

R E P O R T
 OF THE
 UNITED STATES COMMISSIONER OF FISH AND FISHERIES
 FOR THE
 FISCAL YEAR ENDING JUNE 30, 1894.

The appropriations for the work of the Commission for the period covered by this report were as follows:

Salaries.....	\$172, 120. 00
Miscellaneous expenses:	
Administration	9, 000. 00
Propagation and distribution of food-fishes.....	92, 181. 94
Maintenance of vessels.....	30, 500. 00
Inquiry respecting food-fishes	10, 800. 00
Statistical inquiry	5, 400. 00
For completion of the following stations in—	
Texas, at San Marcos.....	8, 300. 00
Montana, at Bozeman.....	6, 400. 00
Vermont, at St. Johnsbury.....	8, 500. 00
For repairs to Armory Building occupied by the United States Fish Commission	7, 100. 00
Rent of temporary offices and transfer of records.....	2, 000. 00

Detailed report of the expenditures under these appropriations was made to Congress December 3, 1894 (House Mis. Doc. No. 19, Fifty-third Congress, third session).

REPAIRS TO OFFICES.

The building known as the Armory Building and occupied by the offices of the United States Fish Commission was built in 1855 for the care and preservation of military trophies of the Revolutionary and other wars, and for the use of the volunteers and militia of the District of Columbia. In 1874 it was condemned by Col. O. E. Babcock, in charge of public buildings and grounds, as old and unsightly, and its demolition was recommended. From 1877 to 1888 it was used by the United States National Museum for the storage of articles transferred from the Centennial Exhibition at Philadelphia, and the Secretary of the Smithsonian Institution states that the four floors, containing 5,000 square feet, were filled with these articles from top to bottom. These heavy loads had caused the floors to settle to such an extent as to cause apprehen-

NOTE.—The operations of the Commission during the period under consideration were under the direction of Commissioner Marshall McDonald, whose declining health, however, prevented him from preparing a report covering them. His death occurred September 1, 1895. The accompanying report, prepared by the chief clerk of the Commission and the assistants in charge of the divisions, shows the work of the Commission during the fiscal year 1893-94.

sion as to the safety of the building, and it became necessary to make a thorough inspection of it. The examination showed the building to be in a very unsafe condition. Estimates of the cost for its repair, with a detailed report of the condition of the building, were transmitted to Congress, and an appropriation of \$7,100 was made for its repair, to be done under the supervision and direction of the Architect of the Capitol.

On February 19, 1894, the offices were temporarily moved to the Atlantic Coast Line Building, corner Sixth street and Pennsylvania avenue. Soon thereafter the work of repairing was begun and was pushed so energetically that the building was ready for occupancy by June 6, and the offices were moved back to it, the Commission occupying the entire building, the Smithsonian Institution having vacated the portion formerly used by it.

OFFICE OF ARCHITECT AND ENGINEER.

The following is a condensed report of the work of construction at the different stations of the Commission during the year:

Green Lake Station, Maine.—The construction of new rearing ponds, supply flumes and pipes, drains, and grading of the grounds, begun in the preceding fiscal year, was finished. An ice-house was built and a number of minor repairs to the station made.

Craig Brook Station, Maine.—Finishing the constructions begun but not completed during the last year, viz, ice-house, food room, settling reservoir, new supply pipe for outdoor rearing troughs, grading, and making other minor repairs in superintendent's residence and barn.

Woods Hole Station, Massachusetts.—A new coal hoist and run was built in place of the old one, which had become decayed and unsafe.

St. Johnsbury Station, Vermont.—This station comprises 24.65 acres of ground on the west shore of Sleeper River, 1½ miles from St. Johnsbury, Vt. After all plans and specifications were made, the development of this station was begun with the construction of a dam across Sleeper River, from which to supply the hatchery and ponds with river water. The construction of a hatchery and barn was given out by contract; a railroad siding was provided, and roads through the grounds were built; a portion of the grounds was graded, some fencing was done, and the springs on the grounds were partly developed.

Battery Island Station, Maryland.—The damage done by extraordinarily high storm tides in September and again in October, 1893, was repaired. It consisted in repairs to the foundation, floors, porch, roof, and chimney of the dwelling house, the erection of a coal shed, a new front incline to hatchery building, and new foundation for water supply tank.

Fish Ponds, Washington, D. C.—A 2-inch supply pipe was laid from the foot of Seventeenth and B streets NW. to the new northeast pond. The office of the superintendent, which showed some settlement in the floor and partitions, was repaired.

Preliminary plans and an estimate of cost were made for the improvement of the Potomac Flats by a number of large and small ponds, a boulevard, and sea wall, a hatchery building, and extensive landscaping, all of which was laid before Congress with a view of obtaining an appropriation to carry the improvements into effect.

Northville Station, Michigan.—Several of the various ponds of this station were provided with new supply pipes; separate drains for all these ponds were laid; a new supply pipe of wood was substituted for one formerly of terra cotta; a number of springy places in the grounds were drained by blind ditching; and twelve new rearing ponds were constructed, complete with supply pipe, overflow, and drains. A number of repairs to the former pipe lines and reservoirs was also made, and a survey for a proposed new spring-water supply.

Neosho Station, Missouri.—At this station two small reservoirs, formerly of wood, were replaced by a construction of concrete. Two new ponds were constructed and some minor repairs were made to ice-house, pipe lines, and ponds.

San Marcos Station, Texas.—This station comprises 25 acres of land at the head of San Marcos River, close to the city of the same name. A supplementary topographical survey of the grounds was made. The new dam constructed by a committee of citizens at San Marcos was inspected and reported upon unfavorably.

Leadville Station, Colorado.—A survey was made with the view of constructing a dam across Rock Creek, thereby filling several large natural depressions in the hills above the hatchery for storage purposes and for obtaining a larger spring-water supply for the hatchery. The result of the survey showed the impracticability of said proposed construction. Steps were then taken to purchase additional adjoining land in which the Evergreen lakes are situated, and to control, through a new Executive order, all of Rock Creek above said lakes. The purchase of said land was consummated.

Bozeman Station, Montana.—This station comprises 77 acres of ground at the lower entrance to Bridger Canyon, 4 miles from Bozeman. A supplementary survey was made of the grounds, and plans for a hatchery and pond system were prepared.

OFFICE OF MECHANICAL ENGINEER.

The following report exhibits briefly the work done during the past fiscal year in the nature of repairs, alterations, and new work to and in the steam engineering departments at the different stations, upon the cars and in the steamers of the Commission, together with the work done in connection with aquarial exhibits at the different stations and the World's Columbian Exposition:

During the past fiscal year there has been a large amount of work done in the machine shop at Central Station by the machinists and firemen who have been detailed for duty there from time to time. This

work has consisted not only in the machine work incident to the necessary overhauling and repairs to the steam launches and machinery of Central Station, Fish Ponds, Bryan Point Station, and Battery Station, but considerable machine work has been done in the above-mentioned shop for the Put-in-Bay, Duluth, Gloucester, and Woods Hole stations, as also repairs, alterations, and new work to the circulating and steam plants of cars Nos. 1, 2, 3, and 4.

