

## 2.--REPORT UPON THE DIVISION OF FISHERIES.

By J. W. COLLINS.

### ANALYSIS.

	Page.
A.—Introduction.....	337
B.—Organization of the Division of Fisheries.....	337
C.—Plans for conducting the work .....	340
D.—Consideration of the status of the work, personnel, etc., when the division was organized.....	341
1. The work, sources of information, etc.....	341
(a) Boston Fish Bureau .....	342
(b) American Fish Bureau .....	342
(c) Reports by S. J. Martin .....	342
(d) Correspondence .....	342
(e) Newspaper clippings .....	342
(f) Special investigations.....	342
2. Personnel and duties .....	343
E.—Routine work .....	343
3. Work relating to statistical circulars .....	344
4. Miscellaneous correspondence.....	344
5. Preparing card catalogue.....	344
6. Classification of newspaper items.....	344
7. Increase of routine work, etc .....	344
F.—Status of uncompleted reports .....	344
8. General considerations .....	345
9. Fisheries of the Great Lakes.....	345
10. The sardine industry.....	346
11. Notes on certain fishery industries of Eastport, Maine, in 1886.....	346
12. Spring mackerel fishery in 1886.....	346
13. The menhaden fishery .....	347
14. Statistics collected by means of the Treasury circulars.....	349
G.—Miscellaneous reports .....	349
15. List of statistical statements, descriptive notes, etc., furnished to Congress and the Executive Departments: (a) to (v) .....	349
16. Report on <i>Mya arenaria</i> .....	350
17. Report on improvements in dories .....	350
18. Maps showing the distribution of certain bait and food species: (a) to (d).....	350
19. Notes on the use of squid for food.....	351
H.—Notice of field work; proposed investigations, etc.....	351
20. Field work.....	352
21. Bait investigation .....	352
22. Inquiry into shad fishery .....	352
23. Proposed investigation of the fisheries of the Pacific coast.....	352

	Page.
II.—Notice of field work, etc.—Continued.	
24. Instructions for fishery expert on the <i>Albatross</i> .....	353
25. New forms of statistical blanks.....	353
I.—Notice of special matters affecting the fisheries.....	353
26. Use of antiseptic preservatives .....	354
27. The Roosen process.....	355
28. The Pursell process.....	356
29. Experiment with bait .....	356
30. Investigations relating to the mackerel .....	357
31. The importation of salted bonito as mackerel .....	358
J.—Participation in the Centennial Exposition of the Ohio Valley and Central States.....	360
32. Detail of persons.....	361
33. Arrangement for statistical work .....	361
K.— <i>Grampus</i> .....	362

## A.—INTRODUCTION.

The Division of Fisheries was established at a date so near the close of the fiscal year that little time remained to organize the work, and get it into successful operation, during the period covered by this report. For this reason, comparatively little can be said here concerning what has been accomplished by this branch of the Fish Commission. In the following pages, however, such facts as relate to the organization of the division, and the events that led up to it, have been recorded. Mention has also been made of the work subsequently performed, and the plans for future effort.

In the months preceding the establishment of the Division of Fisheries much work was accomplished and many interesting events transpired which are intimately associated with this division, and may, therefore, be appropriately referred to in this report. Indeed, it is believed that a review of these matters is necessary to insure a clear and comprehensive understanding of the conditions under which the division entered upon its duties, and also to convey an idea of the scope of its efforts in the interest of the commercial fisheries.

It has been the desire of the writer to mention all matters of moment, and to do full justice to all who have been prominently identified therewith. It is possible that he has not fully succeeded, for he was absent from Washington a considerable portion of the year—a year remarkable for occurrences of exceptional importance to the Fish Commission, resulting from the death of Professor Baird, which in a large measure had a tendency to overshadow all minor matters.

The particular work that is considered to be the function of the Division of Fisheries, which has heretofore been carried on by the Commission without special appropriation, and under conditions that hampered its full development, has now been specifically authorized by Congress, and the money appropriated is available for the next fiscal year. It is confidently anticipated that the importance of this inquiry will be recognized in the future, and that the means will not be wanting to prosecute it actively, so that it may become an important agency in developing and improving the fisheries of this country.

## B.—ORGANIZATION OF THE DIVISION OF FISHERIES.

The Division of Fisheries was instituted by the Commissioner, Hon. Marshall McDonald, on May 24, 1888, on which date he announced its establishment, and appointed an assistant to assume charge of the division and the direction of its work.

The organization of a division of the Fish Commission to which may be referred all matters specially pertaining to commercial fishing, including statistics, has been a matter which for some years has received the serious consideration of those who have been prominently identified with the work of the Commission. As early as 1885 a committee, acting under authority of Professor Baird, submitted a scheme of organization of the Commission, which contemplated among other things a division which would be charged with duties and responsibilities similar to those now devolving upon the Division of Fisheries. It was not, however, deemed advisable at that time to accept the plan submitted, though it is only just to say that it met the approval of the Commissioner, and it has served as a basis for the organization of the work that has since been adopted.

The non-adoption of the organization recommended at that time was largely due to the fact that Professor Baird's administration was essentially paternal. During the formative period of the Fish Commission he watched over its work with true parental solicitude. Having thought out the problems he desired to solve, arranged in his own mind the line of investigation to be followed by individuals, and considered the means at his command, present and prospective, he naturally hesitated to relinquish personal control of affairs, and preferred instead to endure the cares and responsibilities which, with the rapid development of the work, weighed heavily upon him in the last years of his life.

It is, however, proper to state that he was in a large measure relieved in the study of the methods and relations of the fisheries, as well as the collection of statistics, by the work performed by Professor Goode and his associates in 1880, and subsequently, in coöperation with the Census Office. This work covered a very wide scope of investigation of this nature, and rendered it unnecessary while it was in progress for the Fish Commission to attempt any similar undertaking on a large scale, though it is true that certain additional investigations were made and a number of interesting independent papers were prepared and published bearing upon the methods and relations, as well as the current status and development of the fisheries.

In 1885, however, when the termination of the Washington treaty and the anticipation of negotiations for a new treaty rendered it necessary to have information concerning the current condition of the fisheries, Professor Baird made an effort to acquire statistics of the vessel fisheries and to obtain certain other data which he deemed were necessary for the information of the Government. The inquiry contemplated then was largely of a statistical nature, and the means were not available for prosecuting the work upon a basis sufficiently large to meet all requirements. But with the assistance expected from the Treasury Department by an arrangement which was made to furnish, through the Customs Division, statistical returns of the vessel fisheries, it was anticipated that much could be accomplished in the direction of obtain-

ing the desired information. A small corps of clerks was detailed to attend to this work, and others were temporarily assigned to field duty, but no special or official organization was established.

In the *Provisional Regulations* issued by Professor Goode during his short term as Commissioner, a "Division of Statistical Inquiry" was designated. The special work and purposes of this division were not defined, and it is not known to the writer whether it was contemplated that this inquiry should take a broader scope than merely the collection of statistical data (as implied by the title), particularly as there was not sufficient time during his administration in which to formulate or definitely establish the line of investigation which was to be prosecuted by that division.

There are many potent reasons why the collection of statistics should be closely associated with the study of the methods and relations of the commercial fisheries. The two are naturally inseparably connected, and, in order that the statistics may be fully understood, and that proper explanations may be made, it is necessary for the Commission to be in possession of full information as to the manner in which the fisheries are prosecuted and the influences which may affect them for good or evil. Besides, without a full knowledge of all matters affecting the fisheries, including statistics, it would be impracticable for the Commission to successfully continue one of its most important functions—one which has heretofore proved of inestimable advantage to these industries—that of suggesting important changes in apparatus, methods, etc., which may prove beneficial to those engaged in fishing enterprises.

