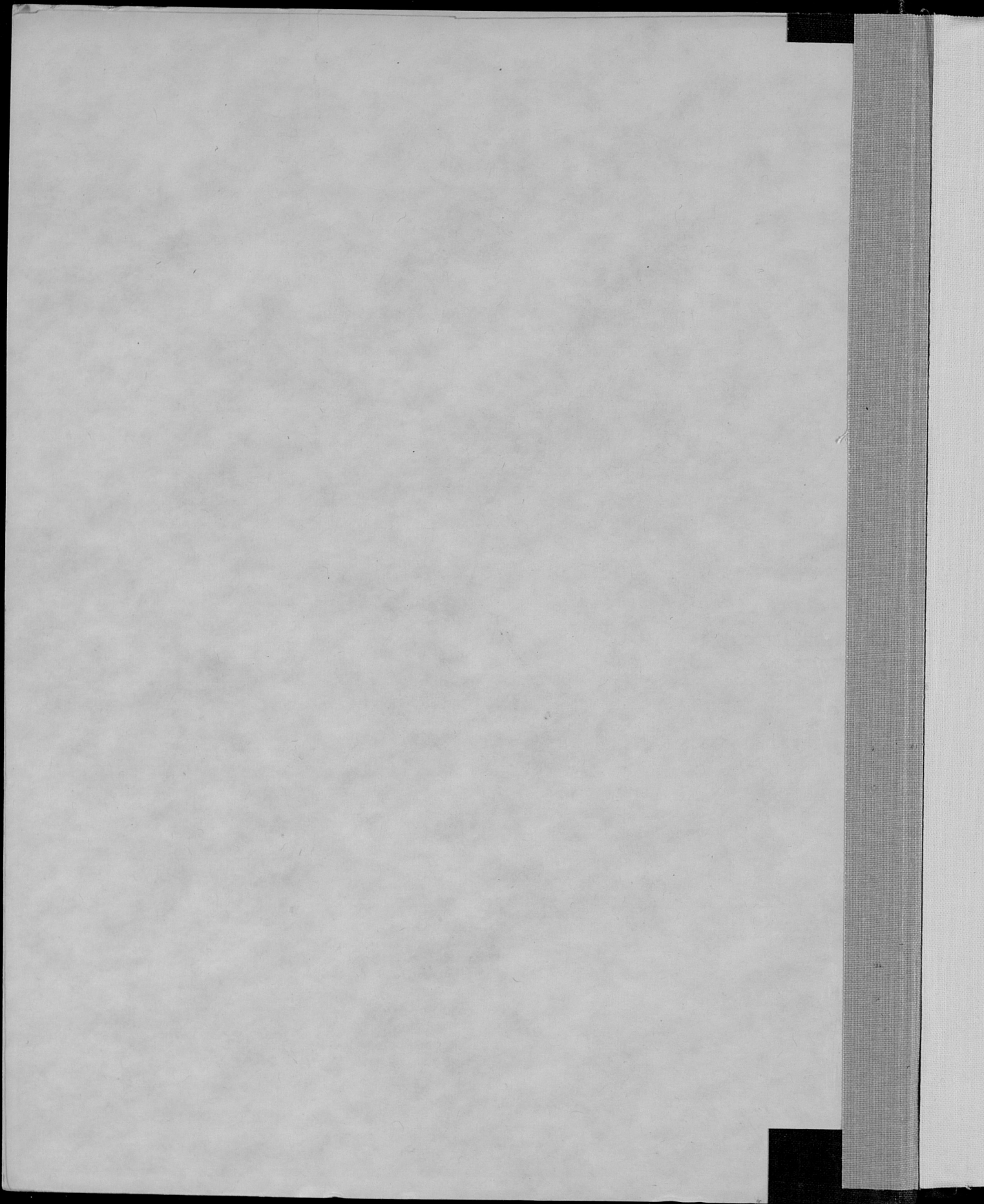


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REPORT OF
EAST GEORGIA
PLANNING COUNCIL

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FOREWORD

CHAPTER

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F o r e w o r d

The State of Georgia, with a gross area of 59,265 square miles, has a coast airline of approximately 100 miles. The coastal area consists of about 1,000 miles of shore line which, with its sounds, estuaries, and tidal rivers, forms the geographic area of the fisheries industry in Georgia.

Compared with the total annual income of the State from all sources - approximately \$1,000,000,000 - this industry is relatively small, producing in 1934 27,140,900 pounds, worth \$359,510 to the fishermen. Adding to this the total productive value of related industries, amounting to \$640,996 in 1934, the entire commercial fisheries industry of Georgia had a total of approximately \$1,000,000. Of course, this does not take into consideration the very substantial commercial value of sport fishing, which is to be treated in another report.

However, while this industry, as before stated, is relatively small, due to various causes either determined or still being studied, the results of studies thus far indicate a potential increase of great proportions. For instance, in the oyster industry alone, which in 1934 amounted to 96,717 bushels, valued at \$31,361, employing approximately 1,000 persons, a preliminary survey has indicated a potential increase of more than 2500% in production and 1300% in employment.

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Commercial Fisheries

By replanting available non-polluted areas, and with proper conservation laws, rigidly enforced, it is estimated that the annual production of oysters in Georgia can be increased from 96,717 bushels, valued at \$31,361, employing 1,000 persons, to an approximate production of 2,500,000 bushels, valued at about \$1,250,000, employing about 13,500 persons.

The establishment here of thriving Diamond-back Terrapin Farms has opened a wider field in the seafood industry. The conditions in the coastal waters of Georgia are conducive to a continued natural supply of this delicacy.

The most important items of seafood produced in this area, with the greatest commercial and economic value, are shrimp, shad, oysters and crabs; besides the menhaden for industrial use only. The catch of other species is almost too negligible for present consideration, except for potential replenishment. The once maligned and plentiful sturgeon, a very valuable species, is now almost extinct; the sea bass also has dwindled in catch to about 10% of former years. Comparison of the length of Georgia's coast line with that of other seafood producing states proves that, by ratio, the quality, quantity, value, and cost of production are favorable to the fostering and development of this resource.

Notwithstanding improved equipment and modernized gear, better methods of refrigeration, and increased facilities for distribution, the fisheries of Georgia have shown a fluctuation in catch, with a decided downward tendency in the seven year period 1927 - 1934. Without factual

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information as to energy expended, a study of this sort can take only into consideration existing equipment and facilities on which conclusions can be based, with the element of scarcity and depletion being given their proper place in determining the trend of abundance.

The accompanying tabulation shows the trend in total catch of fish and shellfish in Georgia 1880 - 1934 as given by the Bureau of Fisheries, United States Department of Commerce. Starting with a total catch in 1880 of 2,273,000 pounds valued at \$120,000, there was a steady increase to 47,607,220 pounds in 1927. Since then there has been an alarming decline, reaching a low of 7,349,813 pounds in 1931. However, this was an abnormal year, as the following year showed a comeback to 16,522,995 pounds, and in 1934, the last year for which figures are available, showed a total of 27,140,900 pounds, which is only a little more than half the peak catch in 1927. The cause of this decline and the possibilities for future increase are vital questions to be considered and analyzed. Remedies should be effected to insure an increasing abundance of this valuable and essential natural resource.

Obviously, it is necessary to plan systematic replanting of oysters, and to enforce regulations for the catching of shrimp, crabs, and shad that will afford the minimum interference in the spawning season and wastage of immature individuals; it is necessary also to plan the creation of a shad hatchery for increased propagation of this valuable species of Georgia's commercial fisheries. Such laws and regulations that inevitably would grow out of these vital needs for conservation

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should, above all else, be rigidly, fearlessly, and adequately enforced.

Another important element in any conservation program is the proper and regular collection of data, not only as a check on the trend of abundancy, but as an important factor in effectuating laws and regulations for conservation and perpetuation of the supply. The lack of complete data is not only a serious handicap to this study, but induces generalization in reaching conclusions and recommendations that should not otherwise be necessary. However, it is absolutely essential from the present known facts that prompt and adequate measures be taken, based upon the best factual information available.

Laws and regulations pertinent to the several subjects in this study will be treated separately in chapters covering the respective subjects. However, a general observation may be made here with respect to the necessity of regulating the size mesh of nets used in catching the various species. Obviously, it is a serious wastage to catch small, immature individuals along with large, adult species, and even though culling were done immediately after each haul, the chances are that the young individuals would already be drowned before culling and replacement could take place. The notorious wastage from this abuse cannot be emphasized too strongly.

TOTAL CATCH OF FISH AND SHELLFISH
IN GEORGIA 1880 - 1934

<u>YEAR</u>	<u>POUNDS</u>	<u>VALUE</u>
1880	2,273,000	\$ 120,000
1887	1,883,000	81,000
1888	1,958,000	83,000
1889	2,644,000	106,000
1890	2,994,000	123,000
1897	4,993,000	171,000
1902	11,103,000	359,000
1908	14,828,000	701,000
1918	37,154,000	416,000
1923	39,897,000	668,000
1927	47,607,220	697,165
1928	42,068,780	866,287
1929	43,513,641	877,232
1930	34,872,521	536,294
1931	7,349,813	251,138
1932	16,522,995	185,942
1934	27,140,900	359,510

Source: United States Department of Commerce,
Bureau of Fisheries,
Administrative Reports.

FISHERIES OF GEORGIA
TOTAL CATCH AND VALUE OF SPECIES
1934

SPECIES OF FISH	POUNDS	VALUE
CATFISH AND BULLHEADS	52,500	\$ 3,150
CROAKER	7,000	280
DRUM, RED OR REDFISH	2,500	125
FLOUNDERS	3,300	96
HICKORY SHAD	10,500	1,042
KING WHITING OR "KINGFISH"	12,000	380
MENHADEN	18,751,500	63,859
MULLET	59,000	2,600
SEA BASS	23,000	690
SHAD	232,000	38,400
SPOT	13,000	460
SQUETEAGUES OR "SEA TROUT", SPOTTED	56,000	4,480
STURGEON	11,600	928
<u>TOTAL</u>	<u>19,233,900</u>	<u>\$ 116,490</u>

SPECIES OF SHELLFISH, ETC.

CRABS: x		
HARD	483,500	7,252
SHRIMP	6,842,900	203,127
OYSTERS: xx		
MARKET, PRIVATE, SPRING	327,600	16,588
MARKET, PRIVATE, FALL	241,100	14,773
TERRAPIN, DIAMOND BACK	11,900	1,280
<u>TOTAL</u>	<u>7,907,000</u>	<u>243,020</u>
<u>GRAND TOTAL</u>	<u>27,140,900</u>	<u>\$ 359,510</u>

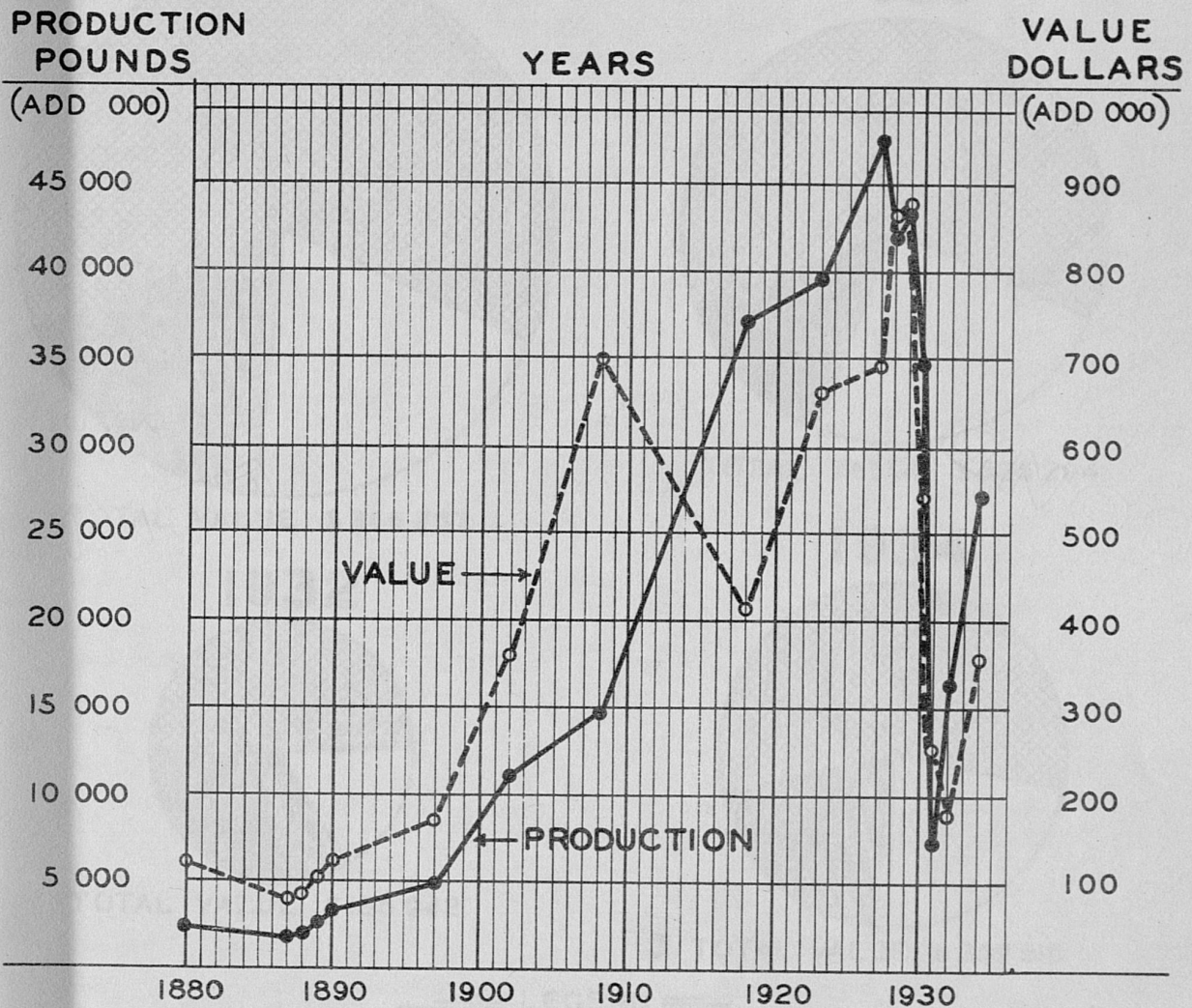
x - Statistics on "hard crabs" used in this table are based on yields of six pounds per dozen.

xx - Statistics on "market oysters" used in this table are based on yields of 5.88 pounds of meats per bushel.