For many years there was located on the third floor at Central Station a cylindrical wooden supply tank for supplying fresh water to the hatching tables. It was found advisable to discontinue this weight upon the floor. The tank was therefore removed, and a 3-inch Watson & McDaniel water-pressure regulating valve was purchased and connected in the main supply system, which proved entirely satisfactory.

The small vertical launch boiler, which was located in the machine shop at Central Station to assist the 15-horsepower horizontal boiler in heating Central Station and the general offices of the Commission, was removed from the shop and erected on car No. 4 to furnish steam for the water and air circulating plants on that car. This boiler being too small to properly assist in heating Central Station and general offices, it was found necessary to make some new arrangement for the increase of boiler power of this station. It was therefore decided to build a new boiler house of sufficient size to allow the introduction of a new 30-horsepower boiler. This boiler was purchased, but after its purchase it was found that the new boiler house could not be erected; and as such a boiler was needed at Woods Hole, it was transferred to that station and there erected.

The steam launch *Blue Wing* was hauled out on the railway and several seams in the hull were calked. The old cabin of this steamer was torn down and a new one erected, the inside and outside were thoroughly painted, the boiler and pumps were overhauled, and extensive repairs were made to the engine.

The steamer *Petrel* was hauled out on the railway, several pieces of rotten plank were removed, and new plank substituted. The moldings around upper deck were renewed, the forward part of the hurricane deck was cut, and a pilot house built. The side curtains were altered. The engine, pumps, boiler, and their attachments were thoroughly overhauled and repaired. The steamer was painted and varnished inside and out. A set of automatic water-glass gauge cocks were put on the boiler. A new steering gear was made and introduced.

The steamer *Canvasback* was hauled out on the railway and the hull repaired. The boiler of this steamer being old and worn out, a vertical steel boiler was purchased, erected, and connected, and the engine and pumps were overhauled and thoroughly repaired.

In order to haul the steamers and other boats out at Battery Island Station, Maryland, a marine railway was constructed and introduced. During a heavy gale here the steamer *Plover* was sunk by having a hole punched through the planking in her hull below the water line.

The steamer was raised, hauled out on the railway, and hull repaired. Extensive repairs were made to its engine and pumps, and a new propeller wheel was purchased and put on. The boiler being old and worn out, a new one was purchased and introduced.

The independent air and feed pump in the steamer *Curlew* not being satisfactory, a new one was made in machine shop at Central Station.

The steamer *Cygnet* was hauled out on the railway and necessary repairs made to the hull. The boiler and pumps were thoroughly overhauled, and extensive repairs were made to the engine.

A new Scotch boiler was built for steamer *Shearwater*, to take the place of the Ward boiler now in the steamer.

Since the introduction about eight years ago of boiler and pumps for the water-circulating and steam-heating plants in car No. 2, it was found necessary to increase the capacity of this car for transporting fry and hatching eggs en route, and as this necessitated an increase of water circulation larger boiler and pumps were purchased, erected and connected in same, the car almost entirely repiped, and the air pump which was removed from car No. 4 erected and connected in order to furnish aeration for transporting tanks.

The 25-horsepower horizontal boiler, which has been in use at the Woods Hole Station for the past nine years, needed such extensive repairs that it was condemned, and the 30-horsepower horizontal boiler which had been purchased for Central Station was transferred to the Woods Hole Station and erected in the boiler room.

The 6-inch wooden suction pipe for the salt-water circulation at the Woods Hole Station, which had been in continual use for the past nine years, was in such bad condition that 225 feet of it was dug up, and new pipe of the same make was laid.

The 6-inch water cylinder of the main circulating pump at Battery Island Station being worn out, a new water cylinder, 10 inches in diameter, was purchased, and will be connected as soon as opportunity offers. There was also purchased and erected at this station a 6,000-gallon wooden supply tank for hatching apparatus, the old tank having been washed away during one of the floods.

As the water around the station at Lake Erie contains so much lime in solution, which causes the accumulation of scale in large quantities in the boilers, a pipe condenser was made in order to condense the exhaust steam from the pumps and radiators, and a small air and feed pump was transferred from the Woods Hole (Mass.) Station, and connected to this condenser. This arrangement allowed the station to be heated by the exhaust steam from pumps and the condensed water to be pumped back into the boilers. The arrangement has worked very satisfactorily.

As the gravity supply of the Duluth (Minn.) Station failed on several occasions on account of drought or freezing up, the steam pumping plant at this station was increased by the transfer from Battery Station of a pump which was there in stock. The wells located on the shore of the lake would not, during the severe cold of the winter, furnish

enough water to supply the necessary amount required in the hatchery, and about 350 feet of 6-inch iron pipe was purchased and laid from the pumps, extending out into the lake about 250 feet into a depth of water of about 12 feet. This pipe was well anchored to the bottom, and since its introduction there has been no trouble in obtaining all the water required. It was found advisable to remodel the hatching apparatus, etc., of this station. A new system of jar battery, hatching and rearing troughs, etc., was made and erected, and the whole piping in the hatchery was rearranged. After the remodeling of the hatchery, it was found that a greater amount of work could be done with considerable saving in water, which has caused a saving in fuel.

WORLD'S COLUMBIAN EXPOSITION.

The exhibit of the Commission at the World's Columbian Exposition, the report covering which appears as an appendix to this volume, had for some time been in complete working order at the opening of the fiscal year. Dr. Tarleton H. Bean continued in charge as representative, assisted by W. DeC. Ravenel, as chief special agent; Prof. S. A. Forbes, as director of the aquarium, and other persons.

The section of Scientific Inquiry, prepared under the direction of Mr. Richard Rathbun, contained illustrations of the marine laboratory of the Commission; models of illustrations of vessels; specimens of seines, trawls, nets, dredges, and sounding machine used in deep-sea work; instruments used in making physical observations; a large series of flexible casts illustrating, chiefly, important economic species; charts and models of the ocean areas investigated, and specimens preserved in alcohol or in a dry state.

The section of Fish-Culture was directly in charge of Mr. W. DeC. Ravenel. In addition to what has already been mentioned it contained apparatus used in modern fish-culture, as well as an historical series showing the changes through which fish-cultural methods have passed; apparatus for collecting and transporting eggs and spawning fish; models and pictures of hatching and rearing establishments; collections showing methods and results of fish-culture; eggs in various stages of development preserved in brine or alcohol; illustrations of the food and enemies, and a collection of fish-cultural literature.

In the hatchery the eggs of the pike perch, yellow perch, and common sucker had all been developed, and about 7,000,000 of fry were planted in Lake Michigan near Jackson Park, and elsewhere. In July a consignment of eggs of the black-spotted trout was received from Leadville, and 70 per cent of them were hatched early in the month. Notwithstanding the high temperature of the water, the fry were kept without considerable loss until an accident to the machinery caused their death.

