

I.—PLAN OF INQUIRY INTO THE HISTORY AND PRESENT CONDITION OF THE FISHERIES OF THE UNITED STATES.*

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U. S. COMMISSION OF FISH AND FISHERIES, AND CENSUS OF 1880.

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At the request of the Superintendent of the Census, the U. S. Commission of Fish and Fisheries has undertaken the task of preparing a report on the fishery industry of the United States, which will be printed as a part of the general report of the Superintendent of the Census of 1880. The accompanying preliminary schedule has been prepared for the instruction of the assistants who shall take part in the investigation. It is arranged in the form of an analysis, and is intended to show the scope of the proposed investigation. It is necessarily far from complete; many of the headings might be expanded much more fully if it were thought necessary. The work of canvassing the fishing towns will be placed in the hands of trained investigators, who will be expected to devise methods of their own, suited to the field which they are working up. The headings are intended as suggestions. Every suggestion should be considered with reference to every community under investigation, and where there is an opportunity of gaining information upon any subject it should be followed up in as great detail as possible. In many cases, however, one or more classes of suggestions will be found inapplicable, and may be omitted. The scheme has been made as com-

prehensive as possible; and it is the intention that the report shall take into consideration every subject which is connected with the history, prosecution, and maintenance of the fisheries.

ORGANIZATION.

The plan of organization provides for the employment of the following assistants.

Superintendent of the Investigation.

Disbursing Agent.

Assistant canvassing Gulf Coast.

“ “ Atlantic Coast.

“ “ Great Lakes.

“ “ Pacific Coast.

“ In Oyster investigation.

} Field assistants.

Assistant in charge of Correspondence.

“ “ “ “ Natural History work.

“ “ “ “ Computation.

} Office assistants.

Copyist.

Stenographic clerk.

Also, the employment of experts to make reports on special subjects of local extent, as, for instance, the trade statistics of certain large cities or individual branches of the fishery.

INSTRUCTIONS.

A.—OF THE FIELD ASSISTANT.

1. To visit every settlement in the district assigned to him.
2. To consider each general heading in the accompanying schedule with reference to that particular settlement.
3. To eliminate those subjects which cannot have reference to the settlement under consideration.
4. To obtain every possible item of information relating to those branches of fishery or fishery manufactures there prosecuted in the present or past. Hints as to the best means of obtaining information on these topics are given below.
5. To make the investigation complete for each town or community, and to forward the full notes to headquarters as soon as convenient; the notes should be very full, and should be written up in the field. Partial memoranda, taken with a view to future elaboration, are unsatisfactory and generally unreliable. The advantage of frequent communication with headquarters is too evident to require recommendation.
6. To keep a journal of daily work, giving the incidents of the trip,

the names, in every case, of persons interviewed, etc. This may subsequently be expanded into a report of the reconnaissance, to be published by its author as a contribution to the history of the fisheries. His full notes will, of course, be available for use in working up his report.

7. To report to headquarters every change of location, giving time of departure by last mail before leaving a place and time of arrival by first mail after reaching next station. This is obviously desirable for convenience of communication from headquarters.

8. For his own sake to keep a careful record of expenditures, and to render accounts in accordance with the regulations of the Treasury Department, a copy of which is given below.

9. To pay as much attention to collecting marine animals as is consistent with the other work, in accordance with special instructions to be given to each assistant; to obtain samples of all fishery products, fishery apparatus, models of peculiar fishing boats, etc., for the fishery collections of the National Museum; and also to investigate shell heaps, mounds, etc., for aboriginal remains, and to collect such whenever it is possible without too much delay.

10. To obtain the names of all intelligent persons, interested in the fisheries, to be inserted in the Directory, for use in future correspondence.

B.—POSTAGE, MAIL ARRANGEMENTS, ETC.

Letters sent from headquarters or addressed to the Commissioner of Fisheries may be inclosed in envelopes with printed frank. Other official letters must have official stamp attached. Letters relating to this investigation should be marked (indorsed on the envelope) F. C. & C.

C.—EXPENDITURES.

The manner of keeping accounts is described in Appendix A. All accounts must be presented on the blank forms of the Census Office.

D.—ASSIGNMENT OF DISTRICTS.

Each assistant will be furnished with a list of the settlements to be visited by him, and with a set of maps on which to record the position of weirs, ship-yards, factories, etc. For the Northern Atlantic Coast the last edition of the Coast Pilot will be used; for other regions the charts prepared by the U. S. Coast Survey.

SOURCES OF INFORMATION.

The general plan of the work proposed may be summarized as follows:

A.—CORRESPONDENCE.

The Directory, prepared for the use of the Commission, now records the name of every post-office within three miles of the sea-coast, and gives the names of several hundred persons, fishery-capitalists, manufacturers, skippers, fishermen, collectors of customs, postmasters, and light-house keepers. All of these have signified their willingness to correspond with the Commission, and most of them have already communicated answers to the various circulars sent out. In Appendix C is given a list of seaboard counties, with statement of number of seaboard townships and post-offices within three miles of tide-water.

This directory should be expanded in its scope so as to include the river and lake townships. An effort should be made to secure one reliable correspondent in each town. The postmasters who have not yet responded should be again addressed, the appeal being strengthened by a special recommendation from the Postmaster-General. In some instances it may be desirable to secure as a correspondent one of the clergymen of the place. This can easily be done through the conference members. A new circular (No. 41) will at once be sent out to every post-office on any considerable body of water. This propounds six questions, *viz.*:

1. Are there any fishing-vessels owned in your township?
2. Are there any pounds, traps, or weirs?
3. Are there any professional fishermen?
4. Are the fish-markets supplied in part or wholly from fisheries in your vicinity?
5. If not, whence is obtained the supply?
6. Will you answer other questions on this subject?

A short circular like this will elicit many answers which would not be called out by a longer one. By this means the list of correspondents will be much increased. A still more important end to be gained is the elimination of a larger number of localities, and a great contraction in the number of towns with which it would be desirable to carry on further correspondence. A negative answer to questions 1 and 2 with reference to any town will practically throw it out of consideration. It is manifestly impracticable to treat unprofessional pond and river fishing otherwise than in a general way and by estimate.

After the answers to the preliminary circular have been received and digested, a rough classification of towns by the kind of fishing carried on should be made, and other circulars should be sent out, for the purpose of ascertaining what points it is desirable to investigate further by letter or by a personal canvass.

B.—CANVASSING.

In many instances, especially in out-of-the-way inland towns, or where a capable, willing correspondent is found, it will not be necessary to send a canvasser. All needful information may be gained by correspondence. The process of elimination, already referred to, will probably throw out three-fourths of the towns named in the directory. This will save much time and expense in the work of canvassing, it being quite unnecessary to send a canvasser to places where there are known to be no fisheries.

There are, however, certain stretches of coast which will require much careful investigation by men acquainted with fishermen and the natural history of fishes. These are—

1. The coast of Maine, with its peculiar system of semi-professional fishing, and its varied river and harbor fisheries.
2. The coast of Massachusetts, with its extensive commercial fisheries.
3. The coast of Southern New England and New York, with its pounds and weirs, and its New York market fishery.
4. The coast of the Middle States, to Cape May.
5. The Gulf Coast.
6. The Great Lakes.
7. The salmon fisheries of the Pacific Coast.

Much has already been accomplished with 2, 3, and 6; the most pressing needs are with 1 and 5. It is strongly recommended that work in these districts be begun at once.

The cheapest and most satisfactory manner of traversing these districts is by small vessels, which can be chartered at very reasonable rates.

The other districts may be undertaken in the progress of the work.

C.—REPORTS OF LARGE MARKETS.

Daily reports of the fresh-fish trade of New York are obtained from the bookkeepers of the eighteen firms represented in the New York Fishmongers' Association, and similar reports are received from Boston and Washington. This system of gathering information, which is proving so satisfactory in these cities, should be extended. Reporters should be secured in other centers of distribution, and particularly in—

Boston (salt-fish trade),
 Portland, Me.,
 New London, Conn.,
 Providence, R. I.,
 New York (oyster trade),
 Philadelphia (oyster trade),
 Baltimore (oyster trade),
 Norfolk and vicinity (oyster trade),
 Charleston, S. C.,

Chicago (general fish trade),
San Francisco,
and other cities.

D.—CUSTOM-HOUSE RETURNS.

Much valuable information will be obtained from the new system of circulars requiring information on specified points from vessels in the off-shore fisheries. These were put in use in September, 1878, and in 1880 their results will be available for a period of two years.

A fuller schedule of questions has been prepared for the use of collectors of customs in gathering statistics of the shore fisheries. It is to be hoped that this will be adopted; its use will add largely to the store of information regarding the products of the fisheries.

E.—SPECIAL INVESTIGATIONS.

Certain branches of trade which are in the hands of a distinct class of men are well worthy of special investigation. Chief among these is the oyster trade, which absorbs more capital than all the other branches of the fisheries, and which has never been thoroughly studied. A special canvasser should devote several months to the oyster trade.

The sponge trade also deserves a study of two or three months by a competent investigator. The subject of the whale fishery has been exhausted in some of its phases, but requires much additional study.

The menhaden fishery and its relations to agriculture also deserve further attention.

F.—MATERIAL ALREADY ACCUMULATED.

The Fish Commission has in its possession 20,000 or 30,000 pages of manuscript, which may be directly utilized in this investigation, since these represent work accomplished in the various lines of investigation already spoken of.

Several circulars have already been sent out relating to the general subject of the fisheries, the fishery marine, and the special history of the cod, herring, mackerel, manhaden, mullet, etc. The answers to these circulars are now awaiting collation.

G.—COMPILATION.

Much has already been done toward compiling as fully as possible a statistical history of the fisheries. The reports of the Treasury Department, of the Bureau of Statistics and Navigation, and of the various special commissions and experts who have studied the fisheries, are to be utilized to the fullest extent, as well as all published accounts of the American fisheries from the earliest times.

SCHEME OF INVESTIGATION.

GENERAL ANALYSIS.

- I. Natural history of marine products (the objects of the fisheries).
- II. The fishing-grounds (places of prosecution of the fisheries).
- III. The fishermen and fishing towns (the men engaged in the fisheries.)
- IV. Apparatus and methods of capture (manner of prosecution of the fisheries).
- V. Products of the fisheries (first results of the fisheries).
- VI. Preparation, care of, and manufacture of fishery products (elaboration of results).
- VII. Economy of the fisheries (financial organization and methods).
- VIII. Protection and culture (oversight by government).

NOTE.—The following headings are arranged with reference to the manner in which they will be discussed in the final report. At the end of each section are given suggestions regarding methods of investigation and subjects which are particularly important.

I.—NATURAL HISTORY OF MARINE PRODUCTS.

MANNER OF DISCUSSION IN REPORT.

