**Pheasants:** In the early spring 1,300 male pheasants were distributed in the twenty-one counties at places where female pheasants were located.

The Board has ordered 6,749 English pheasants and 150 black-neck pheasants for delivery early in the next fiscal year.

The Board allotted to the Carney Point plant of the E. I. duPont de Nemours Company 200 six weeks old pheasants, 160 hens and 40 cocks, for the purpose of increasing the number of pheasants which could be distributed in the State. The Company maintains a game sanctuary of several hundred acres, constructed a model game farm in the area and employed an experienced game keeper, all at their own expense. It was the opinion of the Board that acceptance of the proposition meant practically an auxiliary game farm without further expense to the State.

Under date of July 25, 1929, L. W. T. Waller, Jr., Assistant Director, Sporting Powder Division, reported that the State had benefited from their game farm to the extent of 1,615 pheasant eggs distributed within the State, that 200 ring-neck pheasant chicks between the ages of 8 and 12 weeks were

trapped and ready for distribution on our order; that 100 of the original birds supplied had been liberated on the property of the plant in the immediate vicinity of their pens, and had been fed and protected.

### GAME CONDITIONS IN 1928

Protector J. M. Stratton sent a questionnaire to the wardens respecting game conditions for the following game: Rabbits, squirrels, ring-necked pheasants, quail, ruffed grouse or native partridge, ducks, geese, brant, rail and mud hen, woodcock and raccoon, the questions being as follows:

Supply at beginning of season.

Increase or decrease in killed over last year.

Amount left over.

Hunting conditions during season.

We also requested the estimated number of Hungarian partridge and wild turkey.

There are closed seasons on quail in Warren, Passaic, Bergen, Sussex, Morris, Essex, Hudson, Union, Somerset and Hunterdon Counties, and on ruffed grouse in Essex, Union, Somerset, Hunterdon, Mercer, Middlesex and Monmouth Counties.

The season was closed throughout the State for Hungarian partridge and wild turkey.

Principal points of the reports from the wardens follow:

No Hungarian partridge or wild turkey were reported in any of the counties except: Bergen, 36 Hungarian partridge; Warren, 108 Hungarian partridge; Camden, 30 Hungarian partridge; Burlington, 23 Hungarian partridge; Monmouth, 25 Hungarian partridge; Somerset, 300 Hungarian partridge; Hunterdon, 150 Hungarian partridge; Cumberland, 4 wild turkey.

**Atlantic County.** Wardens Loder and O. C. Small. Rabbits—Fair supply, decrease in killed, small number left. Squirrels—Fair supply, increase in killed, small number left. Pheasant—Poor supply, decrease in killed, thinned out. Quail—Good supply, increase in killed, large number left. Ruffed Grouse—Fair supply, increase in killed, small number left. Ducks—Very poor supply, decrease in killed, thinned out. Geese, Brant and Rails—Poor supply, decrease in killed, thinned out. Woodcock—None. Raccoon—Fair supply, increase in killed, thinned out.

**Bergen County.** Wardens W. H. Small and Mottram. Rabbits—Good supply, increase in killed, small number left. Squirrels—Good supply, increase in killed, large number left. Pheasants—Good supply, usual number killed, small number left. Quail—Poor supply. Ruffed Grouse—Good supply, usual number killed, small number left. Ducks—Good supply, increase in killed, large number left. Geese—Poor supply, usual number killed. Brant—None. Rails—Good supply, usual number killed, large number left. Woodcock—Good supply, increase in killed, large number left. Raccoon—Poor supply, decrease in killed, thinned out.

**Burlington County.** Warden Carson. Rabbits—Good supply, increase in killed, small number left. Squirrels—Fair supply, usual number killed, small number left. Pheasants—Fair supply, increase in killed, thinned out. Quail—Good supply, increase in killed, more than ever left. Ruffed Grouse—Fair supply, increase in killed, small number left. Ducks—Good supply, increase in killed, large number left. Geese—Good supply, increase in killed, thinned out. Brant and Rails—Fair supply, increase in killed, thinned out. Woodcock—Fair supply, increase in killed, small number left. Raccoon—Fair supply, increase in killed, more than ever left.

**Camden County.** Warden Murrow. Rabbits—Good supply, increase in killed, thinned out. Squirrels—Fair supply, decrease in killed, small number left. Pheasants—Fair supply, increase in killed, thinned out. Quail—Good supply, increase in killed, large number left. Ruffed Grouse—Poor supply, decrease in killed, thinned out. Ducks—Fair supply, increase in killed, thinned out. Geese—Fair supply, increase in killed, small number left. Rails—Fair supply, increase in killed, large number left. Woodcock—Poor supply, decrease in killed, thinned out. Raccoon—Fair supply, increase in killed, large number left.

**Cape May County.** Warden Steel. Rabbits—Good supply, increase in killed, large number left. Squirrels—Good supply, decrease in killed, small number left. Pheasants—Poor supply, decrease in killed, thinned out. Quail—Fair supply, slight decrease in killed, small number left. Ruffed Grouse—None. Ducks—Fair supply, decrease in killed, small number left. Geese—Poor supply. Brant—None. Rails—None. Mud Hens—Few, decrease in killed, thinned out. Woodcock—Good supply, increase in killed. Raccoon—Poor supply, decrease in killed, thinned out.

**Cumberland County.** Wardens Phifer and Baker. Rabbits—Good supply, increase in killed, small number left. Squirrels—Good supply, increase in killed, large number left. Pheasants—Fair supply, decrease in killed, thinned out. Quail—Good supply, increase in killed, more than ever left. Ruffed Grouse—Good supply, increase in killed. Ducks—Fair supply, decrease in killed, small number left. Geese—Fair supply, decrease in killed. Brant—Good supply, increase in killed, more than ever left. Rails—Good supply. Woodcock—Fair supply, decrease in killed, small number left. Raccoon—Good supply, increase in killed, small number left.

**Essex County.** Warden F. J. Hall. Rabbits—Good supply, increase in killed, thinned out. Squirrels—Good supply, increase in killed, large number left. Pheasants—Good supply, increase in killed, small number left. Ducks—Good supply, great increase in killed, more than ever left. Woodcock—Good supply, increase in killed.

**Gloucester County.** Warden Graham. Rabbits—Fair supply, usual amount killed, thinned out. Squirrels—Good supply, usual amount killed, large number left. Pheasants—Fair supply, increase in killed, small number left. Quail—Good supply, usual number killed, large number left. Ruffed

Grouse, Geese and Brant—None. Ducks—Fair supply, usual amount killed, large number left. Rails—Good supply, increase in killed, thinned out. Woodcock—Poor supply, usual amount killed, small number left. Raccoon—Poor supply, usual amount killed, small number left.

**Hudson County.** Warden Kelley. Rabbits—Good supply, decrease in killed, large number left. Pheasants—Good supply, increase in killed, thinned out. Ducks and Geese—Poor supply, decrease in killed. Rails—Poor supply, decrease in killed. Woodcock—Good supply, increase in killed. Squirrels, Quail, Ruffed Grouse, Brant and Raccoon—None.

**Hunterdon County.** Warden Park. Rabbits—Good supply, increase in killed, thinned out. Squirrels—Fair supply, increase in killed, thinned out. Pheasants—Good supply, increase in killed, small number left. Quail—Fair supply. Ducks—Poor supply, decrease in killed. Woodcock—Fair supply, decrease in killed. Raccoon—Good supply, increase in killed, thinned out.

**Mercer County.** Warden Nolan. Rabbits—Good supply, increase in killed, thinned out. Squirrels—Poor supply, decrease in killed, thinned out. Pheasants—Good supply, increase in killed, more than ever left. Quail—Poor supply, decrease in killed, small number left. Ruffed Grouse—None. Ducks—Poor supply, decrease in killed, small number left. Geese and Brant—None. Rails—Poor supply, decrease in killed, thinned out. Woodcock—Good supply, increase in killed, more than ever left. Raccoon—Good supply, increase in killed, large number left.

**Middlesex County.** Wardens Hugg and Eggert. Rabbits—Fair supply, decrease in killed, thinned out. Squirrels—Poor supply, decrease in killed, small number left. Pheasants—Good supply, slight decrease in killed, thinned out. Quail—Poor supply, slight decrease in killed, small number left. Ruffed Grouse—Supply increasing. Ducks—Good supply, increase in killed. Geese, Brant and Rails—None. Woodcock—Good supply, increase in killed. Raccoon—Fair supply, increase in killed, thinned out.

**Monmouth County.** Warden Davison. Rabbits—Fair supply, decrease in killed, large number left. Squirrels—Good supply, increase in killed, large number left. Pheasants—Good supply, increase in killed, thinned out. Quail—Good supply, increase in killed, more than ever left. Ruffed Grouse—Fair supply, increasing. Ducks, Geese, Brant and Rails—Poor supply, decrease in killed, small number left. Woodcock—Good supply, increase in killed, large number left. Raccoon—Good supply, increase in killed, large number left.

**Morris County.** Warden Lawrence. Rabbits—Good supply, increase in killed, thinned out. Squirrels—Fair supply, increase in killed, thinned out. Pheasants—Good supply, increase in killed, small number left. Quail—Not many. Ruffed Grouse—Poor supply, decrease in killed, thinned out. Ducks—Good supply, increase in killed, thinned out. Woodcock—Good supply, increase in killed, thinned out. Raccoon—Good supply, increase in killed, thinned out.

**Ocean County.** Wardens Evernham and Crowley. Rabbits and Squirrels—Fair supply, increase in killed, small number left. Pheasants—Poor supply, decrease in killed, small number left. Quail—Fair supply, increase in killed, small number left. Ruffed Grouse—Poor supply, decrease in killed, thinned out. Ducks, Geese, Brant and Rails—Good supply, increase in killed, large number left. Woodcock—Fair supply, increase in killed, thinned out. Raccoon—Fair supply, increase in killed, small number left.

**Passaic County.** Warden Treloar. Rabbits—Good supply, increase in killed, thinned out. Squirrels and Pheasants—Good supply, increase in killed, holding own. Quail—Small number. Ruffed Grouse—Fair supply, slight decrease, thinned out. Woodcock—Good supply, increase in killed. Raccoon—Good supply, holding own.

**Salem County.** Wardens Mizell and G. I. Hall. Rabbits—Good supply, decrease in killed, small number left. Squirrels and Pheasants—Good supply, increase in killed, large number left. Quail—Good supply, increase in killed, large number left. Ruffed Grouse—Fair supply, decrease in killed, large number left. Ducks—Good supply, increase in killed, large number left. Geese—Poor supply, increase in killed, small number left. Rails and Woodcock—Good supply, increase in killed, large number left. Raccoon—Good supply, increase in killed, large number left.

**Somerset County.** Wardens Hill and Paul. Rabbits—Good supply, increase in killed, thinned out. Squirrels—Fair supply, increase in killed, thinned out. Pheasants—Good supply, increase in killed, small number left. Ducks—Poor supply, decrease in killed. Woodcock—Poor supply, decreased in killed. Raccoon—Good supply, increase in killed, thinned out.

**Sussex County.** Wardens Bernius and Ashworth. Rabbits and Squirrels—Fair supply, decrease in killed, thinned out. Pheasants—Fair supply, decrease in killed, small number left. Quail—Poor supply, small number left. Ruffed Grouse—Poor supply, increase in killed, small number left. Ducks—Fair supply, increase in killed. Woodcock—Good supply, decrease in killed, large number left. Raccoon—Good supply, increase in killed, thinned out.

**Union County.** Warden Dackermann. Rabbits—Good supply, increase in killed, thinned out. Squirrels—Poor supply, decrease in killed, thinned out. Pheasants—Fair supply, decrease in killed, thinned out. Quail—Slight increase. Ruffed Grouse—Supply same as usual. Ducks—Good supply, increase in killed, large number left. Woodcock—Fair supply, decrease in killed, small number left. Raccoon—Fair supply, increase in killed, small number left.

**Warren County.** Assistant Protector Cudney and Warden Cox. Rabbits—Good supply, decrease in killed, more than ever left. Squirrels—Good supply, increase in killed, large number left. Pheasants—Good supply, usual number killed, plenty left. Quail—Seem to be increasing. Ruffed Grouse—Good supply, usual number killed, large number left. Woodcock—Very few hunted. Raccoon—Good supply, increase in killed, large number left.

## FORKED RIVER AND ROCKPORT GAME FARMS

Duncan Dunn, Game Farms Superintendent, in his 17th annual report, for the fiscal year ending June 30, 1929, says:

**Forked River Farm.** We disinfected all the hatching equipment, mowed grass in pens, seeded pens with grass, seeded 25 acres with oats, repaired road with 100 loads of gravel, repaired buildings and did necessary painting, packed eggs for distribution and got pheasants ready for distribution.