Source: United States Department of Commerce,
Bureau of Fisheries,
Administrative Report - 1935.

PRODUCTION & VALUE ALL SPECIES

GEORGIA FISHERIES



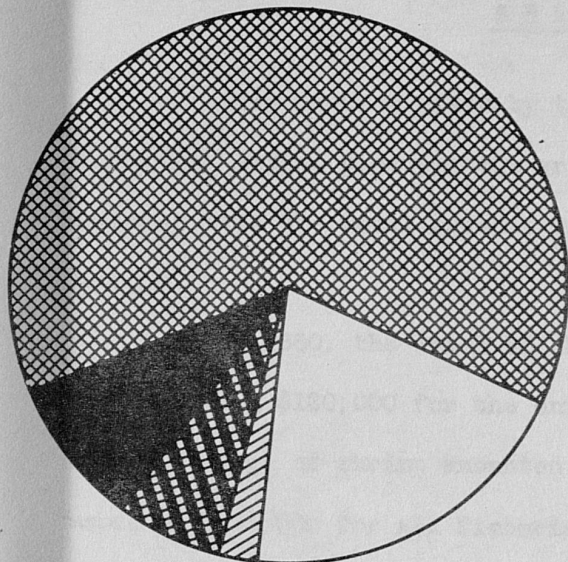
NOTE:- THE INCREASE IN PRODUCTION AND DECREASE IN VALUE 1908 TO 1918 IS DUE TO INCREASED PRODUCTION OF LOW PRICED SPECIES (SUCH AS SHRIMP) AND DECREASED PRODUCTION OF HIGH PRICED SPECIES (SUCH AS SHAD AND OYSTER)
STATISTICS AVAILABLE ONLY FOR THE YEARS DOTTED.

SOURCE OF DATA:-
U.S. BUREAU OF FISHERIES

PREPARED BY
EAST GEORGIA PLANNING COUNCIL
J.C.G. - APRIL 1937

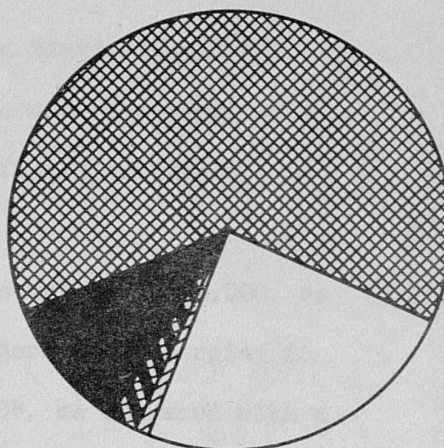
VALUE OF SPECIES GEORGIA FISHERIES

1928



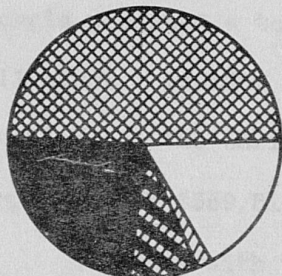
TOTAL VALUE \$ 866 287.

1930



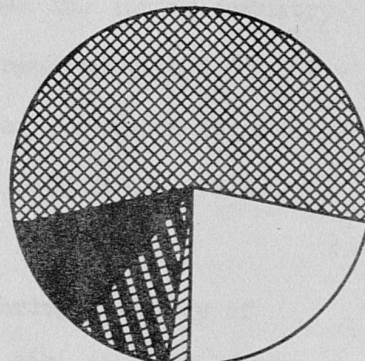
TOTAL VALUE \$ 536 294.

1932



TOTAL VALUE \$ 185 942.

1934



TOTAL VALUE \$ 359 510.

—== LEGEND ==—

SPECIES	VALUE PER 1000 POUNDS
SHAD	\$ 190.60
OYSTER	47.49
SHRIMP	40.68
CRAB	22.98
ALL OTHER	4.80

NOTE:— VALUE PER 1000 POUNDS IS MEAN VALUE FOR THE FOUR YEARS COVERED.
MENHADEN IS INCLUDED IN ALL OTHER SPECIES.

SOURCE OF DATA:—
U.S. BUREAU OF FISHERIES
J.C.G. APRIL 1937

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Commercial Fisheries

CHAPTER I

S H R I M P

From figures given by the United States Bureau of Fisheries, shrimp produces the greatest amount of revenue as compared with the total revenue from the fisheries industry of Georgia.

In 1880, the catch of shrimp was valued at \$4,000, as compared with \$120,000 for the entire fisheries of Georgia; in 1902 the value of shrimp amounted to \$8,408, as compared with a total of \$359,000 for all fisheries of Georgia; in 1918 the value of shrimp had increased to \$173,990 as compared with \$416,000 for all kinds. The peak was reached in 1929, when the shrimp industry of Georgia produced a total of \$581,015 as compared with \$877,232 for all kinds. In 1934 - the most recent year for which figures are available - the shrimp industry produced \$203,127 in value, as compared with \$359,510 for all kinds.

Starting with the year 1923, the shrimp industry of Georgia exceeded in value the total catch of all other kinds by more than 50%, and has since maintained this lead, except for one abnormal year. However, there has been a fluctuation, mostly downward, as the figures for 1934, of \$203,127, will show when compared with \$581,015 for 1929.

A significant feature of this downward tendency is brought out by comparing the total catch of shrimp for Georgia with the total

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catch for the South Atlantic and Gulf States. Taking the number of pounds as the better illustrative medium, it was found that in 1929 the total catch for Georgia was 12,377,619 pounds, as compared with 108,550,538 pounds for the South Atlantic and Gulf, while in 1934, Georgia's total catch of shrimp was only 6,842,900 as compared with 119,317,700 pounds for the entire area. While the total catch for the area has increased, the catch for Georgia has dropped to about one-half in the same period.

There may be various reasons for this downward tendency, but it is not due to a reduction in fishing boats and equipment, as figures taken from the United States Bureau of Fisheries' Statistics show that during this six year period the number of vessels of five net tons or more engaged in the fisheries industry of Georgia increased 100%, or from 22 to 44 vessels. On the other hand, there was some reduction in the number of small boats, from a total of 145 in 1929 to 105 in 1934. There was also a slight reduction in the number and yardage of otter trawls used. Thus, it can be assumed that with the proper amount of energy expended, there was sufficient equipment available to have produced in 1934 approximately the 1929 production, provided the abundance was the same.

However, the question of abundance is a moot one, and while surveys on this subject have been made by the United States Bureau of Fisheries, as reported in their Investigational Report #21, by Messrs. Fred F. Johnson and Milton J. Lindner, and further studies are now

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being pursued by this Bureau, there is sufficiently tangible evidence from these studies to warrant forming tentative conclusions for a constructive program of conservation, as contemplated in this report.

NATURAL HISTORY

Investigational Report #21, United States Bureau of Fisheries, gives the natural history of the shrimp, from which we quote, in part, as follows:

"In the South Atlantic and Gulf area there are three species of sea shrimp, all belonging to the family Penaeidae, and several species of river shrimp, family Palaemonidae, that are of economic importance. Weymouth, Lindner, and Anderson (1933) estimate that in the sea shrimp fishery the common shrimp *Penaeus setiferus* yields about ninety-five percent of the catch, while the grooved shrimp *P. brasiliensis* and the sea bob *Xiphopenaeus kroyeri* each produce about two and one-half percent. The river shrimp fishery, which is of minor economic importance, is restricted mainly to the lower Mississippi River and depends chiefly on *Macrobrachium ohionis*.

"The common shrimp outnumber the other two sea shrimp throughout the entire range of the fishery from North Carolina to Texas. Like the common shrimp, the grooved shrimp is also taken for commercial purposes over the entire fishery, usually mixed with catches of the former which it resembles closely in bodily appearance. The sea bob, on the other hand, because of its smaller size, is only utilized in commercial

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quantities by the drying platforms of Louisiana and occasionally by the fresh fish markets. It commands a lesser price than the other two species.

"Because of the short life history and the heavy fishing of young shrimp, it is necessary that a careful watch be kept on the abundance in order that depletion may be detected in its early stages and the proper remedial actions taken to insure a continued and abundant supply of this important marine resource. The biological work now being conducted by this Bureau in cooperation with the States of Louisiana, Texas, and Georgia is attacking the problems of the abundance and life history of the shrimp."

SPAWNING

Using the "PRELIMINARY REPORT ON THE LIFE HISTORY OF THE COMMON SHRIMP *PENAEUS SETIFERUS* (LINN.)", by F. W. Weymouth, Milton J. Lindner and W. W. Anderson, of the United States Bureau of Fisheries, as a basis for a summary of the spawning phase in the life of the shrimp, the following illuminating information is given:

It has been found that some degree of maturity is observable in the large shrimp from the middle of April to the end of July. The members of the small group appearing in July are without exception immature. Ripe females have been found to be common during April, May, June, July, and present, but scarce, in August and September. Spermatophore-bearing females have been obtained from April to August (these must be within a few hours of spawning). Mature males are present

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throughout this period. Young in the first post-larval stages are found from at least late April to August. Judging from the appearance of the ripest stages that have been recognized and of the young, some shrimp are spawning within two or three weeks from the date on which ovary development was first noticed. It may be assumed, therefore, that spawning occurs during April, May, June, July, and to a reduced extent in August and September, and that the young entering the commercial catch in July came from the earlier spawners among these large shrimp.

The young shrimp upon hatching are about one-seventy-fifth of an inch long and are practically helpless. These young, until they are about one-fourth of an inch in length, are carried by the currents until they eventually reach the inside waters. Upon reaching the inside, they settle to the bottom and inhabit the small sounds and bays. The inside waters are the nursery grounds for the shrimp. The shrimp grow rapidly and as they increase in size, gradually work their way from these inside waters and eventually move out into larger and outside waters. There is, for this reason, with few exceptions, a difference in size of the shrimp in the inside and outside waters, the larger individuals appearing in the outside.

After spawning the shrimp disappear, and it is presumed that they die as no trace of them can again be found. From this it is evident that the life cycle of the common shrimp is short, for they probably survive barely a year.

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THE HEAVY FALL FISHERY CONSISTS ALMOST EXCLUSIVELY OF YOUNG IMMATURE SHRIMP DERIVED FROM THE SPAWNING OF THE PRECEDING SPRING AND SUMMER.

As to spawning grounds, information consisting of various types of data on this important question is indirect.

It has been found that all spermatophore-bearing females which represent the last stage of maturity have been obtained in fairly deep water of high salinity. The common shrimp, unlike the crab or craw-fish which carry their eggs attached to and protected by the abdomen until hatched, emit their ova directly into the water; therefore, since it has been found that the spermatophores are soon dislodged and the eggs must be laid and fertilized before this happens, it is inferred that the spawning occurs in these localities.

Furthermore, in comparing the numbers of immature and maturing males and females from different localities, the greater proportion of maturing individuals are found in outside waters.

These findings are conclusive enough to justify at this time the conviction that spawning occurs predominantly, if not exclusively, in outside waters of high salinity.

As previously stated, these young slowly work their way to the inside shallow waters, leaving the swimming habitat to seek the bottom. Here in shallow water of high temperature and moderate to very low salinity, they inhabit the bays or inside waters often far from the ocean.

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FISHING GROUNDS

According to the United States Bureau of Fisheries, the shrimp fishing areas rarely extend far from shore, and most frequently embrace inside waters and a coastal strip within ten miles of the shore. In Georgia, the shrimp fishery is carried on throughout the entire extent of the inside and littoral offshore waters of the State from the Savannah River on the north to the Saint Marys River on the South. This coast is fairly uniform in its production of shrimp.

FATE OF ADULTS

From the report of Messrs. Weymouth, Lindner and Anderson, some pertinent information as to the fate of adult shrimp, which may have an important bearing on the abundance, is found, namely:

"A question of great interest and importance, both from the theoretical and the practical standpoint, is the fate of the larger group present in July. The smaller group of shrimp, traced into earlier months, was found to have been spawned by the larger, and the larger to have overwintered from young of the previous spring or summer. Traced onward from July the smaller group persists through the winter and spawns the following spring and summer. Does the group of larger shrimp also survive the winter and take part in a second spawning?

"Again our evidence is indirect but impressive. We shall consider the length frequency and sexual maturity data in the light of

Commercial Fisheries

the abundance of the shrimp. No accurate measure of the abundance of the shrimp in the waters of Georgia at different seasons is available. An approximation, however, is furnished by the number of shrimp taken in experimental trawling. By these useful, although imperfect data, let us follow the abundance of the group of small shrimp from the time of their entrance into the commercial catch until their disappearance. The numbers increase rapidly, being constantly augmented by new young of later and later hatchings. The maximum of abundance is reached in the fall, usually September or October, agreeing in time with the fall peak of the commercial catch.