Many more equally potent reasons might be urged to show the wisdom of organizing the division upon its present basis. In a subsequent report (made after the work has been well crystallized), I hope to deal with this subject at greater length; here it is seemingly only necessary to allude to the growing importance of the commercial fisheries from an international as well as a national standpoint, and to call attention to the necessity that exists on that account for the Government to constantly have accessible not only detailed statistics, but a mass of information such as may be required at any time to properly demonstrate the conditions that influence the development or well-being of these industries, and which may be essential to a full understanding of statistical statements that otherwise might not easily be comprehended.

The inquiry concerning statistics of the fisheries, etc., that was inaugurated by the Commissioner in 1885 and prosecuted in subsequent years during the lifetime of Professor Baird, was under the immediate charge of Mr. R. Edward Earll. This gentleman was also in charge of the Division of Statistical Inquiry during the administration of Professor Goode as Commissioner, and he retained that position under Colonel McDonald until May 13, 1888, when he resigned.

At that date I was on duty at Gloucester, Massachusetts, and was

making the necessary preparation for an extended trip of reconnaissance of the fisheries of the Pacific coast. Soon after, the Commissioner ordered me to report in Washington, which I did, and my appointment in charge of the Division of Fisheries took place, as has been stated. In the mean time, however, pending my arrival at Washington and subsequent employment, Mr. Hugh M. Smith was assigned (immediately after Mr. Earll's resignation) to the charge of the office of statistics, as acting assistant.

The courtesies which are usually extended in cases of resignation rendered it nominally impracticable for me to take control of the statistical work until near the close of the fiscal year, though, in compliance with the Commissioner's request, I assumed that responsibility at a slightly earlier date.

### C.—PLANS FOR CONDUCTING THE WORK.

Having been placed in control of the division almost at the end of the fiscal year, and being charged with important duties other than those strictly pertaining to its operations (of which mention is made elsewhere), it is but just to say that there has been scant time to formulate definite plans of work and to effect a proper organization for its conduct before the expiration of the time covered by this report. The difficulty was augmented by the assignment of a considerable portion of the clerical force of the division to other duties.

In view of these facts, and because it has been settled that my duties will compel me to be absent from Washington for several months, a tentative plan of work has been decided upon which seems feasible and adapted to the circumstances in which the division is now placed. This provisional scheme contemplates an inquiry into the methods and relations of the fisheries, and the collection of fishery statistics, by sending experts into the field to supplement the information obtained through other methods that were in operation when the division was organized. Besides this, it has been determined to make special effort to compile reports from material gathered by previous inquiries, and which for various reasons has remained unutilized. In subsequent paragraphs more extended mention is made of these proposed compilations, as well as of other matters directly concerned with the work of the division and its relation to the past.

In contemplating a permanent organization of the work of the division, and the adoption of the best methods for collecting information, I am now strongly in favor of the establishment of a corps of trained field experts, who may be sent to different sections of the country to make a personal canvass of the fisheries. Experience has demonstrated that it is impracticable by other means to secure sufficient knowledge of the many peculiar conditions affecting the fisheries, and the manner of their prosecution, to render it possible to intelligently compile the data ob-

tained and to make such explanations as will lead to a clear understanding by the public of otherwise complex and intricate problems.

It is probable that, when the field force has been well organized, we shall be able to discontinue the collection of statistics through the Treasury Department, and thereby relieve it of an onerous duty it has so generously undertaken and so zealously prosecuted. Unless Congress should authorize the continuance of this work, it seems that the Commission can scarcely continue to request it of the Treasury Department when the organization of the force of this division renders it practicable to secure the desired information through inquiries made by field agents. I am, nevertheless, not unmindful of the fact that many data are secured on Treasury circulars that it may be difficult to obtain by other means, chiefly through the inability of field experts to personally interview those who can supply the knowledge sought for.

For many reasons, it seems eminently desirable that local agencies should be established in the most important fishery sections, and it is hoped that Congress may recognize the importance of this, as bearing upon the welfare and development of the fishing interests of this country.

#### D.—CONSIDERATION OF THE STATUS OF THE WORK, PERSONNEL, ETC., WHEN THE DIVISION WAS ORGANIZED.

1. *The work, sources of information, etc.*—As has been intimated, the work of the newly organized division naturally includes that which came under the jurisdiction of the Division of Statistical Inquiry, as established by the *Provisional Regulations* of Professor Goode. It, therefore, seems necessary to briefly review the work that had previously been done, and to define its status at the time I assumed control of it, in order that the conditions under which the Division of Fisheries began operations may be clearly understood.

Although, under the direction of Professor Baird, the collection of fishery statistics and the study of certain phases of the fisheries had been carried on by the Commission from early in 1885, no specific appropriation was made by Congress for this work; the Commissioner, acting under authority conferred by Congress, assigned at his discretion such funds as he could devote to it, the amount depending largely upon the character and extent of the inquiries undertaken. The first specific appropriation made by Congress for the collection of fishery statistics by the Commission was passed during the first session of the Fiftieth Congress, and is available for the next fiscal year.

Early in 1885 an arrangement was made by Professor Baird with the Treasury Department for the collection (through the Customs Division) of statistics of certain vessel fisheries, and this work was organized by the preparation and distribution to customs officials of the necessary

blanks. In addition to this the sources from which the Commission derived information at first are as follows :

(a) From daily trade reports of the Boston Fish Bureau, which contained information concerning arrivals of fishing vessels at Boston and generally a statement of the amount of fish landed by them.

(b) Information of a similar character concerning vessels arriving and landing fish at Gloucester, Massachusetts, was obtained from daily reports received from the American Fish Bureau at that port.\*

(c) Weekly and monthly reports were forwarded by Capt. S. J. Martin, the agent of the Fish Commission at Gloucester, Massachusetts. These showed the daily arrivals of vessels, the amount of fish landed by each, the locality where the fish were taken, and many other interesting data, including the quantities of fish landed by boats fishing from Gloucester harbor.

(d) Considerable information was received through correspondence with the fishermen and fish dealers.

The data thus obtained were available for utilization in the preparation of tables at short notice showing certain phases of the vessel food fisheries, etc. Information secured in this manner did not, however, embrace within its scope the shore fisheries or those prosecuted by vessels for the capture of whales, seals, and walrus.

(e) *Newspaper clippings*.—In the consideration of the sources of information mention may properly be made of the many newspaper clippings that were received from different sources containing information relating to the fisheries, fish culture, etc., constituting, when properly classified, a valuable collection for reference.

(f) *Special investigations, etc.*—During the summer and fall of 1885 a comprehensive investigation was made of the fisheries of the Great Lakes. The following summer inquiries were made into the condition of the sardine industry of Maine, and certain other fisheries at Eastport, while a study of the spring mackerel fishery was also undertaken, and certain phases of the menhaden industry were investigated. With the exception of a brief inquiry in 1887 into the use of salt clams for bait, their production and exportation to Canada, no other field work was attempted after 1886 until the organization of the Division of Fisheries, the small force being engaged chiefly in routine work in the office; in compiling statistical data for the information of Congress and for the use of the international commission that met in Washington during the winter of 1887-'88 for the purpose of negotiating a new fisheries treaty.

