I.—REPORT ON THE WORK OF THE UNITED STATES FISH COMMISSION STEAMER FISH HAWK FOR THE YEAR ENDING DECEMBER 31, 1882, AND ON THE CONSTRUCTION OF THE STEAMER ALBATROSS.

By Lieut. Z. L. Tanner, U. S. N., Commanding.

At the close of my last report, the Fish Hawk was at the United States navy-yard, Washington, D. C., where she remained until February 25. During this time, the crew were employed in cleaning and refitting the ship in preparation for the season's work. On that date, there were received on board 1,000,000 cod eggs from the United States Fish Commission, which were placed in spawning pans with artificial sea water for transportation to Chesapeake Bay, when they were to be placed in the cones for hatching, using water from the bay. About 75 per cent. of the eggs appeared to be alive when they were brought on board.

At 12.50 p. m. on the date above mentioned, with Captain Collins, an experienced fisherman, on board, we left the navy-yard and steamed down the Potomac River; at 10.45 p. m., anchored in Cornfield Harbor.

The cod eggs were distributed among three cones and one glass aquarium, the water of the bay and river being used; they sank to the bottom, showing that the specific gravity was much less than that of sea water. They were then treated as shad eggs, the feed water being admitted at the base, and discharged through the gauze at the top of the cone in the usual manner. The aquarium was covered with one thickness of white bunting, which prevented oscillation by the motion of the vessel, and allowed the water to escape freely. A quarter-inch glass tube was introduced as a feed-pipe, and the discharge took place through the bunting cover. The temperature of the water was 40° F. at the surface, and 41° F. in the cones.

On the 26th, about 60 per cent. of the eggs seemed to be alive, but little or no development had taken place since the day before. They sank promptly, and the ordinary feed for shad hatching would not keep them at the surface.

When the eggs were received on board, they were 0.06 of an inch in diameter, germinal disk, $\frac{1}{125}$ of an inch, the live eggs seeming to be healthy. During this day, the germinal disk appeared to have contracted, and the proportion of dead eggs rapidly increased.

Gill nets were set at different places on the 26th, and taken up on the 27th. Large numbers of medusæ were found in them, but no fish.

On the morning of the 27th, there were but few cod eggs alive, and they were in an abnormal condition, the germinal disk distorted, shrunk, and shriveled.

At 1.50 p. m. on the 27th, got under way, and examined the oyster beds between Saint Jerome's Creek and Point No Point. Scattering oysters were found in 3 fathoms and upwards, but none at a less depth, large quantities of grass being brought up. At 3 p. m., started for Barren Island, the cutter with nets having been sent on ahead. Arriving off the latter place, the nets were sent in 20 fathoms, and we came to anchor opposite Drum Point, Patuxent River.

At 9.10 p. m. no good cod eggs were to be found in the cones.

On the morning of the 28th the nets were taken up, and twenty-two young menhaden were found in them. These measured from 3 to 8 inches in length, and were all caught by the mouth, the fine twine entering between the upper and lower jaw, after which the fish became more thoroughly entangled in the meshes.

At 10 a. m. got underway, and lowered the dredge in 6 fathoms of water, Drum Point bearing NE., and one-half a mile distant, to try the bottom. Six hauls of the dredge and trawl were made between this position and 2 miles N. N.E. of Smith's Point, the depth varying from $2\frac{3}{4}$ to 25 fathoms. Brought up small numbers of crawfish, young herring, menhaden, and shrimp. Anchored for the night in Cornfield Harbor.

On the 1st of March all the dead cod eggs were thrown overboard and the tank, cones, &c., cleaned and properly cared for.

On the 2d, we examined the oyster-bed between Smith's Creek and Cornfield Point. We found the bivalves few in number and very small. The average was about a bushel of marketable oysters at each haul.

At 8.15 took up nets set off Point Lookout on the evening of the 28th. They were considerably fouled on account of the rough water, but received no material damage. There were large numbers of medusæ in the nets, but no signs of fish.