In the Fisheries section were shown models prepared under the personal supervision of Capt. J. W. Collins, illustrative of vessels and boats now engaged in the fisheries of New England, the Great Lakes,

Chesapeake Bay, Gulf of Mexico, and the Pacific and Arctic oceans, as well as types of historical interest showing the development of fishing craft. This section was also materially improved by the addition of pictures of fishing operations, as well as statistical charts.

The aquarium contained marine fishes and plants obtained along the east and west coasts and the Gulf of Mexico, while the fresh-water supplies were secured from the Potomac, Mississippi, Great Lake basins, and the hatching stations of the Commission.

In the aquarium the salt water reached the very high temperature of 70° early in July, as it had done in the preceding month, and continued very warm, with an occasional fall of a few degrees, until about the middle of August. In September, again, the same difficulty was encountered, but the appliances for perfect aeration and circulation of the water prevented serious loss. In the fresh-water tanks the difficulty was very much greater, the high temperature being accompanied by an outbreak of a fungous disease and a scourge of parasitic protozoans. The fungus destroyed large numbers of catfish, trout, black bass, crappie, pike perch, and other species, while the protozoan was particularly fatal to trout and catfish. Notwithstanding all the drawbacks, the aquarium was one of the most frequented places in the Exposition, and the exhibit was in every way highly creditable.

Immediately after the close of the Exposition such of the aquarium contents as were not required by the Commission were, upon the direction of the Commissioner, transferred to Prof. S. A. Forbes for the State Laboratory of Natural History at Champaign, Ill.

The preparations for the World's Fisheries Congress began shortly before the opening of the Exposition, and were actively continued during the summer. The Commissioner associated with himself Dr. G. Brown Goode, Prof. S. A. Forbes, Dr. T. H. Bean, Mr. E. G. Blackford, Mr. A. Booth, Mr. N. K. Fairbank, and Mr. R. E. Earll as members of a general committee, and upon the invitation of Mr. C. C. Bonney, general chairman of the World's Congress, a large number of men prominent in fish-cultural investigations in various parts of the world were invited to form an advisory council. Invitations were sent out requesting attendance at the sessions of the congress and the preparation of papers to be read at the meetings. Numerous responses were received, and the communications brought together were of a very important character. They form the entire volume of the bulletin of this Commission for 1893.

The formal sessions of the congress were opened in a hall in the Memorial Art Palace, Chicago, October 16, 1893, the Commissioner making the opening address as chairman of the congress, Dr. G. Brown Goode, Hon. E. G. Blackford, and Dr. Hugh M. Smith acting as chairmen of the principal sections. The meetings were brought to a close on December 19 by a fish banquet in the banquet hall of the New York State building, Jackson Park.

Foreign visitors.—A great many persons from foreign countries made a special study of the apparatus and methods employed by the United States Fish Commission. Several of these visitors made reports to their Governments, embracing in them an account of the exhibit of the Commission.

Courtesies.—In addition to the articles deposited by the Commission in the National Museum that institution lent for exhibition numerous objects illustrating fish-culture and the fisheries.

The Bureau of Engraving and Printing furnished a supply of macerated greenback pulp for making casts.

The Department of Agriculture detailed a specialist to investigate a fish parasite which proved very destructive during the progress of the Exposition.

Through the instrumentality of the late Hon. F. B. Stockbridge a number of tank cars belonging to the Standard Oil Company were gratuitously lent for the purpose of conveying salt water from Morehead City, N. C., to Jackson Park, Chicago, the arrangement having been completed through the agent of the company, Mr. Howard Page.

The following railroads granted free transportation to United States Fish Commission cars while engaged in World's Fair work during the fiscal year 1893-94: Chesapeake and Ohio; Chicago and West Michigan; Chicago, Burlington and Quincy; Cleveland, Cincinnati, Chicago and St. Louis; Flint and Pere Marquette; Louisville and Nashville; Michigan Central; Wabash; Burlington, Cedar Rapids and Northern; Chicago and Northwestern; Des Moines, Northern and Western; Illinois Central; Lake Harbor; and Chicago, Milwaukee and St. Paul.

Acknowledgments are due to numerous parties for gifts or loans of models of vessels and boats, apparatus of capture, whaling apparatus, fish-cultural apparatus, angling apparatus, publications, etc., to which reference is made in the report upon the exhibit.

At the close of the Exposition the fishery exhibit of Japan was presented to the United States Fish Commission through Commissioner C. Matsudaira. This was one of the most interesting exhibits in the Fisheries building.

The total expenses of the exhibit to September 30, 1894, amounted to \$89,789.60.

The affairs of the exhibit were wound up before the close of the fiscal year ending June 30, 1894, and the representative returned to his duty in charge of the division of fish-culture.

LIBRARY AND PUBLICATIONS.

The accessions of books to the library, mainly secured by exchange for the publications of the Commission, and by gift, numbered 958 volumes. The policy of distributing the various special papers forming parts of the annual reports and bulletins in advance of the issue of the completed volumes was continued.

The papers issued during the year were as follows:

- Report on the European methods of oyster culture. By Bashford Dean. (Bulletin 1891, pp. 357 to 406.)
- On the classification of the myxosporidia, a group of protozoan parasites infesting fishes. By R. R. Gurley. (Bulletin 1891, pp. 407 to 420.)
- Report upon the investigations of the United States Fish Commission steamer *Albatross* from July 1, 1889, to June 30, 1891. By Z. L. Tanner. (Report 1889-1891, pp. 207 to 342.)
- Report of observations respecting the oyster resources and oyster fishery of the Pacific Coast of the United States. By Charles H. Townsend. (Report 1889-1891, pp. 343 to 372.)
- Report on the coast fisheries of Texas. By Charles H. Stevenson. (Report 1889-1891, pp. 373 to 420.)
- A review of the sparoid fishes of America and Europe. By David S. Jordan and Bert Fesler. (Report 1889-1891, pp. 421 to 544.)
- On fish entozoon from Yellowstone National Park. By Edwin Linton. (Report 1889-1891, pp. 545 to 564.)
- Plankton studies: A comparative investigation of the importance and constitution of the pelagic fauna and flora. By Ernst Haeckel. Translated by George Wilton Field. (Report 1889-1891, pp. 565 to 641.)
- The fishes of Texas and the Rio Grande basin, considered chiefly with reference to their geographical distribution. By Barton W. Evermann and William C. Kendall. (Bulletin 1892, pp. 57 to 126.)
- A study of the fyke nets and fyke-net fisheries of the United States, with notes on the fyke nets of other countries. By Hugh M. Smith. (Bulletin 1892, pp. 299 to 355.)
- The oyster industry of Maryland. By Charles H. Stevenson. (Bulletin 1892, pp. 203 to 297.)
- Summary of the fishery investigations conducted in the North Pacific Ocean and Bering Sea from July 1, 1888, to July 1, 1892, by the U. S. Fish Commission steamer *Albatross*. By Richard Rathbun. (Bulletin 1892, pp. 127 to 201.)
- List of fishes collected at Sea Isle City, N. J., during the summer of 1892. By H. F. Moore. (Bulletin 1892, pp. 357 to 364.)
- Economic and natural history notes on fishes of the northern coast of New Jersey. By Hugh M. Smith. (Bulletin 1892, pp. 365 to 380.)
- On the viviparous fishes of the Pacific Coast of North America. By Carl H. Eigenmann. (Bulletin 1892, pp. 381 to 478.)
- Notes on two hitherto unrecognized species of American whitefish. By Hugh M. Smith. (Bulletin 1894, pp. 1 to 13.)
- Extension of the recorded range of certain marine and fresh-water fishes of the Atlantic coast of the United States. By W. C. Kendall and Hugh M. Smith. (Bulletin 1894, pp. 15 to 21.)
- Notes on fishes from the basin of the Mackenzie River in British America. By Charles H. Gilbert. (Bulletin 1894, pp. 23 to 25.)
- An American fish in Finland. By Oscar Nordqvist. (Bulletin 1894, pp. 27 to 28.)
- Two fertile cyprinoid hybrids. By Karl Knauth. (Bulletin 1894, pp. 29 to 30.)
- A report upon explorations made in Eel River basin in the northeastern part of Indiana in the summer of 1892. By Philip H. Kirsch. (Bulletin 1894, pp. 31 to 42.)
- Notes on the fresh-water fishes of Washington County, Mo. By William C. Kendall. (Bulletin 1894, pp. 43 to 54.)
- World's Fisheries Congress. Report of the secretary of the general committee, by Tarleton H. Bean, and address of the chairman of the general committee, by Marshall McDonald. (Bulletin 1893, pp. 1 to 16.)
- The assimilation of the fishery laws of the Great Lakes. By G. A. MacCallum. (Bulletin 1893, pp. 17 to 20.)
- The decrease of food-fishes in American waters and some of the causes. By A. M. Spangler. (Bulletin 1893, pp. 21 to 35.)
- The sea and coast fisheries. By Daniel T. Church. (Bulletin 1893, pp. 37 to 38.)
- Our ocean fishes and the effect of legislation upon the fisheries. By J. M. K. Southwick. (Bulletin 1893, pp. 39 to 45.)
- The past, present, and future of trout-culture. By W. L. Gilbert. (Bulletin 1893, pp. 47 to 48.)
- The relation of scientific research to economic problems. By George Brown Goode. (Bulletin 1893, pp. 49 to 58.)
- Biological research in relation to the fisheries. By John A. Ryder. (Bulletin 1893, pp. 59 to 63.)
- On the influence of light on the periodical depth migrations of pelagic animals. By Jacques Loeb. (Bulletin 1893, pp. 65 to 68.)
- The investigation of rivers and lakes with reference to fish environment. By Barton W. Evermann. (Bulletin 1893, pp. 69 to 73.)

- The habits and development of the lobster, and their bearing upon its artificial propagation. By Francis H. Herrick. (Bulletin 1893, pp. 75 to 86.)
- The origin of the food of marine animals. By W. K. Brooks. (Bulletin 1893, pp. 87 to 92.)
- Atmospheric and other influences on the migrations of fishes. By J. J. Arnistead. (Bulletin 1893, pp. 93 to 99.)
- Some observations concerning fish parasites. By Edwin Linton. (Bulletin 1893, pp. 101 to 112.)
- On the food of the menhaden. By James I. Peck. (Bulletin 1893, pp. 113 to 126.)
- Some plankton studies in the Great Lakes. By Jacob E. Reighard. (Bulletin 1893, pp. 127 to 142.)
- The aquarium of the United States Fish Commission at the World's Columbian Exposition. By S. A. Forbes. (Bulletin 1893, pp. 143 to 158.)
- Description of the fresh and salt water supply and pumping plants used for the aquarium. By I. S. K. Reeves. (Bulletin 1893, pp. 159 to 161.)
- Observations and experiments on saprolegnia infesting fish. By G. P. Clinton. (Bulletin 1893, pp. 163 to 172.)
- Report on a parasitic protozoan observed on fish in the aquarium. By Charles Wardell Stiles. (Bulletin 1893, pp. 173 to 190.)
- Statistical review of fish-culture in Europe and North America. By N. Borodina. (Bulletin 1893, pp. 193 to 196.)
- Some notes about American fish-culture. By Oscar Nordqvist. (Bulletin 1893, pp. 197 to 200.)
- Fish-culture in Michigan. By Hoyt Post. (Bulletin 1893, pp. 201 to 211.)
- History and methods of whitefish culture. By Frank N. Clark. (Bulletin 1893, pp. 213 to 220.)
- Methods employed at Craig Brook Station in rearing young salmonoid fishes. By Charles G. Atkins. (Bulletin 1893, pp. 221 to 228.)
- The propagation of black bass in ponds. By William F. Page. (Bulletin 1893, pp. 229 to 236.)
- Fish and fishing in British Guiana. By J. J. Quelch. (Bulletin 1893, pp. 237 to 240.)
- Fish-cultural investigations at St. Andrews marine laboratory, Scotland. By W. C. McIntosh. (Bulletin 1893, pp. 241 to 256.)
- Description of the marine hatchery at Dunbar, Scotland. By T. Wemyss Fulton. (Bulletin 1893, pp. 257 to 262.)
- The past, present, and future of the oyster industry of Georgia. By A. Oemler. (Bulletin 1893, pp. 263 to 272.)
- Deep-water oyster culture. By H. C. Rowe. (Bulletin 1893, pp. 273 to 276.)
- Breeding natural food artificially for young fish artificially hatched. By A. Nelson Cheney. (Bulletin 1893, pp. 277 to 279.)
- What we know of the lobster. By Fred Mather. (Bulletin, 1893, pp. 281 to 286.)
- Remarks on the maintenance and improvement of the American fisheries. By Hugh M. Smith. (Bulletin 1893, pp. 287 to 292.)
- Reforms and improvements suggested for the fisheries of Great Britain and Ireland. By J. Lawrence-Hamilton. (Bulletin 1893, pp. 293 to 310.)
- Foul fish and filth fevers. By J. Lawrence-Hamilton. (Bulletin 1893, pp. 311 to 334.)
- Recent experiments in sturgeon hatching on the Delaware River. By Bashford Dean. (Bulletin 1893, pp. 335 to 339.)
- The fisheries of Canada. By L. Z. Jonas. (Bulletin 1893, pp. 341 to 348.)
- The fishing industry of Lake Erie, past and present. By C. M. Keyes. (Bulletin 1893, pp. 349 to 353.)
- Notes on the Irish mackerel fisheries. By William Spotswood Green. (Bulletin 1893, pp. 357 to 360.)
- Past and future of the fur seal. By Joseph Stanley-Brown. (Bulletin 1893, pp. 361 to 370.)
- Notes on the fisheries and fishery industries of Puget Sound. By James G. Swan. (Bulletin 1893, pp. 371 to 380.)
- Report on a collection of fishes from the rivers of central and northern Mexico. By Albert J. Woolman. (Bulletin 1894, pp. 55 to 65.)
- Report of investigations respecting the fishes of Arkansas conducted during 1891, 1892, and 1893, with a synopsis of previous explorations in the same State. By Seth Eugene Meek. (Bulletin 1894, pp. 67 to 94.)
- Notes on the capture of Atlantic salmon at sea and in the coast waters of the Eastern States. By Hugh M. Smith. (Bulletin 1894, pp. 95 to 99.)