Each species in the following groups which is in demand for, or available for, food or other economic uses, should be considered separately. An outline engraving may be given for the sake of identification, and the popular names in use in different parts of North America. A brief abstract should be given of the important facts in its natural history, telling what is known of (a) its geographical distribution; (b) size; (c) abundance; (d) migrations, if such occur; (e) food and rate of growth; (f) mode of reproduction; (g) economic value and uses:

Seals.

Whales.

Turtles.

Fishes.

Lobsters, crabs, shrimps, ecrevisses, &c.

Oysters, clams, mussels, &c.

Sponges.

Marine plants.

Inorganic products of the sea.

These being products of the sea and properly to be considered in a treatise upon the fisheries.

METHOD OF INVESTIGATION.

When opportunities occur, the stomachs and genitalia of marine animals should be examined, to ascertain the nature of their food and the

times of reproduction. Instructions will be given regarding points of special interest which require investigation. Collections of marine animals, particularly fishes, should be made, when occasion offers, especially in the markets of the Southern Atlantic, Gulf of Mexico, and Pacific coast. In Appendix B are given schedules of questions regarding the habits of various groups of fishes. When practicable, it will be well to interview persons acquainted with the habits of fishes and methods of the fisheries, and write down their views and experiences. For this purpose a supply of these circulars will be included in each outfit.

A list of the common food-fishes of North America is here inserted for convenience of reference and to be used in checking the species observed in the markets:

Fishes (Eastern Coast).

- File Fish (*Balistes caprisous*).
- American Sole (*Achirus lineatus*).
- Flat Fish (*Pseudopleuronectes americanus*).
- Smooth Flounder (*Pleuronectes glaber*).
- Busty Flounder (*Limanda ferruginea*).
- Pole Flounder (*Glyptocephalus cynoglossus*).
- Plaice (*Hippoglossoides platessoides*).
- Sand Flounder (*Lophopsetta maculata*).
- Turbot Flounder (*Pseudorhombus dentatus*).
- Four-spotted Flounder (*Pseudorhombus oblongus*).
- Halibut (*Hippoglossus americanus*).
- Newfoundland "Turbot" (*Platysomatichthys hippoglossoides*).
- Pollock (*Pollachius carbonarius*).
- Cod (*Gadus morrhua*).
- Tom-cod or Frost Fish (*Microgadus tomcodus*).
- Haddock (*Melanogrammus aeglefinus*).
- Hake (*Phycis chuss*).
- Squirrel Hake (*Phycis tenuis*).
- Cusk (*Brosmius brosme*).
- Whiting or Silver Hake (*Merluccius bilinearis*).
- Rose-fish or Red Perch (*Sebastes marinus*).
- Tautog or Black Fish (*Tautoga onitis*).
- Chogset or Cunner (*Tautoglabrus adspersus*).
- Sword Fish (*Xiphias gladius*).
- Spear Fish (*Tetrapturus albidus*).
- Sail Fish (*Histiophorus americanus*).
- Mackerel (*Scomber scombrus*).
- Chub Mackerel (*Scomber colias*).
- Bonito (*Sarda pelamys*).
- Tunny or Horse Mackerel (*Orcynus secundi-dorsalis*).
- Little Tunny (*Orcynus alliteratus*).
- Spanish Mackerel (*Oybiium maculatum*).

- Cero (*Cybium caballa*).
 Striped Cero or Florida King-fish (*Cybium regale*).
 Crevalle (*Carangus hippos* and *Paratractus pisquetus*).
 Pompano (*Trachynotus carolinus*).
 Short Pompano (*Trachynotus ovatus*).
 Long-fin Pompano (*Trachynotus glaucus*).
 African Pompano (*Trachynotus goreensis*).
 Butter-fish (*Poronotus triacanthus*).
 Tile (*Lopholatilus chamaeleonticeps*).
 Squeteague (*Cynoscion regalis*).
 Spotted Squeteague or Sea Trout (*Cynoscion carolinensis*).
 Silver Squeteague (*Cynoscion nothus*).
 Drum (*Pogonias chromis*).
 Spot (*Liostomus philadelphicus*).
 Silver Perch or Yellow-tail (*Bairdiella argyroleuca*).
 Red Fish or Spotted Bass (*Sciaenops ocellatus*).
 King Fish (*Menticirrus nebulosus*).
 Southern Whiting (*Menticirrus alburnus*).
 Croaker (*Micropogon undulatus*).
 Sailor's Choice (*Lagodon rhomboides*).
 Sheeps-head (*Archosargus probatocephalus*).
 Scuppaug or Porgy (*Stenotomus argyrops*).
 Grunts or Hog-fish (*Hæmulon arcuatum*, &c.).
 Gray Snapper (*Lutjanus caxis*).
 Red Snapper (*Lutjanus Blackfordi*).
 Mangrove Snapper (*Lutjanus stearnsii* and *Rhomboplites aurorubens*).
 Grouper (*Epinephelus morio*).
 Spotted Grouper (*Epinephelus Drummond-Hayi*).
 Black Grouper (*Epinephelus nigritus*).
 Jew Fish (*Promicrops guasa*).
 Sea Bass or Southern Black-fish (*Centropristris atrarius*).
 Squirrel (*Diplectrum fasciculare*).
 Striped Bass or Rock Fish (*Roccus lineatus*).
 White Perch (*Morone americana*).
 Moon Fish (*Parephippus quadratus* and *P. faber*).
 Triple-tail (*Lobotes surinamensis*).
 Blue Fish (*Pomatomus saltatrix*).
 Striped Mullet (*Mugil albula*).
 White Mullet (*Mugil braziliensis*).
 Silver-Sides or Friar (*Chirostoma notatum*).
 Silver Gar Fish (*Belone longirostris*, *B. hians*, *B. latimanus* and *B. notata*).
 Skipper (*Scombrosox saurus*).
 Mummichogs or Killey-fish (*Hydrargyra majalis*, &c.).
 Capelin (*Mallotus villosus*).
 Smelt (*Osmerus mordax*).
 Salmon (*Salmo salar*).

- Trout (*Salvelinus fontinalis*).
 Tarpum (*Megalops cyprinoides*).
 Menhaden or Pogy (*Brevoortia tyrannus*).
 Shad (*Alosa sapidissima*).
 Alewife, Branch Herring, or Gaspereau (*Pomolobus vernalis*).
 Blue-back or Glut Herring (*Pomolobus aestivalis*).
 Tailor Herring (*Pomolobus mediocris*).
 Herring (*Clupea harengus*).
 Mud Shad (*Dorosoma Cepedianum*).
 Anchovy (*Engraulis vittatus*, &c.).
 Sea Eel or Conger (*Conger oceanica*).
 Eel (*Anguilla bostoniensis*).
 Sturgeon (*Acipenser sturio*, &c.).
 Lamprey Eel (*Petromyzon marinus*).

Fishes (fresh water).

- Burbot or Lawyer (*Lota maculosa*).
 Fresh-water Drum (*Haploidonotus grunniens*).
 Small-mouthed Black Bass (*Micropterus achigan*).
 Large-mouthed Black Bass (*Micropterus pallidus*).
 Rock Bass (*Ambloplites rupestris*).
 Sacramento "Perch" (*Archoplites interruptus*).
 Sun-fish (*Eupomotis aureus*).
 Black-eared Sun-fish (*Lepiopomus auritus*).
 "Bream" of Southern States (*Eupomotis*, *Lepiopomus*, *Enneacanthus*,
Chaenobryttus, numerous species).
 Strawberry or Grass Bass (*Pomoxys nigromaculatus* and *P. annularis*).
 Yellow Perch (*Perca fluviatilis*).
 Yellow Pike-perch (*Stizostedium vitreum*).
 Gray Pike-perch or Sauger (*Stizostedium canadense*).
 Striped Bass or Rock-fish (*Roccus lineatus*).
 White Bass (*Roccus chrysops*).
 Short-striped Bass (*Morone interrupta*).
 Lake Pike (*Esox lucius*).
 Pickerel (*Esox reticulatus*, *E. americanus*, *E. cypho*, &c.)
 Masquallonge (*Esox nobilior*).
 Eastern Salmon (*Salmo salar*).
 Land-locked Salmon (*Salmo salar*, subsp. *sebago*).
 Brook Trout (of eastern slope) (*Salvelinus fontinalis*).
 Brook Trout (of western slope) (*Salmo iridea*).
 Black-spotted Trout (*Salmo Clarkii*).
 Oquassa Trout (*Salmo oquassa*).
 Smelt (*Osmerus viridescens*).
 Salmon Trout or Mackinaw Trout (*Cristivomer namaycush*).
 Siscowet (*Cristivomer siscowet*).
 Missouri Trout (*Salmo Lewisi*).

- White Fish (*Coregonus clupeiformis*).
 Lake Herring or Cisco (*Argyrosomus tullibee* and *A. artedi*).
 Black Fin of Lake Michigan (*Argyrosomus nigripinnis*).
 Michigan Grayling (*Thymallus tricolor*).
 Mountain Grayling (*Thymallus montanus*).
 Standard Bearer (*Thymallus signifer*).
 Shad (*Alosa sapidissima*).
 Glut Herring (*Pomolobus aestivalis*).
 Inland Alewife (*Pomolobus chrysochloris*).
 Branch Herring, Alewife or Gaspereau (*Pomolobus vernalis*).
 Tailor Herring or Hickory Shad (*Pomolobus mediocris*).
 Suckers (of eastern slope) (*Catostomus teres*, &c., *Myxostoma aureola*, &c.).
 Suckers (of western slope) (*Catostomus occidentalis*, &c.).
 Fall Fish (*Semotilus rhotheus*).
 Chubs (of eastern slope) (*Semotilus corporalis*, &c.)
 Chubs (of western slope) (*Lavinia exilicauda*, *Algansea*, sp., &c.).
 "Pike" or "Salmon Trout" of California (*Ptychocheilus grandis*, &c.,
Pogonichthys inæquilobus, &c.).
 Dace (*Ceraticthys biguttatus*, &c.)
 Buffalo Fish (*Ichthyobus bubalus*).
 Shiner (*Notemigonus americanus*).
 Carp (*Carpiodes cyprinus*, &c.).
 Catfishes (*Amiurus catus*, *A. nigricans*, &c., *Ichthaelurus cærulescens*,
 &c., and many other siluroid fishes).
 Sturgeon of the lakes (*Acipenser rubicundus*).
 Shovel-nose Sturgeon (*Scaphirhynchops platyrhynchus*).
 Eastern Sturgeon (*Acipenser sturio*, etc.).

Fishes (Western Coast).