At the time of my appointment in charge of the Division of Fisheries I found that, for various reasons, which are more specifically mentioned elsewhere, little or nothing had been done in elaborating certain data collected in the field investigations. One of my first duties, therefore,

---

\* This bureau was discontinued in the fall of 1887; consequently no reports were received from this source after that time.



has been to make the necessary arrangements for the utilization of these data and for the preparation of reports for publication, and though only about a month has elapsed since the establishment of the division, such gratifying progress has been made that some of the smaller papers are nearly completed and will soon be ready for publication, while the larger work on the Lake Fisheries is well under way.

2. *Personnel and duties.*—At the date of the organization of the Division of Fisheries the following persons were employed in the office of statistics, or were otherwise connected with its work, their duties being as specified :

Hugh M. Smith: Had general direction of the work; attended to all the correspondence, and was also engaged in the preparation of special reports.

W. A. Wilcox: Engaged in compiling statistics of vessel fisheries from Treasury circulars.

M. M. Snell: In charge of card catalogue and fish bureau reports; assisting in the preparation of special reports.

W. H. Abbott: Employed in miscellaneous compiling, assorting circulars and newspaper clippings; registering circulars, etc.

H. R. Center: Engaged in compiling statistics from Treasury circulars, for States not covered by the compilations of Mr. Wilcox.

S. J. Martin: Employed at Gloucester, Massachusetts, as a local statistical agent, his duty being to make weekly and monthly reports of all vessels arriving and landing fish at that port, the receipts of all fish caught in small boats, and other general information bearing upon the fisheries of that place.

Besides those mentioned above as being specially connected with the work of the office of statistics, Mr. Charles B. Hudson, artist, and Mr. E. C. Bryan, stenographic clerk, were permanently assigned to the division by the Commissioner. At that time Mr. Luther Maddocks was in the field engaged, under the direction of the Commissioner, in collecting statistics of the shad fishery from Florida to the Chesapeake. A little later he was assigned to the Division of Fisheries (while the results of his work were also placed under its control), and he may, therefore, properly be included in the personnel of the division when it was organized.

#### E.—ROUTINE WORK.

There is a large amount of work in connection with the compilation of statistics, etc., which may properly be characterized as routine. Under this head may be placed the following:

3. *Work relating to statistical circulars.*—This consists (a) in acknowledging to collectors of customs the receipt of circulars containing statistics of the fisheries; (b) registering the same; (c) examining circulars and making comparisons for detection of errors; (d) correcting errors (this sometimes involves considerable correspondence), and (e)

making compilations. During the fiscal year the official correspondence, of the office aggregated 653 letters, covering 848 pages. Of this 440 letters, covering 530 pages, were written to collectors of customs and other officials of the Treasury Department relating to statistics reported on Treasury circulars.

4. *Miscellaneous correspondence.*—There has been a considerable amount of miscellaneous correspondence relating to the business of the office. This has been chiefly with the Executive Departments, the committees of Congress, and the International Fisheries Commission, and has related principally to matters connected with the fishery relations between the United States and Canada. As will be seen from the foregoing paragraph, 213 letters of this character were written during the year.

5. *Preparing a card catalogue.*—A card catalogue is kept of fishing vessels sailing from the United States upon which is recorded all information of the fishing fleet that is obtained from the bureau reports, letters and records of Fish Commission agents, newspapers, etc. This is alphabetically arranged, according to names, and contains, in addition to names, rig, tonnage, and hailing port, all information obtained regarding each vessel that relates to her movements, etc., including fares of fish landed, where landed, date, etc. Thus a life history of each vessel is recorded, and it is thereby feasible to trace its work and movements, so far as information concerning it has been received.

6. *Classification of newspaper items.*—Items relating to the fisheries which have been clipped from newspapers are received from various sources, but chiefly from established agencies. These are pasted on paper and filed. A rough classification has been attempted, but the system now in vogue is inadequate to the needs of the office, and can be materially improved. I have made an extensive private collection of material of this character, much of which has been systematically classified. This has been placed at the service of the division.

7. *Increase of routine work, etc.*—In considering the routine work of the office it is proper to state that it has increased to such an extent that the force which could be assigned to it without any special provision by Congress has been found inadequate, and it has been necessary to make extra exertion to keep current work from getting behindhand. This inadequacy was greatly increased in the latter part of the year by the assignment of myself and several clerks to duty in connection with the preparation of the Fish Commission exhibit for the Cincinnati Exposition.

#### F.—STATUS OF UNCOMPLETED REPORTS.

8. *General considerations.*—Allusion has already been made to the fact that, at the date of the organization of this division, reports concerning certain important investigations of special fisheries were either incomplete or had not been begun. The paramount importance of preparing these reports for publication as soon as practicable is so evident

that I believe no doubt can exist concerning it. In the following paragraphs more detailed statements are given, under appropriate headings, of the status of this part of the work. A consideration of these will convey a knowledge of present conditions and will also show that the effort to prepare these reports or complete those already begun must necessarily restrict the activity of the division in other directions during the next year at least. The matters which seem to deserve special mention are as follows:

9. *Fisheries of the Great Lakes.*—The inquiry concerning the fisheries of the Great Lakes, which was instituted by Professor Baird in 1885, had for its object the obtainment of as full and definite information of those industries as it was practicable to secure. The supposed expansion in products, value, etc., of the lake fisheries, the intimate relations existing between Canadian fishery enterprises and American markets, and the influence of artificial propagation by the national and State Fish Commissions upon the most important lake fisheries were the principal reasons for making the investigation. It should be borne in mind, however, that the fishery clauses of the Washington treaty had just expired, and it was believed that a consideration of the fishery relations between this country and Canada might be somewhat influenced by a full knowledge of existing conditions in the lake region.

The prosecution of this inquiry was delegated to Mr. Earll, who was assisted by six gentlemen, all employes of the Commission. To facilitate the inquiry, the region was divided into sections, and each assistant was given a certain area to canvass. Work was begun in August, 1885, and continued through the months of September, October, and November.

Notwithstanding the fact that the investigation was practically completed that year, the elaboration of the field notes and the compilation of the review has been delayed, and to the present time little has been done. There have been, of course, many causes for delay which were obviously imperative. Chief among these were the press of other matters connected with the routine work of the office; the absence in the field or assignment to other duty of those intrusted with the preparation of such reviews, thus practically leaving no one available for undertaking the responsible duty of elaborating field notes and compiling reports. Preliminary work on a review of the lake fisheries has been begun, under my instructions, and as soon as practicable it will be made ready for printing; it ought to be completed during the coming year.

10. *The sardine industry.*—The report upon the status of this industry in 1886 has been vigorously pushed forward of late; it is now well advanced and will soon be ready for printing. The report includes much interesting information, among which may be especially mentioned complete statistics; a discussion of changes that have occurred in recent years in the methods of capture of fish and their preparation for market;

the influence upon the industry of the abrogation of the fishery clauses of the Washington treaty; the probable effect of the proposed import duties on Canadian fish, especially in regard to the obtainment of raw material, the cost of canned goods, and the importation of European products.

11.—*Notes on certain fishery industries of Eastport, Maine, in 1886.*—These notes contain the latest information concerning (a) the winter herring fishery and the frozen herring trade in the vicinity of Eastport; (b) the trade in pickled herring; (c) the preparation of bloater herring; and (d) the smoking of “finnan haddies.” They are now well under way and it is expected they will soon be sent to the printer.