The completed volumes issued during the year were the Bulletin for the year 1891, and a report covering the years beginning July 1, 1889, and ending June 30, 1891.

The distribution of publications during the year consisted of 2,800

copies of the complete volumes of reports and bulletins, and 8,300 copies of the separate articles appearing in them.

Under the general title "Reports on an Exploration off the West Coasts of Mexico, Central and South America, and off the Galapagos Islands, in charge of Alexander Agassiz, by the U. S. Fish Commission steamer *Albatross*, during 1891, Lieut. Commander Z. L. Tanner, U. S. N., commanding," the following papers were published in the Bulletins of the Museum of Comparative Zoology, Cambridge, Mass.:

- Report upon rocks collected from the Galapagos Islands. By George P. Merrill. (xvi, No. 13.)
 Preliminary descriptions of new species of Crustacea. By Walter Faxon. (xxiv, No. 7.)
 The Orthoptera of the Galapagos Islands. By Samuel H. Scudder. (xxv, No. 1.)
 Compte-Rendu sur les Pantopodes. Par W. M. Schinkówitsch. (xxv, No. 2.)
 Report on the Turbellaria. By W. McM. Woodworth. (xxv, No. 4.)
 Note Préliminaire sur les Alcyonaires. Par Théophile Studer. (xxv, No. 5.)
 The Hydroids. By Samuel F. Clarke. (xxv, No. 6.)

There were also issued during the year in the "Proceedings of the United States National Museum," under the general title "Scientific results of explorations by the United States Fish Commission steamer *Albatross*," the following papers:

- Report on the *Actinia* collected by the United States Fish Commission steamer *Albatross* during the winter of 1887-88. By J. Playfair McMurrich.
 Descriptions of new genera and species of crabs from the west coast of North America and the Sandwich Islands. By Mary J. Rathbun.
 Report on the mollusk-fauna of the Galapagos Islands, with descriptions of new species. By Robert E. C. Stearns.
 Report on the pteropods and heteropods collected by the United States Fish Commission steamer *Albatross* during the voyage from Norfolk, Va., to San Francisco, Cal., 1887-88. By James I. Peck.
 Catalogue of a collection of birds made in Alaska by Mr. C. H. Townsend during the cruise of the United States Fish Commission steamer *Albatross*, in the summer and autumn of 1888. By Robert Ridgway.
 On *Cetomimida* and *Roncheletiida*, two new families of bathybial fishes from the northwestern Atlantic. By G. Brown Goode and Tarleton H. Bean.
 A revision of the order *Heteromi*, deep-sea fishes, with a description of the new generic types *Macdonaldia* and *Lipogenys*. By G. Brown Goode and Tarleton H. Bean.
 On *Harriotta*, a new type of chimaeroid fish from the deeper waters of the northwestern Atlantic. By G. Brown Goode and Tarleton H. Bean.
 Descriptions of new genera and species of crabs of the family *Lithodida*, with notes on the young of *Lithodes camtschaticus* and *Lithodes brevipes*. By James E. Benedict.
 Report upon the crustacea of the order *Stomatopoda* collected by the steamer *Albatross* between 1885 and 1891, and other specimens in the United States National Museum. By Robert Payne Bigelow.

COURTESIES RECEIVED AND EXTENDED.

The Treasury Department, through Mr. J. Stanley-Brown, furnished base-maps of the seal rookeries of the Pribilof Islands showing their condition in the years 1891 and 1892, and negatives of photographs of the rookeries taken during the latter year; also enlarged photographic reproductions of the charts of the same region made by Mr. Henry W. Elliott in 1890.

The United States Coast and Geodetic Survey supplied its charts as issued, and also met special requests for additional copies of charts needed for use in the inquiries conducted by the Commission. At the

request of the Fish Commission, Mr. Homer P. Ritter, assistant, was detailed to take charge of a survey of the oyster grounds of Mobile Bay and vicinity.

The General Land Office of the Interior Department furnished copies of maps of Montana, New Mexico, and Nevada.

The Post-Office Department supplied a full mounted set of post-route maps of the United States.

Acknowledgments are due Gen. Albert Ordway, commanding the District of Columbia militia, for the loan of tents and accessories for use at the Bryan Point Station of the Commission during the shad-hatching season.

From the health officer of the District of Columbia were received monthly returns of the receipts of fishery products at the Washington markets.

Acknowledgment is due to the Commercial Department of the London, England, Board of Trade for statistics of the fisheries of the coasts of England and Wales, and to the Fishery Board of Scotland, Edinburgh, for similar statistics of the fisheries of the coast of Scotland.

The Boston Fish Bureau, Boston, Mass., furnished daily reports of the receipts of fish at the Boston markets.

In accordance with the instructions of the President of April 9, 1894, the Commission's steamer *Albatross* was transferred to the Navy Department to assist in the patrol of Bering Sea and the North Pacific Ocean, for the enforcement of the regulations governing vessels engaged in fur-seal fishing provided for by the Paris Tribunal of Arbitration. In this duty she was employed till October 15, when she was returned to the Commission.

The United States Coast and Geodetic Survey was furnished with hydrographic data secured by the vessels and field parties of the Commission.

At the request of the Commissioners of the District of Columbia, the steam launch *Blue Wing* was placed at their disposal as a patrol boat pending repairs to the municipal harbor boat.

In compliance with the request of Mr. H. B. Vincent, president of the Ohio Fish and Game Commission, the United States Fish Commission operated the State hatchery at Sandusky during the season of the propagation of the pike-perch, commencing April 5, 1894. The aggregate of eggs placed in the hatchery was 54,800,000. The output of fry was 32,600,000, of which 13,700,000 were distributed in Kentucky waters, and 18,900,000 placed at the disposition of the Ohio Commission. The last shipment of fry was made May 10.

At the request of the governor of Virginia, the launch *Petrel* and crew were detailed in the work of surveying the natural oyster grounds of Virginia, under the direction of Mr. J. B. Baylor, assistant, United States Coast and Geodetic Survey.

PROPAGATION AND DISTRIBUTION OF FOOD-FISHES.

The work accomplished during the year in the propagation of food-fishes is exhibited by the following summary of production:

Summary of fish and eggs furnished by stations.