At 9.40 stopped off Smith's Point, and commenced taking up the nets set on the 28th. Two nets were entirely destroyed, one slightly damaged, and one uninjured. They broke adrift from the weather anchor, and drifted afoul of the lee mooring, where they became twisted and tangled by tide and sea. They were more or less injured also by dragging over oyster shells on the bottom. There were no signs of fish; nothing, in fact, but a little coral and a few oysters.

At 11.20 lowered the dredge to ascertain if there were any life in the sand and mud of the bottom, Smith's Point bearing S. by W. $\frac{1}{2}$ W., $1\frac{1}{2}$ miles distant, depth of water 11 fathoms. Four casts of the trawl and dredge were taken between this position and 1 mile S. S.W. of the southern point of Tangier Island, the depth varying between $9\frac{1}{2}$ and 20 fathoms. Oyster shells, small shrimp, a few worms, and worm tubes, small shells, &c., were brought up.

On the 3d we took up the nets which had been set the night before, and found them full of grass, coral, &c., but no fish. The tide had drifted them somewhat out of place.

As soon as the nets were on board, we started for Fortress Monroe for provisions, leaving there at 2.30 p. m. for Cherrystone Inlet. At 4.30 set four nets in 25 fathoms of water, Cherrystone Light-house bearing E. by S., and 2 miles distant. At 6.20 p. m. arrived at the wharf, where we made fast for the night.

As it was too rough to take up the nets on the 4th, we remained at the wharf taking the opportunity to overhaul and repair fishing gear. The engineers department made some repairs on the boilers in Kimberly's oyster-packing establishment. The nets were taken up during the afternoon of the 5th and found to be badly bunched together, but they contained 50 dogfish and 1 menhaden about 6 inches long.

The stomachs of 20 dogfish were preserved in alcohol; the menhaden was also preserved and 6 dogfish were placed on the ice to be transferred to the Museum. The ovaries of the dog-fish were not at all developed.

On the 6th, the nets set the day before were taken up but they contained no fish.

At 9 a. m. lowered the trawl in 25 fathoms of water, sandy bottom, and dragged into 12 fathoms, Cherrystone Light-house bearing E. by N., distant 2 miles. Three hauls of the trawl were taken during the day between this position and one at which the same light-house bore SE. by E. ¼ E., distant 3 miles, the depths varying between those given above.

At 10 a. m. steamed ahead full speed for Saint Jerome's Creek, where we arrived at 3.40. Sent on shore for the mail, and at 4 p. m. started for Annapolis, having received instructions to that effect. At 10.35 p. m. anchored off the harbor.

At 9 a. m. on the 7th got under way and steamed up the Severn River, anchoring off the city wharf, Annapolis. Remained here until 9.30 a. m. on the 11th, at which time got under way and steamed to the deep water off Kent Island for the purpose of extending the examination of the bottom in maximum depths. At 9.50 a. m. cast the trawl in 14 fathoms, Thomas Point Light-house bearing W. S.W. ¼ W., distant 2 miles. Seven casts of the dredge and trawl were made during the day between this position and one at which the same light-house bore N. by W. ½ W., distant 4¾ miles, the depth varying from 9 to 18 fathoms. We tried the oyster-dredge at several places along the coast of Kent Island with indifferent success, and at 4.20 p. m. anchored off the city wharf at Annapolis.

At 8.55 a. m. on the 13th, got under way and steamed over to Kent Island to continue the examination of the bottom in that locality. At 9.45 cast the trawl in 14 fathoms, Sandy Point light-house bearing N. by W. ¼ W., and distant 3½ miles. Three casts of the trawl were taken between this position and one at which the same light-house bore NW. ¼ W., distant 2¼ miles, the depth varying from 11 to 15 fathoms.

At 11.45 a. m. lowered the oyster-dredge on the banks off the mouth of Magothy River, where several schooners were dredging. Worked about forty-five minutes, averaging about 1 bushel of marketable oysters to 15 of dead shells, the bank having been pretty well dredged out. At 12.40 p. m. started for Annapolis, arriving at 1.35 p. m.

On the 21st steamed out with a party of the Maryland legislature and trawled and dredged in the bay to show them how the work was carried on.