The building done during the year was as follows: Built one new pen 60 feet square and covered same with 1" wire mesh; one new pen 475 feet long and 250 feet wide; construction as follows: 1" mesh wire 18" in ground, boarded up 3 feet from the ground and 4 feet above the boards with 1" mesh wire, and then covered over top with 2" mesh wire; we also built two shelters attached to this pen 8 feet wide and 100 feet long; built 5 new pens 50 feet wide and 150 feet long, constructed same as above, and each pen having a shelter 8 feet wide and 50 feet long; built a new feed shack 12 feet by 16 feet; new porch on Superintendent's residence, 8 feet wide and 30 feet long, and a new fence around one rearing field.

We have harvested 15 loads of hay and 8 loads of oats.

There were 27 owls, 22 hawks, 60 crows, 40 opossum, 6 weasels, 45 cats, 4 foxes, 6 skunks and approximately 3,000 rats killed during the year.

**Rockport Farm.** In the general line of work it was much the same as at Forked River; seeded 30 acres of land with oats and grass seed; gathered about 75 loads of stone out of the breeding pens and carted them on the road; cut and carted 300 posts to use on new fences; and did necessary painting, papering and repairing.

We built a new covered pen 42 feet wide and 550 feet long and covered same with 2" mesh wire; built 4 shelters attached to this pen, each 40 feet long and 8 feet wide; dug pit for new electric pump and concreted same; built house to cover pump; built new fences around the rearing fields, making them 7 feet high instead of 4 feet which they formerly were; put new cement floors in two chicken houses and a new floor in part of the barn; built new feed shack 12 feet by 16 feet; built 40 new hatching boxes and 50 new rearing coops.

We harvested 18 loads of hay and 15 loads of oats.

There were 14 owls, 20 hawks, 30 cats, 50 crows, 50 weasels, 6 skunks, 9 foxes and approximately 3,000 rats killed during the year.

Exhibits were made during the year at Egg Harbor, Flemington, Morristown, Pitman Grove, Branchville, Bridgeton, Singac and Trenton Fairs.

During the year the following eggs were set, hatched and distributed in the State.

Eggs set at Forked River Farm.	17,000	Young birds hatched.....	11,350
Eggs set at Rockport Farm.....	14,200	Young birds hatched.....	9,500
	31,200		20,850

Eggs distributed throughout the State:

Forked River Farm .....	17,267
Rockport Farm .....	12,838
	30,105

The pheasant record is as follows:

### Forked River Farm

Breeding birds on hand June 30, 1928.....	1,574
Mature birds raised .....	6,000
Birds purchased and cared for.....	935
Estimated number young birds on hand June 30, 1929.....	8,700

### Rockport Farm

Breeding birds on hand June 30, 1928.....	953
Mature birds raised .....	5,800
Birds purchased and cared for.....	400
Estimated number young birds on hand June 30, 1929.....	7,400

31,762

### Forked River Farm

Birds liberated .....	6,648
Estimated number young birds on hand June 30, 1929.....	8,700
Breeding birds on hand June 30, 1929.....	1,452
Birds died and escaped .....	409

### Rockport Farm

Birds liberated .....	6,030
Estimated number young birds on hand June 30, 1929.....	7,400
Breeding birds on hand June 30, 1929.....	949
Birds died and escaped .....	174

31,762

## DEER

There was a concentration of the wardens in the deer woods during the season of 1928 to see that no deer were killed except those having horns at least three inches long, that deer were not hunted with rifles or with shot guns of a smaller calibre than 12 gauge, that no missiles larger than buckshot were used, that no deer were hunted at night or with dogs, and that no person killed more than one deer in the season. The State police gave valuable co-operation and we had some assistance from deputy wardens. Following the deer season the Board conducted an extra patrol of the deer woods.

During the 1928 season consisting of five days from December 17th to the 21st, both dates inclusive, there were 1,415 bucks legally killed and reported, and 79 does and fawn were found dead in the woods. This number is 375 less than last year when 1,790 were killed and reported and 78 does and fawns found by the wardens in the four day season.

The reduction in the number of deer killed this year may be attributed to the amendment to the deer act passed at the last session of the Legislature which prohibits the killing of deer, except those having horns at least three inches long. In former years it was legal to kill any deer with horns visible above the hair, which act permitted the killing of very young bucks.

The does and fawns found by the wardens, which were suitable for food purposes were given to hospitals and charitable institutions, and those not suitable for food purposes were buried by the wardens.

There were 45 persons prosecuted for violation of the deer act, and the offenses were as follows: 25 for killing and possessing does and fawns, and eight for using illegal missile, two for mutilating carcass of deer to conceal sex, one for hunting deer with rifle, and five for hunting deer in close season, all of which paid penalties of \$100.00 each, and four persons paid a penalty of \$50.00 each for hunting deer at night by the aid of auto lights.

The following shows the number of deer killed in each county:

County	Bucks	Fawns and Does Found Dead
Atlantic	112	1
Bergen	54	
Burlington	473	48
Camden	25	
Cape May	5	
Cumberland	51	
Essex	12	
Gloucester	0	
Hudson	0	
Hunterdon	3	1
Mercer	8	1
Middlesex	0	
Monmouth	23	
Morris	103	4
Ocean	329	21
Passaic	61	
Salem	0	
Somerset	18	
Sussex	82	3
Union	1	
Warren	55	
	1,415	79

#### DEER KILLED OTHER THAN DURING SEASON

Killed by train	14
Killed by auto	43
Found drowned	7
Running into fence	2
Found dead in woods	26
Killed by dogs	6
Trespassing on cultivated lands	8
	106

#### HUNTING ACCIDENTS

There was one fatal accident during the deer season, and four persons were injured, one self-inflicted and three by others.

During the upland game season, three deaths resulted from accidents, one self-inflicted and two by others. Twenty-two non-fatal accidents were reported, 6 self-inflicted and 16 by others.

#### ROE DEER

The Board took up with Professor Roswell Miller, of the New York Uni-

versity, an inquiry in the matter of the advisability of obtaining some roe deer from Germany, to be placed in High Point Park, which is fenced, with a view that the multiplication of said deer would become an additional source of food supply. The roe deer is a small deer of Europe and western Asia, and is also known as roe and roebuck. It is about 2½ feet tall; dark reddish brown, with a white patch on the rump, and having in the male small rugged erect antlers. The deer is rare in civilized Europe except where preserved in parks and private forests.

It was learned that importations would not be allowed because of disease conditions among live stock abroad not meeting the legal requirements for importation.

#### RABBITS

The Board ordered 15,000 Missouri rabbits for delivery in 1929-30, and from all quarters came commendation from the hunters on the Board's policy of generous stocking with this animal. During the year 14,921 were liberated.

Under date of January 26, 1928, Keith McCause, State Game and Fish Commissioner of Missouri, after inquiry of the Missouri State Board of Health concerning disease of tularemia in rabbits, wrote "I now find they have never had reported a case of death from tularemia. We have heard nothing of this disease as far as Missouri is concerned."

D. C. Bowen, Director of the State Board of Health, informed our Board after the close of the rabbit season in 1928 that no cases of tularemia had been reported in New Jersey. There had been rumors that the disease was common among our rabbits.

In October, the Board sent out a circular letter in response to inquiries on tularemia. It was recited that in November, 1927, there were two supposed cases in Cape May County, and the patients recovered, one case developing in an area where the warden had done no stocking, and the other case in an area which had not been stocked for three years.

The circular continued: "Our Board had numerous specimens examined without showing any evidence of the disease, and a common tape worm condition in rabbits alarms a number of people who believe that such condition is tularemia.

"A Bulletin of the U. S. Department of Agriculture, Bureau of Biological Survey, says there is no danger of contracting tularemia from eating rabbit meat if thoroughly cooked, even though the animal may have been infected.

"The bulletin further states that infected wild rabbits are likely to die within a period of five or six days although they may not invariably do so.

"The rabbits which the Board liberated came from Missouri and arrived in excellent condition showing no signs of any disease.

"Persons should not dress rabbits or squirrels which move slowly as if they were sick. Such should be killed and buried.

"In suspected cases the use of rubber gloves is the best known protection against human infection, although this is not an absolute protection.

"For further information regarding this disease, apply to the Bureau of Biological Survey, Washington, D. C., for their bulletin entitled 'Tularemia, an animal-borne disease.'

## HUNGARIAN PARTRIDGE

The Board placed an order with A. Valla, Prague, for 500 pairs of Hungarian partridges, but the same were not delivered, the vendor claiming that the severe winter in Europe and the restrictions on export of the birds by Czechoslovakia had prevented him from filling the order.

A survey in 1928 showed 672 Hungarian partridges in the State.

## GROUSE

Further protection was given by the Legislature to ruffed grouse by closing the season for one year in Warren, Sussex, Morris, Passaic and Bergen counties. While some persons thought that such protection was not needed in these counties yet there were good arguments to the contrary. Grouse are protected until March 9, 1932, in Essex, Union, Somerset, Hunterdon, Mercer, Middlesex and Monmouth counties, a five year closed period having been fixed in 1927.

## BLACK BIRDS

Under a long standing law persons are kept out of the woods and fields with firearms except when there are legal seasons. Before the passage of such a law thousands went out under the pretense of hunting unprotected birds with the result that protected game birds and animals were taken. It appeared that no warden force could prevent all such violations. The law has given general satisfaction. The Board, however, received a petition to provide for an open and close season on blackbirds which now are not protected birds. No claim was made that blackbirds had dangerously multiplied nor that they should be protected, but it was set forth that with a season fixed for their killing it would prevent persons who go out at the first open season in the fall, when it is legal to take certain game for the purpose of killing blackbirds from killing protected game which they come across. The petitioners did not suggest any close season. We feel that our present warden force is quite competent to deal with the present situation and we can conceive that giving protection to blackbirds would cause such an increase that they would become a nuisance.

## GAME FED BY WARDENS

The wardens were instructed to feed game and erect shelters when necessary during the winter, and to interest farmers, sportsmen, rural mail carriers and others in the work. There was not sufficient snow to warrant feeding for more than two or three days, and in some counties there was practically no snow and no feeding was done.

The following is a list showing the number of birds located and fed in the counties where feeding was necessary.

	Quail		Pheasants		Hungarian Partridges	
	Coveys	Birds	Coveys	Birds	Coveys	Birds
Atlantic .....	28	240	..	..	..	..
Bergen .....	..	..	..	80	..	..
Burlington .....	11	77	..	4	..	..
Camden .....	22	321	..	18	2	28

	Quail		Pheasants		Hungarian Partridges	
	Coveys	Birds	Coveys	Birds	Coveys	Birds
Cumberland .....	86	602	..	41	..	..
Hudson .....	..	..	..	150	..	..
Hunterdon .....	11	132	..	1,000	12	150
Mercer .....	..	..	..	490	..	..
Monmouth .....	72	720	..	125	..	..
Ocean .....	9	111	..	..	..	..
Salem .....	71	660	..	351	..	..
Somerset .....	7	82	..	1,708	26	371
Sussex .....	23	223	..	440	..	108
Warren .....	27	502	..	387	8	108
	367	3,670	..	4,794	48	652

## ATTRACTING BIRDS; JAPANESE BEETLE

We cooperated with the Department of Conservation and Development in sending to our wardens their circular respecting that Department's offer to sell forest tree seedlings for use in the establishment of forest plantations throughout the State. The stock is sold at the production cost price of \$3.50 per thousand seedlings. The Conservation Commission also circularized the fish and game clubs of the State. It was stated that one thousand seedlings spaced six feet by six feet apart would plant nearly an acre of land and two men could plant them easily in one day.

More forest plantation of evergreen trees will assist in the solution of game cover problems, and when planted along trout streams will improve stream conditions. We think this is an excellent work of the Conservation Commission, inasmuch as most of the old time rail fences have disappeared and with them have gone the fence corners which used to be a favorable location for bobwhites.

We are informed that the following plants indigenous to New Jersey, from a list prepared by Dr. Allen of Cornell University, are suitable for raising for providing food and cover for game. The order of grouping is that of the order of fruiting, and it is suggested that for any one game refuge not more than one species from each group if present in sufficient quantities would be necessary to provide bird food throughout the entire season.

- Group No. 1. Mulberry, Wild Strawberry.
- Group No. 2.—Cornus Amomum; Red Raspberry; Black Raspberry; Red Elderberry; Dewberry.
- Group No. 3. Cornus florida; Crataegus occinea and other early fruiting thorns; Blackberries; Elderberries; Blueberries.
- Group No. 4. Virginia creeper; Myrica; Viburnum cassinoides; Viburnum dentatum; Wild Grape; Wild Roses.
- Group No. 5. Crataegus cordata and other late fruiting thorns; Malus coronarius; Sumachs.