12.—*Spring mackerel fishery in 1886.*—One of the special inquiries prosecuted in 1886 had for its object a comprehensive study of the spring mackerel fishery. The principal points upon which information was sought were (a) statistics, whereby the relative quantities of mackerel taken in the spring fishery, and on other grounds later in the season of 1886, could be shown; (b) the effect of the spring fishery upon the price of mackerel caught and salted later in the season, and (c) whether the capture of large quantities of this species in the spring has a tendency to seriously affect its abundance.

The data obtained were valuable and timely. Much information has been supplied to Congress and it has been utilized in connection with the consideration of the probable effect of legislation prohibiting the importation or landing of mackerel caught before the first of June.

This inquiry, like some others relating to different branches of the fisheries, was conducted by Mr. Earll, who, up to the time that he severed his connection with the Commission, was unable to put the notes into shape for publication. Considering the great amount of work of this nature which is pressing for consideration, together with the urgent necessity for prosecuting field investigations, it seems scarcely feasible to do more than to arrange for the early publication of the statistics relating to the spring mackerel fishery, the methods of which have received full consideration in previous reports of the Commission.\*

13. *The menhaden fishery.*—During the summer of 1886 Messrs. R. E. Earll, Hugh M. Smith, and M. M. Snell made an investigation of the menhaden fishery. Much information was obtained concerning the extent of the fishery, location of fishing grounds, factory plants, and the effects of the methods of capture now employed in the menhaden fishery. Many of these data have been compiled and tabulated for the use of Congress, which has had under consideration measures for the restriction of the capture of this species. A considerable amount of new and important information was obtained, but it has not yet been practicable to elaborate the descriptive notes.

---

\*See “Materials for a History of the Mackerel Fishery.” Report of the U. S. Fish Commission, 1881, pp. 89-531; also report upon the mackerel fishery, Volume I, Section V, Fisheries and Fishery Industries of the United States, 4to, pp. 247-313.

It may properly be mentioned here that several members of the Fish Commission were called upon to testify before the fishery committees of Congress during the present session (first session of the Fiftieth Congress) regarding the effect upon the abundance of menhaden of the present methods of fishing; and also to inform the committees whether the supposed unwarranted destruction of the species by purse-seines had exerted any important influence upon certain food fishes that are popularly supposed to feed chiefly upon menhaden. In recent years the tendency, on the part of many, has been to ascribe any scarcity of bluefish, weakfish, striped bass, and other valued food species to the influence exerted by the menhaden fishermen. It has been thought by some that the capture of large quantities of menhaden drove that species from the New England coast north of Cape Cod, and caused a general decrease in its abundance; also that there was danger of its practical extermination, and a consequent scarcity in our waters of those species which prey upon it.

The testimony furnished by the Commission, which was the result of careful scientific study, showed that many of these popular beliefs were unfounded, and the prediction was ventured that menhaden might at any time reappear in the waters north of Cape Cod in as great abundance as they were formerly found in that region. It is certainly a remarkable verification of that prediction that, after having been absent from the Gulf of Maine for 10 years, the menhaden has this summer returned to its former haunts along the coasts of Maine and Massachusetts where it is now reported as being enormously abundant.

14. *Statistics collected by means of the Treasury circular.*—In preceding chapters attention has been called to the method of collecting statistics of certain vessel fisheries through the coöperation of the Treasury Department. This system of obtaining such data is a new feature in the work of the Fish Commission and justly deserves consideration in this report.

In compliance with the request of the Commissioner, the Secretary of the Treasury issued, on December 16, 1885, a circular (No. 177, Bureau of Navigation) embodying certain questions, answers to which were required from owners, masters, or agents of fishing vessels whenever they made application at the customs houses for a renewal of a vessel's papers, or when such were surrendered. It was expected that in this manner very accurate detailed statistics could be obtained with comparatively little trouble and practically without expenditure.

Many difficulties were met with at the start, however, that were not anticipated, and it took considerable time and much patient labor and perseverance to bring the system into working order. At first it was not infrequently the case that the circular would not be properly filled out, and in some cases no attention would be given to it. This, perhaps, might have been expected to some extent, at least, where officials were inexperienced in this kind of work. Such delinquencies were

noted, however, and on several occasions the attention of the Secretary of the Treasury has been called to the matter, and he has been furnished with a list of those who have failed to comply with instructions—a course which has generally proved very efficacious in securing the necessary action. As a result, this method is much improved at present; it may, perhaps, fairly be claimed that it is on a practical working basis, though much yet remains to be done to reach the maximum of desired accomplishment in this direction.

In some cases objection has been made to answering certain necessary questions contained in the circular. For that reason steps were taken to secure the enactment of a law making it illegal to refuse such information as may be asked for by the Government. A bill of this character passed the Senate, but failed in the House of Representatives only because there was no opportunity for its consideration before the close of the session. No steps have since been taken to secure its passage, though it is obvious that a measure of this kind would aid materially in the work, and would make its expansion practicable without additional cost to the Government. If this system of collecting fishery statistics is to be continued (a matter concerning which there might be a difference of opinion as to its wisdom or expediency) it ought unquestionably to be legalized by Congress, since otherwise the Secretary of the Treasury may at any time decide to discontinue a work that is not authorized by law.

The extent of this work is much beyond what might be expected by those unfamiliar with it. To fully understand and appreciate this, it is seemingly only necessary to state that in the calendar year of 1886 there were received in the office 3,445 circulars; in 1887 the number had increased to 5,636, and the present outlook indicates the receipt of a still larger quantity this year.

The information thus obtained is carefully considered, compared with other data to verify its accuracy, and then tabulated. In cases where there is reason to doubt the accuracy of the returns on the face of the circular, communication is had with the collector of the port whence the information came in order to verify or correct the statements.

In a number of instances the information on these circulars has been tabulated for the use of Congress and the Executive Departments. These statistical statements have generally had special reference to the fishery relations between the United States and Canada, and have usually been compiled with the object of showing certain phases of the fisheries of New England and the Middle Atlantic States.

The tables prepared to date may appropriately be classed with uncompleted reports. It is proposed to expand them so as to bring the subjects they deal with up to date, so far as that is practicable. Some new features will be added, including explanatory notes, and it is hoped they will soon be ready for publication. It may also be added that many of the same data will be used, in conjunction with other informa-

tion; for compiling complete returns of the vessel fisheries of the country. In the next chapter is given a list of the statements or statistical compilations, papers, maps, etc., that have been furnished to the different branches of the Government during the year, and, considering the small force available for the work, it is believed the showing will be adjudged very creditable.

#### G.—MISCELLANEOUS REPORTS.

During the year a variety of reports, statistical and descriptive, have been prepared, chiefly for the executive and legislative branches of the Government. This matter has been incidentally referred to in preceding chapters; here it is proposed to present it more in detail, in order that the amount of work of this character performed by the Commission may be more fully understood.

15. *List of statistical statements, descriptive notes, etc., furnished to Congress and the Executive Departments.*—The following is a list of the most important statistical tables, descriptive notes or reports, etc., which have been furnished to Congress and the Executive Departments during the year:

(a) Number of American fishing vessels entering British North American ports, including those of Newfoundland, in 1885, and the amount of money expended by them in said ports for bait, ice, supplies, etc.

(b) The halibut fleet of the United States in 1880, classified according to the fishing grounds.

(c) The mackerel fleet of the United States in 1880, classified according to fishing grounds.

(d) The codfish fleet of the United States for 1880, classified according to fishing grounds.

(e) Total number of men employed on New England fishing vessels in 1886, and the nationality of same.