On the 22d left Annapolis, and on the 23d arrived at Washington.

On the 30th coaled ship. From this date till the 10th of April we remained at the navy-yard, making preparations for the hatching season. On the latter date, proceeded to Quantico, Va., and made fast to the railroad wharf.

From the 10th of April until the 10th of May we remained at this port engaged in hatching, with results as shown by the accompanying table. On the latter date proceeded to Washington, and made fast to the wharf at the navy-yard. On the 11th of May sent to the Armory for transportation 2,000,000 young herring and 600,000 young shad. On the 12th put overboard alongside of the ship 23,000 young shad. On the 14th received from the Fish Commission steamer Lookout, 40,000 shad eggs which were placed in cones. On the 16th transferred to Master W. C. Babcock, U. S. N., 200,000 young shad for transportation.

On the 22d we left Washington for Havre de Grace, Md., arriving at noon the following day. The vessel was moored at the pier at Battery Station, and her boats, with spawn-takers, sent to the various fishing grounds. Active preparations had been made during the season to haul a seine for the purpose of taking shad and other fish, and confining them in an inclosure until ready for spawning. The first haul was made on the 20th instant, and the fish turned into the pool. Such of the crew of this vessel as were required, were detailed to assist at the seine-hauls and the steam cutter was frequently used for towing the seine-boat.

Hauls were made daily, and the fish transferred to the pool, where a small seine was hauled usually once a day, and the fish examined. Those that were in condition for spawning were turned over to the spawn-takers, and the unripe fish were returned to the pool.

About 700 shad were placed in the inclosure during the season and subjected to the rough handling of the small seine and manipulation of spawn-takers once a day for three weeks or more without apparent injury; it was observed, however, that wounds did not heal, but became covered with fungus.

Although the experiment was made too late in the season to demonstrate the practicability of procuring spawn in that manner; it was clearly shown that, with careful handling, shad could be penned for a considerable period. Quite a number remained in the pool after the close of the hatching season, and subsequently began feeding; at least that was the supposition, as four were taken with a hook and clam bait

during the month of August. Shad were seen in the pool as late as November, but were in poor condition and almost covered with fungus.

The results of seining at Battery Station will be found in the table appended.

On the 14th of June we coaled ship at Havre de Grace, and on the 15th left for Washington, arriving on the 16th.

The principal improvement introduced in shad-hatching during the present season on board the Fish Hawk, as shown in Plate 1. Fig. 1, is a vertical sectional view of the base of hatching-cone *a a*, with base-ring *b b* of cast brass, and goose-neck *c*, also of cast brass.

The improvement referred to consists of the small brass cone *d d*, introduced into the base of the hatching-cone in place of the wire gauze formerly used, for the double purpose of strainer and guard, to prevent the eggs from falling into the goose-neck.

The inverted conical surface is $\frac{1}{16}$ of an inch smaller than the base-ring *b b*, and has four ribs $\frac{1}{32}$ of an inch thick, equidistant upon its periphery, which rest on the base-ring above mentioned, forming a channel between the ribs through which the water flows from the goose-neck to the cone.

Fig. 2 is a plan view of the base-ring *b b*, the small cone *d*, the ribs *e e e e*, and the water channel *f f f f*. The hatching capacity of the cones was nearly doubled by the use of this cone, and the labor required in attending them during the hatching process was greatly reduced, as neither goose-neck nor cone required removal for cleaning.

The aerators described in my last report were used during the season, and in case it became necessary to crowd the hatching cones with eggs it would be of great service.

On the morning of June 19 we left the navy-yard with two United States Fish Commission barges in tow, destined for Saint Jerome's Creek. We encountered a gale in the Lower Potomac which damaged one of the barges somewhat and forced us to seek a harbor in Smith's Creek, where we remained till the morning of the 21st, when, the weather having moderated, we went to the station at Saint Jerome's and commenced the task of hauling the barges out on the beach.

The machinery barge weighed 65 tons and the other 45, which we found too much for any purchase we had on board, and as the necessary blocks could be found at Annapolis, we left at once for that place, borrowed what we required from the Santee and returned at 2 p. m. the following day.