Plants other than native that provide an abundant food supply over a long season are Japanese Barberry and Privet.

Much can be done by our citizens in the erection of bird houses to attract birds. The U. S. Department of Agriculture publishes a bulletin entitled "A Home for Birds" which may be obtained from that Department, showing the principles of nest box construction, and of the location of bird houses, suggestions for homes for various birds, etc. The New Jersey Audubon So-

ciety, B. S. Bowdish, Secretary, 164 Market Street, Newark, N. J., acts as a purchasing agent for bird houses and every item used by bird students.

Feeding stations for birds could also be erected, one of the best being a piece of board tacked to a tree on which is built a shelf where the placing of suet and small grains will attract a great many birds which stay in our covers during the winter, and every bird held through the winter assures destruction of more insects in the coming season.

Reducing the number of insects will also operate in the protection of our forests. There is undoubtedly a place for many thousand bird houses in this State, and the birds they attract would charm by their form, color, actions and song, and every person erecting these boxes could congratulate himself that he is doing a fine work.

With the prevalence of the Japanese beetle in New Jersey and the efforts of the U. S. Government to eradicate them by various means, the lesson is again brought home as to the destructiveness of insects, and it is well to repeat the finding by scientists of the great value of song and insectivorous birds in destroying insects, without the help of which it would be practically impossible for the agriculturists of the country to raise food for the people. Pheasants, starlings and black birds are reported as feeding on the Japanese beetle, and many other birds include them in their rations. Laren B. Smith, Principal Entomologist in charge of the Bureau of Entomology, U. S. Department of Agriculture, Moorestown, N. J., says: "The starling and blackbirds have proven very useful in this connection. There have been cases where the starling has reduced the infestation of grubs in the soil on certain lawns and golf courses to a very large extent, and they are probably one of the most important natural enemies of the Japanese beetle in this country at the present time."

## FISH

Without doubt the trout season was the best in years, more fishermen obtaining the bag limit than at any previous time. Heavy rains, however, made conditions unfavorable in the first days of the season.

Most excellent reports were received as to the taking of brown trout which had been put out in the fall, and early in the season many baskets contained a preponderance of brown trout and despite the large catches many were seen in the streams. Pond fish angling was quite satisfactory.

The operations of the Hatchery are noted in the following pages.

There was a total distribution of 109,733,409 fish by the State, as follows:

From the Fish Hatchery at Hackettstown.....	86,552,830
From the State Shad Hatchery (including perch).....	23,088,000
From Boonton and Orange Reservoirs, and other private sources..	92,579

109,733,409

The Bureau of Fisheries, Washington, D. C., distributed in the State during the year ending June 30, 1929, fish as follows:

Catfish .....	1,825
Rainbow trout .....	4,150
Loch Leven trout .....	1,350
Brook trout .....	10,600
Large mouth Black bass.....	5,845
Small mouth Black bass .....	3,450
Sunfish .....	240

27,460

### TROUT CONDITIONS IN 1928

Reports of wardens on trout fishing follow:

*Assistant Protector H. E. Cudney:* I am sure it was the best season in every way that I have known in the last twenty-two years. While the streams were quite high for the first fifteen days there were a lot of fish caught in the small streams. But from May 1 to July 1, it seemed as though the conditions for fishing remained better than usual. We put out more fish and of greater size. Anyone that knew how to fish could go out any day and in a few hours bring home eight or ten nice trout, and while we always look for the trout fishing almost to stop after the bass season opens, this year it continued right up to the last day. Any evening during the season it was nothing unusual to see from ten to thirty along any of the larger streams.

*Warden Park, Hunterdon County:* Trout season opened with the largest attendance of fishermen I have ever seen, excepting the following Sunday which was the largest day I ever saw in my experience. Many caught their limit the first part of the season, many others got none. The South Branch, Raritan, Spruce Run and the Rockaways were heavily fished, and are very popular streams and as a general rule the fishermen were well satisfied. The fishing held out good until about June 15th; then only the regulars fished.

*Warden Treloar, Passaic County:* There were a number of big ones taken from the Wanaque River. I saw one 22-inch rainbow taken below the Mine Hole; also one 20 inches taken out of Cooley's brook. On the opening day one man quit with 15 before 9 o'clock; the smallest fish in his bag were three 10-inch brook trout. Another man later in the season took 15, among them being three two pounders.

*Warden Ashworth, Sussex County:* In the earlier part of the season the increased number of fishermen had no easy time of taking large or limit bags, owing to the extremely high water, which caused more or less disappointment and a waning interest to prevail. As usual the real trout fisherman got his fill.

*Warden F. J. Hall, Essex County:* I have only two streams, known as Notch Brook and South Mountain. The general interest by the sportsmen and in numbers of fishermen far exceeded that of any other year. Many bag limits were taken. I conversed with a great many along the streams and many of them voiced their sentiments as being well pleased and praised the Commission in the highest terms for the good work done.

*Warden Davison, Monmouth County:* Trout fishing conditions were the best we have had in ten years, probably, due to the heavy stocking with large fish. There were more fishermen along the streams, more took the limit, and every one seemed pleased.

*Warden Hugg, Middlesex County:* A banner year for the trout fishermen in Middlesex County; last year the streams were generally so high that a great many fish were left over and the stocking of browns last fall stayed and developed into real fighters. The trout streams in this county are becoming more popular every year, the fishermen coming from Mercer and Monmouth counties. Usually when the pickerel season opens the trout fishermen go after them, and quit entirely when the bass season opens, but this year I had inquiries when the brooks were to be stocked, as late as July 4.

*Warden W. H. Small, Bergen County:* A specific instance of the popularity of trout fishing can be cited from what occurred in Little Ferry. Branch 9, of the Bergen County Sportsmen's Association, acquired the privilege of having Willow Lake stocked by the State to create a public fishing place. Result was an increase of licenses issued of more than 500% over last year. Bag limit frequently reported on stocking days, occasionally on days between.

*Warden Bernius, Sussex County:* Trout fishing was much greater than in previous years.

*Warden Lawrence, Morris County:* More fishermen on the brooks than in previous years. There were a great many bag limits taken and the fishermen in general were satisfied. Also heard a great many compliments as to the size of trout taken this year.

*Warden Graham, Gloucester County:* There was a larger number of men fishing and a large percent of them caught the bag limit.

#### INCREASED COST OF HATCHERY FOOD

In making new contracts for food for the Hatchery which generally consisted of sheep plux, beef hearts, beef liver and pork melts, the Purchasing Agent found prices had largely increased over the last contract.

In 1927-28 we purchased sheep plux on contract for .0440, but running short during the last two months of the year we had to pay .0895, and the contract for the first six months of 1928-29 was still further increased to .0985. Beef livers in 1927-28 were .1025, whereas the 1928-29 contract was .1850.

There were also increases in other foods, and the Board because of these high prices, made contracts for cheaper foods such as beef melts, calf hearts and lungs, beef lungs and frozen fish.

Approximately for the same number of fish in 1928-29 the cost of food was more than double in some cases and in two cases nearly double over 1927-28.

The Board met the situation partly by ordering distributed during the fall a large number of fish which it had been intended to keep at the hatchery until they had attained a larger size.

#### SHAD HATCHERY

The third year's operation of the Shad Hatchery was successful. We more than doubled the output of last year. Many fishermen who at first had little faith in its success are now favorably impressed with its operation, and it has been visited by many persons from Pennsylvania, Maryland and Delaware. There was a total of 23,088,000 shad, yellow and white perch fry hatched.

The Hatchery has indirectly done much for conservation, inasmuch as the perch eggs gathered from sand bars or twigs and bushes would have died from exposure to the sun and air before the next tide returned to the head of our various tide water creeks. The eggs taken from the shad cannot be held together at this stage, and are not marketable, and these roe shad are sold in the market as bucks.

#### HACKETTSTOWN HATCHERY

Charles O. Hayford, Superintendent of the Fish Hatchery at Hackettstown and in charge of the Shad Hatchery at Hancock's Bridge, in his seventeenth annual report for the fiscal year ending June 30, 1929, says:

The output of the Hackettstown Hatchery for the past fiscal year is shown by the following table:

	Inches	Raised July 1, 1928, to June 30, 1929	Disposed of	Estimated Number On Hand
Brook Trout	2-3	100,000		100,000
"	3-4	4,400	4,400	
"	4-6	102,150	102,150	
"	6-7	24,700	24,700	
"	7-9	18,525	15,525	3,000
"	8-10	6,300	6,300	
"	9-11	175	175	
"	12-14	50	50	
Brown Trout	2-3	548,775	98,775	450,000
"	3-5	26,200	26,200	
"	4-6	1,000	1,000	
"	6-9	130,700	50,700	80,000
"	7-9	11,000	11,000	
"	7-10	31,050	31,050	
"	6-10	37,650	37,650	
"	8-10	23,660	8,660	15,000
"	10-12	2,300	2,300	

	Inches	Raised July 1, 1928, to June 30, 1929	Disposed of	Estimated Number On Hand
Brown Trout	12-16	1,085	1,085	
" "	14-18	1,560	1,560	
Loch Leven Trout	2-3	328,075	78,075	250,000
" " "	8-10	15,000	15,000	
" " "	12	1,200	1,200	
Rainbow Trout	1-2	500,000		500,000
" "	4-6	150,000		150,000
" "	6-8	50,700	700	50,000
" "	7-11	74,475	74,475	
" "	8-10	80,000	80,000	
" "	10-12	38,375	38,375	
" "	11-13	21,175	21,175	
" "	12-14	1,825	1,825	
Small Mouth Bass	1	12,000	2,000	10,000
" "	2-3	1,500	1,500	
" "	3-4	18,250	18,250	
Large Mouth Bass	1	285,000	35,000	250,000
" "	1½	83,200	83,200	
" "	2	122,400	122,400	
" "	3-4	22,950	22,950	
Catfish	3	55,900	55,900	
Bluegill Sunfish	fry	250,000		250,000
" "	1-2	369,050	369,050	
" "	4	6,700	6,700	
" "	4-6	300	300	
" "	6-8	100	100	
" "	6-10	325	325	
Sunfish	4-6	75	75	
Long Eared Sunfish	6	700	700	
Yellow Perch	fry	85,100,000	85,100,000	
" "	6	100	100	
" "	8-10	175	175	
		88,660,830	86,552,830	2,108,000

Output from Hancock's Bridge Hatchery, Salem County:

Yellow Perch, fry	19,700,000	19,700,000
White Perch, fry	700,000	700,000
Shad, fry	2,688,000	2,688,000
	23,088,000	23,088,000
Total from both Hatcheries...	111,748,830	109,640,830

In addition to the above:

Various fish netted in State Reservoirs	92,579
Total distribution	109,733,409

A list of the stocking done by the Board showing number, species, and water will be found in succeeding pages.

The following tables show distribution of trout, bass, perch fry, bluegill sunfish, and catfish, during the past five years:

Trout over 6 inches		Trout under 6 inches	
1924-25	249,160	1924-25	1,008,200
1925-26	251,680	1925-26	872,810
1926-27	277,500	1926-27	523,600
1927-28	302,622	1927-28	345,900
1928-29	423,505	1928-29	310,600
	1,504,467		3,061,110
Bass		Yellow Perch Fry	
1924-25	214,307	1924-25	58,000,000
1925-26	145,500	1925-26	65,600,000
1926-27	98,750	1926-27	75,000,000
1927-28	190,300	1927-28	96,325,000
1928-29	285,300	1928-29	104,800,000
	934,157		399,725,000
Bluegill Sunfish		Catfish Fry	
1924-25	125,050	1924-25	5,050
1925-26	217,900	1925-26	86,600
1926-27	388,500	1926-27	8,500
1927-28	607,300	1927-28	58,700
1928-29	376,475	1928-29	55,900
	1,715,225		214,750

**Rearing Pond Station.** On June 18th the fish in one of the ponds at the new rearing station became distressed. Heavy mortality followed. The cause of death was the formation of gas in the bodies of the fish, particularly in the eye sockets, and occasionally on the fins under the skin. The disease is known as "pop-eye". The fish were very lively, even those with both eyes protruding. Not one was observed swimming on one side or at the surface, as dying fish frequently do. They all partook vigorously of the 150 pounds of chopped meat daily. Very fortunately E. G. Applegate, of the State Board of Health, made a complete water analysis of the springs and brook before construction was started. Therefore, he was in a position to check and quickly locate the reaction caused by the chemical changes. The volume of water was increased as recommended by Mr. Applegate which greatly reduced the mortality. At a later date J. E. Bacon, Senior Chemist, and Mr. Applegate again checked the conditions and recommended the use of copper sulphate. This was used as directed with the result that the growth of fine green algae was destroyed with no loss or injury to the trout. I do not anticipate trouble when the ponds are completed and copper sulphate is used in time of profuse growths of algae during the hot summer months. We are grateful to D. C. Bowen, Director, Board of Health, for permitting Mr. Bacon and Mr. Applegate to visit the hatchery and make examinations of the water.