(f) Quantity of fresh and salt mackerel landed by the New England fleet in 1886, and the localities in which the fish were taken.

(g) Names, tonnage, and hailing ports of all American vessels entering the Gulf of St. Lawrence in 1887, with a summary of mackerel caught by them in said waters.

(h) Quantity of salt mackerel packed in Portland during 1887, with percentage caught in the Gulf of St. Lawrence.

(i) Thirty-six original statements of owners and masters of vessels whose fishing operations in 1886 were interfered with by the action of the Canadian government. This was additional to the list transmitted to Congress by the Secretary of State on February 5, 1887.

(j) Statement of the amount of salt clam bait shipped from the United States to the British Provinces in 1886 and 1887.

(k) Table showing the number of New England vessels engaged in the cod fisheries that frequented grounds east of longitude 65° W., during the year 1886; together with the locality where fishing and the kind of apparatus used.

(l) Table showing the average catch per man and per vessel for 5 years, 1879, 1884, 1885, 1886, and 1887, of Gloucester vessels employed in the off-shore cod and in the fresh halibut fisheries.

(m) Table showing in detail, by States, the relative importance of the menhaden fisheries during the years 1880 and 1886, respectively.

(n) Table showing the dates of first appearance of mackerel along the different portions of the coast in 1887, as indicated by their capture in pounds and weirs located between Virginia and Nova Scotia. Also date of first importation of mackerel in 1887, and date of entrance of fish into Gulf of St. Lawrence.

(o) Table showing by customs districts the number and nationality of men employed in the vessel fisheries of Massachusetts in 1886.

(p) Statistical summary of the American mackerel fishery in the Gulf of St. Lawrence in the year 1887.

(q) Table showing the extent and value of the vessel fisheries of the customs districts of Philadelphia, comprising the ports of Philadelphia, Pennsylvania, and Camden, New Jersey, during the year 1887.

(r) Table showing the value of fishery products imported into the United States from Canada and Newfoundland during the year ending June 30, 1887.

(s) Table showing the value of the products of the Canadian fisheries in the year 1886, not including those of Newfoundland.

(t) Table showing the value of fishery products imported into the United States from Canada and Newfoundland, during the year ending June 30, 1886.

(u) Statement of the value of the different New England fisheries in 1886.

(v) Summary of American vessels fishing for cod in the Gulf of St. Lawrence in the years 1885, 1886, and 1887.

16. Report entitled "*Some reasons why the fishermen of Nova Scotia prefer to use salt clams (*Mya arenaria*) for bait in the bank hand-line cod fisheries.*"—These notes I prepared for the use of the Commissioners who negotiated the fishery treaty between the United States and Great Britain in the winter of 1887-'88. A rather full presentation of the matter was made, including statistics to show the results obtained by using salt clams for bait.

17. Notes relating to improvements in dories and other fishing-boats, in the matter of carrying food, water, etc., for the better protection of the lives of fishermen engaged in the deep-sea fisheries.—On February 28, 1888, a bill was introduced in the House of Representatives by Hon. Wm. C. P. Breckinridge, of Kentucky, "for the better protection of life to the fishermen of the United States engaged in the deep-sea fisheries, etc., and for other purposes."

This bill was referred to the Commissioner for consideration, and at his request I prepared a report on the subject, containing twenty-seven type-written pages, and also several drawings illustrative of the text.

The question of alleviating or preventing the suffering and fatalities that so frequently result from fishermen going astray in boats without food or water, or other adequate provision for their safety and welfare, has attracted much public attention of late, and demands have been frequent in the public press for the enactment of a law to benefit the fishermen in this particular.

For this reason, and because of the difficulty of enacting the proper legislation without a full understanding of the points involved, the matter was deemed of sufficient importance to call for an extended review.

18. Maps showing the distribution of certain bait and food species.—In the latter part of 1887 I was directed by the Commissioner to superintend the preparation of four large colored maps of the region from



Cape Hatteras to Labrador, showing the distribution of certain bait and food species, for the use of the International Fisheries Commission then in session at Washington. I was assisted in the work by Mr. Gregor Noetzel, who was charged with the drafting work. The following is a list of the maps:

(a) Map showing the geographical distribution of the halibut; the principal fishing grounds; the regions of former abundance and present scarcity; important fishing ports, and other facts relating to the halibut fishery of the east coast of North America.

(b) Map showing the distribution of the cod family; the principal fishing grounds and localities frequented by cod fishermen of the United States; the important fishing ports and baiting stations, and other facts relating to the cod fishery of the east coast of North America.

(c) Map showing the geographical distribution of mackerel; the regions of the greatest abundance and localities frequented by mackerel fishermen of the United States; inshore fishing grounds in British provincial waters of possible importance to the mackerel fishermen of the United States; the important fishing ports, and other facts relating to the mackerel fishery of the east coast of North America.

(d) Map showing the geographical distribution of the principal species of fish and mollusks used as bait for cod and halibut, as well as for food and other purposes, the important baiting stations, and other facts relating to the bait supply of the east coast of North America.

19. *Notes on the use of squid for food.*—Early in the year my attention was accidentally called to a remarkable innovation in the utilization, on the Atlantic coast, of squid (*Loligo peali*) for food. Desiring to obtain full information on the subject, I communicated with Mr. E. G. Blackford, a prominent dealer in the Fulton fish market, New York City, and Mr. Atkins Hughes, North Truro, Massachusetts, who owns several traps and weirs in that vicinity. The result of this correspondence was printed in the Bulletin for this year. The occurrence is of such interest, however, that it is but proper that mention of it should be made here.

#### H.—NOTICE OF FIELD WORK; PROPOSED INVESTIGATIONS, ETC.

Under this head it is proposed to consider such phases of the work as relate to field inquiries prosecuted during the year; the plans for undertaking new investigations; the preparation of blanks or schedules, and such other matters as seem to be naturally connected therewith.

20. *Field work.*—Very little field work has been done during the past year. The many important events which occurred during the year were of a nature to practically preclude the possibility of undertaking many new investigations. The fatal illness of Professor Baird, that culminated in the sad event which deprived the Commission of its loved and honored chief and founder, had a most depressing effect, while the conditions resulting from his death and the necessity that existed for giving special attention to other vitally important matters placed the statistical inquiry under specially unfavorable influences.

21. *Bait investigation.*—No field work was attempted until the appointment of Professor Goode as Commissioner. Soon after, Mr. W. A. Wilcox was sent to Maine to make a special inquiry concerning the use of clams (*Mya arenaria*) for bait by cod fishing vessels, and the extent of the exportation of salted clam bait to the British North American Provinces. The information thus collected (which was supplementary to that secured at the same time by correspondence with merchants and customs officials) was required for the use of the International Fisheries Commission that was then in session at Washington. This work was satisfactorily accomplished and the results obtained were promptly transmitted to the Fisheries Commission.

22. *Inquiry into the shad fishery.*—Soon after the appointment of the present Commissioner, Mr. Luther Maddocks was directed to make an inquiry into the condition of the shad fisheries of the South Atlantic States, from Florida to and including Chesapeake Bay. This investigation was ordered primarily for the purpose of noting the effect of artificial propagation upon the abundance of the shad and the capture of that species in the region covered by the inquiry. It therefore naturally included the collection of statistical data, the location of fixed apparatus of capture, and the obtainment of other information incidentally or directly connected with the shad fishery.

The field work was completed in April, and Mr. Maddocks has been employed since that time, until the close of the fiscal year, in elaborating his notes.