Work was resumed at once, and the barges were on the beach and blocked up on the 24th. We then went to the wharf and took on board a quantity of stores, which we delivered at the station, then left for Annapolis to return the blocks borrowed, arriving at 11 p. m. Remained at anchor during the following day, Sunday, returned the blocks on Monday morning, and at 7.45 a. m. left for Point Lookout wharf, where we took in stores for Saint Jerome's. Returned to that place and anchored for the night.

The stores were landed the following morning and a working party sent on shore to adjust the machinery of the barge.

Nitrate of silver tests were made for salt in the house and barge drive-wells at Saint Jerome's. Its presence was clearly shown in the cloudiness, bearing a resemblance to skimmed milk. It was not, however, apparent to the taste.

The afternoon of the 28th and morning of the 29th we were occupied in swinging ship to adjust the compasses. On the latter date we left for Washington, arriving at the navy-yard on the 30th, where we remained until the 8th of July, making preparations for the season's work of deep-sea exploration.

At 6.10 a. m. on the latter date we left the navy-yard for Wilmington, Del., to deliver anchors and chains, dinghy, galley, and other parts of the equipment of the new Fish Commission steamer Albatross, building at that place.

At 8.30 a. m., on July 10, arrived at the Pusey & Jones Works, Wilmington, discharged freight for the Albatross, and at 10 a. m. the following day left for Washington by way of Havre de Grace and Baltimore.

We arrived at Havre de Grace at 7.35 a. m. on the 13th; coaled ship, took on board a hoisting engine, launches, boiler, &c., from Battery Station, and at 6.10 a. m. on the 14th left for Baltimore, where we took on board three car-loads of material for a water-tank.

At 3.40 p. m. left for Saint Jerome's, but finding a heavy swell in the bay were obliged to seek a harbor in the mouth of the Patuxent River for the night. On the following morning at daylight we got under way, arriving at Saint Jerome's at 8.30 a. m. Discharged the freight and left for Washington at 5.30 p. m., arriving at the navy-yard at 11.20 a. m., July 16. We remained here until the 21st, preparing for the season's work of deep-sea exploration.

At 1.10 p. m. on that date left Washington for Wood's Holl, arriving at 6.10 a. m. on the 24th. Landed outfit, &c., for the Commission, took on board dredging outfit and completed all arrangements for deep-sea work.

At 3 p. m. on August 1 we left for a dredging trip, anchoring inside of Monomoy Point for the night.

At 5.10 the following morning got under way, and at 7.34 cast the trawl in 55 fathoms of water, Nausett Beacons bearing NW. $\frac{1}{4}$ N., distant 10 miles. Work was continued from that point to the Highland Lights. Seven hauls were made during the day, the depth varying from 28 to 84 fathoms.

At 2.55 p. m. started for Provincetown, arriving at the latter place at 6 p. m., and made fast to the wharf for the night.

At 5.30 on the morning of the 3d left the harbor, and at 6.05 put the trawl over in 35 fathoms, Race Point Light-House bearing S. 33° E., distant 2 miles. Six hauls were made during the day between this

point and the Highland Lights. At 12.20 p. m. started for Wood's Holl, arriving at 7.55 p. m.

This trip was made for the purpose of re-examining certain localities in the vicinity of Provincetown and Chatham, and investigating certain places in the vicinity of Nausett Lights, not previously visited.

The naturalists were engaged in the laboratory in examining and preserving specimens, and in work about the shores until the 10th, when at 5 p. m. we left the harbor for an off-shore trip. At 5.30 a. m. on the 11th the trawl was cast in 65 fathoms, latitude 40° 03′ N., longitude 69° 44′ W. Eight hauls of the trawl were made during the day between this position and latitude 39° 53′ N., longitude 69° 43′ W., the depth varying from 65 to 349 fathoms. At 5.55 p. m. started for port, arriving at 7.30 on the morning of the 12th. During the trip the weather was clear and pleasant, with light southerly wind.