On March 13th a microscopic examination of the small trout in the nursery found all the fish to be free from parasites. On Monday, March 25th, twenty per cent of the fish were affected with Chilodonjasis. The fish were treated with a two per cent solution which effected a complete cure.

Numerous outbreaks of Gyrodactylia were controlled by the use of glacial acetic acid. A bacterial infection of the gills was treated with very good

success with copper sulphate. A parasite known as Ichthyophthirius multifiliis was successfully combated by the use of aluminum sulphate.

We are deeply indebted to Dr. H. S. Davis, U. S. Pathologist, and Dr. G. C. Embury, Professor of Limnology of Cornell University for their co-operation in the study of the different parasites and diseases and the control of same.

There was an increase in the cost of the regular fish foods, but the trucking of thousands of bait fish and frozen fish to the hatchery, and quickly distributing the trout from the hatchery, resulted in a very substantial saving, the trucking being done under the supervision of Assistant Protector Harry E. Cudney.

Commissioner Henry O'Malley and Chief Fish Culturist, G. C. Leach, of the U. S. Bureau of Fisheries, visited the hatchery during the past year. Many fish culturists from other states also visited us on account of our having one of the largest hatcheries in the country using modern methods in breeding, rearing and disease control.

**Construction.** Completed two ponds under construction, and built seven new ponds in the new rearing pond station.

**Farm Crops.** Harvested 20 loads of hay.

**Shad Work.** The shad work at Hancock's Bridge was very satisfactory as shown by the three years' operation:

1926-27.....	40,000
1927-28.....	1,120,000
1928-29.....	2,688,000

If the shad run continues above Trenton in the future, as it did this past season another station could be established in Hunterdon County.

**Forage Minnows for Bass Food:** The last few years have witnessed a marked change in the attitude of the public toward fish culture. There is an increasing demand for larger and better fish, for fish which have reached the stage where they have a reasonable chance of survival when left to shift for themselves.

It is a comparatively simple matter to raise trout to a large size as they readily take to and thrive on many varieties of food easily available.

With the large and small mouthed bass, however, conditions are very different. Since these fish cannot be crowded together successfully in such close quarters as trout, and since the young must be reared under essentially natural conditions, comparatively large ponds are required with a relatively small production per unit area. As compared with trout this means a much higher overhead which, fortunately, is offset to a considerable extent by lower food and labor costs. Nevertheless, so expensive is the propagation of 4 to 5-inch fingerling bass that some of our leading fish culturists have held that the end does not justify the means. In other words they believe that since the production of fingerling bass is so expensive and fraught with so much uncertainty it is economically unjustifiable and that it will be necessary to rely on protective measures, supplemented to some extent by the planting of fry, to maintain a supply of bass in our lakes and streams.

While such a policy may be successful in the more remote and inaccessible localities, it is evident that in a state like ours, with a limited number of lakes, in order to insure the lake fishermen their sport, we have to work the artificial propagation of pond fish to its maximum with modern methods.

It is generally agreed by the leading fish culturists who have successfully conducted experiments that large numbers of forage minnows must be produced in separate ponds to feed the young bass after they attain a size of two inches. By using this method 3 to 5 inch bass can be produced for October distribution. A three to five inch bass has the same ability to care for himself which an eight to ten inch trout has.

Mr. Frederick Tresselt, of Thurmont, Maryland, raised bass five to seven inches long in four months. These fish had all the young gold fish they could consume after they attained the size of two inches on insect life. These same bass at one year old reached the size of 9 to 11 inches and one of them attained a length of 13 inches.

We have the trout situation well in hand and I believe we are spending all the money for the propagation of large trout we should until we have further developed our pond fish culture. As previously stated according to our biological survey over sixty per cent of our stockable waters are adapted to pond fish only. Another point in favor of pond fish culture is that the food cost is very small per thousand.

## SHAD

Protector James M. Stratton prepared the annual statistics of the shad fishing industry of the Delaware River and Bay, which includes only the shad caught by persons operating from the New Jersey shore.

There was a total increase in 1929 over 1928 of 11 nets operated, 14 men engaged in the business, 36,684 shad caught, with an increased value of \$24,963.00 of shad caught, all counties showing an increase in shad caught.

The decrease in the value of boats and nets since 1928 was \$9,385.00

In Cumberland County 102 men with 44 nets in 1928 caught 25,200 shad, and in 1929 43,100 shad were caught by 99 men with 52 nets. Of the above number of fish 14,400 were caught in the Maurice River by short gill nets and hauling seines, whereas a few years ago very few shad were caught in this river by reason of pollution which the State Board of Health has remedied.

Salem County shows a decrease of five nets and 10 men since 1928, but an increase of 14,029 shad caught.

There was no shad fishing in Camden County last year. This year eight men with four nets caught 1,000 shad.

The increase in the catch of shad is noticeable in the counties further up the river, as in 1928 there were 4,588 shad caught in Burlington County by 35 men with 16 nets. During the past season 41 men with 19 nets caught 5,496 shad.

There were 6,584 shad caught in Mercer County in 1928 by 29 men with 12 nets, while in 1929 the catch was 7,168 shad by 42 men with 10 nets.

Hunterdon County has shown the following increases for three years: In 1927 there was only one net in use which was operated by six men and caught 1,034 shad; in 1928 17 men with 6 nets caught 3,587 shad and in 1929, 25 men with 13 nets caught 4,850 shad.

**REPORT OF SHAD CAUGHT IN DELAWARE RIVER AND BAY—1929**

County	Boats and Nets		Men Engaged		Number Shad Caught		Value Shad Caught		Value of Boats and Nets	
	1928	1929	1928	1929	1928	1929	1928	1929	1928	1929
Cumberland	44	52	102	99	25,200	43,100	\$25,200	\$39,500	\$27,800	\$17,120
Salem	38	33	76	66	20,210	34,239	24,068	36,620	30,400	31,350
Camden		4		8		1,000		800		290
Burlington	16	19	35	41	4,588	5,496	4,502	5,496	2,485	1,990
Mercer	12	10	29	42	6,584	7,168	10,087	6,154	1,400	2,005
Hunterdon	6	13	17	25	3,587	4,850	4,901	5,951	965	1,200
Increase	116	127	259	273	60,169	94,853	\$68,758	\$93,721	\$63,050	\$53,665
Decrease		11		14		34,684		24,963	9,385	

Increase and Decrease figured exclusive of Camden County where no shad were caught in 1928.

**POUNDS SUMMARY**

Following is a summary of the pound fisheries report for the calendar year ending December 31, 1928:

Approximate value of all pounds .....	\$770,813.00
Proceeds derived from sale of fish.....	\$978,289.16
Number of pounds of fish caught and disposed of.....	25,261,805

Licenses issued:

Atlantic Ocean .....	101
Sandy Hook and Raritan Bay.....	22
	123

Number of pounds operated .....	118
Number of men employed.....	457

**NETTING WATERS**

We netted the following waters for fish for stocking State waters: Boonton Reservoir, Delaware and Raritan Canal, Maurice River, Gate hole, Cohansey river; private lake at Swedesboro, Orange Reservoir, and Gate hole at Alloway Creek.

The Conservation Department of New York granted the Board a permit to take white perch, with a net in Hudson river, for propagating purposes and 1134 were obtained and put in our waters.

**SWARTSWOOD LAKE**

At the request of fishermen, the Department of Conservation and Development issued an order forbidding the use of outboard motors on Swartswood Lake in Swartswood Lake Park. It was claimed that the use of the motors made such a disturbance of the waters as to prevent the catching of fish. Swartswood Lake Park is the property of the State and contains 568 acres, and was taken over by the State at the request of citizens of Sussex county. The Department issued a permit for our patrol boat on the lake.

**WASTE TREATMENT PLANTS**

Complaints of pollution of waters were greatly less during the year, and in the few complaints the Board did all that it could with the power behind it. We received cooperation from the State Board of Health whose laws on this subject are stringent.

That progress is being made in the installation of treatment plants is evidenced from data obtained from the Board of Health. During the year that Board approved of plans for treatment plants for municipalities at Barrington, Bellmawr, Brigantine City, Emerson, Gloucester Township, Lavallette, Rahway, Raritan Township, Red Bank, Springfield Township, West Orange, Woodbridge and West Paterson, and also for the American Salpa Corporation, at East Spotswood; American Gas and Electric Company and United Gas Improvement Company at Lower Penns Neck Township; Packanack Lake, Inc., in Wayne Township.

Sewage treatment plants completed during the year were at Atlantic Highlands, Brigantine City (temporary), Camden, Mount Ephriam, North Wildwood, Seaside Heights and Totowa.

Plans were approved for improvements at 18 sewage plants.

There are in the State 339 sewage and trade waste treatment plants and 16 creamery and dairy waste treatment plants.

### PATROLLING WATERS

The cruiser "H. J. Burlington" patrolled the Atlantic Ocean, Sandy Hook and Raritan Bay, Barnegat Bay, Delaware River and bay for the enforcement of laws relating to these waters, and wardens also operated patrols in coastal and inland waters in bank skiffs.

### LOBSTERS

We informed Captain Charles J. Frieberger, of the Sheepshead Bay Boat Owners' Association, that we would be pleased to cooperate with the Association in the enforcement of the law on short lobsters, illegal netting, etc. Four members of that Association were appointed special game protectors by the Conservation Commission of New York. Captain Frieberger wrote us that the Association's boat owners had been instructed not to permit lobster boats to sell short lobsters to their passengers. We informed him that we had a bank skiff in service looking for violations in our waters adjoining those of New York, Sandy Hook Bay, Raritan Bay and Lower Bay, and also referred him to our laws respecting these waters.

### COMMERCIAL AND HAND LINE FISHING

As is well known, there are the conflicts between the net fishermen and the anglers along our coast, revolving around the laws for the taking of menhaden with purse or shirred seines within the three mile limit, for the operation of pounds, and for the taking of fish other than menhaden with purse or shirred seines and otter or beam trawls, at a distance beyond two miles from the coast line.

As to the pounds which have been operated on our coast for many years and the act of 1929 allowing the taking of food fish at a distance beyond two miles from the coast line, the claim is made that the operations increase the supply of food for the masses at fair prices, and that hand line fishing would only supply a small part of the demand.

A recent compilation of the United States Bureau of Fisheries shows that the middle Atlantic States have a less number of pound nets, trap nets and weirs than any group, the number being 650. The New England group have 770, Chesapeake 3,712, South Atlantic 2,781, Gulf 3,837, Pacific 821, Lakes 8,082 and Alaska 767.

The question of abolishing the pounds has been before the Legislature on various occasions for many years, but after public hearings the conclusion is reached that to do away with the pounds would be to increase the cost of fish.

In regard to the law of 1929 allowing the taking of food fish at a distance beyond two miles from the coast line, the bill was introduced by Senator Charles C. Read of Cape May county. It was given a public hearing, which was attended by about fifty persons and a number spoke in its favor. At the hearing it was stated that these nets would not interfere with the anglers, and consideration should be given to the fact that the nets would increase the fish food supply. No one spoke in opposition to the measure. To the end of the fiscal year 29 licenses had been issued under the law.

### INVESTIGATION OF FISH HABITS

In 1927, our Board, after a conference with representatives of the Bureau of Fisheries at Washington, and the angling clubs and net fishermen of the State, referred to in detail in our last annual report, introduced a bill in the Legislature providing for a State marine laboratory to study the habits of fishes, to be supported by a \$1.00 salt water fishing license, but this bill was defeated.

Respecting fish migration, spawning periods and locations of spawning, there is great difference of opinion, and the United States Bureau of Fisheries have a special force now investigating this matter in this State, and they have obtained records from this office of the catch of pound nets.

As to the status of this investigation, Lewis Radcliffe, Acting U. S. Commissioner of Fisheries, at our request, forwarded a report on the work written by Mr. R. A. Nesbit. In his letter of transmittal Commissioner Radcliffe says:

"As stated in the body of the paper, the work has not been continued for sufficient time to make definite statements in regard to the fishery conservation laws needed. You will recognize the futility of making any definite recommendations prior to a thorough examination of all data obtainable, and I trust that the outline attached will be suitable for your purpose."