- Flounders (*Platichthys stellatus*, *Lepidopsetta umbrosa*, &c.).
 "Soles" (*Parophrys vetulus*, *Psettichthys melanostictus*, &c.).
 Halibut (*Uropsetta californiana*, *Hippoglossus*, sp., &c.).
 Tom-cod (*Microgadus proximus*).
 Cod of Alaska (*Gadus macrocephalus*).
 Rock Fish or "Rock Cod" (*Sebastes rosaceus* and species of *Sebastes*,
Somus, *Sebasticthys*, &c.).
 Rock Trout (*Chirus constellatus*).
 "Cod" of San Francisco (*Ophiodon elongatus*).
 Black Fish or "Sheeps-head" (*Pimelometopon pulcher*).
 "Perch" (numerous species of *Embiotoca*, *Holconotus*, &c.).
 "Bass" (*Atractoscion nobilis*).
 Cognard or Little Bass (*Genyonemus lineatus*).
 San Francisco "Smelt" (*Atherinopsis californiensis*).
 Pacific Smelt (*Osmerus elongatus*).
 Salmon (*Oncorhynchus quinnat*, &c.).
 Oulachan (*Osmerus pacificus*).

Sardine or Pilchard (*Pomolobus cæruleus*).

Herring (*Olupea mirabilis*).

Sturgeon (*Acipenser acutirostris*, &c.).

Columbia River Sturgeon (*Acipenser transmontanus*).

II.—FISHING GROUNDS.

MANNER OF DISCUSSION IN REPORT.

On a general map should be indicated the geographical distribution of all animals, &c., which are sought by fishermen; also the location of the principal fishing grounds. On charts of minor scale should be indicated in detail the location of all

Off-shore fishing banks and shoals.

In-shore fishing grounds and ledges.

Seining flats and reaches.

Stations for gill and fixed nets.

Locations of weirs, traps, and pounds.

Seal rookeries.

Lobster crawls.

Oyster and clam beds.

Sponge reefs.

Moss ledges (for "Irish moss").

Each important fishing ground should be described with reference to its topography and climate, location, area, depth of water, character of bottom, temperature of water, currents, character of invertebrate life, etc.

METHOD OF INVESTIGATION.

As has already been stated, maps of the coast will be supplied, drawn on a scale sufficiently large to admit of marking in the various kinds of fishing grounds mentioned above.

Each fishing station should be carefully designated on the map, with its local name, notes on depth of water, and on the kind of fish and invertebrates commonly to be found there. The names of those species best taken there should be underscored.

Temperature observations are daily being taken at about thirty stations on the coast, principally light-ships and signal-service stations. Where convenient it will be well to take surface and bottom temperatures on any good fishing grounds, the date, time of day, state of the clouds and tide being carefully noted. For this purpose a thermometer will be furnished.

When a person engaged in taking observations on temperature is encountered he should be encouraged and his attention called to the importance of keeping the records of the movements of fishes in the last column of the blank (No. 35) furnished them.

III.—FISHERMEN AND FISHING TOWNS.

MANNER OF DISCUSSION IN REPORT.

A.—*General statistics.*

For each of the seaboard, lake, or river townships of the United States, the following statement should be obtained, to be summed up for each State, and for each river, lake, or stretch of coast:

Total population.*

Number of professional fishermen.

Number of semi-professional fishermen.

Number of fitters and owners (fishery capitalists).

Number of clerks and others employed in curing fish and preparing them for market, or in factories of oil, guano, &c.

Number of sail-makers and riggers and caulkers.

Number of seine-makers.

Number of salt-dealers and employés.

Number of ship-carpenters and ship-smiths.

Number of shop-keepers dependent on fishermen.

Number of fishermen's widows and orphans.

Number of families dependent upon fishermen.

B.—*Social, vital, and other statistics.*

To be worked out as fully as convenient in each community of fishermen of considerable size.

Nationality; ancestry; how many fishermen of foreign birth.

Hereditary profession.

Health, diseases—at sea, on shore.

Disasters, past and present years—numerical statements.

Longevity of fishermen and fishermen's wives.

Age of marriage.

Fertility.

Effects of seasons of plenty on birth rate.

Dwellings.

Character of food—at sea, on shore.

Manner of living.

Education.

Amusements—at sea, on shore.

Religious proclivities; morals.

Manner of providing for bereaved families.

Financial profits of active fishermen.

In a town engaged in manufacturing fish, fish-oil, &c. (*e. g.* Boothbay or Lubec, Me.), the same investigation to be prosecuted.

* This will be ascertained by the enumerators in the census.

MODE OF INVESTIGATION.

Each of these topics suggests a line of research which would be more or less instructive in different communities.

The manner of working up these points must be left to the discretion and ingenuity of the investigator. In many instances it will be quite impossible to gain definite information; in others much that is valuable may be obtained which is not even hinted at above. The headings are simply suggestions. *This line of investigation cannot be too fully followed up.*

In working up this division, as well as those which follow (viz: divisions IV, V, VI, and VII), much may be learned by the methods mentioned below.

A.—By interviewing as many practical fishermen as possible.

B.—By interviewing fishery capitalists, owners and fitters of vessels. When there is any chance of success, they should be asked to allow an inspection of their books, for the purpose of obtaining accurate statistics of trade in present and past years. Bookkeepers and clerks may be paid for services in searching records. It is not the object of the investigation to pry into the secrets of private business, and pledges may be given that information obtained from persons engaged in business will be kept secret, and used only in preparing the general statistics of the industry.

C.—By interviewing the "oldest inhabitants," retired fishermen, sea-captains, &c., and obtaining from them reminiscences of former methods, seasons of abundance, &c. The value of information thus obtained cannot be overestimated. Especial attention should be given to it. The following subjects are especially to be studied in this manner:

1. The introduction of new methods of fishing, with dates.
2. The early history of all branches of the fishery prosecuted in that vicinity.
3. Supposed increase and decrease of abundance of fishes.
4. Changes in size and model of fishing-vessels.

D.—By interviewing the local clergymen and physicians with reference to vital and social statistics of fishing population. In the case of clergymen, those who have been for the longest time permanent residents of the community should be visited as well as those who, from more recent acquaintance, may have clearer and stronger impressions.

E.—By obtaining what information may be available from the store-keepers patronized by the fishing population.

F.—By gaining access, as often as possible, to files of local papers preserved in the offices or in town libraries. *This method cannot be too strongly commended.* A week or two might be well spent in ransacking the back numbers of local papers of any fishing town.

IV.—APPARATUS AND METHODS OF CAPTURE.

METHOD OF DISCUSSION AND INVESTIGATION.

NOTE.—In this division it seems scarcely practicable to separate the method of treatment and method of investigation. They are therefore discussed together.

A.—*Apparatus in general use.*

Special apparatus to be described under the head of methods of the fisheries, with reference to its manner of application.

Vessels and boats:

A description of each kind of vessel or boat, with diagrams illustrating peculiarities of rigging or outfit, positions of ice-houses, baits, bins, wells, "slaughter-houses," &c. The different kinds of vessels may be illustrated by engravings.

Whaling ships and schooners.

Sealing schooners.

Cod vessels.

Halibut vessels.

Mackerel vessels.

Oyster vessels.

Block Island boats.

Menhaden steamers, &c.

Circular No. 10 and blank No. 11, which are reproduced in Appendix B, should be used in every fishing port, and should be thoroughly worked out. These require—

1. Name of vessel.
2. Description of rig.
3. Tonnage. (This may be ascertained from the custom-house registers of all vessels of over ten tons; so need not be filled in at the time.)
4. Date of building.
5. Place of building.
6. Number of crew.
7. What fishery engaged in. What kind of outfit.
8. Mode of fishing pursued at different periods.
9. Disposition made of the fish.

A set of these will be furnished with every outfit. Sketches should be made of any peculiar vessel or boats and of the arrangements on deck and below deck.

Also answer the following questions:

10. During how many months of the year, and what months, are these vessels laid up? Are they engaged in other service part of the year?
11. State the seasons at which any of them are engaged in special kinds of fishing.

12. What baits do they use at different seasons? Where and how are they obtained?
13. What is the average length of a trip in the case of vessels on the high seas? Specify for each kind of fishery.

SHORE AND BOAT FISHING.

Answer the following questions for each town:

1. How many small fishing-boats of less than ten tons burden?
2. How many men engaged in boat fishery in summer from dories, rowboats, sailboats?
3. How many in winter?
4. How many, besides those professionally engaged in fishing, make part of their living by fishing?
5. How far from the shore do they fish?
6. Are hand-lines or trawls used? Describe methods of anchoring, bait, trawls.
7. What kinds of fish are chiefly taken? State for different seasons.
8. Estimate the average daily, in the season, and annual catch of a man fishing with hand-lines.
9. Make the same estimate for a man fishing with trawl-line.

STATIONARY APPARATUS.

Attention should be paid to the various kinds of stationary apparatus:

- Traps.
- Weirs.
- Pounds.
- Gill-nets.
- Seines.
- Slides.
- Baskets, &c.

These should be described in detail, illustrated with drawings, and with accounts of the methods of working. The local peculiarities of setting and hauling them should be described also.

Material of construction.

Relation to bars, tides, &c.

Mark the location of each pound, weir, or trap on a chart; also make a diagram of the shape and location of some of the most characteristic, giving—

1. Dimensions of bowls.
2. Length of leader.
3. Material and manner of construction.

Depth of water where they are constructed; dependence on tides, &c.

Answer these questions:

POUNDS AND TRAPS.

1. How many pounds and traps are there in the township?
2. How many and during what months are they kept down?
3. How many men are required to work each one?
4. What are the principal kinds of fish taken?
5. Estimate the average annual catch.
6. Estimate the average daily catch. Usual hours of the day for removing the fish.
7. How many fyke-nets are in use, and how many men are employed in this branch of the fishery?

GILL-NETS.

8. How many gill-nets are in use? Are they drift-nets or stationary nets?
9. What is the usual length and depth?
10. What is the size of mesh?
11. How many and during what months are they used?
12. What kinds of fish are taken in them?
13. How many nets are usually set by one boat?
14. Estimate the average catch to a boat—daily and annually

SEINES.

15. How many drag-seines are in use?
16. What is their length and depth?
17. What is the size of mesh?
18. How many men are required to man a seine?
19. During what months are they used?
20. What kinds of fish are taken in them?
21. Estimate the average annual catch of a seine. Give instances of large hauls.

FISH-POTS AND EEL-POTS.

22. Are any fish-pots or baskets in use?
23. Are any eel-pots in use?
24. Are any lobster-pots in use?
25. What baits are used?
26. State how many men are engaged in each of these branches of fishing; how many pots they use, and what is their average annual catch.

PERSONAL EQUIPMENT.

The peculiar costume and personal appliances of fishermen in different parts of the country.

BAITS.

The whole question of bait, its obtaining, its preservation, and its use.

OYSTER AND CLAM FISHERY.

1. Are there oyster or clam banks in the vicinity?
2. Have there ever been any?
3. Mark their locations on the chart.
4. How many men are employed in this fishery?
5. How many boats?
6. What disposition is made of them, &c.?
7. Describe boats and implements in use.

B.—*Manufacture and trade in the apparatus of the fisheries.*

Boat factories.

Ship yards. (Source of lumber.)

Marine railways. Spar yards.

Rigging and sail lofts.

Anchor foundries.

Ship and boat fitting factories.

Canvas factories.

Cordage factories.

Line and net factories.

Hook factories.

Shipsmiths.

Block factories.