On the 14th steamed to New Bedford, coaled ship, and returned the following day.

On the 18th eight hauls of the trawl were made in Vineyard Sound for the purpose of re-examining certain localities.

The naturalists were engaged in the laboratory until the 21st, when at 6.40 p. m. we left the harbor for an off-shore trip. At 5.58 the following morning, in latitude 40° 02′ N., longitude 70° 35′ W., depth 116 fathoms, a trawl line was set for tile-fish. At 6.12 cast the trawl in the same vicinity. At meridian the fishing party returned, having caught several hake, large skate, and other fish, but no tile-fish. Twelve casts of the trawl were made between the position given above and latitude 40° 03′ N., longitude 70° 45′ W., the depth varying from 70 to 245 fathoms. During the day the weather was clear and pleasant, with a light breeze from east to southeast. Whales and porpoises were seen. At 6.50 p. m. started for port, arriving at 5.15 on the morning of the 23d.

At 3 p. m. on the 25th left port for an off-shore trip, passing out through the Muskegat Channel. At 6.32 the following morning the trawl was cast in 97 fathoms, latitude 40° 08′ N., longitude 68° 48′ W. Seven casts of the trawl were made during the day between this position and latitude 40° 03′ N., longitude 68° 56′ W., the depth varying from that above given to 787 fathoms. At 6.50 p. m. started for port, arriving at 9.40 the following morning.

At 9 on the morning of the 28th the United States steamer Tallapoosa arrived, having on board the Hon. W. E. Chandler, Secretary of the Navy, and chiefs of bureaus. At meridian we left the harbor with Professor Baird, the Secretary, and the chiefs of bureaus, for a short trip to show the manner of working the various apparatus used on board. Three casts of the dredge and trawl were made in Vineyard Sound, and at 4.30 p. m. we returned to Wood's Holl. The Tallapoosa left the harbor at 9.15 the next morning.

The naturalists were employed in the laboratory until September 2, when at 11.10 we left the harbor and steamed to No Man's Land. A party was sent on shore to examine a reported rock formation, but nothing of the kind was found. Five hauls of the dredge were made in this vicinity, and at 3.35 started for port, arriving at 6.07 p. m.

At 9.30 a. m., September 6, the United States steamer Despatch, having on board the President of the United States, and accompanied by the Fish Commission steamer Lookout, arrived in the harbor. At meridian we left the harbor with the President, Professor Baird, and others on board. To show the former the manner of working the various apparatus, three hauls of the trawl and dredge were made in Menemsha Bight. We reached port at 5.55 p. m., when the President returned to the Despatch. At 5 the next morning the Despatch, with the President on board, got under way and left the harbor.

At 3.30 p. m. on the 7th we left for an off-shore trip. From 8 to 9 p. m. we were steaming through a school of fish. They were first sighted about 12 miles to the southward of No Man's Land. At daylight the following morning the coast-survey steamer Blake was sighted.

At 6 o'clock cast the trawl in 176 fathoms, latitude 39° 40′ N., longitude 71° 52′ W. Eight hauls of the trawl were made during the day between this position and latitude 39° 33′ N. longitude 72° 06′ W., the depth varying from 168 to 452 fathoms. During the last haul the trawl net parted from the frame and was lost. The cause was an overload of blue mud which would not wash through and tore the net from the frame.

At 7.30 p. m. started for port, arriving at 10.35 the following morning.

On the 11th we steamed to New Bedford and coaled ship. The weather was cloudy and rainy during the morning, ending with a fresh gale from the southeast to east. On the 13th we returned to Wood's Holl.

We were detained in port by unfavorable weather until 5 p. m. on October 3, when we left for an off-shore trip.

At 6.45 the next morning a fishing party left the ship and set a trawl line in 99 fathoms, latitude 40° N., longitude 70° 37′ W., for the purpose of taking tile-fish.

At 6.30 cast the trawl in 140 fathoms, latitude 39° 58′ N., longitude 70° 37′ W.