In another letter Mr. Radcliffe wrote respecting the agitation for prohibition of commercial fishing:

"It must be realized that such action would destroy a great source of revenue and prohibit the utilization of a great food resource. One hope of the Bureau's present work in New Jersey is to provide information which will aid in harmonizing these conflicting views."

*Mr. Nesbit's report follows:*

"The United States Bureau of Fisheries is engaged in scientific studies of the shore fisheries of the Middle Atlantic States. As the center of abundance of most of the important food and game fishes of this region is in New Jersey waters, these studies will be of great value in providing a sound basis for the conservation policies of the State. The object of these studies is to determine the extent and the causes of changes in the yield of the fisheries. In this way it is expected to discover what means should be employed to keep in adjustment the productive capacity of the sea and the strain due to fishing, so as to insure the continuation of an undiminished resource.

"Available statistical records show considerable variation in the annual catch but when changes in the amount of gear are taken into consideration, there is no positive evidence of a persistent decline in abundance of the more important fishes.

"Since the commonest cause of fluctuation in abundance of marine fishes is irregularity in the amount of the annual additions to the population by spawning, biological studies are being carried on to determine whether the considerable annual variations in the yield of weakfish are due to this cause. This point is extremely important, for experience has demonstrated that species subject to this sort of variation are subject to severe declines even when not subjected to excessive fishing and that they are capable of natural recovery from such periods of depression. These biological studies consist of observations of spawning grounds of weakfish and other species and of study of fish taken commercially. Since comparison of observations over a period of several years is necessary before conclusions can be drawn, it is not profitable to discuss the observations in detail at this time. It may be noted in passing, however, that destruction of fish of less than the legal minimum size by commercial fishing gear has not been observed to occur in New Jersey to an objectionable extent.

"In order to determine whether conservation is a local or a general problem, fish are being tagged and released. 1800 weakfish were tagged during June, 1929, at Wildwood, N. J., and others will be tagged elsewhere if the experiment proves successful.

"At the present stage of the investigation it is not possible to make recommendations. The problems connected with adjustment of regulations to the habits and life histories of the several species and to the economic requirements of the fishery are extremely complex and several years will be required before suitable recommendations can be made. Meanwhile, it does not appear advisable to add to existing restrictions."

#### PICKEREL AND BASS

Of late the pickerel laws have been the object of fire of a few individuals. There are some, notably bass fishermen, who would have the Commission net every pickerel from our waters because of their alleged menace to all other fish. Others would protect pickerel still further by a shorter season, a smaller bag limit and an increase in the legal length. Then there are advocates of prohibiting their taking under the ice, with the view that they might increase and afford more sport for the average fisherman. Aside from the enjoyment of taking them through the ice and for food the ice fishermen believe that what they take makes for better conditions for bass and other fishing.

As to the opening of the bass season on June 15th it is well known that this question has been threshed out for many years, and it is conceded that what bass may be hooked from May 20 to June 15 are practically nothing as compared to the number of bass which would become the prey of pickerel if their numbers were not curtailed. It must be remembered also that thousands of persons look forward to the holiday of Decoration Day to enjoy pickerel

fishing, and until better reasons are put forth it would seem unfair to deprive them of the right to find pleasure at that time.

One person wanted the Board to lessen the bag limit on perch, pike-perch, pike and pickerel when fishing through the ice, in a certain lake; another urged the staking of bass beds and prohibition of fishing within the stakes, unmindful that there was no legal authority for the same, and that such staking would advertise the areas to a certain class of fishermen and that when bass are on their beds they are easily caught.

#### SUPPLEMENT TO 1927-1928 REPORT

##### Income

Balance as per last printed report..... \$112,386.41

##### Expenditures

Chapter 318, Laws of 1927, paid after June 30, 1928, on requisitions for 1927-1928..... \$26,694.40  
To Balance ..... 85,692.01  

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\$112,386.41

#### REPORT FOR 1928-1929

##### Income

Balance July 1, 1928 ..... \$85,692.01  
Hunters' and Anglers' Licenses:  
Chapter 152, Laws 1914 (Regular)  
Chapter 320, Laws 1915 (Juvenile)  
Chapter 125, Laws 1922 (Woodcock)..... \$286,502.20  
Chapter 153, Laws 1918:  
Menhaden Licenses ..... \$2,325.00  
Food Fish Licenses ..... 1,300.00  
Pound Licenses ..... 5,350.00  
Breeders' Licenses ..... 1,700.00  
Sales Farms and Hatchery..... 1,898.99  
Sundries ..... 1,609.67  
Trespass Cases ..... 1,090.50  

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15,274.16  
Chapter 147, Laws 1911 (Fines)..... 27,152.50  

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328,928.86  
Refund (Valla order) ..... 4,825.00  

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\$419,445.87

##### Expenditures

Chapter 257, Laws 1928 (including Valla order)..... \$319,401.32  
Requisitions outstanding ..... \$10,701.94  
Account Balance ..... 89,342.61  

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100,044.55  

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\$419,445.87  
Account Balance June 30, 1929..... \$89,342.61

## STOCKING OF NEW JERSEY WATERS

By the New Jersey Board of Fish and Game Commissioners  
For the Fiscal Year Ending June 30, 1929

Total Number of Fish Planted from All Sources—109,733,409

### KEY TO ABBREVIATIONS

Fish	Fish
Bt. .... Brook Trout	Pic. .... Pickerel
Brnt. .... Brown Trout	S. .... Sunfish
Rt. .... Rainbow Trout	B. .... Baitfish
Lt. .... Loch Leven Trout	Cr. .... Crappie
Lmb. .... Large Mouth Bass	Wper. .... White Perch
Smb. .... Small Mouth Bass	Yper. .... Yellow Perch
Bs. .... Bluegill Sunfish	Shad. .... Shad
C. .... Catfish	Misc. .... Miscellaneous
Les. .... Longeared Sunfish	

### SIZE

fg. .... fingerlings
f. .... fry
a. .... adults

### ATLANTIC COUNTY

#### (Great Egg Harbor System)

Lenape Lake—Mays Landing—900 Lmbfg.  
Mare Run—Emitsville—600,000 Yperf.  
Union Creek—Egg Harbor—1,200,000 Yperf.

#### (Mullica River System)

Hammonton Lake—Hammonton—900 Lmbfg, 700 Brnta, 9,000 Bsf, 1,000 Rta, 600,000 Yperf.

### BERGEN COUNTY

#### (Hackensack River System)

Closter Brook—Closter—300 Bta, 150 Brnta, 330 Rta.  
Cooper's Pond—Northvale—11,000 Cfg, 150 Smbfg.  
Demarest Pond—Demarest—1,000 Bsf, 205 Rta.  
Dyers Pond—Northvale—500 Lmbfg.  
Gardners Pond—Little Ferry—50 Bta, 300 Brnta, 1,430 Rta.  
Hackensack Lake—Hackensack—2,000 Bsf.  
Hackensack River—Oradell—1,467 Rta, 100 Brnta.  
Musquasink Creek—Westwood—300 Bta, 300 Btfg.  
Oradell Reservoir—Oradell—1,000 Lmbfg, 6,000 Bsf, 1,500 Cfg, 1,350,000 Yperf.  
Pascack Creek—Woodcliff Lake—600 Lta, 225 Bta, 6,725 Brnta, 3,750 Brntfg, 3,000 Btfg, 5,850 Rta.  
Tellers Brook—Riverdale—3,750 Brntfg, 125 Rta, 150 Lta.

Tenekill Creek—Closter—300 Bta, 150 Brnta, 455 Rta.  
Washington Spring Brook—Cherry Hill—100 Bta, 580 Rta, 300 Brnta.  
West Washington Spring Brook—Spring Valley—250 Rta.  
Willow Lake—Little Ferry—450,000 Yperf.  
Winters Pond—Ramsey—3,000 Bsf.

#### (Pascack Creek System)

Bear Creek—Woodcliff Lake—2,000 Btfg, 300 Bta, 125 Rta, 150 Lta.  
Bear Lake—Woodcliff Lake—375 Lmbfg, 10,000 Bsf, 600 Cfg.  
Electric Lake—Montvale—1,000 Lmbfg, 1,350,000 Yperf, 5 Smba, 1 Cr, 300 S.  
Woodcliff Lake—Woodcliff Lake—1,000 Lmbfg, 9,000 Bsf, 1,500 Cfg.

#### (Passaic River System)

Saddle River—Saddle River—800 Bta, 5,935 Rta, 4,250 Brnta, 3,750 Brntfg, 450,000 Yperf, 3,300 Btfg.  
Valentine Brook—Hawthorne—300 Bta, 200 Rta.  
Van Zaun Lake—Little Ferry—500 Lmbfg, 1,000 Bsf, 50 Bta, 100 Brnta, 500 Rta, 450,000 Yperf.

#### (Saddle River System)

So. Bergen Boy Scouts Camp—Oakdale—10,000 Bsf, 900 Cfg.  
Tallman's Brook—Upper Saddle River—3,750 Brntfg, 200 Brnta.

### BURLINGTON COUNTY

#### (Delaware River System)

Bread & Cheese Run—Tabernacle—950 Brnta, 250 Rta.  
Sylvan Lake—Burlington—400 Rta, 1,300 Lmbfg, 3,000 Bsf, 500 Brnta, 400,000 Yperf, 500 Per.

#### (Mullica River System)

Atsion Lake—Atsion—650 Lmbfg, 3,000 Bsf, 200,000 Yperf.

#### (Rancocas Creek System)

Cedar Lake—Eayrstown—650 Lmbfg, 1,500 Bsf, 200,000 Yperf.  
Durand's Lake—Mt. Holly—500 Lmbfg, 200,000 Yperf.  
Hunter's Lodge Lake—Brown's Mill—200,000 Yperf.  
Little Pine Lake—Brown's Mill—500 Lmbfg, 200,000 Yperf.  
Mirror Lake—Brown's Mill—500 Lmbfg, 200,000 Yperf.  
Norcross Lake—Pemberton—800 Lmbfg, 200,000 Yperf, 500 Rta.  
New Lisbon Lake—New Lisbon—500 Lmbfg.  
Ockanickin Lake—Near Medford—500 Rta.  
Rancocas Lake—Rancocas—300 Lmbfg, 1,500 Bsf, 75 Smba.  
Smithville Lake—Smithville—650 Lmbfg, 1,500 Bsf, 200,000 Yperf, 50 Cra, 25 Pic.  
Vincentown Lake—Vincentown—300 Lmbfg, 200,000 Yperf.

#### (Wading River System)

Cotoxen Lake—Kirby's Mills—850 Lmbfg, 1,500 Bsf.

### CAMDEN COUNTY

#### (Delaware River System)

Blackwood Lake—Blackwood—700 Lmbfg, 1,500 Bsf, 200,000 Yperf.  
Bridgeview Lake—Gibbsboro—1,000 Lmbfg, 200,000 Yperf.

Evans Lake—Haddonfield—500 Lmbfg, 200,000 Yperf.  
 Farnham Park Lake—Camden—700 Lmbfg, 3,000 Bsf.  
 Good Intent Lake—Blackwood—300 Lmbfg, 11 Smba, 30 Wper, 100 Cr, 75 S.  
 Grenloch Lake—Grenloch—1,000 Lmbfg, 1,500 Bsf, 200,000 Yperf, 11 Smba,  
 11 Cr, 50 S.  
 Haddon Lake—Mt. Ephraim—600 Lmbfg, 200,000 Yperf.  
 Hopkin's Lake—Haddonfield—200,000 Yperf.  
 Lakeside Lake—Kirkwood—1,000 Lmbfg, 3,000 Bsf, 200,000 Yperf.  
 Laurel Lake—Laurel Springs—300 Lmbfg, 200,000 Yperf.  
 Little Lake—500 Lmbfg.

**(Mullica River System)**

Atco Lake—Atco—200,00 Yperf.  
 Spring Lake—Beebétown—500 Lmbfg.

**(Timber Creek System)**

Back Run—Berlin—250 Rta.  
 Bottomley Lake—Clementon—1,000 Lmbfg, 3,000 Bsf, 200,000 Yperf.  
 Brown's Run—Turnersville—275 Brnta.  
 Cheeseman Run—Laurel Springs—200 Rta.  
 Cold Water Run—Laurel Springs—200 Rta.  
 Big Lebanon Run—Turnersville—825 Brnta, 250 Rta.  
 Kettle Run—Berlin—50 Bta, 250 Brnta.  
 Little Lebanon Run—Turnersville—325 Brnta.  
 New Brooklyn Lake—New Brooklyn—500 Lmbfg.  
 Overbrook Lake—Overbrook—200,000 Yperf.  
 Rattlesnake Run—Turnersville—375 Brnta.  
 Silver Lake—Clementon—200,000 Yperf.  
 Trout Run—Near Clementon—100 Rta.