23. *Proposed investigation of the Pacific coast fisheries.*—The fisheries of the Pacific coast are of great importance, and, being chiefly prosecuted along the shore or in bays and rivers, come largely under the classification of "shore fishery." For this reason detailed comprehensive information can not be obtained concerning them except by special investigation, since the circulars received through the coöperation of the Treasury Department do not include the shore fishery, nor do they apply to the now valuable industries of whaling and sealing which are important features in the Pacific fisheries.

But, although it was thus manifestly desirable that the status of the fisheries of that region should be well understood, it has not been feasible since the census of 1880 to send Fish Commission agents there to make an inquiry into their extent and value. The Commissioner, Colonel McDonald, was, however, strongly impressed with the importance of making a comprehensive study of the Pacific fisheries, and early in his administration he decided to undertake it. His plans contemplated a preliminary reconnoissance of the coast fishing stations before detailing agents to make the investigation, and he proposed to send me to the Pacific States for that purpose, as has been stated elsewhere. Unexpected events and unanticipated exigencies of the service combined to temporarily frustrate the proposed inquiry, but it is hoped that it may soon be practicable to undertake it.

24 *Instructions for fishery expert on the Albatross.*—In the autumn of 1887 the steamer *Albatross* was ordered to the Pacific Ocean for the purpose of studying the fishing grounds of that region, attempting the discovery of new fishing areas, and carrying on other investigations for the purpose of developing the fishery resources of the region.

In organizing the staff of naturalists and experts to accompany the ship, after her arrival at San Francisco, it was thought necessary to include some one familiar with the methods pursued in the Atlantic fisheries, who could be intrusted with making inquiries relating to commercial fishing, and whose experience would be of service in conducting fishing operations, preparing apparatus, etc. Accordingly, Mr. A. B. Alexander, who had previously served on board the schooner *Grampus*, was assigned to this duty on my recommendation.

The instructions relating to the work to be performed by Mr. Alexander on the *Albatross* were comprehensive and detailed. It is believed they will prove amply sufficient for the purpose, and that he will be able to make many important observations concerning the methods and relations of the fishing industries on the Pacific coast.

25. *New forms of statistical blanks.*—At the time I assumed control of the work of the division the schedules or blank forms used for collecting statistics of the shore and vessel fisheries were the same as those prepared for the census work of 1880. These did not include many details that are important, and in various other respects they were inadequate and unadapted to the work of fishery investigation as now conducted by the Commission. For the above reasons, one of the first duties to which my attention was directed was the preparation of new forms which seemingly include all that is requisite for securing complete statistics of the extent and value of the fisheries. For convenience two forms were adopted (instead of the single blank as formerly used), one for the shore fisheries and another for the vessel fisheries, each of which has distinctive features that render it inexpedient to have one schedule apply to both.

Instructions for the guidance of field agents were also prepared, and it is believed that even those who have had comparatively little experience in collecting fishery statistics can, by using these blanks and conforming to the instructions, meet with success in obtaining the requisite information.

These schedules, when printed, have been bound in books containing one hundred blanks each. A set of instructions adapted to the blanks is bound in each book. The size of the blanks is such as is well adapted to field work, since they are convenient for carrying in the pocket.

#### I.—NOTICE OF SPECIAL MATTERS AFFECTING THE FISHERIES.

During the year just ended many things have occurred of more than ordinary importance to the fisheries. While some of these matters have been more or less closely associated with the work of the Commission,

others are of a more general character, and are mentioned here only because of the great influence which they may exert in the future upon the welfare or development of certain fisheries. The following notes are simply brief references to the most noticeable events, the object being rather to call attention to them than to discuss them in an exhaustive manner, since it would scarcely be practicable to do the latter in a report of this kind.

26. *Use of antiseptic preservatives.*—The use of antiseptics as a substitute for common salt for preserving fishery products, particularly those intended for food purposes, has received marked attention in Europe in recent years and is beginning to attract the notice of those in this country who are interested in the fisheries. In Europe the use of "preservatives" has practically passed the experimental stage, speaking from a commercial standpoint. One result is that an immenso trade has grown up between Norway and English markets, the Norwegians sending to England large quantities of so-called fresh herring, mackerel, codfish, etc., that have been "preserved" with antiseptics. The success attained in Europe by the use of this new agent for preserving fish is well known in the United States, and numerous experiments have been made here to test its usefulness. But while partial success has been reached in some cases, it is, nevertheless, true that the matter is still in the experimental stage.

For several years past Dr. J. H. Kidder, formerly chemist of the Commission, and late Assistant and Acting Commissioner, has experimented with some of the "processes" used in Europe. To facilitate these experiments Professor Baird purchased and imported complete apparatus for preserving fish by the Roosen process. This was tested. Those interested in other processes were informed that the Commission would be glad to see the results they could attain. Consequently, in addition to what was done under Dr. Kidder's direction, various packages of fish put up in Europe were received and opened by the Commission, after the lapse of a certain time, the effect on the contents being carefully noted. The results so far obtained have not been entirely satisfactory, and the utility of these "processes" for American markets has not been fully established. What seems to be eminently, if not imperatively, needed in this country as a fish preservative, is something that will prevent deterioration long enough to permit of transportation to markets hundreds of miles distant from the centers of production, and with a margin of time sufficient to effect sales after the goods reach their destination. Nothing else will fully meet the requirements of a domain of such extensive proportions as the United States; though there can be no reason to doubt that advantages will accrue to fish packers by using antiseptics for the preservation of products intended for markets comparatively near and for early consumption. It is anticipated that much benefit may be secured by the use of antiseptics in moderate quantity on pickle-cured dried codfish, to pre-

vent the reddening in summer that results from the growth of a plant (*Clathrocystis*), much to the detriment of the trade. In this case, however, the material will not be employed to preserve the fish, which are already heavily salted, but the object is simply to prevent the growth of the noxious plant.

It is also possible that antiseptics may be used to advantage on bait, particularly on clam bait, in conjunction with common salt; though it is probable that an extended series of experiments will be required to fully determine the effect of this treatment upon the flavor of the bait. The mere preservation of bait from deterioration is a secondary matter as compared with the retention of that flavor which is attractive to fish, and which is often present to a considerable degree in fish or mollusks that are heavily salted. However, if these can be kept in a comparatively fresh condition, with the original flavor correspondingly unaffected, much benefit might accrue to those engaged in the hand-line bank cod-fishery, in which salt bait is chiefly used.

Dr. Kidder has recorded the results obtained from the experiments conducted by him, and I understand that, as soon as his time will permit, notes containing a full discussion of the experiments made and results secured will be prepared and printed. It is anticipated that these notes will contain much that will be instructive and of interest to those concerned in the preparation of fishery products.

I have had the opportunity of observing the results obtained in several practical tests of two of the best known "processes." These are known to the trade as the Roosen and Purcell methods. In the following notes the result of the experiments, as they came under my observation, are briefly stated.

27. *The Roosen process.*—I have had only two opportunities for examining food products preserved by the Roosen method, as follows:

On April 24, 1888, I was present at the warehouse of Hon. E. G. Blackford, at New York City, when two packages of fish were opened which had been put up in accordance with the Roosen formula. There were present also Hon. E. G. Blackford, fish commissioner of the State of New York, Dr. J. H. Kidder, Mr. C. G. Kidder, Mr. C. H. S. Schultz, and another gentleman.

The first package opened contained a lot of codfish that had been eviscerated and placed in the solution on February 24, precisely 2 months previously. The metallic cask in which the fish were packed was about half full of cod, but was well filled with the preserving fluid. The solution was clear on top of the cask, nearly odorless, and tasted like salt water.