At 2 p. m. the fishing party returned on board, having taken a large number of hake, skate, and other species, but no tile-fish. Over these grounds where they had been invariably taken before we found no trace of them during the present season. Six hauls of the trawl were made during the day between the position given above and latitude 39° 52′ N., longitude 70° 30′ W., the depth varying from 115 to 554 fathoms.

At 6 p. m. stated for port, arriving there at 6 a. m. on the 5th. This

was the last trip of the season, and preparations were then made for leaving the station. During the 9th and 10th specimens and other articles were received on board for transportation to Washington.

The dredging apparatus worked satisfactorily during the season, and no changes suggested themselves except in the method of registering the Negretti & Zambra deep-sea thermometer.

The Tanner case, described in my report of last year, is all that can be desired in the depths usually sought by the Fish Hawk; but, in anticipation of more extended explorations on board the Albatross, we considered it necessary to devise some method of registering in deep water without the necessity of waiting for the descent of a messenger.

The propeller on the Sigsbee water bottle suggested a simple and reliable method of reversing at any desired depth and would permit the use of any number of instruments in series.

I called the attention of Passed Assistant Engineer William L. Bailie to the matter, and he devised the plan shown on Plate II. Fig. 1 shows the instrument clamped to the sounding wire ready for use; Fig. 2 shows a front view of the case, and Fig. 3 a vertical sectional view of the Bailie attachment, which consists of the propeller and slip-hook inclosed in a metal case which screws to the upper end of the Tanner case, the slip-hook having been removed for the purpose.

To use the thermometer, clamp it to the sounding wire, as shown in Fig. 1, and the action of the propeller will close the hook and retain the wire during the descent. As soon as the ascent is commenced the propeller is set in motion, bringing the screw in the upper end of the spindle into action, gradually raising the propeller until the small part of the spindle at the lower end (Fig. 3) allows the hook to open, releasing the wire, when the thermometer capsizes and registers the temperature by breaking the column of mercury.

The drift or distance which the thermometer must move through the water before capsizing is regulated by a set screw, and can be varied at pleasure between the limits of 3 and 10 fathoms.

Later in the season we received several of the Magnaghi improved frames which, also, depended upon a propeller for reversing. They were not well adapted for use on sounding wire, and were not, therefore, much used.

The frame above mentioned is the device of Commander Magnaghi, of the Italian Navy. The following description is taken from the advertisement of Messrs. Negretti & Zambra.

NEGRETTI & ZAMBRA'S PATENT IMPROVED-FRAME STANDARD DEEP-SEA THERMOMETER.

"The apparatus will be best understood, short of inspection, by reference to Plate III (Nos. 1 and 2). A is a metallic frame in which the case B containing the thermometer is pivoted upon an axis, H, but not

balanced upon it. C is a screw-fan attached to a spindle, one end of which works in a socket, D, and on the other end is formed the thread of a screw, E, about half an inch long, and just above it is a small pin or stop, F, on the spindle. G is a sliding stop-piece against which the pin F impinges when the thermometer is adjusted for use. The screw E works into the end of the case B the length of play to which it is adjusted. The number of turns of the screw into the case is regulated by means of the pin and stop-piece. The thermometer in its case is held in position by the screw E, and descends into the sea in this position (Fig. 1), the fan C not acting during the descent because it is checked by the stop F. When ascent commences the fan revolves, raises the screw E, and releases the thermometer, which then turns over and registers the temperature of that spot, owing to the axis H being below the center of gravity of the case B, as adjusted for the descent. Each revolution of the fan represents about 10 feet of movement through the water upward, so that the whole play of the screw requires 70 or 80 feet ascent; therefore the space through which the thermometer should pass before turning over must be regulated at starting. If the instrument ascends a few feet by reason of a stoppage of the line while attaching other thermometers, or through the heave of the sea, or any cause whatever, the subsequent descent will cause the fan to carry back the stop to its initial position, and such stoppages may occur any number of times provided the line is not made to ascend through the space necessary to cause the fan to release the thermometer. When the hauling-in has caused the turn over of the thermometer, the lateral spring K forces the spring L into a slot in the case B and clamps it (as seen in Fig. 2) until it is received on board, so that no change of position can occur in the rest of the ascent from any cause. The case B is cut open to expose the scale of the thermometer, and is also perforated to allow the free entry of the water.