**CAPE MAY COUNTY**

County Alms House Pond—Cape May Court House—1,200 Lmbfg, 400,000  
 Yperf.  
 East Creek Lake—Eldora—1,050 Lmbfg, 400,000 Yperf.  
 Lilly Lake—Cape May—700 Lmbfg.  
 Ludlam's Lake—Dennisville—400,000 Yperf.  
 Rio Grande Pond—Rio Grande—1,050 Lmbfg, 400,000 Yperf.  
 Sleepy Hollow Lake—Middle Township—1,200 Lmbfg.

**CUMBERLAND COUNTY**

**(Cedar Creek System)**

Crystal Lake—Cedarville—400,000 Yperf, 3,000 Bsf.

**(Cohansey Creek System)**

Clark's Lake—Bridgeton—1,000 Lmbfg, 400,000 Yperf.  
 East Lake—Bridgeton—200,000 Yperf, 3,000 Bsf.  
 Elmer Lake—Bridgeton—1,000 Lmbfg, 200,000 Yperf, 3,000 Bsf.  
 Sunset Lake—Bridgeton—1,000 Lmbfg.  
 Tumbling Dam Lake—Bridgeton—300 Lmbfg, 34 Cr, 200,000 Yperf, 164 Smba,  
 859 Per, 165 Pic, 52 Wper.

**(Maurice River System)**

Cumberland Pond—Near Millville—300 Lmbfg, 200,000 Yperf.

Frie's Lake—Near Millville—350 Lmbfg, 200,000 Yperf.  
 Laurel Lake—Near Millville—600 Lmbfg, 600,000 Yperf.  
 Little Mill Lake—Millville—1,300 Lmbfg, 200,000 Yperf.  
 Leaming Lake—Near Millville—200,000 Yperf.  
 Union Lake—Millville—1,650 Lmbfg, 400,000 Yperf, 104 Smba, 662 Per, 94 Pic.

**ESSEX COUNTY**

**(Passaic River System)**

Branch Brook Park Lake—Branch Brook Park—2,000 Lmbfg, 675,000 Yperf.  
 Weequahic Park Lake—Newark—3,000 Lmbfg, 675,000 Yperf, 700 S, 62 Smba,  
 9 Cr, 31 Pic, 1,000 Misc.  
 Yanticaw or Notch Brook—Essex Park—1,400 Rta.

**(Rahway River System)**

So. Mt. Reservation—Bloomfield—4,050 Rta, 300 Lta.

**GLOUCESTER COUNTY**

**(Mantua Creek System)**

Alcyon Lake—Pitman—1,700 Lmbfg, 400,000 Yperf.  
 Mantua Creek—Pitman—250 Bta, 650 Rta.  
 Wenonah Lake—Wenonah—1,000 Lmbfg.

**(Maurice River System)**

Iona Lake—Iona—1,300 Lmbfg.  
 Kandle Creek—Franklinville—200 Brnta, 300 Bta, 200 Rta.  
 Kettle Run—Franklinville—150 Rta.  
 Silver Lake—Clayton—400,000 Yperf.  
 Wilson Lake—Clayton—1,700 Lmbfg.

**(Raccoon Creek System)**

Mullica Hill Lake—Mullica Hill—400,000 Yperf.  
 Raccoon Creek—Ewing—150 Bta, 25 Brnta.  
 Wright's Pond—South of Ewan—150 Bta, 25 Brnta.

**(Timber Creek System)**

Almonesson Lake—Almonesson—1,900 Lmbfg, 400,000 Yperf, 20 Smba, 75 Cr,  
 100 S.  
 Bell's Lake—Woodbury—400,000 Yperf.  
 Big Lebanon Run—Near Turnersville—400 Brnta, 400 Bta.  
 Little Lebanon Run—Near Turnersville—400 Brnta, 250 Bta.  
 Woodbury Lake—Woodbury Heights—600 Lmbfg.

**HUDSON COUNTY**

Hudson County Park Lake—Jersey City—1,200 Rta.

**HUNTERDON COUNTY**

**(Delaware River System)**

Everittstown Brook—Everittstown—250 Rta.  
 Lacatang Creek—Stockton—500 Rta.

Little York Brook—Little York—441 Bta, 1,250 Rta.  
Musconetcong River—Penwell to Asbury—4,100 Brnta, 4,250 Rta, 1,800 Lta.  
Sergeantsville Brook—Sergeantsville—450 Rta.  
Sweet Hollow Brook—Near Little York—50 Bta.  
Wichechoke Run—Sergeantsville—500 Rta.

**(Musconetcong River System)**

Creveling Brook—Near Asbury—116 Bta.  
Dairy Run—Changewater—600 Brntfg.  
Penwell or Beaty's Brook—Penwell—4,000 Brntfg, 300 Bta, 300 Brnta, 1,100 Rta.  
Point Mt. Creek—Anderson—625 Brntfg.

**(Raritan River System)**

Beaver Brook—Clinton—3,000 Brntfg, 125 Bta.  
Cushtunk Lake—White House—5,000 Lmbfg, 600 S, 206 Smba, 40 Cr, 32 Pic, 300 Misc, 150 Per.  
Frog Hollow Brook—Califon—100 Bta, 100 Btfg.  
Hellefton Brook—Hamden—1,500 Btfg.  
Nishisakawick Creek—Frenchtown—500 Rta.  
Philhower Brook—Califon—3,400 Brntfg.  
No. Br. Raritan River—White House—250 Rta.  
So. Br. Raritan River—High Bridge—600 Lta, 7,400 Brnta, 4,200 Bta, 300 Btfg, 5,565 Rta.  
Spruce Run—Clinton—1,950 Brnta, 5,290 Rta, 1,300 Lta, 650 Bta.  
Solitude Lake—High Bridge—3,000 Lmbfg, 1,350,000 Yperf.  
Sutton Brook—Burnt Mills—100 Bta, 100 Btfg.  
Van Noy & Cress Beds—Califon—1,500 Brntfg.

**(Rockaway River System)**

Burrell Brook—Mountainville—100 Bta.  
Cold or Skillman Brook—New Germantown—3,000 Brntfg, 1,000 Btfg.  
Guienna Hollow Brook—Mountainville—1,500 Brntfg.  
Hoover's Brook—Lebanon—750 Rta, 200 Brnta.  
Reed Brook—New Germantown—3,000 Brntfg.  
Rockaway River—White House—400 Rta.  
No. Br. Rockaway River—New Germantown to White House—2,962 Rta, 2,362 Brnta.  
Trib. No. Br. Rockaway River—3,000 Btfg, 250 Bta.  
So. Br. Rockaway River—Lebanon to White House—2,943 Rta, 5,313 Brnta.  
Trib. So. Br. Rockaway River—3,000 Brntfg, 150 Bta.  
Tietz Run—Mountainville—3,000 Brntfg, 125 Bta.

**(Spruce Run System)**

Black Brook—Near Clinton—600 Brntfg, 400 Btfg, 100 Bta.  
Bryant Brook—Woodglen—600 Brntfg.  
Buffalo Hollow Run—Glen Gardner—600 Brntfg.  
Charleston Mt. Brook—Van Syckles—266 Bta.  
Conover Run—Near Clinton—1,000 Btfg.  
Fields Brook—Van Syckles—800 Btfg, 266 Bta.  
Fraces Brook—Van Syckles—1,000 Btfg, 266 Bta.  
Hawk Brook—Clinton—600 Brntfg, 1,000 Btfg, 120 Bta.  
Mulhockaway Creek—Van Syckles—600 Brntfg, 500 Btfg, 75 Bta, 240 Rta, 200 Brnta.  
Pattenburg Brook—Van Syckles—800 Btfg.  
Rocky Run—Glen Gardner—1,200 Brntfg, 150 Bta.  
Sanitarium Brook—Glen Gardner—600 Brntfg.  
Willowby Brook—High Bridge—600 Brntfg.

**MERCER COUNTY**

**(Assanpink Creek System)**

Lawrence Pond—Lawrence Station—1,050 Lmbfg, 450,000 Yperf.

**(Crosswicks Creek System)**

Gropp's Lake—Maple Shade—1,000 Lmbfg.

**(Delaware River System)**

Hillwood Lake—Ewingville—1,400 Lmbfg.  
Whiteheads Pond—Trenton—700 Lmbfg.

**(Millstone River System)**

Carnegie Lake—Princeton—1,000 Lmbfg, 900,000 Yperf.  
Etra Lake—Etra—1,000 Lmbfg, 450,000 Yperf.  
Grover's Mills—Princeton Junction—700 Lmbfg.  
Hunts Lake—Rosedale—1,050 Lmbfg.  
Peddie Lake—Hightstown—500 Lmbfg, 450,000 Yperf.  
Stoney Brook—Pennington—500 Brnta, 1,800 Rta, 300 Lta.

**(Miry Run System)**

Hutchinson's Pond—Robbinsville—500 Lmbfg, 450,000 Yperf.  
Reed's Mill Pond—Mercerville—700 Lmbfg.  
Shabbyconk Creek—Ewing Township—675,000 Yperf, 75 Smba, 125 Per, 25 Cr, 15 Misc.

**MIDDLESEX COUNTY**

**(Lawrence River System)**

Milltown Lake—Milltown—350 Lmbfg.  
Oakey Brook—Franklin Park—350 Rta.

**(Manalapan River System)**

Barclay Brook—Jamesburg—200 Brntfg.  
Bloomfield Lake—Old Bridge—350 Lmbfg.  
Helmetta Lake—Helmetta—450,000 Yperf, 350 Per, 45 Pic.  
Hrsick Brook—Old Bridge—200 Brntfg.  
Jamesburg Lake—Jamesburg—1,700 Lmbfg, 450,000 Yperf, 50 Smba, 150 Per, 25 Cr.  
Manalapan River—Jamesburg—1,050 Brnta, 318 Rta.  
Matchaponix Brook—Old Bridge—400 Brntfg, 600 Brnta, 316 Rta.  
Ruyons Pond—Old Bridge—500 Lmbfg.  
Wigwam Brook—Jamesburg—750 Bta.

**(Millstone River System)**

Brainard Lake—Cranbury—500 Lmbfg, 450,000 Yperf, 25 Smba, 400 Per, 25 Cr.  
Plainsboro Lake—Plainsboro—500 Lmbfg, 450,000 Yperf, 25 Smba, 400 Per.  
Wickoff's Pond—Near Hightstown—350 Lmbfg.

**(Rahway River System)**

Sage or Sucker Brook—Metuchen—200 Brnta, 1,375 Rta.

**(Raritan River System)**

Bonhampton Lake—Bonhampton—500 Lmbfg, 100 Smba, 300 Per.  
Brunswick Reservoir—New Brunswick—250 Rta.  
Crystal Lake—Piscatawaytown—500 Lmbfg.  
Farrington Lake—Near New Brunswick—1,700 Lmbfg, 450,000 Yperf, 161 Smba, 7 Pic, 1,000 S.  
Lawrence Brook—New Brunswick—2,400 Brntfg, 416 Rta, 100 Brnta.  
Mill Brook—Bonhampton—525 Brnta.  
Sayreville Pond—Sayreville—350 Lmbfg.  
Silver Lake—Near Piscatawaytown—500 Lmbfg.  
Westons Mill Lake—New Brunswick—1,000 Lmbfg, 450,000 Yperf, 50 Smba, 150 Per, 25 Cr.

**MONMOUTH COUNTY**

**(Atlantic Ocean System)**

Como Lake—Como—500 Lmbfg, 225,000 Yperf, 100 Smba, 300 Per.  
Deal Lake—Allenhurst—500 Lmbfg.  
Manasquan River—Ardena—1,710 Brnta, 250 Bta, 200 Rta.  
Old Mill Pond—Villa Park—500 Lmbfg, 2,000 Bsf, 250 Rta, 225,000 Yperf.  
Osborne's Pond—Bailey's Corner—84 Brnta, 250 Rta, 225,000 Yperf.  
Shafto Brook—Near Hamilton—122 Bta.  
Spring Lake—Spring Lake—1,200 Lmbfg, 225,000 Yperf.  
Takanasee Lake—Long Branch—500 Lmbfg, 225,000 Yperf.

**(Delaware River System)**

Connine Pond—Allentown—700 Lmbfg, 1,000 Cfg, 225,000 Yperf.  
Doctor's Creek—Red Valley to Allentown—700 Brnta.

**(Doctor's Creek System)**

Imlaystown Lake—Imlaystown—700 Lmbfg, 2,000 Cfg, 166 Rta, 225,000 Yperf.