Source of supply.	Species.	Eggs.	Fry.	Adults and yearlings.
Craig Brook, Me	Atlantic salmon	170,000		233,308
	Landlocked salmon		6,000	1,005
	Brook trout			7,330
	Rainbow trout		500	471
	Swiss Lake trout			30
	Lock Leven trout			40
Green Lake, Me	Von Behr trout			18
	Landlocked salmon	79,000		143,481
	Sea salmon			3,908
	Brook trout	46,000		5,500
	Lock Leven trout			21,468
	Von Behr trout			36,803
Gloucester, Mass	Rainbow trout			400
	Lake trout		25,000	
	Cod		24,617,000	
Woods Hole, Mass	Haddock		19,500	
	Lobster		9,332,000	
	Cod		1,254,000	
Delaware River (steamer Fish Hawk)	Flatfish		1,795,000	
	Lobster		69,066,000	
Battery Island, Md	Shad	1,500,000	5,768,000	
Bryan Point, Md	Yellow perch			150
	Shad	5,634,000	22,645,000	
Central Station, Washington, D. C.	Shad	27,934,000		
	Whitefish		21,082,000	
	Landlocked salmon		3,800,000	
	Brook trout		2,500	
Fish Ponds, Washington, D. C.	Rainbow trout		10,500	
	Shad		22,000	
	Carp			1,000,000
	Tench			51,802
	Golden tench			10,022
	Goldfish			431
	Golden ide			8,427
	Black bass			1,947
	Black bass			12,330
	Black bass			90,640
Wytheville, Va	Rainbow trout	104,500	15,000	20,750
	Rock bass			40
	Black bass			790
	Carp			2,649
Put-in-Bay, Ohio	Goldfish			
	Whitefish	6,000,000	21,710,000	
	Pike perch	5,000,000	177,700,000	
	Lake herring		30,005,000	
	Lake trout		121,000	
	Yellow perch		70,000	
Northville, Mich	Brook trout	105,000	6,000	29,100
	Von Behr trout	100,000		8,472
	Loch Leven trout	85,000	24,000	10,600
	Lake trout	1,100,000	102,000	19,593
	Quinnat salmon		40,000	
	Whitefish	200,000	13,050,000	
Alpena, Mich	Whitefish		10,100,000	
	Lake trout		2,540,000	
	Brook trout		10,000	
Duluth, Minn	Pike perch		8,000,000	
	Black bass			13,642
	Crappie			8,542
	Catfish			16,597
	Warmouth bass			2,328
	Sunfish			219
	Yellow perch			262
	Pike			100
	Rock bass			30
	Rainbow trout	287,500	2,000	52,513
Quincy, Ill	Catfish			1,059
	Black bass			630
	Rock bass			4,710
	Tench			9,210
	Carp			2,275
	Goldfish			4,231
	Golden ide			18
Neosho, Mo	Golden ide			

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Summary of fish and eggs furnished by stations—Continued.

Source of supply.	Species.	Eggs.	Fry.	Adults and yearlings.
Leadville, Colo.....	Brook trout.....		23,000	35,900
	Loch Leven trout.....			19,800
	Black-spotted trout.....			11,100
	Rainbow trout.....		11,000	950
	Von Behr trout.....			1,450
	Yellow-finned trout.....			700
Baird, Cal.....	Quinnat salmon.....	7,500,000	438,500	
Fort Gaston, Cal.....	Rainbow trout.....			5,450
	Steelhead trout.....	50,000		
Korbel, Cal.....	Silver salmon.....		280,000	
	Steelhead trout.....	25,000	308,500	
Clackamas, Oreg.....	Quinnat salmon.....		213,000	

The details of the distribution of the foregoing product are given in the accompanying report of the assistant in charge of the division of fish-culture. Thirty-three species of fishes and one crustacean, the lobster, were distributed, the kinds and number of each being given in the following table:

Summary of distribution.

Kind of fish.	Eggs.	Fry.	Adults and yearlings.	Total.
Spotted catfish.....			16,556	16,556
Catfish (common).....			1,059	1,059
Carp.....			47,757	47,757
Tench.....			17,820	17,820
Goldfish.....			13,391	13,391
Golden ide.....			1,780	1,780
Golden tench.....			272	272
Shad.....	3,324,000	α 53,509,000	1,000,000	57,833,000
Quinnat salmon.....	7,500,000	690,500		8,190,500
Silver salmon.....		280,000		280,000
Atlantic salmon.....	170,000		235,306	405,306
Landlocked salmon.....	79,000	8,500	140,434	227,934
Steelhead trout.....	75,000	308,500		383,500
Loch Leven trout.....	65,000	24,000	50,914	139,914
Rainbow trout.....	372,000	62,500	137,058	561,558
Von Behr trout.....	100,000		45,774	145,774
Black-spotted trout.....			11,000	11,000
Brook trout.....	138,000	58,000	75,079	271,079
Yellow-finned trout.....			700	700
Lake trout.....	1,100,000	2,781,000	19,390	3,900,390
Whitefish.....	6,200,000	48,750,000		54,950,000
Lake herring.....		30,005,000		30,005,000
Pike perch.....	5,000,000	181,700,000		186,700,000
Pike.....			100	100
Yellow perch.....		70,000	340	70,340
Black bass.....			22,783	22,783
Rock bass.....			18,981	18,981
Warmouth bass.....			2,161	2,161
Crappie.....			8,218	8,218
Sunfish.....			170	170
Cod.....		25,871,000		25,871,000
Haddock.....		19,500		19,500
Flatfish.....		1,795,000		1,795,000
Lobster.....		78,398,000		78,398,000
Total.....	24,123,000	424,320,500	1,867,043	450,310,543

a In addition to these, 2,109,000 were deposited for rearing in the fish ponds, Washington, D. C.

NOTE.—In addition to the foregoing there were furnished for distribution, but lost in transit, during the year: 684,000 shad fry, 7,000 lake-trout fry, 4,000,000 pike-perch fry, and the following adults and yearling fish: 41 spotted catfish, 7,110 carp, 1,412 tench, 1,915 goldfish, 1,990 Atlantic salmon, 4,052 landlocked salmon, 1,000 Loch Leven trout, 13,338 rainbow trout, 989 Von Behr trout, 100 black-spotted trout, 751 brook trout, 239 lake trout, 72 yellow perch, 3,859 black bass, 6,509 rock bass, 187 warmouth bass, 824 crappie, 49 sunfish, and 68 golden ide.

There were also collected from sloughs and deposited in the St. Francis River near Marked Tree, Ark., 8,500 fingerling crappie, and from the sloughs and deposited in the Illinois River near Meredosia, Ill., 21,100 white perch, 25,000 sunfish, 23,000 carp, 2,000 warmouth bass, 500 pike perch, 8,600 white bass, 1,000 black bass, 2,000 crappie, and 8,900 pike; but none of these figures are included in the above table.

STATE FISH COMMISSIONS.