"Although the fall peak of the total catch tends to be over-emphasized by the intensity of the fishing at this season, and in general economic factors prevent a complete correspondence, nevertheless, the fall catch rests on a period of marked abundance of shrimp. From this peak the abundance declines and reaches a low point in late winter and early spring, coinciding with the low point of the catch which falls in February, March, or April.

"The numbers obtained by experimental trawling then again increase, reaching a second peak in April or May at the time of the spring catch of large, mature shrimp so prized by the canners. The crest is more prominent and earlier than the spring catch would suggest.

"From this peak of abundance there is a rapid and steady decline. In the first half of July, when the young of the year make their first appearance in the commercial catch, the two groups are approximately equal in abundance. By the latter part of the month the abundance of

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the group of large shrimp has already fallen below that of the growing young. The group of large shrimp can be more or less clearly recognized in August by their greater length, but the rapid growth of the young soon brings about an overlap, so that size alone will not suffice to identify them. The group of large shrimp are at this time sexually mature, and by this criterion a few may be found in September, but the number is very small- two or three out of hundreds. A careful study of the size frequency curves and those of sexual maturity fail to disclose further trace of them, and we are forced to conclude that they disappear from the fishery in Georgia. We have also been unable to find spent individuals such as should be present after the spawning season if the adults remained within the range of the fishery. Among the thousands of immature shrimp no undoubtedly spent female has been found, although some males examined may possibly belong to this category; the number of these, however, is small."

DEPLETION AND PROTECTION

Quoting again from the report of Messrs. Lindner, Weymouth and Anderson, it should be emphasized that depletion can only be detected by a careful analysis of the abundance of shrimp and that knowledge of abundance requires adequate statistical data. Existing catch statistics are inadequate, since they do not show the effort by which the indicated total catches were obtained. In addition, the amount of gear and number of men should be known, or the individual boat catches should be recorded for analysis.

Improvements in the method of gathering statistics have recently been made by other States, and it is hoped that Georgia will so modify its regulations

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covering the reporting of fish taken as to make possible the future analysis of abundance.

Fortunately, it is not necessary to take an alarmist attitude; at the same time common prudence should make impossible a complacent inaction which would result in the depletion of the available supply. While there is yet time, a concentrated effort should be made to institute the collection of statistics which could be used effectively in the immediate future.

Although hundreds of hauls with various types of fishing gear have been made and hundreds of thousands of shrimp have been examined, there yet remains to be found a common shrimp which is two or more years old. If the shrimp live but one year there is a definite cause for anxiety, for if a single year class is seriously depleted it will be difficult for the shrimp to again regain their former abundance unless stringent regulations are enforced. That this is probable can be explained by the fact that with the animals living only one year there are no older shrimp to act as carry-over breeding stock; consequently, if one year group is badly depleted, either due to natural or man-made causes, the stock in the ensuing years will be dependent directly upon the success of spawning of that year, and if there are not sufficient numbers of shrimp to produce a successful spawning, the population is likely to decline quite rapidly under the strain of the heavy fishing imposed upon it.

Now, in considering the problems of regulations and protection, the life history of the shrimp should be borne in mind. The outstanding features of the life history of the shrimp which may affect the question

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of its resistance to over-fishing are: (1) Its short life span of one year, (2) its extended breeding season of about five months, (3) the very large number of eggs produced, and (4) its extensive habitat in the littoral waters of Georgia.

The shrimp's life span of one year, shorter than that of any other important economic animal, is clearly an unfavorable factor to steady reproduction. When the pressure of over-fishing begins the shrimp will show sudden and violent fluctuations in number, probably disastrous to the fishery.

Protection may take one or more of four lines, limitation of sizes taken, closure of certain seasons, closure of certain areas, and regulation of gear. All of these measures have been tried; the regulation of gear, the closure of certain areas in inside waters forming nursery grounds for a preponderance of young, and closure of certain seasons, promise the most satisfactory results. Experiments now in progress will, it is hoped, indicate how gear may advantageously be modified.

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CONCLUSIONS AND RECOMMENDATIONS

From the foregoing, there are several important conclusions and constructive suggestions arising. These may be briefly stated, as follows:

It is manifest that the shrimp industry is the most valuable part of the commercial fisheries of Georgia.

The tendency appears to point to depletion of supply, and, while not too alarming at present, there seems to be urgent need for carefully considered laws and regulations to conserve this industry.

While regulation of gear and size of mesh may be important, it would seem more necessary to regulate the seasons and areas for commercial catch, with the object of reducing the drain on the supply at the time when wastage would be the greatest.

The collection of catch statistics is also very essential, in order to show the trend of abundance, and legislation should be enacted making it mandatory upon all commercial fishermen to report certain definite data covering their catch.

It would also seem very necessary to continue studying this fishery from a biological as well as a statistical standpoint for guidance in formulating wise conservation measures.

A thorough patrol of all fishing waters should be diligently pursued in order to rigidly enforce conservation laws and regulations.

On the subject of recommendations, Mr. Milton J. Lindner, in charge of Shrimp Investigations for the United States Bureau of Fisheries,

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writes us his recommendations, as follows:

"On the basis of our studies of the life history of the shrimp which we have been conducting in this area since the fall of 1930, Mr. Anderson and I have the following recommendations to make in regard to seasons in Georgia:

"1. We believe that since the creeks and rivers are now closed at all times to fishing, that they should remain closed as a matter of protection on the nursery grounds.

"2. We believe that the sounds should be closed during JULY and AUGUST to protect the young rapidly growing shrimp.

"3. We believe that the sounds should be closed during DECEMBER, JANUARY, FEBRUARY AND MARCH and that the outside waters to the three mile limit be closed during JANUARY, FEBRUARY AND MARCH. This winter closing of inside and outside waters, we believe would be decidedly advantageous because if these small shrimp are protected during the winter they will have approximately doubled or tripled their weight by May, besides allowing a larger stock an opportunity to spawn.

"We believe that the best and most advantageous time to protect shrimp is when they are small. There are two major reasons for this:

"1. The small shrimp have an exceedingly rapid rate of growth. During the summer THEY DOUBLE THEIR WEIGHT WITHIN ONE MONTH.

"2. There is a great waste in the taking of small shrimp. Large numbers of the small shrimp when caught are thrown overboard dead for the sake of a few large ones that happened to be in sufficient numbers to permit sorting. An additional waste occurs in the handling of small shrimp

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during the heading and peeling processes, as they are too small for use and also as the headers who are paid on a volume basis will discard large numbers of small shrimp since they cannot make as much money picking these small shrimp."

Emphasizing these recommendations of Mr. Lindner, which are based on several years scientific research work, also the conclusions previously noted and drawn from the preceding treatise, the East Georgia Planning Council concurs in and recommends their effectuation for the conservation and perpetuation of this very valuable and important marine resource in Georgia.

S H R I M P
COMPARISON WITH TOTAL FISHERIES OF GEORGIA
1880 - 1934

YEAR	T O T A L C A T C H			S H R I M P C A T C H				
	Pounds (000)	Value (000)	Value per 1000 Lbs.	Pounds (000)	Percent of Total Catch	Value (000)	Percent of Total Value	Value Per 1000 Lbs.
1880	2,273	\$ 120	\$52.79	58	2.46	\$ 4	3.33	\$ 71.42
1887	1,883	81	43.01	185	9.82	7	8.64	37.83
1888	1,958	83	42.39	191	9.75	7	8.43	36.65
1889	2,644	106	40.09	150	5.67	6	5.66	40.00
1890	2,994	123	41.08	162	5.41	6	4.88	37.03
1897	4,993	171	34.24	68	1.36	3	1.75	44.11
1902	11,103	359	32.33	344	3.09	8	2.23	23.25
1908	14,828	701	47.27	528	3.56	20	2.85	37.88
1918	37,154	416	11.19	5,793	15.59	174	41.83	30.03
1923	39,897	668	16.74	10,668	26.74	373	55.84	34.96
1927	47,607	697	14.64	12,280	25.79	469	67.29	38.19
1928	42,069	866	20.58	9,526	22.64	545	62.93	57.21
1929	43,514	877	20.15	12,378	28.68	581	66.25	46.94
1930	34,873	536	15.37	8,853	25.39	335	62.50	37.84
1931	7,350	251	34.15	5,471	74.43	181	72.11	33.08
1932	16,523	186	11.25	3,602	21.80	90	48.39	24.98
1934	27,141	360	13.26	6,843	25.21	203	56.39	29.66

Source: United States Department of Commerce,
Bureau of Fisheries,
(Investigational Report - No. 21)
(and Administrative Reports)

S H R I M P
COMPARISON OF GEORGIA WITH SOUTH ATLANTIC AND GULF STATES
1880 - 1934

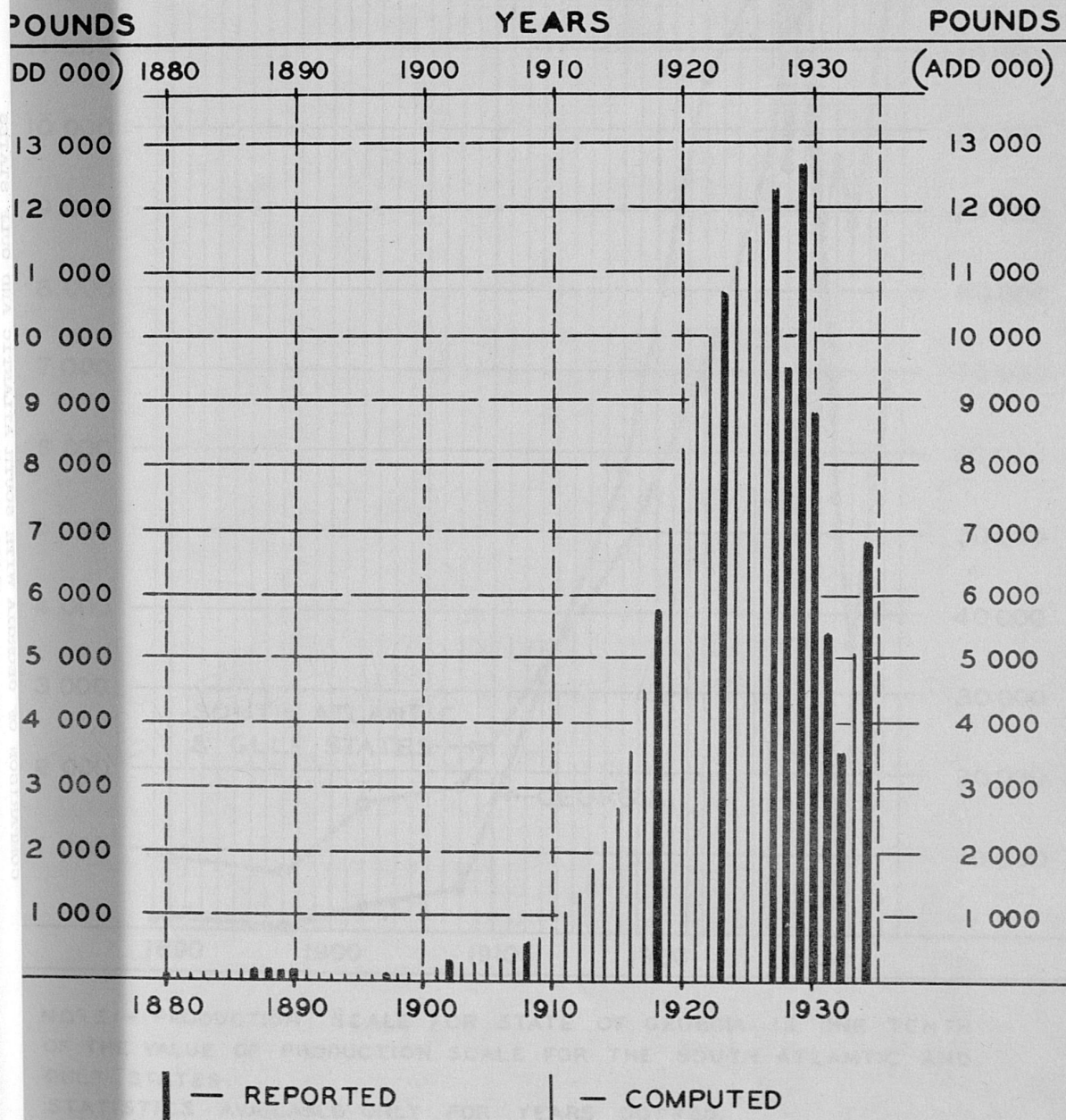
YEAR	SOUTH ATLANTIC AND GULF STATES			GEORGIA				
	Pounds (000)	Value (000)	Value Per 1000 Lbs.	Pounds (000)	Percent of Total Catch	Value (000)	Percent of Total Value	Value Per 1000 Lbs.
1880	*	\$ *	\$ *	56	*	\$ 4	*	\$ 71.42
1887	*	*	*	185	*	7	*	37.83
1888	*	*	*	191	*	7	*	36.64
1889	9,048	154	17.02	150	1.67	6	3.90	40.00
1890	*	*	*	162	*	6	*	37.03
1897	7,418	146	19.68	68	0.92	3	2.05	44.11
1902	16,178	286	17.67	344	2.13	8	2.80	23.25
1908	18,260	411	22.51	528	2.89	20	4.87	37.87
1918	48,005	1,569	32.68	5,793	12.07	174	11.09	30.03
1923	70,823	2,557	36.10	10,668	15.06	373	14.59	34.96
1927	98,869	3,518	35.58	12,280	12.42	469	13.33	38.19
1928	115,480	4,550	39.40	9,526	8.25	545	11.98	57.21
1929	108,551	4,435	40.85	12,378	11.40	581	13.10	46.93
1930	88,118	2,995	33.98	8,853	10.05	335	11.19	37.84
1931	96,451	2,730	28.30	5,471	5.67	181	6.63	33.08
1932	88,262	2,036	23.06	3,602	4.08	90	4.42	24.98
1934	119,318	3,069	25.72	6,843	5.74	203	6.61	29.66

* Data not available.