**(Manalapan River System)**

Black Mills or Millhurst Lake—Millhurst—1,000 Cfg, 166 Rta, 450,000 Yperf, 2,000 Bsf.  
Englishtown Pond—Englishtown—500 Lmbfg, 1,000 Cfg, 450,000 Yperf.  
Freehold or Topenemus Lake—Freehold—1,000 Lmbfg, 2,000 Bsf, 168 Rta, 450,000 Yperf.  
Topenemus Brook—Englishtown—650 Brnta, 300 Bta, 50 Smba, 800 Per, 25 Cr.

**(Manasquan River System)**

Allaire Pond—Allaire—500 Lmbfg, 2,000 Bsf, 83 Brnta, 250 Rta, 450,000 Yperf.

**(Millstone River System)**

Perrineville Pond—Perrineville—700 Lmbfg, 1,000 Cfg, 225,000 Yperf.

**(Raritan River System)**

Izaak Walton Lake—Englishtown—500 Lmbfg.  
Manalapan River—Millhurst—1,500 Brnta, 300 Rta, 100 Lta.  
Matawan Lake—Matawan—225,000 Yperf.  
Pine Brook—Englishtown—675 Btfg, 550 Bta.  
Wemrock Brook—Englishtown—350 Brnta.

**(Shark River System)**

Horse Pond—Shark River—122 Bta.  
Hurley's Pond—Glendola—2,000 Bsf, 208 Brnta, 125 Rta, 225,000 Yperf.  
L. Y. Brook—Hamilton—122 Bta.  
Shark River—Belmar—2,100 Btfg, 1,084 Bta.

**(Swimming River System)**

Big Brook—Marlboro—250 Rta, 125 Bta, 150 Brnta.  
Buck Mills Lake—Colts Neck—2,000 Bsf.  
Hockhocks Brook—Tinton Falls—675 Btfg, 550 Bta.  
Lewis Brook—Tinton Falls—375 Btfg, 250 Rta.  
Snyders Brook—Colts Neck—375 Btfg.  
Tintern Manor Lake—Lincroft—2,000 Bsf, 450,000 Yperf, 100 Smba, 300 Per, 50 Cr.  
Willow Brook—Holmdel—725 Bta, 150 Brnta.

**MORRIS COUNTY**

**(Delaware River System)**

Musconetcong River—Near Hackettstown—100 Bta, 350 Rta.  
Electric Brook—Schooley's Mt.—450 Rta.  
Electric Lake—Schooley's Mt.—1,000 Bsf.  
Golf Brook—Near Hackettstown—4,000 Brntfg.  
Mine Hill Brook—Near Hackettstown—625 Brntfg.  
Musconetcong Lake—Netcong—3,500 Cfg, 7,150 Lmbfg, 19,000 Bsf, 1,800,000 Yperf, 50 Wper, 24 Smba, 3 Cr, 10 Pic.  
Schooley's Mt. Brook—Schooley's Mt.—7,000 Brntfg, 250 Bta, 625 S, 1,350 Rta, 400 Lta.  
Stephensburg Brook—Stephensburg—625 Brntfg.  
Weldon Brook—Hurdstown—125 Bta, 125 Btfg, 950 Rta.

**(Passaic River System)**

Beaver Brook—Rockaway—3,168 Brntfg, 400 Bta, 400 Btfg, 1,450 Rta.  
Burnt Meadow Brook—Denmark—1,200 Brntfg.  
Cobb Brook—New Foundland—150 Bta, 150 Btfg.  
Connett Brook—Brookside—7,350 Brntfg, 200 Bta, 625 Rta, 200 Lta.  
De Cosen's Lake—Whippany—300 Bsa, 100 Wper.  
Dismal Brook—Brookside—600 Brnta, 7,350 Brntfg, 200 Bta, 625 Rta, 200 Lta.  
Hibernia Brook—Hibernia—75 Bta, 75 Btfg, 4,832 Brntfg.  
Hibernia Lake—Hibernia—1,200 Lmbfg.  
Morris Plains Brook—Morris Plains—500 Rta.  
Rockaway River—Rockaway—5,550 Brnta, 1,000 Bta, 1,000 Btfg, 6,800 Rta, 100 Lta, 4,900 Brntfg.  
Ruzicka Lake—Chatham—1,200 Lmbfg, 1,000 Bsf.  
Stony Brook—Taylortown—150 Bta, 150 Btfg.  
Washington Valley Brook—Morristown to Mendham—4,900 Brntfg, 4,800 Rta, 1,600 Brnta.

**(Raritan River System)**

Black River—Milltown to Pottersville—9,210 Brnta, 4,975 Rta, 250 Bta, 1,000 Lta.  
So. Br. Raritan River—Budd Lake to Naughtright—1,650 Lta, 8,100 Brnta, 2,800 Bta, 500 Btfg, 11,200 Rta.

**(No. Br. Raritan River System)**

Burnett Brook—Ralston—1,775 Rta, 6,000 Brntfg, 4,400 Btfg, 1,400 Brnta, 400 Bta.

Indian Brook—Ralston—2,025 Rta, 6,000 Brntfg, 4,000 Btfg, 1,400 Brnta.  
Mt. Kimble Lake—Morristown—1,000 S.  
Peapack Brook—Chester to Gladstone—1,300 Rta, 200 Lta.

**(So. Br. Raritan River System)**

Budd Lake—Budd Lake—13,800 Lmbfg, 19,000 Bsf, 3,500 Cfg, 50 Wper,  
1,800,000 Yper, 66 Smba, 4 Cr, 46 Pic, 1,363 S.  
Budd Lake Brook—Budd Lake—2,100 Rta, 3,900 Brnta, 1,100 Bta, 200 Btfg.  
Conklin's Lake—Flanders—2,000 Cfg. (In exchange).  
Devine's Spring Brook—Near Flanders—2,400 Brntfg.  
Drakes Brook—Flanders—150 Bta, 150 Btfg.  
Flanders Brook—Flanders—1,050 Rta.  
Mc. Peak Spring Brook—Near Hackettstown—3,000 Brntfg, 100 Bta, 100  
Btfg.  
Mt. Olive Brook—Mt. Olive—2,400 Brntfg, 100 Bta, 100 Btfg.

**(Rockaway River System)**

Army Pond—Kenvil—1,500 Lmbfg.  
Arrowhead Lake—Denville—900 Lmbfg, 1,200 Bsf, 21 Smba, 15 Cra, 5 Pic,  
1,000 S.  
Bayles Pond—Milton—300 Brnta.  
Cedar Lake—Denville—1,800 Lmbfg, 1,040 Bsf, 1,350,000 Yper, 12 Pic, 700 S.  
Cooks Lake—Denville—900 Lmbfg, 1,040 Bsf.  
Cozy Lake—Longwood—2,500 Lmbfg, 600 Bsf, 675,000 Yper.  
Crooked Brook—Montville—750 Rta.  
Estling Lake—Denville—1,500 Lmbfg, 1,040 Bsf, 4 Smba, 7 Pic, 500 S.  
Fayson Lake—Boonton—60 Smba, 1 Cr, 1 Pic, 575 S.  
Green Pond—New Foundland—3,500 Smb, 400 Rta, 1,200 S, 2,000 Bsf,  
1,575,000 Yper, 20 Smba, 6 Cra, 16 Pic.  
Hopatcong Lake—Lake Hopatcong—15,600 Lmbfg, 300 S, 16 Pic, 30,000 Bsf,  
5,400,000 Yper, 80 Wper, 24 Smba, 1 Cr.  
Hopewell Brook—Hopewell—500 Bta, 250 Rta.  
Indian Lake—Denville—900 Lmbfg, 1,040 Bsf, 17 Smba, 9 Pic, 550 S.  
Jersey City Water Works—Boonton—125 Misc.  
Longwood Pond—Longwood—800 Bsf, 1,350,000 Yper, 8,000 Lmbfg, 23 Smba,  
2 Cr, 3 Pic, 325 S.  
Lenore Lake—Mt. Tabor—5 Smba, 2 Pic, 500 S.  
Mill Brook—Dover—500 Rta.  
Moosepack Lake—Oak Ridge—2,500 Lmbfg, 600 Bsf, 675,000 Yper.  
Navy Pond—Kenvil—1,500 Lmbfg.  
Parsippany River—Parsippany—450 Rta.  
Rainbow Lake—Denville—900 Lmbfg, 1,040 Bsf, 21 Smba, 16 Cr, 6 Pic,  
1,000 S.  
Rock Ridge Lake—Denville—900 Lmbfg.  
Shongum Brook—Dover—500 Rta, 300 Brnta.  
Shongum Lake—Dover—100 Wper.  
Stickles Brook—Rockaway—250 Bta, 250 Btfg, 500 Rta, 300 Brnta.

**(Whippany River System)**

Burnham Park Lake—Morristown—600 Lmbfg, 1,000 Bsf, 1,737 S.  
McAlpine Brook—Malapardis—200 Rta.  
Pochantas Lake—Morristown—1,200 Lmbfg, 1,000 Bsf, 500 Rta, 1,362 S,  
1,350,000 Yper.  
Spring Brook Country Club Lake—Morristown—800 Brnta.

**OCEAN COUNTY**

Brindle Park Lake—1,000 Lmbfg.

Cushing Brook—300 Bta, 250 Rta.  
Forked River Pond—675,000 Yper.  
Jackson Mills Lake—Jackson Mills—1,000 Lmbfg, 500 Rta, 675,000 Yper.  
New Egypt Lake—New Egypt—2,000 Lmbfg.  
Sweet Water Run—300 Bta, 250 Rta.

**PASSAIC COUNTY**

**(Greenwood Lake System)**

Belcher's Creek—West Milford—750 Rta.  
Black Creek—Greenwood Lake—2,000 Ltf, 1,000 Btfg.  
Boiling Spring Brook—West Milford—3,000 Ltf.  
Cooley Brook—Greenwood Lake—2,000 Ltf, 450 Rta, 1,500 Btfg.  
West Milford Brook—West Milford—1,500 Btfg, 350 Rta.

**(Passaic River System)**

Passaic River—Columbia Bridge—4 Smba, 42 Cr, 12 Pic, 1,800 S.  
Preakness Brook—Preakness—200 Rta, 250 Brnta.  
Wanaque River—Greenwood Lake—7,898 Rta, 11,235 Brnta, 500 Bta, 250 Lta.  
West Brook—Upper Macopin—4,000 Ltf, 2,500 Btfg, 700 Brnta.  
Willow Lake—Little Falls—25 Smba, 6 Pic, 300 S.

**(Pequannock River System)**

Kampfe Lake—Near Butler—1,500 Lmbfg, 60 Smba, 6 Cr, 19 Pic, 500 S.

**(Pompton River System)**

Packanack Lake—Wayne—5,000 Lmbfg, 61 Smba, 5 Pic, 800 S.  
Pequannock River—Charlottesville—1,350 Brnta, 1,800 Rta.

**(Ramapo River System)**

Pompton Lakes—Pompton—10,000 Lmbfg, 8,000 Bsf, 1,350,000 Yper, 429  
Wper, 7 Smba, 12 Pic, 900 S.

**(Wanaque River System)**

Cyclone Brook—Hewitt—4,000 Ltf, 1,000 Btfg.  
Greenwood Lake—Greenwood Lake—11,500 Lmbfg, 2,000 Bsf, 2,925,000  
Yper.  
High Mt. Brook—Wanaque—500 Btfg, 100 Rta, 125 Brnta.  
Iosca Lake—Midvale—400 S, 60 Wper.  
Lindy's Lake—Macopin—1,500 Lmbfg.

**SALEM COUNTY**

**(Alloway Creek System)**

Alloway Creek—Alloway—300,000 Wper, 182,000 Shadf.  
Ballinger's Mill Lake—Aldine—300 Lmbfg, 1,500 Bsf, 200,000 Yper.  
Camp Roosevelt—Aldine—1,500 Bsf.  
Cobbs Lake—Alloway—650 Lmbfg.  
Diamond Lake—Alloway—650 Lmbfg, 400,000 Yper, 1,500 Bsf, 407 Smba,  
22 Per.  
Sycamore Lake—Alloway—650 Lmbfg, 1,500 Bsf.  
Watson Lake—Aldine—650 Lmbfg, 200,000 Yper.

**(Delaware River System)**

Hope Creek—Near Hancocks Bridge—200,000 Yperf.

**(Maurice River System)**

Centreton Lake—Centreton—300 Lmbfg, 1,500 Bsf, 400,000 Yperf.  
Elmer Lake—Elmer—600 Lmbfg, 1,500 Bsf, 400,000 Yperf.  
Maurice River—Millville—2,506,000 Shadf.  
Rainbow Lake—Near Norma—200,000 Yperf, 300 Lmbfg.  
Union Grove Lake—Near Centreton—300 Lmbfg, 1,500 Bsf, 200,000 Yperf.  
Willow Grove Lake—Willow Grove—1,500 Bsf.