The skin of the cod looked bright and fresh, but the eyes were sunken and red; the flesh, too, where it had been cut in the process of evisceration had a reddish tinge and a slight odor. Some of the fish were cooked and eaten, and proved very palatable.

The second package was a cask containing herring, which were

packed at Gottenburg, Sweden, during the preceding February. The contents of this package were found to be very offensive and considerably decayed. Some of the specimens were moderately hard, but wholly unfit for food or bait.

28. *The Pursell process.*—On May 28 a keg of about 8 gallons capacity, filled with split haddock (finnan haddies), which had been preserved by the Pursell process about 3 or 4 months previously, was opened at Central Station of the U. S. Fish Commission in the presence of Dr. J. H. Kidder, Mr. W. P. Seal, and myself. The top layer of fish was covered with a white mold, but had no offensive smell whatever; the remainder were bright, sweet, and firm in flesh, and apparently in good condition. Specimens were given several persons for trial, who reported that the fish tasted strongly of the acid—so much so as to render them unpalatable.

It is very possible that the result might have been materially different had this package been opened in about a month or 6 weeks after it was put up. I believe that the contents might have still retained much of their original flavor and value for food purposes if they had been subjected to a shorter test.

29. *Experiment with bait.*—On May 11, 1888, I had the opportunity to be present, at Gloucester, Massachusetts, when an experiment was made by Mr. C. H. S. Schultz to preserve bait for sea fishing by the Roosen process. The object was to determine if bait preserved by that method could be utilized by American fishermen with good practical results. This is a matter in which the U. S. Fish Commission has taken more than ordinary interest, since success in this direction would be a matter of the greatest importance to our sea fishery. For this reason I gave Mr. Schultz what assistance I could and noted the chief points of interest in connection with the experiment. The following extracts from a memorandum, which I sent to the Commissioner on May 26, contains information relating to the obtainment and packing of the bait on this occasion:

Sea herring and squid could not be obtained, as it was not the season for them to approach the coast, and on May 10 I went with him [Mr. Schultz] from Gloucester to Essex to secure some alewives, which was the only bait fish then obtainable. Although the town statutes prohibit the capture of more than fifty fish by any individual, the authorities were very kind and considerate when learning from me the purpose for which the fish were required, and offered to supply what Mr. Schultz needed for his experiments without charge. This they did on the following day, and Mr. Story, with whom I am personally acquainted, very generously volunteered to haul them to Gloucester without any expense to Mr. Schultz. The fish were put into the preservative on May 11, and I understand that they are to be practically tested some time during the summer or autumn.

I am informed that after being kept about a month the bait was put on board of a cod fishing vessel going on a short trip to the banks. When opened the alewives were found to be in excellent condition—sweet and sound. Nevertheless the fishermen say they were totally unattractive to cod, and therefore wholly worthless for bait.

While this may foreshadow future results, I think it would be unwise to accept it as entirely conclusive. It is therefore to be hoped that these experiments will be continued in the future, and with a variety of material commonly used for bait.

30. *Investigations relating to the mackerel.*—Although not directly connected with the work of this division, the investigations undertaken by the schooner *Grampus* during the year, relating particularly to the occurrence or abundance of the mackerel in certain localities, are so intimately associated with the commercial aspects of the fishery for this species that it seems entirely appropriate to call attention to them here.

For more than 50 years reports have been circulated at intervals of the occurrence of mackerel in great abundance on the northeast coast of Newfoundland and along the shores of Labrador, particularly in the Strait of Belle Isle and vicinity. These reports have generally emanated from vessels trading in those regions, but, as a rule, they have gained circulation too late in the season for the mackerel fishermen to profit by them if true, while there has been associated with apparent reliability more or less of indefiniteness and uncertainty which has left the whole matter in an undetermined condition. For this reason the procurement of precise information respecting the truth of these reports has been a matter of especial interest to American fishermen, particularly in the past year, when the exceptional scarcity of the mackerel in its usual haunts has caused much anxiety and restlessness in the minds of those in pursuit of this species, and a consequent increased desire to learn from reliable sources all that may affect the welfare of the industry in which they are engaged.

In view of these conditions, the *Grampus* was ordered to make a cruise, in the summer of 1887, to the Gulf of St. Lawrence, the east and northeast coasts of Newfoundland, and along the coast of southern Labrador, including the Strait of Belle Isle. The principal object of this voyage was to determine the truth or falsity of the reports of the occurrence of mackerel in those localities. I was in charge of the investigation. The cruise began on July 2, on which date we sailed from Gloucester, Massachusetts, and it ended on September 1, when we arrived at Wood's Holl.

Careful inquiry developed the fact that mackerel have not occurred on the northeast coast of Newfoundland for considerably over a decade, with the exception of scattering specimens taken occasionally in gill-nets. It was learned that the species has occasionally been moderately plentiful for a brief period in the Straits of Belle Isle and vicinity, as late as 1885. But this fact loses its significance when it is known that such appearances of the mackerel in that region are very uncertain and that when found there it is invariably in a poor and emaciated condition and scarcely fit for food.

The information obtained was promptly disseminated among the mackerel fishermen, who were met by the *Grampus* on her return voy-

age, and later in fishing towns, and it may reasonably be assumed that its result has been to prevent the undertaking or continuance of unprofitable trips, and the loss of much valuable time by fishing vessels.

During the past 3 months the *Grampus* has been continuously and actively engaged in a research having for its principal object the careful observation of the mackerel during its spring migrations, both as relates to its movements and abundance. This investigation is of exceptional importance this year for two reasons:

First, mackerel were very scarce during the previous season, as has already been intimated, and therefore much importance attaches to having early information which may indicate their probable abundance during the present summer.

Second, this is the first year of the so-called "close-time mackerel law," which prohibits the catching of mackerel (except those "caught with hook and line from boats, and landed in said boats, or in traps and weirs connected with the shore,") between March 1 and June 1 of each year while the law continues in force; namely, for 5 years.

In view of the fact, therefore, that vessels engaging this year in the mackerel fishery have practically been debarred from making the usual observations in spring, the cruise of the *Grampus* was looked forward to as possibly being the means of supplying the fishermen with much useful information which would be of immediate practical value. Under ordinary circumstances such result would undoubtedly have been accomplished. But, strange as it may seem, the *Grampus* failed to meet with large schools of mackerel during her cruise which has just ended; only a few small-sized fish have been seen. While it is to be regretted that such is the outcome of her trip, since it would be more gratifying to record conditions indicative of prosperity to the mackerel fishermen, it will, nevertheless, be apparent that the result conveys useful and important information to those most interested, for it is thus placed almost beyond question that mackerel will be even less numerous this year than they were last season—a probability which it may be very important for the fishing interest to know at the beginning of the season.

31. *The importation of salted bonito as mackerel.*—The exceptional scarcity of the common mackerel (*Scomber scombrus*) on the fishing grounds of the western Atlantic during the past year resulted in the supply of that species being much below the demand and a consequent increase in the price. The supply from ordinary sources being inadequate, dealers have sought to obtain from other countries material for filling their orders, and in one case at least an attempt has been made to place on the American market an allied species imported from Europe as a substitute for mackerel. It is highly probable that a confusion of common names may have led to the importation alluded to, since it is by no means impossible that the foreign shipper may not have known that the fish he sent to the United States differed materially if any from our common mackerel. And it is also supposable that he may have been



equally ignorant of the fact that, with the exception of the bull's-eye mackerel (*Scomber colias*), which closely resembles the common species, no fish has been found that satisfactorily fills the place of *Scomber scombrus* in the markets of the United States.