Manufacture of rubber boots, &c.

Manufacture of oil-clothing.

For each of these classes of articles the following facts should be noted:

Location of each factory.

Centers of consumption and drift of trade.

Capital invested.

Men employed.

In case only part of the articles manufactured are consumed in the fisheries, a proportionate estimate should be obtained.

The salt trade, its statistics and history. Early manufacture of salt for use in the fisheries. History.

Search should be made for any traces of ancient salt-works.

C.—*Methods of the fishery.*

Under this head should be described in detail the methods at the present time employed in the various branches of the fishery, with detailed accounts of the peculiar apparatus employed and the manner of

its use. Among many other branches, the following may be mentioned as typical (these need not be touched except at special request):

- The Whale Fishery.
- The Antarctic Seal and Sea-Elephant Fishery.
- The Alaska Seal Fishery.
- The Off-Shore Halibut Fishery.
- The Greenland and Grand Bank Halibut Fishery.
- The Flounder Fishery.
- The Block Island and Noman's Land Cod Fishery.
- The George's Bank Cod Fishery.
- The Grand Bank Cod Fishery (baiting).
- Do. do. (shacking).
- The New England Boat Cod Fishery.
- The Hake Fishery.
- The New York Market Fleet.
- The Boston Market Fleet.
- The San Francisco Market Fleet.
- The Charleston Market Fleet.
- The Alaska and Siberian Cod Fishery.
- The Sword-Fish Fishery.
- The Mackerel Fishery (seining).
- Do. do. (gilling).
- Do. do. (jigging).
- The Bluefish Fishery.
- The Bonito Fishery.
- The Scup Fishery.
- The Striped Bass Fishery.
- The Sea-Bass Fishery.
- The Red-Snapper Fishery.
- The Smelt Fishery.
- The White-fish Fishery.
- The Eastern Salmon Fishery.
- The West-coast Salmon Fishery.
- The Menhaden Fishery.
- The Shad and Alewife Fishery.
- The Herring Fishery.
- The Eel Fishery.
- The Mullet Fishery.
- The Eastern River Sturgeon Fishery.
- The Lake Sturgeon Fishery.
- The Eastern Weir and Pound Fishery.
- The New England Coast Line-Fishery.
- The Middle States Coast Line-Fishery.
- The South Atlantic Coast Line-Fishery.
- The Gulf Line-Fishery.
- The Havana Market Fishery.

The Eastern Fresh-water Fishery.
 The Western Fresh-water Fishery.
 The Great Lakes General Fishery.
 The Green Turtle Fishery.
 The Lobster Fishery.
 The Crab Fishery.
 The Prawn and Shrimp Fishery.
 The Oyster Fishery and Oyster Culture.
 The Long Neck Clam Fishery.
 The Little Neck Clam Fishery.
 The Bait Clam Fishery.
 The Scollop Fishery.
 The Squid Fishery.
 The Sponge Fishery.
 The Irish Moss Trade.
 The Sea-Sand Trade.

V.—PRODUCT OF THE FISHERIES.

METHOD OF DISCUSSION IN REPORT.

Annual yield to be specified by separate articles and in total, with estimated values for the year 1880.

To be specified also by districts, with estimated values.

Yield in past years, returns to be made as complete as possible, and also to be supplemented by authentic accounts of productiveness of particular localities in past years.

(Here might be considered the question of decrease or increase of abundance of individual species.)

(In this chapter may be included much historical matter.)

Comparisons of yield of fisheries of the United States with those of other countries.

METHOD OF INVESTIGATION.

These returns are already provided for in the case of New York, Boston, and Washington. *In every other settlement the study of the markets is the most important thing, especially if there be any shipments of fish to other points.* The New York market blanks (20) or the New England market blanks (31) should be used in making up estimates of the annual product, and the opinions and estimates of several capable men should be obtained. Intelligent estimates may be safely founded upon (1) the study of the number of men or boats employed in each fishery; (2) the number of months the fishing continues; and (3) the estimated average daily catch. *No point should be left until this estimate of the annual product of the local fisheries has been obtained.* In some instances the following table may be more convenient.

Please mark after each kind, in the columns prepared for the purpose, your estimate of the total annual catch, stating definitely whether the estimate is in numbers of fish or barrels; also stating whether the estimate is founded upon records.

	Amount in numbers.	Amount in pounds.	Amount in barrels.
Flounders and Flat Fish			
Hallbut			
Turbot			
Cod			
Tom-cod or Frost Fish			
Haddock			
Pollock			
Hake			
Cusk			
Whiting or Silver Hake			
Redfish or Norway Haddock			
Rock Fish (W. coast)			
Tantog or Black Fish			
Chogset or Cunner			
Perch (W. coast)			
Sword Fish			
Mackerel			
Bonito			
Tunny			
Crevalle			
Spanish Mackerel and Coro			
Pompano			
Dollar-fish or Butter-fish			
Squeteague or Weakfish			
Red or Channel Bass (S. States)			
Drum			
King Fish and Whiting			
Spot and Croaker (S. States)			
Sheepshead			
Porgy, Scup or Scupping			
Sailor's Choice (S. States)			
Grunts and Red-mouths (S. States)			
Sea or Rock Bass or Black-fish (South)			
Red Snapper (S. States)			
Striped Bass or Rock-fish			
Black Bass			
Breams and Pond Fish			
White Perch			
Yellow Perch			
Pike Perch			
Blue-Fish, Skip-Jack, Horse-Mackerel, or Tailor			
Mullet			
Pickrel, Pike, Muskalonge			
Smelt or Frost Fish			
Salmon			
Sea-Trout			
White-Fish (Lakes)			
Lake Trout			
Menhaden, Mossbunker, Porgy, or White-Fish			
Shad			
Alewife or River Herring			
English or Sea Herring			
Tailor Herring, Hickory or Sea Shad			
Suckers, Carp, Buffalo Fish			
Eel			
Sturgeon			
Lamprey			
Squid			
Lobster			
Shrimp			
Crabs			
Clams			
Turtles			
Terrapine			
Alligators (hides)			

VI.—PREPARATION, CARE, AND MANUFACTURE OF FISHERY PRODUCTS.

METHOD OF TREATMENT IN REPORT.

Here should be described the methods of the various devices for utilizing fish after they are caught, with statistics of capital, men employed, etc., as fully in detail as possible. Some of the methods are as follows:

Food.—Uses:

Preservation of living fish—

Well-smacks.

Cars and live-boxes. Fish and lobster.

Fish-ponds.

Refrigeration—

The trade in iced fish.

Sun-drying—

Kench-curing codfish.

Pickle-curing codfish.

Preparation of boneless fish.

Preparation of desiccated fish.

Smoke-drying—

Herring-smoking.

Halibut-smoking.

Sturgeon-smoking, etc.

Brine-salting—

Mackerel-curing.

Whitefish-curing.

Swordfish-curing.

Bluefish-curing, etc.

Pickling—

Pickling eels, herring, salmon, etc.

Canning—

Canning sardines, etc.

Canning salmon.

Canning codfish-balls, etc.

Canning oysters, cooked and raw.

Canning lobsters.

Canning clams.

Canning crabs, anchovies.

Use in the arts:

Leather and fur-dressing. Seal-skins.

Whalebone preparation.

Isinglass manufacture.

Ambergris.

Murexides.

Carbazotates.

Fish guano. Menhaden guano.

Oil rendering.

Whale-oil and its applications.

Menhaden oil.

Cod-liver oil.

Other fish-oil.

METHOD OF INVESTIGATION.

Every manufacturing establishment should be visited, and as fully described as may be possible. When practicable, statistics of the business should be obtained. Secrecy may be promised when necessary. Where the parties interested in manufacturing are unwilling to impart information, estimates should be obtained from their neighbors.

Answer specifically these questions:

1. What are the principal markets for the fish?
2. Are there establishments for canning fish? Are there establishments for canning lobsters? Are there establishments for canning oysters?
3. Are there establishments for smoking?
4. Are there establishments for oil manufacturing?
5. Are there establishments for guano manufacture?
6. Are there establishments for isinglass manufacture?
7. Enumerate these, and obtain statistics as fully as possible.
8. Are the roes of cod saved for use as bait or to be exported? If so, get statistics.

VII.—ECONOMY OF THE FISHERIES.

METHOD OF TREATMENT IN REPORT.

The following questions to be considered in all their bearings for each report. *They should be worked out very fully.*

A.—*Fishery capital and capitalists.*

Building vessels or purchase.

Capital invested in vessels:

In gear or outfit;

In stores for trip or season.

Manner of insurance:

Relations to crew;

Manner of "lay" or copartnership system.

Disposition of fish:

Whether sold fresh or cured by the owners of vessels.

B.—*Labor in the fisheries.*

Relations of crew to "fitters-out."

Shares in the "lay" or copartnership.

- Wages; where "lay" system is not in use.
 - Relations of captain to employer; to vessel; to crew.
 - Share of crew in catch of fish.
 - Chance of crew for promotion.
 - Relation of fishermen's family to shoresmen; are goods advanced on credit?
- These questions to be worked out for each community.

C.—Commerce of the fisheries.

- Market prices, past and present.
- Lines of traffic and centers of consumption for individual articles. (This subject will be covered by Circular No. 42, relating to interior fish trade and consumption of fish.)
- Exports of fishery products.
- Imports of fishery products.
- Duties.

(Here may be considered the past commercial history of the fisheries, utilizing the vast amount of statistical material already tabulated.)

Answer specifically these questions:

1. How many capitalists, owners, or fitters are there in the township or port, as the case may be?
2. Are the vessels owned wholly or in part by any of the crew?
3. Describe the "lay" or business arrangements by which the fishermen are remunerated and the vessels fitted out.
4. Are the fish to be cured by the owner, or are they sold to firms making a special business of curing fish?
5. How many wharves are there where fish are cured or salted? Mention them by name.
6. How many wharves or establishments where fish are iced for immediate shipment?
7. Describe the usual method of insurance of vessels.

METHOD OF INVESTIGATION.

Each of the topics suggested above should be investigated. Both capitalists and employes of all grades should be consulted, and their views given as fully as practicable. The subjects mentioned in Section C will be studied by the office assistants.

VIII.—PROTECTION AND CULTURE.

METHOD OF TREATMENT IN REPORT.

- A.—Fishery laws, past and present; their effect.
- B.—Bounties; their history and results. Drawbacks on salt, &c.
- C.—Fisheries treaties and their results. Seizure of fishing vessels.
- D.—Public fish-culture; its results, its present status, and its prospects.

METHOD OF INVESTIGATION.

The Sections B and C should be inquired into with much care and reported on very fully.

APPENDIX A.

INSTRUCTIONS FOR MAKING OUT ACCOUNTS.

It is desirable, in order to avoid confusion in and rejection of accounts, that the following suggestions be adhered to :

1. Vouchers must be signed in ink, and by the person in whose name the account is made—not “per” any agent or clerk—and the amount expressed both in writing and figures.