Source: United States Department of Commerce,
Bureau of Fisheries,
(Investigational Report No. 21).

SHRIMP PRODUCTION

GEORGIA FISHERIES

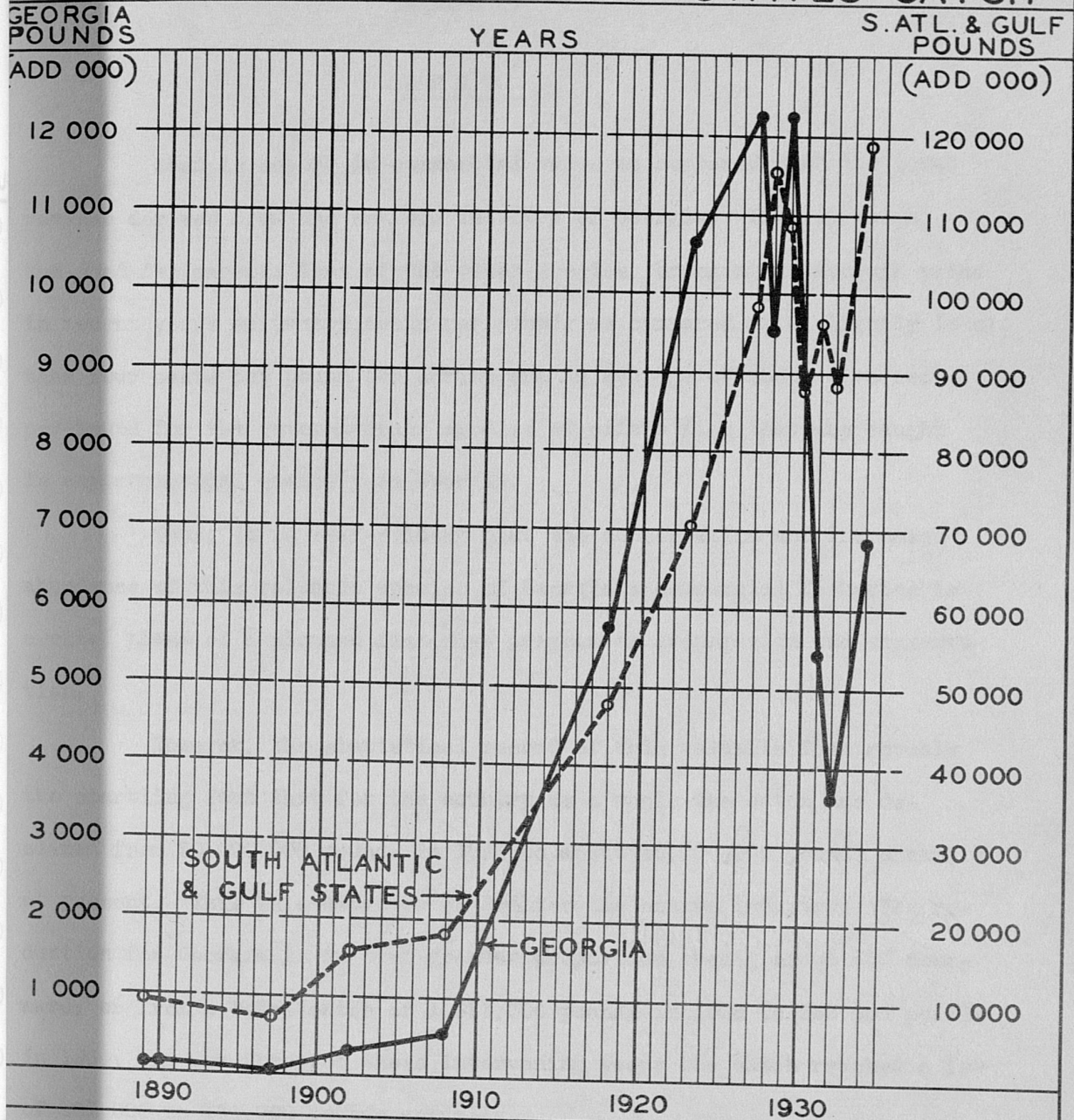


SOURCE OF DATA:
U.S. BUREAU OF FISHERIES

PREPARED BY
EAST GEORGIA PLANNING COUNCIL
A.F.B. — APRIL 1937

SHRIMP PRODUCTION

COMPARISON OF GEORGIA CATCH WITH TOTAL SOUTH ATLANTIC AND GULF STATES CATCH



NOTE:- PRODUCTION SCALE FOR STATE OF GEORGIA IS ONE TENTH OF THE VALUE OF PRODUCTION SCALE FOR THE SOUTH ATLANTIC AND GULF STATES.

STATISTICS AVAILABLE ONLY FOR YEARS DOTTED.

SOURCE OF DATA -
U.S. BUREAU OF FISHERIES

PREPARED BY
EAST GEORGIA PLANNING COUNCIL
J.C.G. APRIL 1937

Commercial Fisheries

CHAPTER II

S H A D

Shad is second in commercial value as compared with the total revenue derived from the seafood industry of Georgia. In unit value the shad far exceeds that of the other species, bringing an average price in recent years of twenty cents per pound, as compared with slightly less than four cents per pound for shrimp and an average of about five cents per pound for the several other species of edible fish that are caught in any commercial quantity in Georgia.

Thus, it is self-evident that the conservation and increased abundance of this valuable species of Georgia's commercial fisheries is a vital phase of a planned fisheries program of propagation and conservation.

However, the statistical record of this valuable fish reveals the startling fact that for the country as a whole the catch has declined from 50,000,000 pounds in 1896 to about 10,000,000 pounds annually at present. This is a decrease of 80% for the entire industry. The reduction for Georgia is in even greater proportion, being about 83% downward, or from a total catch of 1,333,000 pounds in 1908 to 232,000 pounds in 1934; and for three of these intervening years the catch reached a low of 101,000 to 134,000 pounds annually.

Considering the high price this fish brings, which should intensify effort towards its production, the obvious conclusion is that the supply is being depleted at an alarming rate. Evidently, over-fishing and

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certain malpractices are responsible for the tremendous reduction in abundance, and unless immediate drastic measures for conservation and generous means for propagation are adopted and rigidly pursued, it is not at all unlikely that, in the near future, the shad will no longer be found in Georgia waters.

The accompanying tables will give a more complete chronological illustration of the dangerous trend towards annihilation of this valuable species of Georgia's fisheries industry.

HABITAT AND LIFE HISTORY

The United States Bureau of Fisheries, their Bulletin 1-129, revised October, 1936, gives some very interesting information descriptive of the shad, its habitat and life history, which we incorporate in this report, as follows:

"The shad (Alosa sapidissima) is probably the best known and most highly prized fish on the Atlantic coast of the United States. Its range is from Florida to the Gulf of St. Lawrence. It ascends all suitable streams throughout this long stretch of seaboard. The shad is the largest member of the herring family (Clupeidae) in United States waters. The clupeoids as a group are of great economic importance, including several species collectively known as sardines, the menhaden, the river herrings, and others of lesser value to men. The shad takes first rank as a food fish. Since the days when the spring runs up the Potomac brought them to the tables of George Washington and John Marshall, the shad has

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been known as a favorite among epicures. The flesh is rich but not oily, and the roe is particularly considered a great delicacy.

"From the river herrings with which it is frequently associated in fresh water, the shad may be distinguished by the shape of the cheek, which is deeper than long, and by the form of the lower jaw, which fits into a groove in the upper and does not project. The upper jaw is deeply indented anteriorly, and the jaws of the adult are toothless. The shad is greenish in color with a metallic luster above, silvery sides, and a dark spot at the shoulder, occasionally followed by smaller ones. The maximum weight attained by shad on the Atlantic Coast is about twelve pounds, but fish weighing more than nine pounds are now extremely rare. The average weight is about three pounds for males and four and three-quarter pounds for females.

"The shad belongs to that group of fishes known as anadromous, a term of Greek derivation meaning "running up". It migrates annually from the ocean, entering suitable bays and rivers of the coastal plain to spawn. The commercial fishery is carried on during this brief sojourn in fresh water. After spawning the shad returns to the sea where the greater part of its life is spent. The details of its oceanic existence are largely unknown.

"In its natural habitat the shad is restricted to the Atlantic Coast. It appears in the southernmost river of its range, the St. Johns, early in November but does not reach the Miramichi River, New Brunswick, until late in May. The intervening streams are entered in more or less regular sequence, the time of migration apparently bearing a close relation

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to water temperature.

"From these facts it was once supposed that the entire body of shad wintered in southern waters and began a northward migration in late autumn, sending detachments into the various streams as the main body continued along the coast. This theory is still cherished among certain fishermen, but is not accepted by scientists. It is rather supposed that the migration of the shad is an on-shore movement from deeper waters possibly near the edge of the continental shelf.

"The statement is often made that shad return to spawn in the same stream in which they were born. While it is probably true that bodies of these fish winter in sea areas off the waters of their nativity so that their spawning migration leads them to return to the general region in which they were hatched, there is no evidence that the shad possesses the remarkable instinct that enables certain Pacific salmon to return not only to the same river but even to the very tributary in which they were hatched.

"The main body of shad ascends the rivers when the temperature is from 56° to 66° F. In any given stream successive schools appear over a period of several months, resulting in a rise and fall in catch. Males predominate in the early runs, their numbers sometimes amounting to 90% of the total. Later in the season males are often scarce. For spawning the shad appears to prefer sounds off the mouths of rivers or river areas below the mouths of creeks where the warm water of the stream tempers the cooler water below. The fish are paired, swimming side by side, while

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spawning. The greater part of the spawning takes place about sunset when the water on the spawning grounds reaches its highest daily temperature. The average number of eggs produced by a female is 30,000 although a large fish may yield as many as 100,000. After spawning, the spent fish immediately begin their return journey to the sea.

"The eggs are deposited loosely, without a nest, and quickly fall to the bottom. Many fail to be fertilized, others are buried by mud washed down by spring rains, and the development of a cottony fungus or the depredations of eels and other spawn-eaters take a further toll.

"The hatching period is ordinarily 6 to 10 days. The newly hatched shad are less than .4 inch long and are transparent. They are very active even when first hatched. A large yolk sac provides food for about a week, after which time they feed freely. Growth is rapid. By fall the young fry are from 3 to 7 inches long, depending upon the environmental conditions. The migration of young shad to salt water begins with the approach of cool weather, but usually the last of the young do not leave the rivers until late November or early December. A few young may remain in the salt or brackish waters of bays or estuaries until the following year.

"From the fact that adult shad in the sea are known to feed partly on mysid shrimps (bottom dwellers) and on bottom-dwelling amphipods, etc., it is supposed that the shad spends most of its oceanic life at the bottom of the sea. It is thought to mature at the age of about three or four years. While the life history of the shad is imperfectly known, there is reason to believe that the same individual may return to fresh water to

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spawn for several successive years."

The above bulletin also gives some interesting observations on the cause of the decline of this particular fishery, and we quote from the same as follows:

"Due to the combined action of the three factors of over-fishing, obstruction of the spawning grounds, and the pollution of streams the shad have disappeared entirely from many rivers and in others have declined to a mere shadow of their one-time abundance. It has been estimated that the destruction of the Delaware Bay Shad fishery represents an annual loss of at least \$200,000."

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CONCLUSIONS AND RECOMMENDATIONS

It takes no stretch of the imagination to realize that something must be done and done quickly to save the shad fishery. In this connection we quote again from the United States Bureau of Fisheries, as follows:

"In spite of the fact that millions of young shad have been hatched and liberated into the streams of the Atlantic seaboard, the fish has not been reestablished in its former abundance. In view of the destruction of natural spawning grounds and the lack of intelligent regulation of the commercial fishery, the program of artificial propagation cannot do more than stem the tide of depletion. Further restrictions concerning the use of nets, the placement of obstructions in rivers, and the discharge of refuse and waste into the streams are necessary to maintain the shad as an important commercial fish."

While it is obvious that cultivation or propagation through the medium of fish hatcheries is very important, it seems even more important to enforce rigidly the existing laws and to make them more stringent. With regard to enforcing these laws, there is the serious problem of apprehending and convicting those guilty ones who ruthlessly and ignorantly contribute towards the elimination of this industry. Unlike other fishery activities, which are carried on mostly in open bays, sounds, and estuaries in daylight, the catch of shad takes place far upstream in tidal rivers, often in secluded places, and mostly at night; all of which is conducive to malpractices, and increases the difficulty in apprehending law-breakers.

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However, faced with the very definite early depletion of shad in Georgia, drastic measures must be employed. If the fishermen, who earn their livelihood during the shad season, insist upon committing economic suicide, and if the laws cannot be enforced sufficiently to stem this tide of depletion, then the spawning grounds for shad should be completely closed to fishing for a period of years. Naturally, this would work a temporary hardship on the hundreds of persons engaged in this industry during the season. However, the situation has become so acute that a decision should be made whether to suffer a temporary hardship in order to save the industry, or let it die a natural death and make the hardship permanent.

The United States Bureau of Fisheries proposes to establish a shad hatchery on the Ogeechee River, near Savannah, Georgia. The public spirited citizens and Government Officials connected with this movement are to be highly commended. However, this much needed medium of replenishment cannot be taken as a complete solution of our shad problem. The Bureau of Fisheries, as quoted above, clearly shows that in spite of the fact that millions of young shad have been hatched and liberated into the streams of the Atlantic seaboard, the fish have not been reestablished to their former abundance.