Early in April my attention was called to an importation of what was called "Black Sea mackerel," 89 barrels of which had been salted and shipped to this country from Turkey as an experiment. Wishing to obtain fuller information concerning the so-called mackerel, I corresponded with the firm in Boston, Massachusetts, to whom the fish were consigned, and was courteously furnished specimens and all the facts relating to the importation.

The fish proved to be the common bonito (*Sarda sarda*). They were about the size of extra large No. 1 mackerel of the common species; perhaps a few were slightly larger; they were split down the back; had evidently been soaked before being salted, were "rimmed," and with the exception that the flesh was very dark, their resemblance to mackerel was sufficiently close to pass for the latter among people unfamiliar with its special characteristics.

Several persons to whom specimens were given for trial, and who are thoroughly competent to pass judgment regarding the edible qualities of the bonito when prepared in this manner, reported them to be a fair substitute for mackerel, though the flesh was rather oily and coarse, and less delicate in flavor than that of the latter.

These so-called mackerel were said to have been caught in the Bosphorus, and, so far as I am informed, this is the only instance where an attempt has been made to supply our markets with such a substitute for the common mackerel from foreign countries.

It is pertinent here to remark that the bonito occurs off our own coast in considerable numbers, and is frequently specially abundant on the California coast. If a sufficient demand could be obtained for it as a substitute for mackerel there seems to be no doubt but what the demand could be supplied to a considerable extent by our own fishermen.

What is, however, of still greater importance to the fishing interests of this country at the present time is the fact that the demand for mackerel caused by the exceptional scarcity of the common species off the Atlantic coast may, to a considerable extent, at least, be supplied from the coast of California, where the chub or bull's-eye mackerel (*Scomber colias*) occurs in great abundance. This species finds a ready sale in our markets; those caught in the Atlantic are nearly the equal of the common mackerel, and for this reason it is probable that an important mackerel fishery may be established on the southern coast of California if the attempt is made by those having sufficient skill and enterprise.

### J.—PARTICIPATION IN THE CENTENNIAL EXPOSITION OF THE OHIO VALLEY AND CENTRAL STATES.

The participation of the Commission in the exposition to be held at Cincinnati during the early part of the coming fiscal year deserves brief mention here, for it has exerted a marked influence upon the work of the Division of Fisheries since its establishment. This has been due to the connection of myself and others of the personnel of the division with the Fish Commission Exhibit, which, from the time of my appointment in charge of it, has occupied most of the time and attention of those who have been detailed to this work. This would, perhaps, have been less noticeable if my appointment in charge of the exhibit had not been so nearly simultaneous with the organization of the Division of Fisheries.

On May 28, 1888, a bill which was introduced early in the month became a law and provided for the participation by the "several Executive Departments of the Government and the Bureau of Agriculture and the Smithsonian Institution, including the National Museum and Commission of Fish and Fisheries," in the Exposition of the Ohio Valley and Central States, to be held at Cincinnati, Ohio.

The provisions of the bill directed that the different Departments and bureaus of the Government, as above mentioned, should "prepare and make suitable exhibit at the said Centennial Exposition," and that the head of each Department and bureau should appoint a person, from among the officers or employes thereof, to act as representative to have responsible charge of and to supervise the preparation and conduct of such exhibit.

In accordance with the provisions of the aforesaid act the Commissioner, on June 2, 1888, designated me as the representative of the U. S. Fish Commission to have the responsibility of the preparation, installation, and conduct of the exhibit, in addition to the ordinary duties as chief of the Division of Fisheries.

Although this action was taken as soon as practicable after the passage of the act making it necessary, the appointment was, nevertheless, made only about a month prior to the opening of the Exposition, which is to take place on July 4. The time thus available for the preparation of the exhibit of the Commission has therefore been entirely insufficient. This inadequacy has been more noticeable, too, for various important reasons.

First. It was necessary at the outset, before the scope and character of the exhibit could be definitely decided upon, that I should visit the Exposition grounds and buildings at Cincinnati to obtain information regarding available space, probable location of our exhibit, facilities for obtaining water for aquaria, etc. This caused a delay of several days.

Second. Several gentlemen whose services were specially needed in

connection with the preparation, installation, and conduct of the exhibit were absent from Washington on other duty (one of them nearly across the Continent and another at sea), and it was not practicable to get the personnel all assigned until after June 20.

Third. It has been necessary to prepare specially for this occasion much of the material embraced in the exhibit. Several new features have been introduced that were not included in previous exhibits made by the Fish Commission.

Because of the foregoing reasons I have had to give my personal attention to details in the preparation and packing of the material, a duty that has necessitated night and day work.

Notwithstanding the many difficulties attending the assembling of the material constituting the exhibit, and the very short time available for getting it ready, it is gratifying to be able to record the fact that at the close of the fiscal year the work is rapidly nearing completion, and it is anticipated that the shipments will be made in three or four days, about which time the personnel assigned to duty in connection with the installation and conduct of the exhibit will leave Washington for Cincinnati, with the exception of one or two, who will have to remain to look after certain details that require additional attention.

32. *Detail of persons from the Division of Fisheries.*—In the report upon the exhibit made by the Commission at Cincinnati that will be prepared in due time and to which reference is made, full details will be given of the personnel. Here it is intended only to consider those whose connection with the affair affected the work of the Division of Fisheries.

Three of the force of the division beside myself have been detailed to assist in the preparation of the exhibit. These are Messrs. E. C. Bryan, W. H. Abbott, and H. R. Center. It is scarcely necessary to remark that the work of the division has suffered during the past month by the assignment of so many persons from its limited number. Nevertheless, much was accomplished by the division, as has been stated in previous chapters of this report, though it is beyond question that the work would now have been much farther advanced had it been practicable to keep the entire force engaged upon it.

33. *Arrangement for conducting statistical work, etc.*—As has been shown, the demands upon my time and attention in connection with the preparation of the exhibit, and the fact that it will be necessary to devote myself almost exclusively to affairs at the Exposition for some months to come, renders it impracticable for me to retain more than a general direction of the office work of my division, leaving the details in the hands of another. Therefore, on June 3, Mr. Hugh M. Smith, who has long been associated with the office, was placed in charge of the statistical work, including compilation of reports, to act under my direction. This arrangement has been very satisfactory, since it has thus been possible for me to give more exclusive consideration to duties connected with the Exposition.

## THE GRAMPUS.

K.—My association with the schooner *Grampus* has been so intimate in the past, and her work being to a large extent connected with a study of the deep-sea fisheries, it seems appropriate that mention should be made of her here.

I held command of the vessel from the time she went into commission, on June 5, 1886, until the organization of the Division of Fisheries, though most of the time I have been on special detached duty, in Washington or elsewhere.

My official connection with the schooner ceased on the day of my appointment in charge of the division, and on the following day (May 25, 1888) the first mate, Capt. D. E. Collins, who had been acting master for the most of the time since the vessel was built, was promoted to full command; Mr. E. E. Hahn, the second mate was made first mate, and Mr. Frank Conley was appointed second mate.

In preceding pages allusion has been made to the work accomplished by the *Grampus* during the year, having a special bearing on the commercial phases of the fisheries. Reference is made to a report upon her operations, pp. 491–598 of this volume, for more detailed information, and also to pages 437–490 for a report which I have prepared upon her construction, etc.