2. In the case of partnerships, the name of the firm, nothing more, should be signed by one of its members.

3. When an account is made out in the name of an incorporated company it should be signed by one of its officers with his official character in the company appended.

4. Signatures by mark must be witnessed. If John Smith has a bill and he is unable to write his name, it should be written for him, and then he should place his mark—thus : John + Smith, his mark. Witness : David O’Neill.

5. Accounts for traveling expenses should give the places of departure and destination, supported by subvouchers, such as hotel bills, &c. Each day’s expenses should be mentioned under its date.

6. Hotel bills should give the dates of arrival and departure and the rate per day. Thus a person arriving before breakfast June 20, and leaving after dinner June 24, will have been at the hotel four and a half days, which, at \$3 per day, would amount to \$13.50, and should so express it in the account.

7. Laundry bills and baths will not be allowed.

8. Vouchers for supplies must be in detail, showing the nature, quantities, and rate, as well as the amount, namely : 5 pounds nails, at 5 cents, 25 cts.

9. Accounts for service must give the dates, stating whether inclusive or not, on which such service was performed, and the rate of pay, thus : A man employed from June 28 to July 10, inclusive, would have served 13 days, which, at \$1.50 per day, would amount to \$19.50.

10. Accounts involving subvouchers, some or all of which, for good reasons, cannot be furnished, must be signed by the party, and then taken to a notary public or justice of the peace and sworn to as being correct and for the purpose indicated.

The seal of the officer before whom an account is sworn should be affixed.

APPENDIX B

The following circulars previously issued by the Fish Commission are appended for the information of persons receiving this prospectus :

(10.)

STATISTICS OF THE FISHERY MARINE.

CIRCULAR.

In the absence of any law requiring the registry of fishing-vessels, the statistics of the coast and deep-sea fisheries of the United States are very incomplete, and it is found impossible to gain any definite idea of their extent and value. The present registry-lists, although including all vessels of more than five tons burden, do not indicate the manner in which they are employed.

It is very desirable to obtain full lists of the *fishing-vessels* of the United States, with tonnage, number of men employed, and information regarding their movements which shall be of service in estimating the extent of the various fisheries in these waters; also, similar lists of vessels engaged in the *whale* and *seal* fisheries, in the *lobster* and *oyster* trade, and in the *fish-carrying* trade.

I therefore beg leave to call attention to the accompanying blank tables which have been prepared for this census. They may be filled out as fully as is practicable, although tonnage, date, place of building, and name of master are of less importance than the other data desired, and should be mailed to the U. S. Commission of Fish and Fisheries, Washington, D. C. The method of registry is illustrated by the table on the opposite page.

The information thus obtained will be embodied in a report to Congress, in which full credit will be given to all contributors.

SPENCER F. BAIRD,
Commissioner.

SMITHSONIAN INSTITUTION, *Washington, D. C.*

STATISTICS OF THE FISHING VESSELS OF THE UNITED STATES.

SAMPLE TABLE.

Part of Oldtown, Conn., October 1, 1875.—Recorded by George W. Jackson, collector of customs.

Name of vessel.	Tonnage.	Description of rig.	When built.	Where built.	Name of master.	No. of crew.	What fishery engaged in.	Mode of fishing.	Where fishing.	Disposition made of fish.
Breeze.....	24	Sloop.....	1871	Myrtle.....	Peter Wilbur.....	6	Cod.....	Line.....	Nantucket Shoals.	Carried in ice to New York.
White Squall.	75	Schooner.....	1865	Noank.....	Samuel Fish.....	8	Halibut.....	Trawl.....	George's Banks and Seal Island.	Carried in ice to New York.
Aden.....	32	Schooner.....	1868	Hanover.....	John Smith.....	7	{ Cod and haddock.	Line.....	Nantucket Shoals in summer.	Carried in ice to New York.
							{ Black Fish, &c..	Line.....	Coast of South Carolina in winter.	Charleston market.
Verbena.....	28	Schooner.....	1872	Guildsleeve	Simon Fish.....	5	School-fish.....	Pound.....	Menemsha Bight..	Shipped in ice from Oldtown to New York.
							{ Cod in summer..	Line.....	Nantucket Shoals.	Shipped in ice from Oldtown to New York.
Mary Jane.....	31	Schooner.....	1860	Oldtown.....	John Pike.....	6	{ Mullet, &c., in winter.	Seine.....	Tampa Bay, Fla. and Tortugas.	Mobile market.
Dauntless.....	31	Schooner.....	1865	Oldtown.....	Peter Black.....	6	Grouper and snappers.	Line.....	Cuba.....	Carried in well to Havana.
Nightingale..	14	Sloop.....	1861	Oldtown.....	Simon Smith.....	2	Blue Fish.....	Gill-net.....	Long Island Sound.	Shipped in ice from New London.
Placoid.....	30	Steamer.....	1873	New York..	G. A. Littlejohn..	8	Menhaden.....	Purse seine..	Long Island Sound.	Chapman's factory at Nepeague.
J. F. S.....	20	Sloop.....	1870	Oldtown.....	Henry Spicer.....	9	Menhaden.....	Purse seine..	Long Island Sound.	Chapman's factory at Nepeague.
Acacia.....	20	Sloop.....	1863	Oldtown.....	John Washington..	2	Striped bass.....	Line.....	Block Island Sound.	New London market.
Devilmons..	30	Schooner.....	1869	Mystic.....	J. H. Thompson..	10	Mackerel.....	Line and purse seine.	Bay of Chaleur....	Salted, taken to Boston market.
Gabriel.....	3	Sloop.....	1874	Mystic.....	Robert Henry.....	2	Lobsters.....	40 pots.....	Oldtown Harbor..	New Bedford market.
Herbert Gill.	40	3-masted schooner.	1858	Hackensack.	George Hamilton..	7	Oysters.....	Carrying from	York River, Va., to Boston.	
Bluelight.....	200	Ship.....	1850	New Bedford	I. K. Trumbull....	12	Whale.....	North-Pacific.....	Oil sold at New Bedford.
Leuape.....	60	Schooner.....	1809	Haddam.....	P. Q. Nickerson..	10	Fur-seal.....	S. Sheland Islands	Sold at New London.

(28.)

QUESTIONS RELATIVE TO THE COD AND THE COD FISHERIES.*

OFFICE OF U. S. COMMISSION OF FISH AND FISHERIES,
Washington, D. C.

The most important of the marine food-fishes of Eastern North America is the Cod (*Gadus morrhua*). The fresh fish are extensively sold in Northern markets, while salted and dried they form a staple of great commercial importance.

It is considered very desirable to obtain a full account of the habits, migrations, &c., of this fish, as well as complete statistics of its capture and commercial relations. The statistics of the fisheries of Labrador and the Grand Banks of Newfoundland are particularly desired. I beg leave to call attention to the inclosed table of questions, and to request answers to as many as practicable, to be addressed to the U. S. Commission of Fish and Fisheries, Washington, D. C. This circular may also apply to the codfish of the Pacific coast of North America. Replies should be made on foolscap paper, if equally convenient, and written on one side only of the page.

The information thus obtained will be embodied in a report to Congress, in which full credit will be given to all contributors.

Many very full and satisfactory communications have already been received in response to a former circular containing questions about the cod fisheries. Thanking those who have already responded for their efficient aid, I beg to call their attention to this revised series of questions, and to ask that they will read them attentively and add any new suggestions which may occur to them. Attention is especially requested to the questions relating to migrations and schooling (18-32, inclusive), and very especially to No. 29, which is introduced to elicit information regarding the large schools which have appeared on our coast during the autumn and winter of 1877.

I would also request new answers to questions 62-90, inclusive. The former circular failed to draw out all the information desired upon the statistics of the fisheries.

SPENCER F. BAIRD,
Commissioner.

SMITHSONIAN INSTITUTION, Washington, D. C.

A.—Name.

1. Is the cod ever known by any other name?
2. Are there names for special varieties of the cod?

* These questions may also apply to the other fishes of the cod family, the haddock, pollock, hake, and cusk, and to the halibut and flounder, also scup, sea-bass, and tautog.

50. Is there any marked change in the shape or color of either sex during the breeding season; or any peculiar development of or on any portion of the body, as the mouth, fins, scales, &c.?

51. Are there any special or unusual habits during the spawning season?

52. At what age does the male begin to breed; and at what age the female?

YOUNG FISH.

53. What was the size of the smallest codfish you ever saw?

54. At what season do the young fish appear?

55. What is their food?

56. Are their habits like those of the old fish?

G.—*Enemies, fatalities, &c.*

DISEASES.

57. Are diseased or deformed codfish ever seen?

58. Can you describe them?

59. Have dead fish ever been seen in any quantity?

PARASITES.

60. Are crabs, worms, lampreys, or other living animals found attached to the outside or on the gills of these fish?

ENEMIES.

61. Do other animals, such as whales, seals, birds, and other fish attack or prey upon the cod; can you mention any instances?

H.—*The fisheries.*

IN-SHORE FISHERIES.

62. At what season of the year and for how many months are cod taken so near to your shore that the fishermen can be at home every night?

63. What are the favorite grounds, what is the depth of water, and what the nature of the bottom?

64. How many men are engaged in this fishery, and when not so engaged how are they employed?

65. How many boats, and what kind?

66. How many men do they carry?

67. What kind of gear is used? If trawls or long lines, describe length of line, of gaugings, and of buoy-lines; number and kind of hooks, anchors, and buoys, and manner and time of setting. If hand-lines, describe lines, hooks, and leads.

68. What bait is used; is it different at different seasons; how and where do they get it; how much does it cost?

SCHOOLING.

25. Do cod associate in schools, or are they independent? Answer for the whole year or for particular seasons.

26. Are there different schools in your waters at different seasons?

27. Are there different schools in different places?

28. Do males, females, and young associate together in the same schools?

29. Have any schools of unusual size been observed at any time, particularly in the winter of 1877; if so, at what time did they come and go? Were there any peculiarities in their shape or movements? Were any hooks of a peculiar character found in them which would indicate where they came from?

30. Are the movements of the schools affected by the presence of food, or other fish preying upon them?

31. Are they affected by the ebb and flow of the tide?

32. Do cod at any time refuse to take the hook; if so, why?

ABUNDANCE.

33. Are cod as abundant now as they were five, ten, twenty, and thirty years ago?

34. If not, how do you account for their decrease?

35. Have their haunts and habits been changed by the influence of man?

36. Have their numbers been decreased by overfishing?

37. Will the mother fish take the hook freely?

38. Is the trawl more destructive than the hand-line; if so, why?

39. Do you regard the practice of throwing gurry overboard as injurious to the cod fishery?

E.—*Food.*

40. What do the cod feed upon?

41. What is found in their stomachs?

42. Are they ever seen feeding at the surface; if so, can you describe their movements?

43. Is their food different in different seasons and localities?

F.—*Reproduction.*

SPAWNING HABITS.