Therefore, it is the conclusion and recommendation of the East Georgia Planning Council that drastic conservation methods and regulations must be pursued, either by rigid enforcement of present laws, or by closing the spawning grounds entirely for a period of years.

S H A D *
1880 - 1934

YEARS	POUNDS	VALUE
1880	252,000	\$ 17,941
1887	255,200	18,760
1888	263,200	19,000
1889	356,352	27,000
1890	399,660	30,918
1897	787,550	46,705
1902	1,029,050	75,189
1908	1,333,000	190,000
1918	100,540	26,960
1923	133,750	27,890
1927	187,380	43,578
1928	317,267	73,676
1929	471,807	112,262
1930	274,755	54,751
1931	132,294	33,073
1932	288,145	45,111
1934	232,000	38,400

* Does not include hickory shade.

Source: United States Department of Commerce,
Bureau of Fisheries,
Administrative Reports and
Special Data

S H A D *
SOUTH ATLANTIC AND GULF STATES
1934

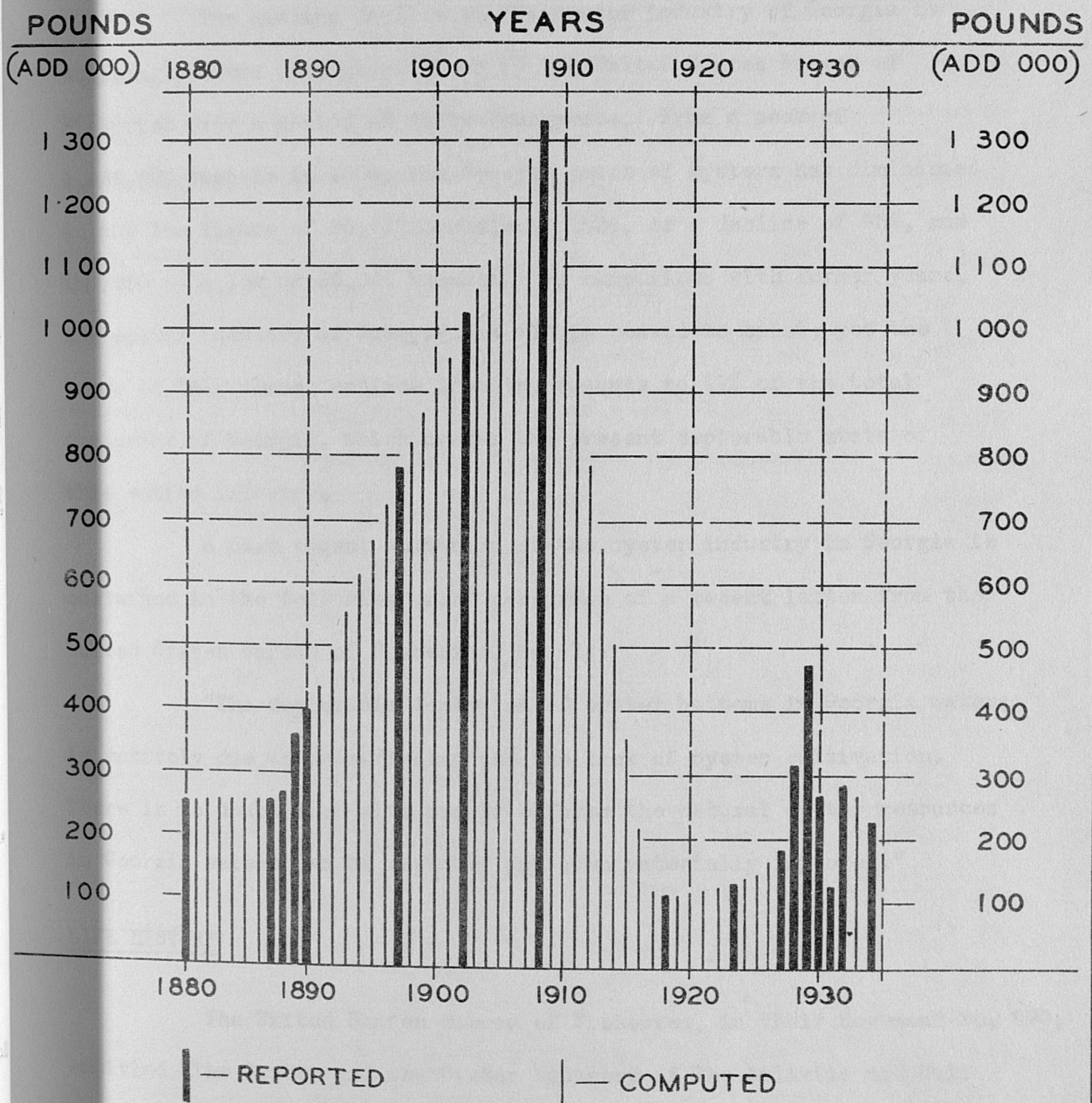
STATES	C A T C H		V A L U E	
	Pounds	Percent	Dollars	Percent
North Carolina	1,274,000	51.03	\$ 193,187	58.56
South Carolina	208,600	8.32	31,290	9.48
Georgia	232,000	9.30	38,400	11.65
Florida	782,200	31.35	66,986	20.31
<u>TOTAL</u>	<u>2,496,800</u>	<u>100.00</u>	<u>\$ 329,863</u>	<u>100.00</u>

* Does not include Hickory Shade

Sources: United States Department of Commerce,
Bureau of Fisheries,
Administrative Report - 1935.

SHAD PRODUCTION

GEORGIA FISHERIES



SOURCE OF DATA:
U. S. BUREAU OF FISHERIES

PREPARED BY
EAST GEORGIA PLANNING COUNCIL
J.C.G. - A.F.B. - APRIL 1937.

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CHAPTER III

OYSTERS

The amazing decline in the oyster industry of Georgia is strikingly shown in figures given by the United States Bureau of Fisheries over a period of fifty-four years. From a peak of 1,436,000 bushels in 1908, the Georgia catch of oysters has diminished to the low figure of 96,717 bushels in 1934, or a decline of 93%, and in 1930 to a low of 36,000 bushels. By comparison with former years, the oyster industry of Georgia has almost ceased to exist; yet the value of this almost extinct industry amounts to 11% of the total fisheries of Georgia, which proves the present deplorable state of this entire industry.

A most cogent summation of the oyster industry in Georgia is contained in the following brief paragraph of a recent letter from the United States Bureau of Fisheries, namely:

"The deplorable depletion of oyster bottoms in Georgia waters is entirely due to over-fishing and the lack of oyster cultivation. There is no doubt that with proper efforts the natural oyster resources in Georgia waters can be restored and even materially improved."

LIFE HISTORY

The United States Bureau of Fisheries, in their document No. 890, entitled "The Oyster and the Oyster Industry of The Atlantic and Gulf Coasts" gives a very profound and scientific treatise on this subject. Excerpts from this study are given as follows:

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"The oyster of commerce in the United States, with the exception of certain parts of the Pacific Coast, is the so-called 'Eastern Oyster' belonging to the species, *Ostrea Virginica*, Gmelin. It is a member of the group of molluses popularly known as bivalves, since it has two valves, or shells, which are joined at the narrower ends by a hinge.

"The oyster may spawn when the water reaches a temperature of 68° F., but spawning proceeds at normal speed only when the water is 70° F., or above. For this reason the spawning period varies in different regions, depending on the temperature regulated by the depth of the water and the general meteorological conditions.

"Fertilization of the eggs occurs in the water. The oysters, male and female, lying about over the bottom, at spawning time discharge the reproductive elements into the water where they mingle as chance may bring about. The more numerous the oysters on a particular bed, the greater the chance of the actively moving spermatozoa meeting the eggs. The spermatozoa swarm around the eggs, many about each one, until a spermatozoon penetrates the egg membrane, the head only of the spermatozoon passing on in, the tail dropping off. The material of the head unites with that of the egg, and important changes in the latter are thereby initiated.

"The single cell of the egg begins to divide into many cells and to change its form and in the course of from 5 to 10 hours develops into a small oyster larva, which swims by means of fine hairs or cilia on the outside of its body. A shell then begins to develop and soon

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covers the entire body, so that the larva resembles a tiny hard clam.

"The period passed through by the oyster larva from the development of the cilia, a few hours after fertilization, until it 'sets' or 'strikes' is known as the free-swimming stage. Although the larva swims about freely in the water, being so small, its movements and location at any particular time are largely subject to the tides and currents. The free-swimming period lasts from about 14 to 18 days in the more northern waters and a somewhat shorter time in the southern. The warmer the water the more rapidly development occurs and consequently the shorter the free-swimming period.

"At the close of the free-swimming period, when the oyster is about one-third of a millimeter (one-seventy-fifth of an inch) long, it 'sets' if the proper conditions are present. It attaches itself to some surface in the water, a rock, shell, stake, in fact almost any object.

"Once secured, the swimming organ disappears and the oyster never wanders again of its own volition.

"The rate of growth of oysters varies widely, depending on temperature, density, and food content of the water, season of the year, and other factors. Its growth is more rapid in warmer waters than in colder. It takes about two years for an oyster to reach a length of four to five inches, or marketable size. Oysters if left undisturbed may attain a length of eight to ten inches or more. While the exact age which an oyster may reach cannot be definitely stated, oysters have been found which appeared from the number of layers in the shell, to be at least 15 years of age.

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"Oysters are not usually out in the main body of the sea water, away from the influence of the fresh water from the streams, where the density is 1.025 or more. It will thus be apparent that oysters have become adapted to a certain range of densities, and natural beds have grown up at points fairly close to shore or in inclosed bays where the salinity of the sea water is modified by the inflowing of fresh water.

"Usually oyster beds, under natural conditions are from or near high water mark to a depth of about 130 feet; between high and low water marks; and in the grass on the edges of the marsh prairies above the level reached by many high tides."

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CONCLUSIONS AND RECOMMENDATIONS

The United States Bureau of Fisheries, in their Fisheries Document No. 1077, entitled "Oyster Investigations in Georgia", give some very definite conclusions and recommendations, from which we quote, as follows:

"The survey and experiments carried out in Georgia coastal waters have demonstrated both the advantages and the difficulties in the cultivation of oysters in this region. The present method of exploitation of natural beds, consisting in taking every good-shaped oyster from the tidal flats, leads to gradual depletion of the natural resources. On the other hand, it appears possible by introducing modern methods of cultivation not only to maintain the productivity of the natural beds at its present level but to utilize waste areas of barren bottoms by converting them into oyster farms, thereby increasing the value of marsh land which is unutilized and low priced at present.

"What measures should be taken to restore the natural wealth of oyster resources, and what policy should be followed for better exploitation of barren bottoms? We know that most of the natural beds are formed by 'coon' oysters of inferior quality, while single oysters of better quality are found scattered about in deeper waters below low-water mark. Bunch or cluster oysters are mostly used by the local canneries, the price averaging from 10 to 12 cents a bushel, while single oysters bring a price of about 60 cents to \$1.00 a bushel. It is quite obvious that the best policy is that which encourages the production of the best type and increases the total crop. As the depletion of the

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natural beds continues, it is necessary to restore and protect them from future destruction. These measures should be taken at once, because the exhaustion of the natural beds leads to a threatening decrease of the annual output. Merely the restoration of the natural beds will not, however, improve the quality of the oyster, nor will it increase considerably the total production. For the two latter purposes the following practical measures should be adopted: (1) The return of the shells to the natural beds from which oysters were taken, (2) the restoration of the depleted oyster beds by the planting of seed or adult oysters, (3) the establishment of oyster beds in suitable localities, and (4) the development of oyster culture.

"Return of the shells to natural beds. - Under section 10 of the coastal fisheries law of the State of Georgia, the lessee is required to deposit every year under the supervision of the tidewater commissioner a number of bushels of shells equal to 25% of bushels of oysters taken from the grounds leased. If reasonably enforced, this rule will be of great benefit for maintaining the natural beds and preventing their depletion, provided that the planting operations are carefully supervised so that the shells are planted at the right time and place.

"Restoration of depleted oyster beds. - In many localities, the natural beds contain nothing but dead shells, all live oysters having been taken out. These beds can be easily restored by planting seed or adult oysters. In this case the beds should be closed to the public for a definite period of time and efficiently patrolled.

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"The establishment of oyster beds in suitable localities. - There are numerous localities in Georgia coastal waters where oysters grow scattered on the mud flats. Where the mud is not too soft, these flats can be utilized for the establishment of new oyster beds by the following method: During June and July when the oyster larvae are free-swimming in the water, spat may be collected on oak brush stuck into the mud between tide marks or on shells in wire-bag collectors placed on tidal flats between 1 foot below and 2 feet above low-water mark. The brush gradually decays or is destroyed by the shipworm and breaks to pieces, so that the oysters fall on the mud forming a new bed. The process can be expedited by breaking the twigs and scattering them over the grounds when the oysters are sufficiently large. Spat collected on shells in wire bags must be scattered on the flats or transplanted below low-water mark.

"The development of oyster culture. - The greatest progress of the oyster industry in Georgia can be achieved by the introduction of improved methods of oyster culture, which consists in the following: Setting aside sufficiently large areas suitable for cultivation of oysters; improving the bottoms, by dredging out the accumulation of debris and grass and reinforcing them if necessary by planting shells or gravel; establishing of spawning grounds; collection of seed oysters on spat collectors (wire bags, brush); transplanting seed oysters on suitable bottoms below low-water mark; and protecting the beds from the attacks of drills and other enemies.