**(Muddy Creek System)**

Palatine Lake—Palatine—300 Lmbfg, 1,500 Bsf, 400,000 Yperf.

**(Salem Creek System)**

Avis Lake—Woodstown—650 Lmbfg, 200,000 Yperf.  
Davis Lake—Salem—1,500 Bsf, 400,000 Yperf.  
Hester's Stopping—Salem—400,000 Yperf.  
Mannington Lake—Salem—400,000 Yperf.  
Memorial Lake—Woodstown—650 Lmbfg, 1,500 Bsf, 400,000 Yperf.  
Pioneer Lake—Salem—400,000 Yperf.  
Richmontown Lake—Woodstown—1,500 Bsf.

**SOMERSET COUNTY**

**(Millstone River System)**

Clark's Brook—Franklin Park—250 Brnta, 500 Rta.  
Hamil or Ten Mile Run—Griggstown—250 Brnta, 500 Rta.

**(Passaic River System)**

Dead River—So. of Liberty Corners—450,000 Yperf.  
Indian Graves Brook—Bernardsville—450 Bta, 700 Btfg, 1,450 Rta.  
Somerset Inn Brook—Bernardsville—700 Bta, 700 Btfg, 1,550 Rta.

**(Raritan River System)**

Black River—Pottersville—500 Rta, 600 Brnta.  
Dukes Park—Somerville—(In exchange)—300 Brnta, 500 Lmbfg, 1,000 Bsf.  
Middle Brook—Boundbrook—500 Brnta, 500 Rta.  
Millstone River—Rocky Hill—75 Smba, 75 Per, 50 Cr.  
Peapack Brook—Gladstone—2,450 Rta, 200 Lta.  
Peters Brook—Somerville—500 S.  
No. Br. Raritan River—Far Hills—4,200 Brnta, 3,650 Rta, 50 Smba, 75 Per.  
So. Br. Raritan River—Neshanic—1,400 Brnta, 250 Rta, 50 Smba, 75 Per.

**SUSSEX COUNTY**

**(Delaware River System)**

Big Flat Brook—Between Club & Flatbrookville—7,550 Rta, 6,175 Brnta, 4,500 Btfg, 2,150 Bta.  
Trib. Big Flat Brook—17,700 Ltfg.  
Little Flat Brook—Layton—4,100 Btfg, 750 Bta, 2,050 Rta.  
Trib. Little Flat Brook—7,000 Ltfg.  
Mill Brook—Montague Township—500 Bta, 300 Btfg.

Millville or Shimers Brook—Millville—500 Rta.  
Paulinskill River—Lafayette to Stillwater—2,400 Rta, 200 Lta, 8,750 Brnta, 2,000 Bsf, 100 Bta, 100 Btfg.  
Paulinskill River Tributary—2,400 Btfg, 3,500 Ltfg.  
Pequest River—Brighton to Springdale—500 Bta, 1,150 Btfg, 5,600 Rta.

**(Big Flat Brook System)**

Stoney Brook—Stokes Reservation—800 Bta, 200 Btfg.  
Tuttles Corner Brook—Tuttles Corner—200 Brnta.

**(Hudson River System)**

Walkkill River—Sparta to Franklin—1,900 Brnta, 900 Bta, 600 Btfg.

**(Musconetcong River System)**

Cranberry Lake—Cranberry—1,350,000 Yperf, 3,100 Lmbfg, 14,000 Bsf, 3,500 Cfg, 90 Smba, 27 Pic, 350 Misc, 400 S.  
Lackawanna Lake—Andover—700 Lmbfg, 6,500 Bsf.  
Forge Pond—Waterloo—800 Bsf, 1,000 Cfg.  
Waterloo Pond—Waterloo—800 Bsf, 1,000 Cfg, 1,350,000 Yperf, 2,500 Lmbfg.

**(Paulinskill River System)**

Camp Cole Lake—Stockholm—28 Smba, 7 Per, 300 S.  
Coursen Brook—Fredon—100 Bta, 100 Btfg.  
Culvers Lake—Culvers—39,000 Bsf, 1,000 Cfg, 950 Smbfg, 1,575,000 Yperf, 28 Smba, 1,220 S.  
Culvers Lake Brook—Culvers—200 Brnta.  
Dennis Brook—Stillwater—100 Bta, 100 Btfg.  
Fairview Lake—Near Hardwick—3,000 Lmbfg, 6,000 Bsf, 1,575,000 Yperf.  
Kemañ Lake—Branchville—60 Wper.  
Margerum Brook—Stockholm—100 Rta.  
Owassa Lake—Near Culvers—1,575,000 Yperf, 950 Smbfg, 6,325 Lmbfg, 4,400 Bsf, 62 Smba, 4 Cr, 6 Pic, 1,850 S.  
Quick's Pond—No. of Swartswood—1,500 Lmbfg, 2,000 Bsf, 900,000 Yperf.  
Ross Brook—Stockholm—100 Rta.  
Roy Brook—Stillwater—100 Btfg, 100 Bta.  
Trout Brook—Middleville—300 Bta.  
Big Swartswood Lake—Swartswood—1,000 Cfg, 3,000 Smbfg, 2,250,000 Yperf, 6,400 Lmbfg, 18,500 Bsf, 205 Wper, 64 Smba, 1 Cr, 22 Pic, 1,738 S.  
Little Swartswood Lake—Swartswood—1,500 Lmbfg, 6,000 Bsf, 1,000 Smbfg, 1,125,000 Yperf.  
Van Stone Brook—Stillwater—100 Bta, 100 Btfg.

**(Pequest River System)**

Goodales Lake—Andover—33 Smba, 2 Cr, 19 Pic, 1,650 S.  
Iliff Lake—Near Andover—2,500 Lmbfg, 450,000 Yperf.  
Lenape Lake—Andover—1,500 Smbfg, 450,000 Yperf.  
Wawayanda Lake—Andover Jc.—3,500 Lmbfg, 4,000 Bsf, 900,000 Yperf.

**(Pochuck Creek System)**

Doublekill—Vernon—600 Brnta.

**(Rockaway River System)**

Bear Pond—Lake Hopatcong—2,500 Lmbfg, 800 Bsf, 1,000 Cfg, 675,000 Yperf.  
Lake Hopatcong—Lake Hopatcong—4,200 Lmbfg, 1,000 Bsf, 1,000 Cfg, 18,450,000 Yperf.

**(Wallkill River System)**

Black or Pochuck Creek—McAfee—6,350 Btfg, 950 Bta, 350 Brnta, 800 Rta.  
Black Brook—Franklin—750 Rta.  
Glove Brook—Sussex—650 Rta, 250 Brnta, 150 Lta.  
Grinnell Lake—Monroe—2,400 Lmbfg, 11,500 Bsf, 450,000 Yper, 21 Smba,  
1 Cr, 2 Pic, 300 S.  
Hawthorne Lake—Ogdensburg—3,000 Lmbfg.  
Mohawk Lake—Sparta—4,200 Lmbfg, 11,500 Bsf, 3,500 Cfg, 1,350,000 Yper,  
30 Smba, 1 Cr, 11 Pic, 2,000 S.  
Papakating River—Sussex—250 Brnta, 1,150 Rta, 150 Lta.  
Sparta Jc. Brook—Sparta—3,000 Brntfg, 1,850 Rta.

**UNION COUNTY**

**(Rahway River System)**

Ash Brook—Ashbrook—250 Btfg, 200 Rta.  
Echo Lake—Mountainville—2,000 Lmbfg, 3,400 Bsf, 36 Smba, 14 Pic, 1,200 S.  
Normahaggin Brook—Cranford—300 Bta, 550 Brnta, 1,325 Rta, 150 Lta.  
Poor House Pond—Rahway—200 Bsf.  
Rahway River—Rahway—1,775 Rta, 725 Brnta, 150 Lta, 675,000 Yper.  
Reformatory Lake—Rahway—450 Rta.  
Surprise Lake—Summit—2,000 Lmbfg, 6,400 Bsf, 850 S.

**(Raritan River System)**

Blue Brook—Summit—300 Bta.  
Cedar Brook Lake—Plainfield—2,000 Lmbfg, 250 Btfg, 200 Bsf, 225 Rta.  
Green Brook—Scotch Plains—500 Rta.  
Seeley's Pond—Scotch Plains—2,000 Lmbfg, 3,000 Bsf, 550 Brnta, 650 Rta,  
675,000 Yper, 1,200 S.

**WARREN COUNTY**

**(Delaware River System)**

Buckhorn Creek—Roxburg—2,500 Ltfg, 134 Bta, 134 Btfg, 300 Rta.  
Delaware River—Brottsmansville to Copper Mine—7,700 Smbfg.  
Dunfield Creek—Dunfield—1,500 Btfg, 250 Bta, 250 Brnta, 1,000 Rta.  
Lomison's Glen Brook—Summerfield—2,500 Ltfg, 133 Bta, 2,133 Btfg, 100 Lta,  
300 Rta.  
Lopatcong Creek—Above Phillipsburg—2,133 Btfg, 133 Bta, 1,800 Rta, 200 Lta.  
Musconetcong River—Waterloo to Penwell—2,800 Lta, 1,400 Bta, 1,000 Brntfg,  
15,850 Rta, 10,410 Brnta, 10,600 Btfg, 3,000 Smbfg.  
Paulinskill River—Stillwater to Paulina—1,200 Lta, 800 Bta, 9,465 Brnta, 600  
Btfg, 4,600 Rta.  
Pequest River—Townsbury to Belvidere—14,225 Rta, 7,900 Btfg, 4,813 Bta,  
600 Lta.  
Pohatcong Creek—Washington—250 Bta, 250 Rta.  
Pophandusing Brook—Belvidere—2,500 Ltfg.  
Silver Lake—Hope—2,400 Lmbfg, 6,000 Bsf, 675,000 Yper.  
Van Campens Brook—Millbrook—2,000 Btfg, 250 Bta, 1,300 Rta, 600 Lta.

**(Musconetcong River System)**

Andersontown Brook—Andersontown—4,000 Ltfg.  
Belnap Brook—Hackettstown—625 Ltfg.  
Gruendyke's Mill Pond—Hackettstown—100 Ypera, 700 Lesa.

Guard Lock—Near Hackettstown—5,000 Lmbfg, 4,500 Cfg, 800 Bsf, 175  
Ypera, 2,925,000 Yper.  
Hance Brook—Beatystown—4,000 Ltfg.  
Hatchery Pools—79 Smba, 46,000 B.  
Intervale Brook—Saxon Falls—625 Ltfg, 250 Bta.  
Rockport State Game Farm Lake—Rockport—450 Bsf, 1,500 Cfg.  
Springtown Run—Port Colden—4,000 Ltfg, 3,000 Brntfg, 375 Bta.  
Van Atta Run—Penwell—4,000 Ltfg.

**(Paulinskill River System)**

Blairs Creek—Blairstown—5,625 Ltfg, 1,096 Rta, 812 Brnta, 500 Bta, 500 Btfg.  
Cedar Lake—Blairstown—1,200 Lmbfg, 75 Sa, 675,000 Yper.  
Columbia Lake—Columbia—3,800 Lmbfg, 5,000 Cfg, 6,600 Bsf.  
Jacksonburg Brook—Jacksonburg—946 Rta, 363 Brnta, 4,500 Ltfg, 2,300 Btfg,  
500 Bta.  
White Lake—Marksboro—4,900 Lmbfg, 1,350,000 Yper, 6,000 Bsf.

**(Pequest River System)**

Bacon Run—Petersburg—400 Btfg, 237 Bta.  
Barker Brook—Vienna—400 Btfg.  
Bear Creek—Long Bridge—1,700 Btfg, 3,075 Bta, 250 Rta.  
Beaver Brook—Hope—1,350 Btfg, 5,725 Rta, 2,000 Btfg, 850 Bta, 250 Brnta.  
Cox Brook—Near Mt. Hope—400 Btfg.  
Mt. Lake—Near Buttzville—3,000 Lmbfg, 6,600 Bsf, 1,400 Cfg, 325 Bsa,  
1,575,000 Yper.  
Trout Brook—Hope—500 Btfg, 100 Bta.  
Yards Creek—Hainesburg—383 Rta.

**(Pohatcong Creek System)**

Mill Brook—Broadway—5,350 Btfg, 550 Bta, 600 Brnta, 650 Rta.  
Roaring Rock Brook—Brass Castle—2,000 Btfg, 325 Bta, 600 Rta.