44. Where do the cod spawn, and when?

45. Have you ever seen the operation?

46. What is the depth of water in the spawning-grounds?

47. Do the eggs sink to the bottom, or float?

48. What is their color and size? (Compare with sizes of shot.)

49. Do the eggs and the milt ever run from the fish after it is caught?

B.—*Characteristics.*

SIZE.

3. What is the average length and weight of the cod ?
4. What is the weight of the largest individuals ?
5. Are the longest always the heaviest ?
6. Is there any difference in the size of males and females ?
7. Can you estimate the annual rate of growth ?
8. What is the length of a cod one year old, two years old, &c. ?

SHAPE AND COLOR.

9. Are there differences in different fish in the shape and color of body, fins, head, nape, and other parts ?
10. Can you describe these differences ?
11. Do these differences depend upon age, sex, season, habits, food, or kind of bottom ?
12. Do the fish taken at different seasons or in different places vary in shape and color.
13. Are there names for these different kinds or schools ?

C.—*Distribution.*

14. Are there any places on your coast where the cod are not found ?
15. How far from the shore, and in how deep water do they occur ?
16. How close to the shore, and in how shallow water ?
17. Are they ever known to enter brackish water at the mouths of rivers ?

D.—*Movements, &c.*

MIGRATIONS.

18. Do the cod remain with you throughout the year, or are they absent for a time ?
19. If they remain throughout the year, are they to be found always in the same places, or do they approach and recede from the shore with the change of seasons ?
20. If they approach and recede from the shore, when do these movements occur, how long a time do they occupy, and how far do they extend ?
21. Can you explain the cause of these movements ?
22. If they are *entirely* absent at certain seasons, please state carefully at what time they go, how long they are absent, and when they return.
23. Where are they supposed to go, and for what purpose ?
24. By what route do they leave the shore and return ?

69. What is the average annual and daily catch to a man?
70. Is this greater or less than in former years?
71. What would be a large catch for one man now and twenty years ago?
72. Are seines ever used in your vicinity to catch cod?

OFF-SHORE FISHERIES.

73. How many vessels from your vicinity are engaged in the off-shore and bank fisheries; what is their tonnage, rig, and cost? Can you give their names?
74. How are they owned and fitted out; what proportion of cost of outfit is borne by owner, captain, and crew, and what share of the returns? Describe the kind of "lay" customary.
75. How many men do they carry? Are there any officers besides the captain? What proportion of the fishermen are foreigners? Are the men paid wages?
76. What banks do they frequent, and at what seasons?
77. What is the average length of a voyage, and how many voyages in a year?
78. At what depth do they fish?
79. Do they use hand-lines or trawls? Describe the length of these, and the manner of rigging and setting.
80. What bait do they use at different seasons; where and how do they get it? If they buy it, how much does it cost? How much do they take on a trip, and how do they stow it? How long do the different kinds of bait last?
81. How much salt and ice do they carry? Where do these articles come from; how much do they cost?
82. What would be small average and large returns for a vessel for a voyage, and for a year? Estimate in the same way for a single fisherman.
83. Is the number of vessels engaged in this fishery greater or less than it was five, ten, twenty, thirty, and forty years ago?

I.—*Products and fisheries.*

84. What quantity of fresh cod is annually brought to your place? What is its average price? What proportion is brought in vessels engaged in the off-shore fisheries?
85. What quantity of cod is iced for shipment to other places? Where is it sent to?
86. What are the principal markets for salt cod? Do the owners of the vessels dry them, or are they dried by merchants who buy them from the vessels? What is the usual price of salt cod; does it vary much?
87. Are any packed in drums or casks?
88. Are the livers saved? Describe the process of making oil; how much is usually obtained by one vessel during a voyage or year?

89. Are the roes saved? What quantity? Are any exported? To whom are they sold? What are they worth?

90. Are the tongues, sounds or bladders, and napes saved? What are they worth? To whom are they sold?

NAME AND ADDRESS OF OBSERVER:

DATE OF STATEMENT:

(32.)

QUESTIONS RELATIVE TO THE MACKEREL AND THE MACKEREL FISHERIES.*

OFFICE OF U. S. COMMISSION OF FISH AND FISHERIES,
Washington, D. C.

One of the most important of the marine food-fishes of the North Atlantic is the mackerel (*Scomber scombrus*). The fresh fish are extensively sold in Northern markets, while salted they form a staple of great commercial importance.

It is considered very desirable to obtain a full account of the habits and migrations of this fish, as well as complete statistics of its capture and commercial relations. The statistics of the fisheries of the Gulf of Saint Lawrence are particularly desired. I beg leave to call attention to the inclosed table of questions, and to request answers to as many as practicable, to be addressed to the United States Commission of Fish and Fisheries, Washington, D. C. Replies should be made on foolscap paper, if equally convenient, and written on one side only of the page.

The information thus obtained will be embodied in a report to Congress, in which full credit will be given to all contributors:

Many very full and satisfactory communications have already been received in response to a former circular containing questions about the mackerel fisheries. Thanking those who have already responded for their efficient aid, I beg to call their attention to this revised series of questions, and to ask that they will read them attentively and add any new suggestion which may occur to them. Attention is especially requested to the questions relating to migrations and schooling.

I would also request new answers to questions 61-78, inclusive. The former circular failed to draw out all the information desired upon the statistics of the fisheries.

SPENCER F. BAIRD,
Commissioner.

SMITHSONIAN INSTITUTION, Washington, D. C.

* These same questions may apply to the swordfish, bluefish, weakfish or squeteague, and the other sea fishes which visit our coast in summer.

A.—*Name.*

1. Are there names for any special varieties and schools of mackerel?
2. What names are used for the young mackerel at different stages of growth?

B.—*Characteristics.*

SIZE.

3. What is the length and weight of the largest mackerel?
4. Are the mackerel now caught larger or smaller than those of five, ten, or fifteen years ago?
5. Is there any difference in the size of males and females?

SHAPE AND COLOR.

6. Are there differences in different fish, in the shape and color of body, head, fins, and other parts? Can you describe them?
7. Have you ever observed a film over the eyes of the mackerel? If so, at what season of the year? Does it make them blind? Why do you think so?

C.—*Migrations and movements.*

8. At what date did the mackerel appear in your vicinity in 1878? Was this earlier or later than usual?
9. At what date were the first mackerel taken by the southern fleet in 1878? Was this earlier or later than usual?
10. At what date did the mackerel disappear in 1878? Was this earlier or later than usual?
11. Have mackerel ever been taken in winter in your vicinity? Can you give dates and circumstances?
12. Where do mackerel go in winter? For what purpose?
13. When the mackerel appear in the spring, do they come at once or in separate schools? How long are the intervals between the schools? Are the first largest?
14. Do the schools swim high or low? Do they make a ripple on the water? Do they attract birds? If so, what kinds? Do they attract other fish, porpoises, or whales?
15. By what route do they come in to the coast, and what are their subsequent movements?
16. Is their appearance on the coast regular and certain, or do they ever fail for one or more seasons at a time, and then return in greater abundance? If so, what is the reason?
17. Are their movements affected by the ebb and flow of the tide?
18. What are the favorite localities of these fish?
19. What depth of water is preferred by these fish, and how low do they swim?
20. How far from the shore have they been seen?

21. How close to the shore and in how shallow water ?
22. Do they ever enter brackish water at the mouths of rivers ?
23. Does the temperature of the water appear to affect them ?
24. Are there different schools in your waters at different seasons of the year ?
25. Are the fish in the same school usually of the same size ?
26. Are the movements of the schools affected by the presence of other fish preying on them ?
27. When do the fish leave the coast, and is this done by degrees or in a body ?
28. By what route do they leave the coast.
29. How far south have you known mackerel to occur ?

D.—*Abundance.*

30. Have mackerel decreased or increased in abundance within the past ten years ?
31. Does their extensive capture affect their abundance ?
32. When small mackerel are abundant in any given year can you predict a supply of large ones in a year or two ? Can you give any instances ?
33. Has the weather of any given summer any influence on the abundance of the fish in the following year.
34. Can you mention any years in which the mackerel were remarkably abundant ?

E.—*Food.*

35. What do mackerel feed upon ?
36. Are they ever seen feeding at the surface ? If so, can you describe their movements ?
37. Is their food different in different seasons and localities ?
38. Does their food ever burn their stomachs after their capture, and prevent their keeping when iced or salted ? What kind of food has this effect ?

F.—*Reproduction.*

SPAWNING HABITS.

39. Where do mackerel spawn, and when ?
40. How long does the breeding season continue ?
41. What is the depth of water on the spawning grounds ?
42. Do the eggs sink to the bottom, or float ?
43. What is their color and size ? (Compare with sizes of shot.)
44. Have you ever seen the eggs and milt running from the fish after they were caught ? Where and under what circumstances ?
45. Are there any changes in shape or special habits during the breeding season ?

G.—*Enemies, fatalities, &c.*

DISEASES.

46. Are diseased, deformed, or "logy" mackerel ever seen?
 47. Are dead fish ever seen in considerable numbers?

PARASITES.

48. Are crabs, worms, lampreys, and other living animals ever found attached to the mackerel?

ENEMIES.

49. Do other animals, such as whales, seals, birds, and other fishes attack or prey upon the mackerel? Can you mention any instances?

H.—*The fisheries.*

OFF-SHORE FISHERY.

50. How many vessels from your vicinity went mackereling in the summer of 1878? Can you give their names?
 51. How are they employed this winter?
 52. How many of them joined the southern mackerel fleet in the spring?
 53. How many went to the Gulf of Saint Lawrence?
 54. How many carried purse-seines?
 55. When did the first vessel start for the gulf and when did it return?

IN-SHORE FISHERY.

56. How many men are employed in your vicinity in fishing for mackerel with small boats?
 57. How many mackerel gill-nets are employed in your vicinity? Can you give their dimensions and size?
 58. How many weirs or pounds in your vicinity catch mackerel? Can you name their owners?

APPARATUS.

59. By whom and when was the purse-seine introduced on vessels from your port?
 60. By whom and when was the mackerel-jig introduced?
 61. By whom and when was the gill-net introduced?
 62. Are mackerel-gaffs ever used by your fishermen?

I.—*Products of the fisheries.*

63. Do the vessels from your port carry mackerel, fresh, to market at any season of the year? If so, at what season and to what place?
 64. Are any mackerel iced in your vicinity for shipment to other places?

65. Are there inspection laws in force in your State and at your port ?

66. To what markets are your salted fish carried ?

67. Can you estimate the quantity of mackerel taken by boat-fishermen in your vicinity for home consumption ?

NAME OF CORRESPONDENT:

ADDRESS:

DATE OF COMMUNICATION:

(29.)

QUESTIONS RELATIVE TO THE ALEWIFE AND THE ALEWIFE FISHERIES.*

OFFICE OF U. S. COMMISSION OF FISH AND FISHERIES,
Washington, D. C.