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"As has been demonstrated by the experiments at Dobby Island, a good set of oysters can be obtained easily in many localities in the coastal waters of Georgia by means of oak brush or wire-bag collectors filled with shells. Seed oysters, upon reaching the size of a half-dollar coin, can be transplanted below low-water mark on firm and unshifting bottoms in the creeks, small rivers, and in the marshes where they will grow and assume perfect form. If necessary, they can be kept there for several years. Although, as our observations of 1928 show, setting may occur in deep water, its intensity is much less than in the tidal zone, and consequently there is little danger that the transplanted seed oysters will become overcrowded with new generations. As the oysters grow larger the extra space is taken up so that it is often advisable to work the beds and remove part of the crop to other grounds. The improvement in conditions for those left on the bed will result in better growth and better quality of the meats. It is believed that by an intelligent application of oyster cultural methods to local conditions, the total output can be considerably increased and the quality of the oysters greatly improved."

In connection with the restoration of depleted oyster beds, we would like to emphasize particularly the recommendation in the above report that where beds have been planted with seed or adult oysters, these beds should be closed to the public for a definite period of time and efficiently patrolled.

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In connection with the area available for planting oysters, it is interesting to note from a report of a survey made by Mr. George D. Newton, Engineer for the Bureau of Fisheries, that the Georgia oyster industry at present is utilizing only a little over one-tenth of the estimated area that is, according to Mr. Newton's survey, suitable for oyster cultivation, and which, according to his estimates, if properly planted, would produce approximately 2,500,000 bushels, with an estimated annual value to the producer of \$1,250,000. Mr. Newton estimates that the industry then should employ about 13,500 persons as compared with about 1,000 persons now employed in the oyster industry of Georgia.

There is an Appropriation Act, now pending in Congress, providing (1) \$45,000 for beginning an investigation of the shad fishery on the Atlantic coast, and, (2) \$30,000 for oyster cultural investigations, with which it is planned to establish experimental oyster farms at several sections along the Atlantic coast. This will no doubt lead to the establishment of much needed oyster farms along the Georgia coast.

The East Georgia Planning Council heartily endorses the conclusions and recommendations of the United States Bureau of Fisheries, as noted above, and emphasizes very strongly the need for the strictest kind of protection for existing oyster beds; it urges a rigid enforcement of present laws requiring replanting; and it stresses the necessity for the early effectuation of plans for planting and cultivating additional suitable areas.

FISHERIES OF THE SOUTH ATLANTIC AND GULF STATES
CATCH OF MARKET OYSTERS, VARIOUS YEARS, 1880 TO 1934

YEAR	NORTH CAROLINA		SOUTH CAROLINA		GEORGIA		FLORIDA		ALABAMA	
	Bushels	Value	Bushels	Value	Bushels	Value	Bushels	Value	Bushels	Value
1880	170,000	\$ 60,000	50,000	\$ 20,000	70,000	\$ 35,000	78,600	\$ 15,950	104,500	\$ 44,950
1887	212,980	48,353	37,725	18,581	110,085	26,950	(1)	(1)	(1)	(1)
1888	204,703	46,129	40,242	19,146	120,600	29,370	239,195	57,398	76,125	32,174
1889	1,001,620	194,272	43,620	19,890	163,200	28,356	357,227	86,312	438,425	96,758
1890	807,260	175,567	63,150	23,204	224,355	40,520	468,431	108,542	481,070	107,812
1895	(1)	(1)	(1)	(1)	(1)	(1)	269,952	61,723	(1)	(1)
1897	858,818	241,099	214,900	45,360	486,634	86,709	231,544	62,024	255,053	60,207
1902	1,022,813	268,363	689,700	118,460	1,224,000	220,467	882,656	161,296	347,400	119,773
1908	753,500	227,300	1,563,000	137,000	1,436,000	334,000	1,067,000	296,000	536,000	169,000
(2)1910-11	332,257	63,405	705,124	93,927	505,157	170,812	331,422	143,937	371,435	68,842
1918	216,962	70,280	397,690	96,542	158,546	73,913	439,276	141,948	120,243	38,175
1923	559,628	229,576	719,906	113,955	245,762	86,771	303,058	86,399	233,086	86,719
1927	434,375	200,742	777,183	156,002	108,191	43,602	359,779	207,512	166,391	47,174
1928	414,241	167,490	828,245	162,867	149,775	54,670	505,389	254,753	602,589	151,107
1929	512,395	245,533	658,302	125,661	78,695	19,970	437,374	223,661	57,132	18,952
1930	411,354	155,148	706,635	133,152	36,153	10,608	534,087	142,198	88,873	23,854
1931	251,352	92,061	500,947	60,676	49,321	9,251	505,427	122,054	301,459	28,258
1932	210,395	51,339	507,950	51,856	103,411	15,670	456,598	77,367	358,007	32,318
1934	208,012	53,092	603,777	101,774	96,717	31,361	570,309	101,631	119,087	23,834

(1) Statistics not available.

(2) South Atlantic States 1910 and Gulf States 1911.

NOTE: - Until 1901 no consistent or uniform effort was made to separate market oysters from seed oysters, thus, previous to that date the figures above undoubtedly include some seed oysters. It should be stated that a considerable part of the oysters shown for Mississippi in more recent years were taken in the Louisiana Waters by Mississippi fishermen.

Source: United States Department of Commerce,
Bureau of Fisheries.

FISHERIES OF THE SOUTH ATLANTIC AND GULF STATES (Cont'd)
CATCH OF MARKET OYSTERS, VARIOUS YEARS, 1880 TO 1934.

YEAR	MISSISSIPPI		LOUISIANA		TEXAS		TOTAL	
	Bushels	Value	Bushels	Value	Bushels	Value	Bushels	Value
1880	25,000	\$ 10,000	295,000	\$ 200,000	67,054	\$ 47,300	860,154	\$ 433,200
1887	561,100	118,974	678,227	215,163	256,199	83,275	(1)	(1)
1888	767,205	157,463	719,992	230,820	341,275	109,633	2,509,337	682,133
1889	845,503	167,713	835,520	269,057	360,600	111,400	4,045,715	971,758
1890	806,478	166,872	841,585	299,896	440,800	127,990	4,133,129	1,050,203
1895	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
1897	629,713	110,964	959,190	432,668	355,910	94,663	3,991,762	1,133,694
1902	2,405,132	426,222	1,198,413	493,227	343,113	100,359	8,119,237	1,908,167
1908	1,067,100	295,800	2,966,000	675,000	489,400	167,200	9,878,000	2,301,300
(2) 1910-11	650,995	139,773	3,081,671	799,316	364,800	123,565	6,342,861	1,603,577
1918	1,272,389	307,326	1,122,203	494,299	477,784	143,610	4,205,093	1,366,093
1923	1,696,422	472,652	1,022,109	770,434	359,978	176,076	5,141,949	2,022,582
1927	2,687,369	667,127	1,647,693	1,097,833	394,697	189,665	6,576,178	2,609,657
1928	2,027,582	490,223	1,549,809	946,767	258,233	129,958	6,335,863	2,357,835
1929	2,667,732	453,786	1,128,884	438,410	357,249	146,167	5,897,815	1,672,140
1930	2,560,798	320,607	1,215,525	550,046	248,938	80,494	5,802,363	1,416,107
1931	1,358,851	143,843	915,791	278,866	189,639	59,371	4,072,737	794,380
1932	2,384,621	201,945	719,338	228,327	194,178	52,610	4,934,496	711,432
1934	2,203,964	309,790	1,294,375	414,315	297,461	105,204	5,398,702	1,141,001

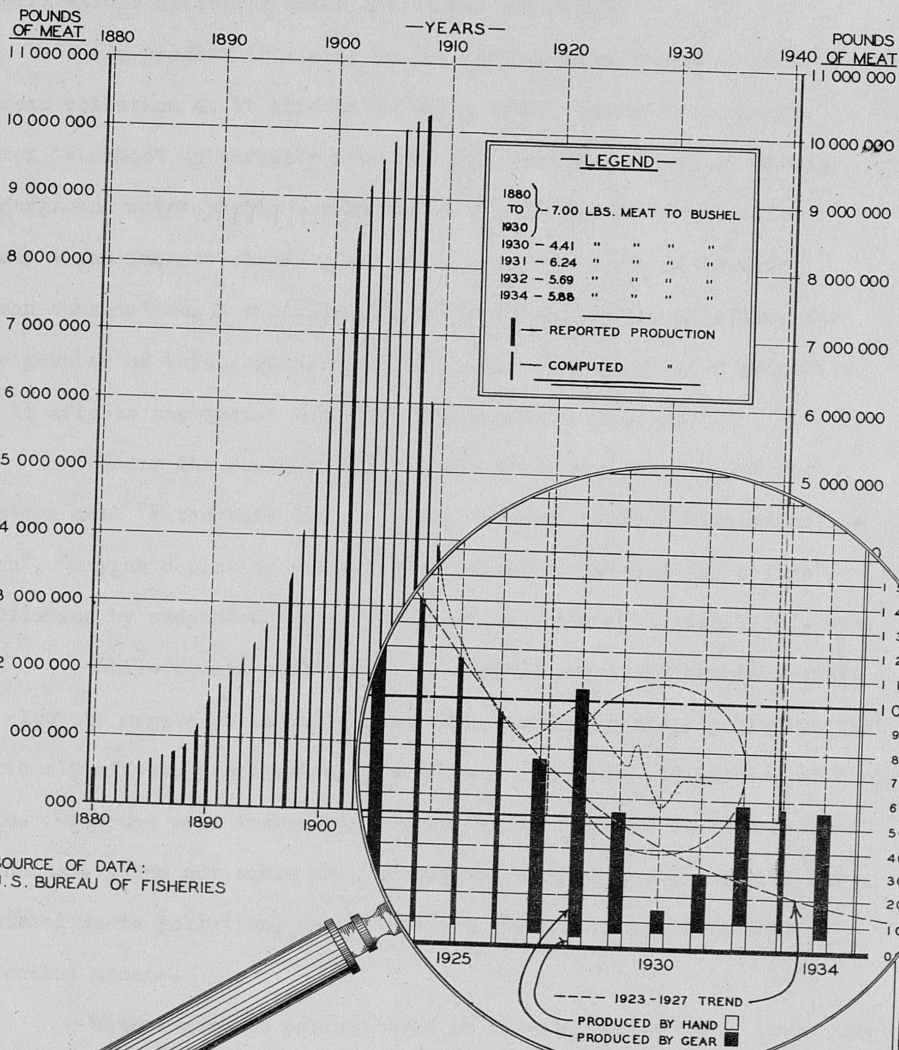
(1) Statistics not available.

(2) South Atlantic States 1910 and Gulf States 1911.

NOTE: - Until 1901 no consistent or uniform effort was made to separate market oysters from seed oysters, thus, previous to that date the figures above undoubtedly include some seed oysters. It should be stated that a considerable part of the oysters shown for Mississippi in more recent years were taken in the Louisiana waters by Mississippi fishermen.

Source: United States Department of Commerce,
Bureau of Fisheries.

OYSTER PRODUCTION GEORGIA FISHERIES



SOURCE OF DATA:
U. S. BUREAU OF FISHERIES

A. F. B.

FEB. 1937.

BASE CHART ENLARGED 3.6 TIMES
PREPARED BY EAST GEORGIA PLANNING COUNCIL

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POLLUTION

The problem of water pollution is a broad one, with many ramifications affecting human and animal existence.

At present this area is not particularly concerned with stream pollution as it affects drinking water, inasmuch as ground water is almost universally used for this purpose. However, should underground water supply become seriously endangered by excessive draught for industrial uses, and surface water is substituted for human consumption, a vital problem will arise. In the meantime, for the purpose of this report, water pollution will be treated primarily as it affects the oyster industry from a health standpoint.

Under the heading "Pollution", there may be included such factors as: "Pathogenic disease organism pollution", "chemical pollution", "oxygen depleting pollution", "pollution by floating solids", "pollution by suspended solids", "pollution adverse to fish life", etc.

While sewage pollution is a serious potential problem, there is also the menace of industrial waste and other chemical pollution that seriously affects propagation, growth, and supply of all species of fish life. With the ever increasing industrial development in this area, it is necessary and advisable that a study be made of the problem of industrial waste pollution, and a constant check maintained on this potential menace.

With regard to pollution as it affects oyster beds, under the supervision of the United States Public Health Service, cooperating with the Georgia State Game and Fish Department, a systematic collection of

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water samples was made from oyster areas along the Georgia coast. On the basis of the bacteriological analysis of these samples, Official Order No. 5, page 18, Georgia "Oyster Laws and Regulations", was promulgated on September 1st, 1930, which is quoted as follows:

"PURSUANT to the authority conferred upon the Board of Game and Fish by the Act of the General Assembly of August 8, 1934, it is, therefore ordered that the taking or removing of oysters from any of the beds or areas hereinafter described is prohibited until the further order of the Board of Game and Fish.

"AREA NO. 1. All areas in Georgia north of latitude 32 degrees, as shown on maps Nos. 440 and 1241 issued by the U. S. Coast and Geodetic Survey. This comprises all waters of Wilmington River, with its tributaries to a point approximately one-quarter of a mile south of where Turners Creek joins Wilmington River; Tybee River from a point slightly north of where Tybee River joins Oyster Creek; also Shad River; also Oyster Creek; Lazaretto Creek with its tributaries; also includes Turners Creek; Richardson Creek; Herb River and St. Augustine Creek with their tributaries.