"The construction of the thermometer will be understood by reference to Fig. 3. The bulb is cylindrical, and mercury is the thermometrical fluid. The neck of the bulb is contracted at A, and upon the shape and fineness of this contraction the success of the instrument depends. Beyond A the tube is bent, and a small reservoir is formed at B. At the end of the tube a small receptacle, C, is provided. When the bulb is downward it contains sufficient mercury to fill the tube, and a part of the reservoir C, if the temperature is high, leaving sufficient space for the expansion of the mercury. In this position no scale would be possible, as the apparent movement of the mercury would be confined to the space C. When the thermometer is held bulb upward, the mercury breaks off at A, and by its own weight flows down the tube, filling C, and a portion of the tube above. The scale accordingly is made to read upward from C. To set the thermometer for observation it is only necessary to place it bulb downward, then the mercury takes the temperature just as an ordinary thermometer. Whenever the exist-

ing temperature is required, all that has to be done is to turn the thermometer bulb upward and keep it in this position until read off. The reading may be taken any time after."

At 11.55 a. m. on the 12th, left for Washington by way of Bristol R. I., and anchored in the latter port at 5.30 p. m. On the 16th a steam cutter and steam life-boat, built by the Herreshoff Company for the Fish Commission steamer Albatross, were received on board for transportation to Wilmington, Del. We were detained by fog until 4.15 p. m. on the 17th, when we got under way and steamed out of the harbor. The fog shutting down thick, we anchored at 5.20 near Coddington Harbor, Narragansett Bay, where we remained until 11.40 the following morning, when we got under way and steamed to Newport, where we anchored, waiting for favorable weather. At 6.25 on the morning of the 19th, got under way for New York. The weather was cloudy and rainy, with a moderate to brisk breeze from the northward.

At 4.35 p. m. we anchored for the night near Penfield Reef, Long Island Sound. At 5.30 the following morning got under way and arrived at the navy-yard, New York, at 11.10 a. m. At 11 a. m. on the 21st, left the navy-yard and steamed down the harbor. Finding a heavy swell outside and weather unfavorable, we anchored near Sandy Hook for the night. On the afternoon of the 22d we got under way and steamed to Perth Amboy, and on the following day coaled ship. On October 21, there were fresh northerly winds and passing clouds. At 4.45 p. m. got under way and proceeded to sea. Passed Cape Henlopen at 7.55 the following morning, and arrived at Wilmington, Del., at 6.20 p. m.

The boats were delivered to the Albatross on the 26th and at meridian on the 27th, we left for Washington, arriving at 10.30 a. m. on the 29th. Specimens and other articles consigned to the National Museum were delivered on the 30th, 31st, and November 1. The crew were actively employed in refitting ship.

On the 10th of November I received orders from the Navy Department detaching me from the command of the Fish Commission steamer Fish Hawk, and ordering me to report to the Commissioner of Fish and Fisheries for the command of the steamer Albatross.

Received orders from the Commissioner to retain temporary command of the former vessel until the reporting of my relief, and on the 20th turned over the command to Lieut. W. M. Wood, U. S. N.

My connection with the Albatross has been more or less intimate from her inception. On the 13th of March, 1882, I was ordered by the Navy Department to special duty in connection with her construction in addition to my regular duty in command of the Fish Hawk. Passed Assistant Engineer George W. Baird, U. S. N., was also ordered to the same duty in addition to his other duties and rendered great service, especially in connection with the special machinery and appliances required on board.

The contract for the hull and engines was closed on March 28, the

Pusey & Jones Company agreeing to complete her according to the specifications within six months from date, in consideration of the sum of $135,800. Work was commenced at once and pushed forward vigorously. Mr. Baird proceeded to Wilmington in compliance with his orders and I visited the place as often as my other duties would allow.

An appropriation of $45,000 had been made for the outfit, which was to include special machinery for sounding and dredging, electric lighting, ventilation, &c.