Among the most valuable of the fish of the eastern coast of North America is the *Pomolobus pseudo-harengus* or fresh-water herring, which enters the mouths of rivers early in the spring, a little in advance of the shad, and ascends the waters to a greater or less extent, usually known as the herring south of Long Island. It is called alewife throughout the greater portion of New England, and gaspereau in the British Provinces.

For the purpose of eliciting such information as may be procurable relative to the alewife the present circular has been prepared by Mr. Charles G. Atkins, of the United States Fish Commission, who has been charged with the preparation of a report on the subject, to be based in great measure on the answers to be received.

Replies should be made, when possible, on foolscap paper, and written on one side only of the leaf. The questions need not be repeated, but reference made merely to their number, respectively.

Replies should be addressed to United States Fish Commission, Washington, D. C.

SPENCER F. BAIRD,
Commissioner.

SMITHSONIAN INSTITUTION, Washington, D. C.

Questions relative to the alewife, river herring, or gaspereau (*Pomolobus pseudo-harengus*).

A.—Name and varieties.

1. By which name is the fish known in your neighborhood?
2. Does there appear to be more than one variety? If so, what names?

*These same questions may be applied to the shad and other fishes of the herring family, also to the mullet and striped bass.

are given to the different kinds, and how do they differ from each other?
Which is the principal or most abundant variety?

3. Which variety shall you have in mind in your answers to the following questions?

B.—*Characteristics.*

4. What is their average size (both length and weight), or how many to a barrel or bushel?
5. Are they all about of the same size? If not, how much do they vary?
6. Do those of the same "school" or "run" vary in size?
7. What is their color when seen in the water?

C.—*Abundance.*

8. How abundant are they compared with other fish?
9. Have they increased or decreased in numbers since ten, twenty, or thirty years ago? If so, to what extent?
10. If either, what is supposed to have been the cause?

D.—*Movements.*

11. At what date do the alewives first appear in the spring?
12. When are they plentiest?
13. When do they disappear?
14. Are they present during the whole time from their first appearance to their final disappearance, or are there separate "runs" with intervals between?
15. If separate "runs," are the fish of the separate "runs" alike in appearance, size, and behavior? If not, state the difference.
16. Is the water of the district of which you speak salt, fresh, or brackish?
17. How far do they ascend such rivers (naming the rivers) as you are acquainted with?
18. Do they ascend to any lakes and ponds (if so, name them), or run into any brooks?
19. Have their movements up the rivers and streams been interfered with by dams or in any other way, or can they now ascend as far as they were ever accustomed to do?
20. Has there been any change in their habits in any other respect?
21. At what date do old fish leave the fresh waters?
22. Do they appear to go right off to sea, or do they linger awhile about the shores?
23. How far out to sea are they ever found?
24. Are they ever found in the stomachs of cod, hake, pollock, or other fish caught at sea? If you can mention any instances, state where and when the fish were caught.
25. Are they ever taken in seines or gill-nets along with mackerel, menhaden, or other fish? If so, mention instances of date, distance, &c.

26. Where do they spend the winter?

27. In entering a bay or the mouth of a large river at the beginning of the season, where do they first strike the shore? At the point nearest the sea or farther up?

28. Is it known from what direction they arrive when first coming in from sea, or which way they go when returning to it?

29. Do they swim near the surface or bottom?

30. What effect have the weather and tides on their movements?

31. Do they appear to move about by night the same as by day?

32. Have any observations been made as to the temperature of the water at the time they arrive or during their stay, or at the time they ascend fresh-water streams? Will you not, if possible, make such observations?

E.—*Food.*

33. Do you know any facts about the food of this fish?

34. Do they feed while ascending the rivers or while descending?

35. Are they generally feeding while in your vicinity?

F.—*Reproduction and growth.*

36. How do the male alewives differ from the females?

37. Which sex is plentiest, take the season through?

38. Do both sexes come along together in the spring and ascend the fresh-water streams together? If not, which is first, and how much difference in time?

39. Are any of them found in the spring without spawn or milt? If so, how do they compare in size and condition with those that have spawn and milt?

40. Where and at what date do alewives lay their eggs? Mention any facts known to you relative to the act of reproduction.

41. Can you tell anything about the kind of ground selected by them for this purpose and their mode of laying their eggs; whether the eggs stick to plants or stones, and how soon they hatch?

42. Do they ever lay their eggs in brackish water, and do such eggs prosper?

43. About what date are the young hatched?

44. When do they begin to go down toward the sea?

45. How large are they then?

46. Do these young fish swim in schools or singly, near the shore or near mid-stream, at the surface or below it?

47. How fast do they travel?

48. If you have observed at any particular place, state the date at which the young alewives pass that place, and the size of the first and of the last.

49. State any other facts about the behavior of the young fish.

50. How large are they when they reach the sea?

51. Do they go right off to sea and disappear at once, or do they linger about the shores?

52. What is the very latest date at which they are seen on the shore, and their size at that time? Can you furnish a few specimens in alcohol?

53. How large do they get to be in a year?

54. Do they come back to the bays and rivers when a year old, or at any time before they are full grown?

55. In how many years do they attain full size? Give all the facts on which your opinion is based.

G.—*Enemies, fatalities, &c.*

56. Have you observed or heard of any epidemic or other disease afflicting them?

57. Do they ever die in large numbers without apparent cause?

58. Are deformed fish ever seen?

59. Are crabs, lice, worms, lampreys, or other living animals found attached to any part of these fish?

60. What fishes and other animals prey upon the alewife?

H.—*Capture.*

61. By what mode are these fish caught in your vicinity?

62. Give all the facts you can about the different modes of fishing—how the different nets, traps, pounds, &c., are constructed, and how they are worked; the date when they begin to operate, and when they close operations.

63. How many of each of these implements are in use in the district over which your knowledge extends? State definitely the limits of the district included, and give the number of implements exactly if you can.

64. Is the number of such implements greater or less than it was 5, 10, 20, or 30 years ago.

65. Are any of these implements used exclusively or mainly for the capture of alewives?

66. What other kinds of fish do the same implements catch?

67. Name the kinds of fish, if any, which are considered by the fishermen of more importance to them than the alewife, that is, which bring them in more money.

68. Make an estimate, as exact as possible, of the number of alewives caught in each of these modes of fishing; how many to each weir, pound, net, &c., in a season.

69. What is the total catch for the whole district included within the limits given in answer to question 63?

70. What are the local regulations or restrictions in regard to the capture of these fish, the persons authorized to take them, the number allowed, &c.?

I.—*Curing and marketing.*

71. What proportion of the alewives caught are consumed by the fishermen and their families?

72. Where is the surplus marketed?

73. What proportion are sold fresh, salted, or smoked? Give the proportion sold in each way, or better still, if you can, the exact quantity sold in each way, and the purposes to which applied, especially the quantity used as bait.

74. Describe the process of salting and smoking, and in what sort of packages they are sent to market.

75. Where are these marketed fish finally sold to consumers?

76. What are the prices obtained by the fishermen for fresh, salted, and smoked fish?

77. What are the prices paid by the consumers in different districts?

78. Are alewives used to any extent for manure, or any other purpose except food for man?

79. If there is a fishery for alewives in your neighborhood managed by a town or other municipality, state the rules governing the catching and distribution of the fish.

J.—*Sources of information.*

80. To what extent are the above statements drawn from your personal experience and observation? Please to state what opportunities you have had for observation.

81. Can you name any persons who have made a study of the habits of these fish, or collected statistics in reference to them, or any fishermen who have kept records of their catch? If so, please furnish their address.

82. Are there any published statements that bear on this subject?

NAME OF OBSERVER:

OCCUPATION:

P. O. ADDRESS:

DATE OF STATEMENT:

Here furnish the names and addresses of any persons in your neighborhood engaged in the capture and curing of this fish.

(30.)

QUESTIONS RELATIVE TO THE SMELT AND THE SMELT FISHERIES.*

OFFICE OF U. S. COMMISSION OF FISH AND FISHERIES,

Washington, D. C.

The American smelt, of which there are perhaps several species (the best known being the *Osmerus viridescens*), is a fish of considerable

*These same questions may also be applied to the various species related to the alewife, the salmon, lake trout, whitefish, &c.

importance in the fisheries of the United States and of the British Provinces. It is sometimes called frost-fish, from the fact that it makes its appearance in cold weather; but it must not be confounded with another fish known as the Tom-cod (*Microgadus tomcodus*), which resembles the true cod.

The determination of the different species and varieties of this fish, their geographical distribution, habits, statistics, &c., is considered very desirable, and answers to the following questions, prepared by Mr. Charles G. Atkins, will greatly aid in accomplishing this object.

The transmission to the Smithsonian Institution at Washington, from numerous points, of a few perfect specimens of both sexes, preserved in alcohol, will be of much importance in solving the problem.

Answers to the queries should be addressed to the United States Fish Commission, Washington, D. C.

SPENCER F. BAIRD,
Commissioner.

SMITHSONIAN INSTITUTION, Washington, D. C.

A.—*Name and varieties.*

1. Is the smelt known in your vicinity by any other name?
2. Does there appear to be more than one variety of smelt in your neighborhood? If so, how do the several varieties differ from each other, and which is the principal one?
3. Which variety shall you have reference to in the following statement?

B.—*Characteristics.*

4. What is the *average* length and weight of the smelts caught in your neighborhood? State whether your answer to this question is founded on an actual weighing and measuring of the fish, or upon an estimate.
5. What is the greatest size of the smelts nowadays caught in your neighborhood.
6. Are the fish as large as they were years ago? If not, how much difference is there?

C.—*Abundance.*

7. How abundant are the smelts in comparison with other fish?
8. Are they as abundant now as they were five, ten, twenty, or thirty years ago.
9. If they have increased or decreased, how do you account for it?
10. Have their haunts and habits been changed by the influence of man?
11. Have their numbers been decreased by overfishing?

D.—*Migrations and movements.*

12. Are smelts caught in your neighborhood at all seasons of the year? If not, state as definitely as you can the portions of the year when they are caught.

13. Is the water there salt, fresh, or brackish?
14. Do the smelts in your neighborhood appear to be moving in any general direction? If so, which way are they going?
15. Do they seem to belong to one general body, or are there successive runs of them, as though they belonged to separate schools? If the latter, is there any difference in the appearance of the different schools?
16. What fresh-water rivers and streams that you can name do smelts ascend, and how far? And at what dates?
17. Do they ever ascend to lakes and ponds?
18. Have their movements up the rivers been interfered with by dams or in any other way, or can they now ascend as far as they were ever accustomed to do?
19. Has there been any other change in their range?
20. How far out to sea do smelts go?
21. Are they ever caught in seines along with mackerel, menhaden, or other fish? If so, mention any instances you know of, and state where they occurred.
22. Are smelts ever found in the stomachs of cod, lake, pollock, or other fish caught at sea? If you can mention any instances, state where and when the fish were caught.
23. Have any observations been made on the temperature of the water at the time when smelts are present in your neighborhood? If not, can you not make and report them?
24. When they leave your neighborhood where do they go?
25. What effect have the tides and weather on their movements?
26. Do they appear to move about by night the same as by day?
27. State any further facts you may know about the movements of smelts, such as the direction they appear to come from when they arrive in your neighborhood, which way they go when they leave, how fast they travel, whether they swim near the surface or bottom, in schools or singly, &c.