The policy of extending all possible aid to the fish commissions of the different States and Territories in the stocking of their respective waters was continued, and the aid thus given during the year is here shown:

State or Territory.	Species.	Eggs.	Fish.
California.....	Quinnat salmon.....	7,500,000	.....
	Steelhead trout.....	50,000	.....
Colorado.....	Loch Leven trout.....	20,000	.....
	Rainbow trout.....	.....	475
Connecticut.....	Atlantic salmon.....	25,000	.....
	Von Behr trout.....	20,000	.....
	Lake trout.....	100,000	.....
	Whitefish.....	200,000	.....
Georgia.....	Carp.....	.....	3,000
	Goldfish.....	.....	30
	Golden ide.....	.....	100
Illinois.....	Rock bass.....	.....	600
	Catfish.....	.....	a 2,800
	Black bass.....	.....	a 802
	Rock bass.....	.....	a 30
	Warmouth bass.....	.....	a 150
	Crappie.....	.....	a 1,000
	Spotted catfish.....	.....	300
Iowa.....	Tench.....	.....	50
	Goldfish.....	.....	100
	Black bass.....	.....	100
Kansas.....	Goldfish.....	.....	30
	Rainbow trout.....	.....	471
Maine.....	Lake trout.....	.....	.....
Massachusetts.....	Carp.....	100,000	.....
	Goldfish.....	.....	2,500
Minnesota.....	Golden ide.....	.....	50
	Loch Leven trout.....	.....	25
	Rainbow trout.....	20,000	.....
	Von Behr trout.....	42,000	.....
	Brook trout.....	20,000	.....
	Lake trout.....	20,000	.....
	Lake trout.....	100,000	.....
	Goldfish.....	.....	100
	Golden ide.....	.....	50
	Rainbow trout.....	50,000	.....
Nebraska.....	Rainbow trout.....	23,000	.....
	Brook trout.....	20,000	.....
	Lake trout.....	100,000	.....
	Lake trout.....	40,000	.....
Nevada.....	Rainbow trout.....	25,000	.....
New Hampshire.....	Atlantic salmon.....	.....	5,000
	Shad.....	.....	b 5,414,000
New York.....	Atlantic salmon.....	2,000,000	.....
	Landlocked salmon.....	60,000	.....
	Lake trout.....	30,000	.....
	Lake trout.....	300,000	.....
	Whitefish.....	6,000,000	.....
	Pike perch.....	5,000,000	.....
Ohio.....	Pike perch.....	.....	b 18,900,000
	Atlantic salmon.....	60,000	.....
Pennsylvania.....	Lake trout.....	100,000	.....
Utah.....	Landlocked salmon.....	.....	1,000
	Rainbow trout.....	30,000	.....
	Von Behr trout.....	20,000	.....
	Brook trout.....	20,000	.....
Vermont.....	Lake trout.....	300,000	.....
	Goldfish.....	.....	100
Wisconsin.....	Rainbow trout.....	45,000	.....
Wyoming.....	Rainbow trout.....	15,000	.....
	Von Behr trout.....	.....	.....

a Deposited by U. S. Fish Commission in waters designated by State commissioners. b Fry.

FISH-CULTURAL AID EXTENDED TO FOREIGN COUNTRIES.

During the year eggs of fishes propagated by the Commission were furnished the following foreign countries:

Canada.—Mr. W. Greenough, Portneuf, was furnished with eggs of the rainbow trout.

Mexico.—Eggs of the Loch Leven trout and Von Behr trout were supplied to E. Chazari for the Mexican Government.

United States of Colombia.—At the request of Lieut. H. R. Lemly yearling golden tench and eggs of the landlocked salmon and brook trout were forwarded to the Government of the United States of Colombia.

Belgium.—Maj. W. Turner, of Bertrix, was supplied with eggs of the rainbow trout.

France.—Eggs of the rainbow trout were shipped to Mr. A. Geoffroy St. Hilaire and Mr. Raveret-Wattel for the Société Nationale d'Acclimatation at Paris.

Scotland.—Brook-trout eggs were sent to Mr. J. J. Armistead, Killywhan, Scotland.

Switzerland.—At the request of the Swiss Government eggs of the brook trout were shipped to Switzerland, and upon arrival were reported in very good condition.

Japan.—Eggs of the steelhead trout were forwarded to Japan through the Japanese consul at San Francisco, Cal.

FREE TRANSPORTATION FURNISHED BY RAILROADS.

The limited appropriation made for the conduct of the fish-cultural work of the Commission would necessitate the distribution of the product of the different stations to neighboring waters, thereby preventing the introduction of desirable food-fishes in suitable waters distant from the source of supply, were it not for the generous aid extended by many of the railway companies of the country. Even at the very favorable rate granted by the roads demanding compensation for the transportation for the cars and messengers of the Commission, the value of the transportation furnished during the year would have aggregated a cost of over \$13,000. In the following table is given the names of the railway companies extending this aid, and the amount of mileage respectively furnished:

Table showing aid extended by railroads.

Name of railroad.	Cars.	Messengers.	Total.
Atchison, Topeka and Santa Fe.....	1, 278	183	1, 461
Baltimore and Ohio.....	766	.....	766
Burlington, Cedar Rapids and Northern.....	1, 466	.....	1, 466
Baltimore and Lehigh.....	.....	39	39
Chesapeake and Ohio.....	2, 088	70	3, 058
Chesapeake, Ohio and Southwestern.....	337	.....	337
Chicago and Great Western.....	.....	170	170
Chicago and Northwestern.....	1, 163	.....	1, 163
Chicago and West Michigan.....	548	.....	548
Chicago, Burlington and Quincy.....	6, 540	264	6, 804
Chicago, Milwaukee and St. Paul.....	1, 028	191	1, 219
Chicago, St. Paul, Minneapolis and Omaha.....	372	.....	372
Cleveland, Cincinnati, Chicago and St. Louis.....	4, 079	140	4, 219
Delaware and Hudson River.....	533	294	827
Denver and Rio Grande.....	1, 048	2, 025	3, 073
Des Moines, Northern and Western.....	84	.....	84
Detroit, Bay City and Alpena.....	2, 254	.....	2, 254
Duluth and Iron Range.....	12	.....	12
Duluth, South Shore and Atlantic.....	168	.....	168
Flint and Pere Marquette.....	3, 588	.....	3, 588
Fremont, Elkhorn and Missouri Valley.....	.....	18	18
Fort Worth and Denver City.....	.....	678	678
Grand Rapids and Indiana.....	222	218	440
Great Northern.....	144	.....	144
Illinois Central.....	610	17	636

Table showing aid extended by railroads—Continued.

Name of railroad.	Cars.	Messen- gers.	Total.
International and Great Northern.....	234	.....	234
Jacksonville Southeastern.....	206	.....	206
Jacksonville, Tampa and Key West.....	112	.....	112
Kansas City, Fort Scott and Memphis.....	078	282	058
Kansas City, Pittsburg and Gulf.....	170	.....	170
Lake Erie and Western.....	161	.....	161
Lake Harbor.....	20	.....	20
Louisville and Nashville.....	2,205	432	2,037
Maine Central.....	.....	3	3
Missouri, Kansas and Texas.....	2,568	.....	2,568
Missouri Pacific.....	1,444	.....	1,444
Michigan Central.....	10,868	76	10,944
Minneapolis, St. Paul and Sault Ste Marie.....	322	.....	322
Mobile and Ohio.....	126	.....	126
Northern Pacific.....	3,312	2,020	5,332
Quincy, Omaha and Kansas City.....	.....	108	108
St. Louis and San Francisco.....	2,142	353	2,495
St. Louis, Iron Mountain and Southern.....	544	.....	544
Texas and Pacific.....	1,020	342	1,368
Union Pacific.....	5,038	909	5,947
Wabash Railroad.....	2,700	879	3,579
Wabash, Chester and Western.....	28	.....	28
West Virginia and Pittsburg.....	208	.....	208
Wilmington and Northern.....	.....	82	82
Wisconsin Central.....	1,796	.....	1,796
Total.....	65,093	9,793	74,886

ADDITIONAL FISH-CULTURAL STATIONS.