"AREA NO. 2. This area cleared. (Altamaha River Estuary)

"AREA NO. 3. All oyster producing areas south of the Highway Bridge running between Brunswick and St. Simon Island on the Frederica and MacKays Rivers, thence following a northerly direction along the westerly shore of MacKays River to the cut-off between MacKays River and Back River;

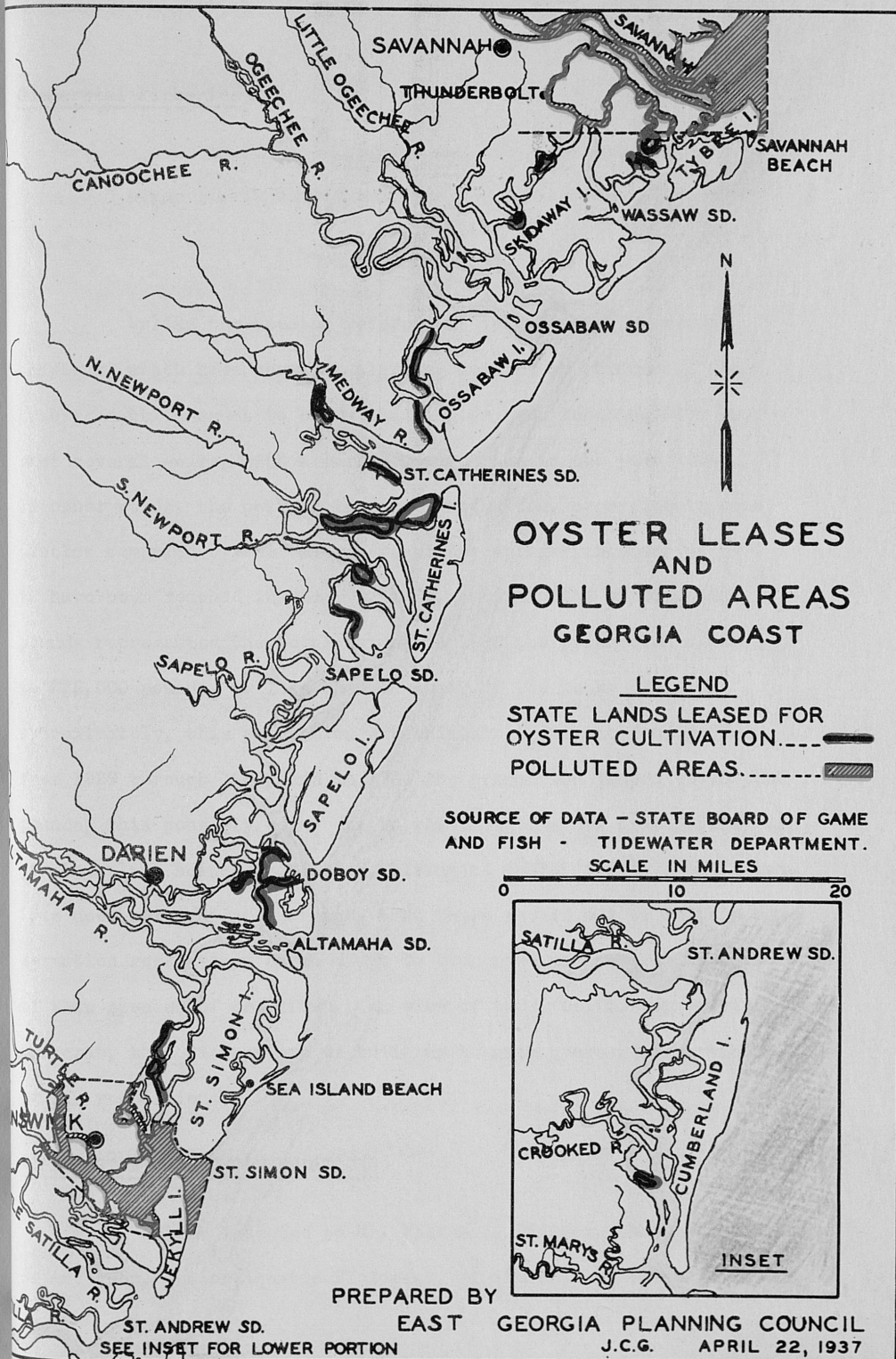
Commercial Fisheries

the Southerly boundary of this area being the Northerly shore of Jointer Creek; also this prohibits the taking of oysters for commercial purposes from Jekyll Creek between Jekyll Sound and the Brunswick River; from Jointer Creek to Brunswick River, from the Brunswick, the South Brunswick and the Turtle Rivers; from Plantation Creek, Club Creek, St. Simon Sound and MacKays, Frederica and Back Rivers to a point designated above as the northerly boundary line of this prohibited area."

The accompanying map shows the polluted areas and oyster beds leased from the State. It will be readily seen that there are large non-polluted areas available for oyster cultivation.

The polluted areas along the Georgia coast comprise only a small fraction of the total actual or potential oyster growing areas. The elimination of pollution in the condemned areas, arising from discharge of sewage from cities located on tributary rivers, would cost many millions of dollars. It is questionable, therefore, whether elimination of existing pollution would be economically justified by the degree of benefit resulting to fisheries, as well as to recreation. However, the problem does offer a long time potential threat, as the doubling or tripling of the existing pollution load might result in serious consequences.

We are indebted to Mr. John M. Henderson, Division Engineer of the Georgia State Board of Health, for valuable suggestions used in the foregoing treatise on pollution.



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CHAPTER IV

CRABS

Unlike the species referred to in the three preceding chapters, which have shown an alarming decline in abundance, the crab production seems to be maintaining an even tendency over the past several years, with a marked upward rise in the year 1934. In other words, the peak of the crab production, according to statistics compiled by the United States Bureau of Fisheries, seems to have been reached in the year 1928, when a total of 569,000 pounds represented the total catch; in 1929 the production dropped to 225,000 pounds, or less than one-half of the peak. However, approximately, this production was maintained for the four years from 1929 through 1932, and in 1934 the production jumped to 483,500 pounds, this possibly being due to the fact of a new crab picking and packing plant being established, giving an outlet for this shellfish. This does not indicate, though, that there should not be certain conservation regulations carried out to conserve and increase the abundance of this species of shellfish. In view of the prolific reproduction of the crab, this fishery can be built up to much greater proportions, with proper regulations.

LIFE HISTORY AND RECOMMENDATIONS

We are indebted to Mr. Milton J. Lindner, through Mr. William W. Anderson, Junior Aquatic Biologist, of the United States Bureau of

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Fisheries, for a brief resume of the life history of the blue crab, as contained in their letter to us dated February 2nd, 1937, which we quote as follows:

"In reply to your letter of January 26th concerning the life history of the blue crab, we are unable to give you precise information on the blue crab in this locality as no studies have been made on this animal in our area. However, the life history of the blue crab (*Callinectes sapidus*), which is the crab we have in Georgia, has been worked out for Chesapeake Bay and will probably hold true here in most respects, consequently for the present we can consider that the blue crab in Georgia behaves similarly to the blue crab in Chesapeake Bay.

"1. Mating takes place in inside waters.

"2 & 3. Mating begins the latter part of June or first of July and probably lasts until September.

"4. The sperm is carried by the female until the following spring when the eggs become ripe, are fertilized in the body of the female, and are extruded and attached to the underside of the abdomen, where they are retained until the young hatch from the egg. This last stage is known as the sponge or berried stage, and extends from early spring into summer.

"5. Hatching takes place in both inside and outside waters in Georgia.

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- "6. The eggs hatch in about fifteen days after they are extruded.
- "7. It takes a crab about one year to reach maturity after it is hatched.
- "8. Crabs are hatched one spring and summer and do not reach maturity until the following spring and summer.
- "9. In all cold blooded or poikelothermal animals (of which the blue crab is one), the temperature determines the rate of metabolism or rate of bodily activities. When the water is warmer the blue crabs move, grow, and eat faster than they do when the temperature is colder.

"The blue crab is one of those peculiar animals that is capable of retaining active sperm for a long period of time. Generally mating takes place in spring or early summer and the female retains the sperm for approximately nine months or more, before the eggs are fertilized and extruded. However, some individuals mate in early spring and lay eggs the same summer.

"The length of life of the blue crab is not definitely known although it is probably about three years.

"We believe that it would be a very good thing for the crab industry if the taking of sponge crabs was prohibited in Georgia waters."

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From the foregoing, it appears that a definite measure towards conservation of this species would be to prohibit by law the taking of sponge crabs - those with eggs extruded and attached to the underside of the abdomen.

Since the crab industry of Georgia is in the embryonic stage, it is advisable that a study be made of this fishery upon which conservation laws and regulations could be based.

C R A B S
1880 - 1934

YEAR	POUNDS	VALUE
1880	7,200	\$ 125
1887	44,360	730
1898	45,866	742
1889	43,267	935
1890	47,866	1,060
1897	74,660	1,864
1902	80,000	3,150
1908	196,000	7,500
1918	8,455	504
1923	120,000	7,000
1927	58,800	2,395
1928	569,341	19,413
1929	225,000	5,813
1930	(1) 228,000	4,560
1931	(2) 209,250	3,139
1932	(3) 225,492	3,383
1934	(3) 483,500	7,252

- (1) Statistics on hard crabs used in this figure are based on yields of 4 pounds per dozen. Figures for previous years are based on 4 pounds per dozen.
- (2) Statistics on hard crabs used in this figure are based on yields of 3 pounds per dozen.
- (3) Statistics on hard crabs used in this figure are based on yields of 6 pounds per dozen.

Source: United States Department of Commerce,
Bureau of Fisheries,
Administrative Reports and
Special Data.

C R A B
SOUTH ATLANTIC AND GULF STATES,
FOR 1934

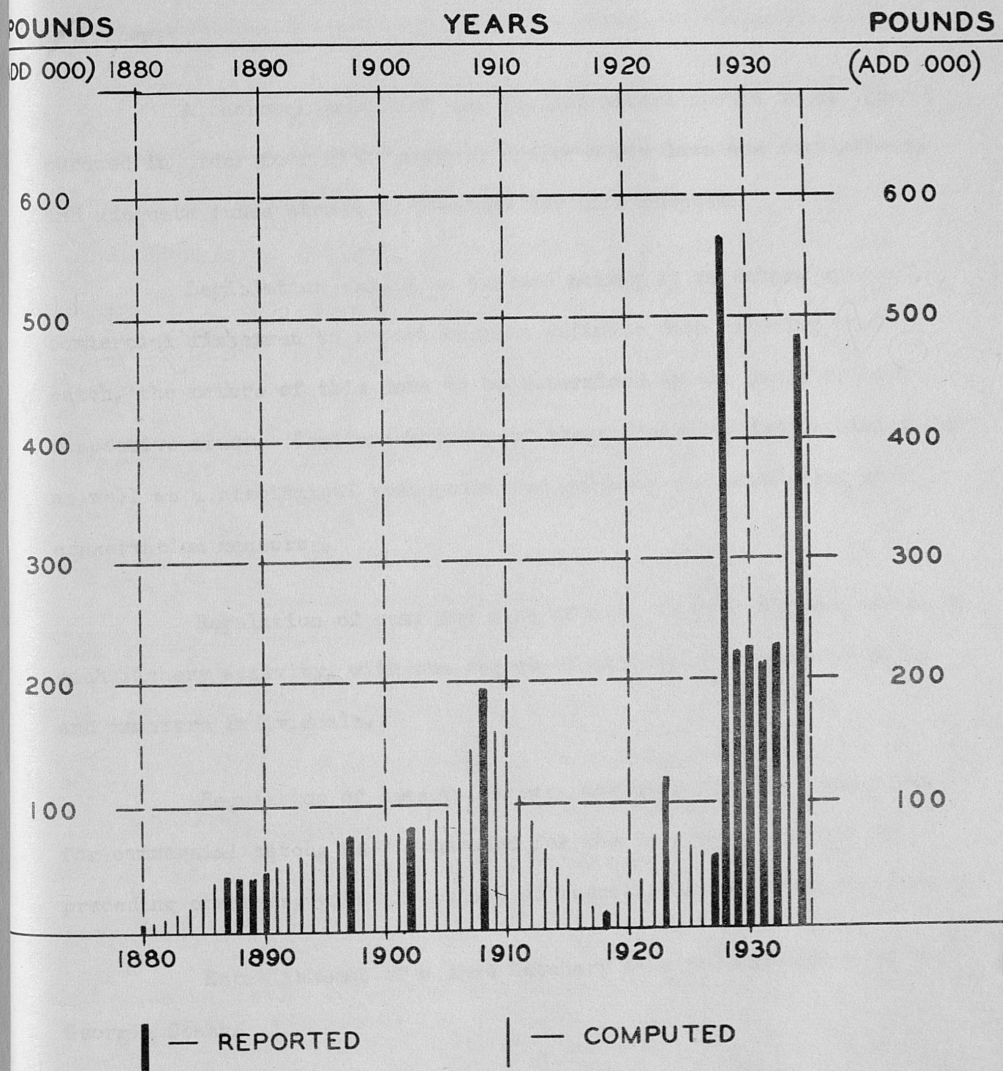
STATES	C A T C H		V A L U E	
	Pounds	Percent	Dollars	Percent
North Carolina	4,795,000	24.59	\$ 103,448	26.22
South Carolina	8,000	.04	160	.04
Georgia	483,500	2.48	7,252	1.82
Florida	763,400	3.87	9,811	2.48
Alabama	259,000	1.34	3,989	1.01
Mississippi	606,900	3.13	7,834	1.98
Louisiana	12,327,700	63.22	249,511	63.22
Texas	258,100	1.33	12,704	3.23
<u>TOTAL</u>	19,501,600	100.00	394,709	100.00

NOTE: Statistics on hard crabs used in this table are based on yields of 4 pounds per dozen in North Carolina and South Carolina; 6 pounds in Georgia; 6.28 pounds in Florida; 7 pounds in Alabama; 6.09 pounds in Mississippi; 5.43 pounds in Louisiana; and 5.5 pounds in Texas.