E.—*Food.*

28. What do smelts feed on?
29. Do they feed at the time of spawning?

F.—*Reproduction and growth.*

30. How do the male smelts differ from the females?
31. Which sex is the plentiest the season through?
32. Do the sexes always go in company or does one of them precede the other, especially at the time when they ascend the streams or visit their spawning places?
33. Are barren smelts, that is, containing neither spawn nor milt, ever found?
34. Where and at what date do smelts lay their eggs?
35. Can you tell anything about the kind of ground selected by them?

for this purpose, and their mode of laying their eggs? Are these loose, or do they adhere to each other and to sticks, stones, earth, &c.?

36. When are the young hatched? How long is this after the eggs are laid?

37. Do the young begin to go down to the sea as soon as hatched, or do they stay in the streams awhile, and how long?

38. Do they go off to sea while growing up, or stay about the shores?

39. How fast do the young smelts grow? Give, if you can, their length at hatching, and at one, two, three, and sixth months, and one year old.

40. Do the young move about singly or in schools?

41. Are they found in company with the old fish or not?

G.—*Enemies, fatalities, &c.*

42. Are smelts ever afflicted with epidemics or other diseases?

43. Are they ever found dead in any considerable numbers without apparent cause?

44. Are crabs, lice, worms, lampreys, or other living animals ever found attached to the outside or on the gills of smelts?

45. What fishes or other animals have been known to prey upon smelts? Can you mention instances?

H.—*Capture.*

46. By what mode are smelts caught in your vicinity?

47. Give all the facts you can about the different modes of fishing, how the different nets, traps, pounds, &c., are constructed and how they are worked; and at what date each sort of implement comes in use, and how long it is used each year.

48. How many of each of these implements are in regular use in the district over which your knowledge extends? State definitely the limits of the district included, and give the number of the implements exactly if you can; but if this is impracticable, make the best estimate or general statement you can.

49. If they are taken at all by hook and line, state in what months this is done, whether on the ice or otherwise, whether in brackish water or fresh.

50. How many persons, if any, follow smelt fishing with hook and line as a regular occupation?

51. Do they fish under tents or huts, or in the open air?

52. What sort of places are most favorable for hook and line fishing? Depth and character of water, character of bottom, &c.

53. Describe the hooks and lines.

54. What bait is used?

55. What time of day and of tide are most favorable?

56. What other kinds of fish are taken on hooks along with the smelts?

57. Is hook and line fishing as productive as it used to be, and what number or weight would be an average day's result ?

58. If hook and line fishing for smelts has been abandoned with you, or has become less productive than formerly, state how long ago it was abandoned or when the yield began to fail, and give reasons therefor if you can.

59. If any of the weirs, pounds, nets, seines, &c., mentioned by you as being used in the smelt fishing catch other fish, please to state which kinds of implements, and what other kinds of fish they catch, and which are the most important.

60. Can you make an estimate of the number of smelts caught, or the number of pounds' weight, by each sort of implement mentioned, in a year, and the total annual catch of the district you are speaking about, within the same limits as given by you in the answer to question number 48 ?

I.—Markets and consumption.

61. What proportion of the smelts caught are sold and what proportion consumed by the fishermen ?

62. To what market or markets are those sold mostly sent ?

63. How are they prepared for market ?

64. In what sort of packages are they sent ?

65. What prices do they bring ? How do these prices compare with those of former years ?

66. To what extent are smelts used as bait for other fish ?

J.—Sources of information.

67. To what extent is the above information drawn from your personal experience and observation ? Please to state what opportunities you have had for observation.

68. Can you name any persons who have made a study of the habits of smelts or collected any statistics in reference to them, or any fishermen who have kept records of their business ?

69. Are there any published statements that bear on this subject ?

NAME OF OBSERVER :

OCCUPATION :

P. O. ADDRESS :

DATE OF STATEMENT :

APPENDIX C.

LIST OF SEABOARD COUNTIES, WITH STATEMENT OF NUMBER OF SEABOARD TOWNSHIPS AND POST-OFFICES WITHIN THREE MILES OF TIDE-WATER.

State.	County.	Townships, number.	Post-offices, number.
Maine	Washington	24	32
	Hancock	82	62
	Waldo	9	19
	Knox	13	16
	Lincoln	18	80
	Sagadahoc	10	14
	Cumberland	10	81
York	8	21	
		124	225
New Hampshire	Rockingham	11	17
	Strafford	4	6
		15	23
Massachusetts	Essex	20	89
	Middlesex	6	6
	Suffolk	1	1
	Norfolk	6	18
	Plymouth	11	27
	Barnstable	14	59
	Nantucket	1	7
	Dukes	11	22
Bristol	*		
		75	180
Rhode Island	Newport	7	9
	Bristol	3	5
	Providence	5	13
	Kent	2	9
	Washington	4	19
		21	55
Connecticut	New London	10	23
	Middlesex	8	15
	New Haven	7	18
	Fairfield	9	27
		34	86
New York	Suffolk	9	78
	Queens	6	51
	Kings	6	10
	Westchester	7	16
	Richmond	5	15
		33	170
New Jersey	Cumberland	5	16
	Salem	4	7
	Gloucester	2	8
		11	20
Delaware	Newcastle	6	16
	Kent	5	10
	Sussex	9	23
		20	49

APPENDIX C.—List of seaboard counties, &c.—Continued.

State.	County.	Townships, number.	Post-offices, number.
Maryland	Worcester	6	9
	Somerset	9	15
	Wicomico	5	9
	Dorchester	14	26
	Caroline	2	7
	Talbot	5	13
	Queen Anne	4	6
	Kent	5	16
	Cecil	7	19
	Harford	3	18
	Baltimore	4	8
	Anne Arundel	7	21
	Calvert	3	9
	Saint Mary's	0	20
	Prince George's	5	14
	Charles	9	20
			04
Virginia	Acomack		25
	Northampton		13
	Fairfax		4
	Prince William		7
	Stafford		5
	King George		13
	Westmoreland		14
	Richmond		7
	Essex		11
	Northumberland		6
	Lancaster		9
	Middlesex		10
	Matthews		5
	Gloucester		7
	King and Queen		4
	King William		5
	New Kent		2
	James City		3
	Charles City		4
	Prince George		4
	Surry		3
	York		1
	Warwick		1
Elizabeth City		3	
Isle of Wight		2	
Nansemond		4	
Norfolk		7	
Princess Anne		0	
Alexandria		1	
			189
North Carolina	Currituck		8
	Camden		6
	Pasquotank		2
	Perquimans		5
	Chowan		3
	Gates		2
	Hertford		4
	Bertie		6
	Martin		3
	Washington		4
	Tyrell		3
	Dare		8
	Hyde		10
	Beaufort		14
	Pitt		5
	Paullico		4
	Craven		5
	Jones		3
	Carteret		8
	Onslow		0
	Pender		9
New Hanover		2	
Brunswick		7	
Columbus		8	
			138

APPENDIX C.—List of seaboard counties, &c.—Continued.

State.	County.	Townships, number.	Post-offices, number.
South Carolina.....	Horry.....		7
	Georgetown.....		2
	Charleston.....		7
	Colleton.....		9
	Beaufort.....		11
			86
Georgia.....	Chatham.....		2
	Effingham.....		6
	Savannah.....		6
	Bullock.....		2
	Bryan.....		1
	Liberty.....		3
	Molokan.....		8
	Wayne.....		1
	Glynn.....		6
	Camden.....		8
Chariton.....		2	
			89
Florida.....	Nassau.....		6
	Duval.....		7
	Clay.....		2
	Saint John's.....		5
	Putnam.....		16
	Volusia.....		8
	Brevard.....		5
	Dade.....		3
	Monroe.....		3
	Manatee.....		3
	Hillsborough.....		4
	Hernando.....		1
	Marion.....		1
	Levy.....		2
	La Fayette.....		4
	Taylor.....		1
	Wakulla.....		3
	Franklin.....		2
	Liberty.....		6
Calhoun.....		2	
Washington.....		2	
Walton.....		3	
Santa Rosa.....		3	
Escambia.....		8	
			99
Alabama.....	Baldwin.....		4
	Mobile.....		3
			7
Mississippi.....	Jackson.....		6
	Harrison.....		5
	Hancock.....		3
			14
Louisiana.....	Saint Tammany.....		5
	Orleans.....		4
	Saint Bernard.....		1
	Plaquemines.....		11
	Jefferson.....		3
	La Fourche.....		4
	Tangipahoa.....		1
	Livingson.....		2
	Ascension.....		1
	Saint John Baptist.....		2
	Saint James.....		4
	Saint Charles.....		3
	Terre Bonne.....		1
	Saint Mary's.....		8
Assumption.....		5	
Iberia.....		4	
Vermillion.....		2	

APPENDIX C.—List of seaboard counties, &c.—Continued.

State.	County.	Townships, number.	Post-offices, number.
Louisiana.....	Cameron		2
	Calcasieu		4
			67
Texas.....	Orange.....		1
	Jefferson.....		2
	Chambers.....		4
	Galveston.....		4
	Brazoria.....		3
	Matagorda.....		5
	Calhoun.....		2
	Refugio.....		2
	Aransas.....		3
	San Patricio.....		2
	Nueces.....		1
	Hidalgo.....		2
Cameron.....		1	
			33
California.....	San Diego.....		4
	Los Angeles.....		4
	Ventura.....		2
	Santa Barbara.....		5
	San Luis Obispo.....		6
	Monterey.....		3
	Santa Cruz.....		6
	Santa Clara.....		1
	San Mateo.....		9
	San Francisco.....		2
	Alameda.....		11
	Contra Costa.....		5
	Solano.....		4
	Sonoma.....		5
	Marin.....		9
	Mendocino.....		12
Humboldt.....		9	
Del Norte.....		2	
			98
Oregon.....	Curry.....		3
	Coos.....		10
	Douglas.....		1
	Lane.....		
	Benton.....		4
	Tillamook.....		4
	Clatsop.....		8
	Columbia.....		6
	Multnomah.....		8
	Wasco.....		1
Umatilla.....		1	
			40
Washington Territory.....	Walla Walla.....		1
	Klikitat.....		3
	Skamania.....		2
	Clarke.....		4
	Cowlitz.....		7
	Wahkiakum.....		4
	Pacific.....		8
	Chehalis.....		2
	Clallam.....		3
	Jefferson.....		3
	San Juan.....		5
	Whatcom.....		9
	Island.....		4
	Snohomish.....		5
	King.....		4
Pierce.....		3	
Mason.....		4	
Kitsap.....		4	
			75
Total number of townships and districts from Maine to Maryland inclusive.....		427	
Total number of post-offices.....			1,885