On June 9, 1894, Hon. H. H. Bingham introduced in the House of Representatives the following resolution:

Resolved, That the United States Fish Commissioner be, and is hereby, directed to report to the House of Representatives the desirability of the Government establishing a fish-hatchery in the grounds of the Zoological Society, Philadelphia, on the Schuylkill River, in the city of Philadelphia, State of Pennsylvania.

A similar resolution was presented to the Senate on July 19, 1894, by Hon. M. S. Quay.

In replying to this resolution the Commissioner expressed an opinion adverse to the establishment of a station as proposed thereby, for the reason that it would be improper to locate Government works on property not freely open to the public, the Zoological Society charging an admission fee for entrance to its grounds. It was also ascertained that title to the site proposed for a station could not be vested in the United States, as required by law.

Fish-hatchery at San Marcos, Tex.—The release of the trustees under the trusts given to secure certain bonds issued by the San Marcos Water Company, mentioned in a previous report as required by the Attorney-General as necessary before the deed of said company conveying to the United States certain rights would vest a valid title to the same, were secured, and on September 27, 1893, the Attorney-General certified to their sufficiency to convey with the deed a proper transfer of the easements mentioned. Pending the erection of the dam across the San Marcos River, agreed to be built by the San Marcos Water Company and the citizens of San Marcos, settlement of the consideration to be paid was deferred. Payment for the tract of land purchased from Mr. W. D. Wood was made June 18, 1894.

Fish-hatchery, New York.—During July, 1893, a further investigation for a suitable site for the establishment of a fish-cultural station for the propagation of salmon as well as whitefish was made by Mr. Frank N. Clark, superintendent of the Northville, Mich., Station. The result of this examination demonstrated the impracticability of securing, within the limited territory specified in the appropriation act, a location such as was necessary for a station to be conducted on the plan originally contemplated. It was therefore decided to confine our attention to the increase of the principal commercial fishes of Lake Ontario—whitefish, lake trout, and the pike perch. On May 26, 1894, instructions were given the chief clerk and the engineer of the Commission, Mr. Gill and Mr. Reeves, to examine the eastern shore of Lake Ontario in New York for a location affording facilities for the propagation of these fishes. They recommended Cape Vincent, on the St. Lawrence River at the outlet of the lake, and secured options for the sale of two pieces of property affording the necessary requirements. One of these embraced a lot having a water front of about 115 feet on the river and extending about 200 feet to the main street of the village, and in near proximity to the railroad station, improved by a substantial stone building 60 feet by 40 feet, with a lean-to of 24 feet by 65 feet, and a large detached brick chimney tower. This building, which was formerly used as a grist mill, has walls between 2 and 3 feet thick, with their foundations on the solid rock, and is in close proximity to the river. It has three floors, a basement, and an attic, which afford ample facilities for hatcheries and office and sleeping accommodations. The option also provided in case of sale for the construction of a stone-crib wharf into the river in front of the building for the proper placing of the necessary water pipes for the supply of the hatcheries. The compensation to be paid was fixed at \$3,500. The proposal has been accepted, and the necessary steps will be taken for the acquisition of the property.

Tennessee.—Under provision of an act approved August 5, 1892, authorizing an "investigation and report respecting the advisability of establishing a fish-hatching station at some suitable point in the State of Tennessee," investigations were made in that State during the September and October, 1893, and a report thereon submitted to Congress January 24, 1894 (Mis. Doc. No. 52, Fifty-third Congress, second session). The site appearing to offer the more favorable conditions for a station was one several miles distant from the town of Athens, McMinn County, though its distance from Athens, where the labor and supplies needed for the maintenance of a station must be obtained, would prove a serious drawback. It was recommended, however, that a final selection be deferred, should Congress direct the establishment of a station in Tennessee, till further comparisons of the sites mentioned in the report could be made. For the establishment of the station an item of \$12,000 was submitted.

Iowa, Nebraska, South Dakota, and Wyoming.—Reference is made in the Commissioner's preceding report to the investigations in these States for the purpose of determining, as directed by Congress, the advisability of establishing in them fish-cultural stations. The results of these investigations were presented to Congress on January 24, 1894 (Mis. Doc. No. 53, Fifty-third Congress, second session). In this report the following conclusion was submitted:

From a consideration of the foregoing results of the examinations in the States of Wyoming, South Dakota, Iowa, and Nebraska, I would recommend the establishment of but one station to supply the needs of South Dakota, Iowa, and Nebraska, Wyoming to be cared for by the station now being established at Bozeman, Mont. If a new station is authorized, either Manchester or Decorah, Iowa, should be selected. Which to recommend, however, I am not ready to say, final selection being dependent upon a careful consideration of the respective sites from an engineering standpoint, the certainty of their being secured by the Government, their cost, the expense of adapting the water supply, etc., questions which can not be determined in advance of the actual authorization of a station.

In case a station was authorized, an appropriation of \$15,000 was recommended.

PROTECTION OF FISH IN POTOMAC RIVER.

By act approved March 12, 1894, provisions of the act of March 2, 1885, entitled "An act to protect the fish in the Potomac River in the District of Columbia, and to provide a spawning ground for shad and herring in the said Potomac River," were continued for a period of ten years. Under this law, if properly enforced, reasonable hopes can be entertained for still more appreciable results from the Commission's efforts in stocking this river with shad.

VISITS FROM OFFICIALS OF FOREIGN COUNTRIES.

During this year the offices were visited by a number of representatives of foreign countries, detailed by their governments to the World's Columbian Exposition, Chicago, for the purpose of studying the fisheries and fish cultural methods of the United States. Among these may be mentioned Dr. Henri de Varigny, delegate of the minister of commerce, Paris, France; Dr. Oscar Nordqvist, inspector of fisheries of Finland, Helsingfors; Dr. Nicolas Borodine, Uralsk, Russia; Dr. L. Wittmack, of Berlin, accompanied by Mr. Alfred Schillinger, of Munich, president of the fish-cultural department of the Bavarian State Fishery Association, in Sternberg, and Mr. Lewis Laudau, of the Hungarian ministry of agriculture; Dr. Ernst Ehrenbaum, of the Royal Biological Station, Helgoland; Mr. Sakaye Sawatari, commissioner of the Japanese Fisheries Society, and Mr. J. J. Armistead, proprietor of the Solway fisheries, Dumfries, Scotland.