Source: United States Department of Commerce,
Bureau of Fisheries,
Administrative Report - 1935.

CRAB PRODUCTION

GEORGIA FISHERIES



SOURCE OF DATA :
U. S. BUREAU OF FISHERIES

PREPARED BY
EAST GEORGIA PLANNING COUNCIL
A. F. B. — APRIL 1937.

Commercial Fisheries

SUMMARY

The foregoing chapters embody several conclusions and recommendations, which the East Georgia Planning Council emphasizes as follows:

A thorough patrol of all fishing waters should be diligently pursued in order to rigidly enforce conservation laws and regulations, and adequate funds should be provided for this purpose.

Legislation should be enacted making it mandatory upon all commercial fishermen to report certain definite data covering their catch, the nature of this data to be determined by the needs of each respective study. Continuous study of these fisheries from a biological as well as a statistical standpoint for guidance in formulating wise conservation measures.

Regulation of gear and size of mesh to suit the exigencies of each fishery activity, with the object of minimizing wastage of young and immature individuals.

Regulation of seasons, areas, and closure of certain areas for commercial catch, as recommended for the respective species in preceding chapters, with the object of reducing the drain on the supply.

Establishment of a shad hatchery at a suitable place on the Georgia Coast.

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Establishment of a sturgeon hatchery to replenish this valuable fish in Georgia waters. The hatchery should be located on a river not generally inhabited by the destructive gar or other spawn-eating species.

A systematic replanting of oysters; restoration of depleted beds; establishment of new beds in suitable localities; development of oyster culture, and the closure of certain planted areas are absolute essentials to the perpetuation and conservation of this valuable fishery.

A study should be made of stream pollution with regard to sewage as well as industrial waste and other chemical pollution.

Establishment of a sewage hatchery to replace this
wastewater than in Georgia waters. The hatchery should be located
on a river and generally in a shallow water area.

This book may be kept


Other agencies are also interested in this

A systematic recording of species, location of habitat
habitat, establishment of new beds in suitable locations, development
of system output, and the degree to which the system is
adequate according to the population and composition of the
valuable fishery.

A study should be made of stream pollution with regard to
cause as well as industrial waste and other chemical pollutants.

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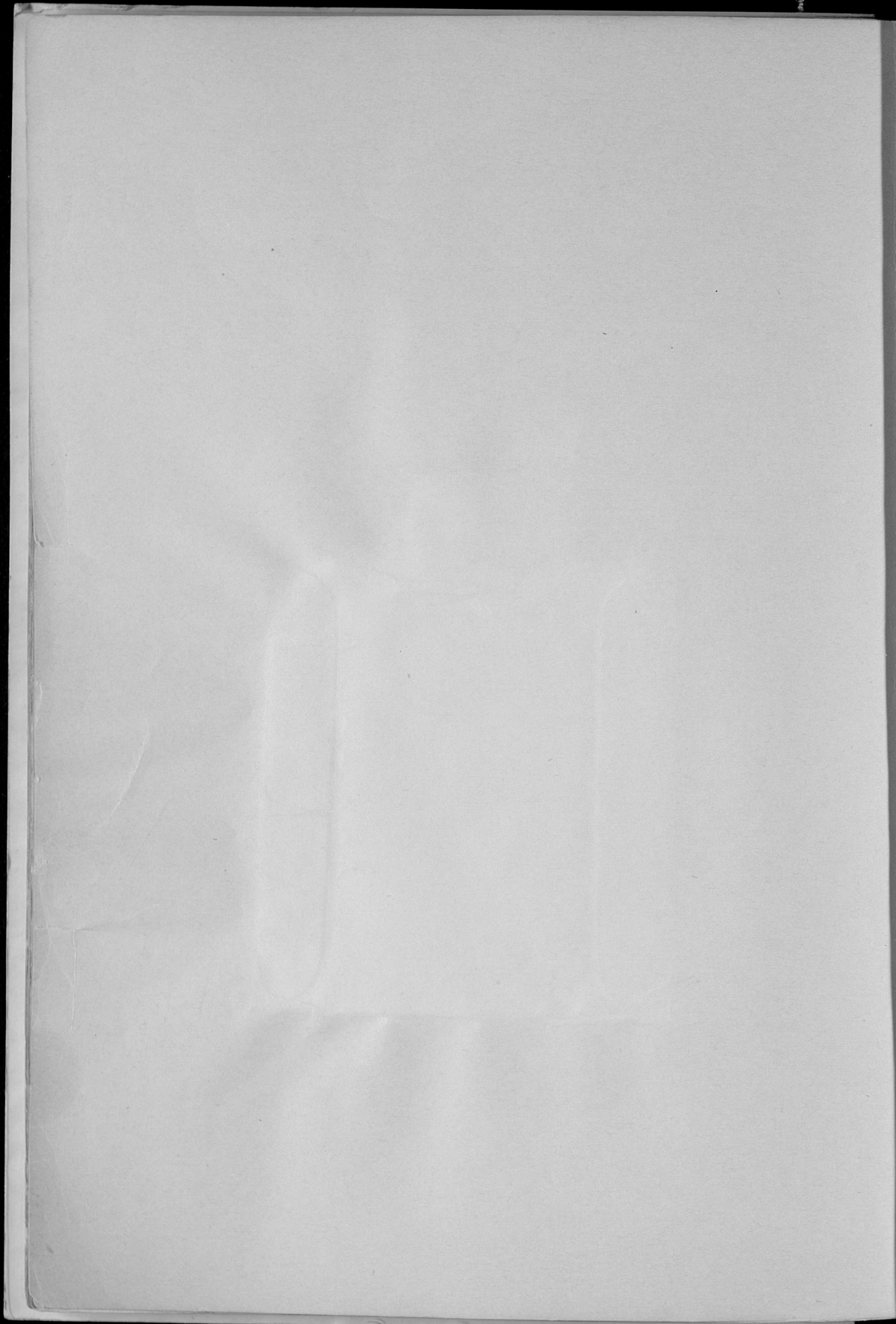
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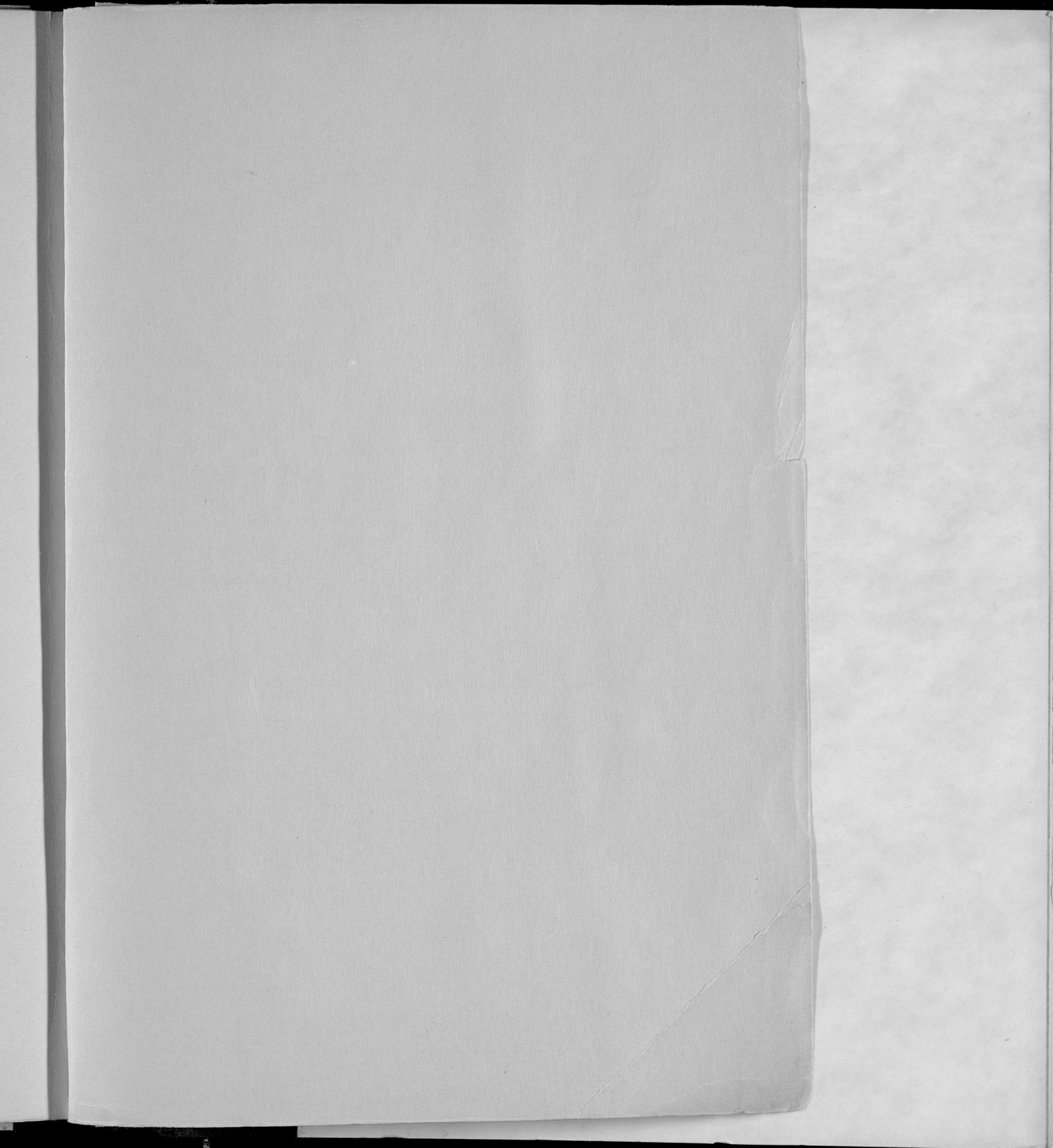
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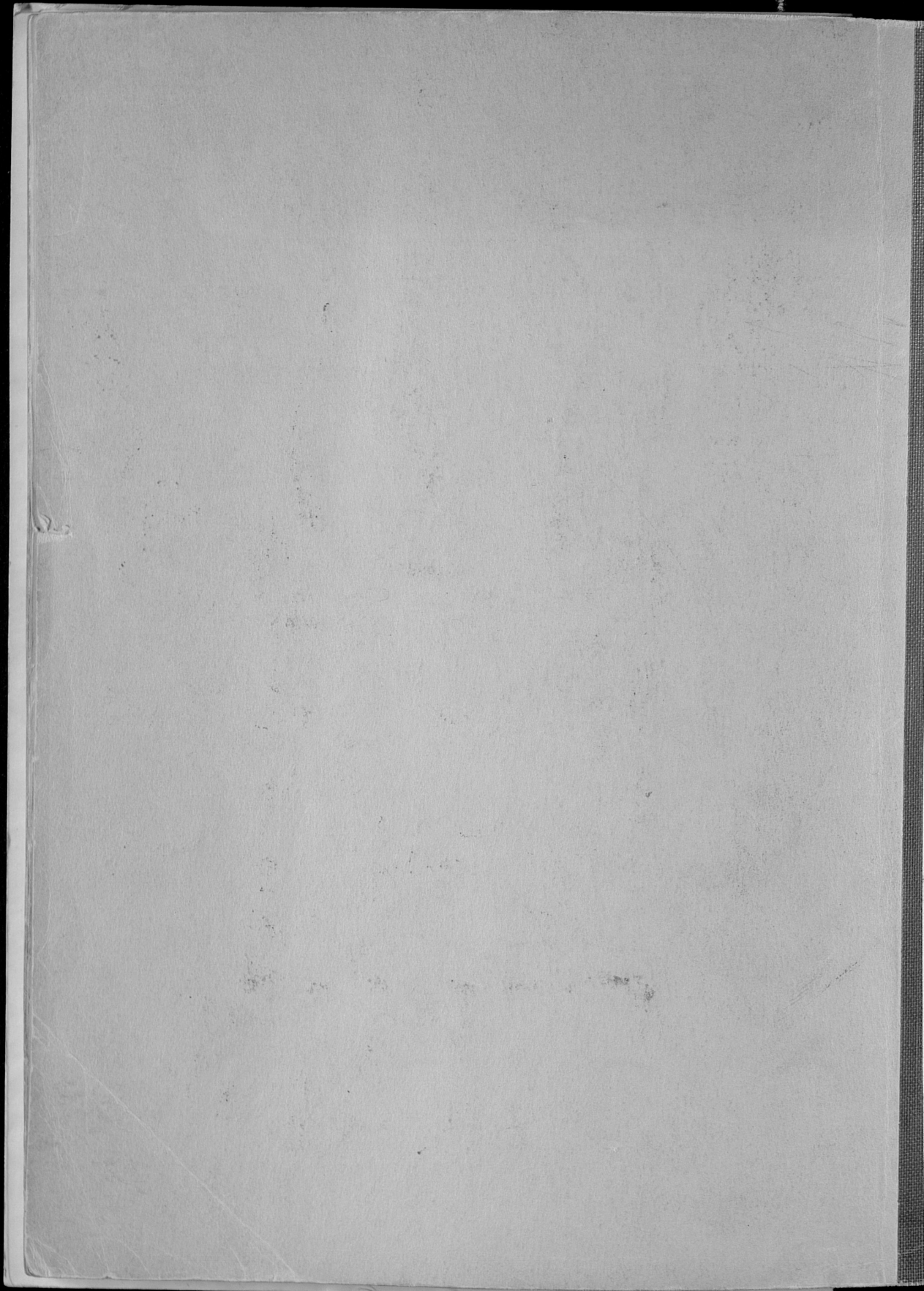
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