The vessel was launched on the 19th of August, and, according to the terms of the contract, was to be completed on the 28th of September. As various delays occurred after launching, many of which were caused by work outside of the contract, which it was necessary to have done at certain stages of her construction, the builders requested, and were granted, an extension of time.

Work was pushed forward as rapidly as possible, and on the 29th of December we left the builders' yard and anchored in the Delaware, preparatory to a trial trip on the following day. Many things were incomplete, and large gangs of mechanics were at work on board. We would not have left at this time had we not been apprehensive of an ice blockade, and it was desirable to have the vessel in Washington as soon as practicable.

At 8.30 a. m. on the 30th Mr. Charles W. Copeland, constructing engineer, Mr. William G. Gibbons, president of the Pusey & Jones Company, and others came on board to witness the trial trip. At 9.45 a. m. we got under way and steamed down the river for a trial under the direction of the builders.

At 2.30 p. m. Mr. Copeland expressed himself as satisfied with the trial, and at 3 p. m. left the ship in a tug, which also took the mechanics and others not belonging to the ship back to Wilmington. We then proceeded to sea, bound for Washington, D. C.

The weather was cloudy, and during the night we had a fresh breeze from the southeast, with heavy swell. The motions of the vessel were remarkably easy. The 31st was clear and cold, with a moderate breeze from northwest. At 10 a. m. passed Cape Charles. At 1.30 p. m. we swung ship under steam, observing azimuths for compass deviation, and at 11.30 p. m. anchored off Blackistone Island.

The engines worked satisfactorily during the trip, considering the fact that everything was new. Many of the valves and joints were leaky, and there were some quite extensive leaks in the boilers; but the greatest trouble was with the reversing gear, which made it impossible to work the engines with any degree of certainty. This, however, can be remedied with but little expense.

The following officers were attached to the ship at this date, viz:

Z. L. Tanner, lieutenant, U. S. N., commanding.

Seaton Schroeder, lieutenant, U. S. N., executive officer and navigator.

S. H. May, lieutenant, U. S. N.
A. C. Baker, master, U. S. N.
R. H. Miner, midshipman, U. S. N.
J. H. Kidder, surgeon, U. S. N.
George H. Read, paymaster, U. S. N.
George W. Baird, passed assistant engineer, in charge of machinery.

Petty officers.—Samuel H. McAvoy, machinist; John Hawkins, machinist; H. H. Walker, machinist; George B. Till, yeoman; William A. McDowell, master-at-arms; W. F. Lee, paymaster's yeoman; N. B. Miller, apothecary; and a crew of twenty-seven men.

Memoranda of seine hauls, Battery Station, May 20 to June 13, 1882, inclusive.

Date.	Kind of seine.	Shad taken.	Herring taken.	Perch taken.	Rock taken.	Shad eggs.	Remarks.
1882.							
May 20	Large seine...	4	700	500	0	0	One-quarter flood.
22	....do	70	800	1,500	1	0	One-half flood.
23	....do	150	2,000	1,000	1	.....	Strong current.
24	....do	100	1,000	300	0	0	Young flood.
25	... do	48	600	300	0	0	
26	....do	100	500	300	.....	.....	
26	Pool	28	(*)	(*)	.....	.....	
29	....do	100	1,000	.....	0	0	Freshet in river.
30	....do	75	.....	.....	.....	0	Do.
June 2	Large seine...	27	400	200	0	0	One hour flood.
3	....do	12	300	200	0	0	
3	Pool	100	.....	.....	.....	0	Pool hauled after dark.
5	Large seine...	16	.....	.....	.....	0	One scale carp 2 lbs. (?)
6	....do	47	.....	.....	.....	0	
6	Pool	90	.....	.....	.....	30,000	
7	Large seine...	26	300	200	4	5,000	Milt of shad hard.
7	Pool	100	.....	.....	.....	117,000	Five ripe females.
8	Large seine..	47	100	.....	10	0	
8	Pool	160	.....	.....	.....	317,000	Eleven females and twelve males.
9	Large seine...	26	50	200	14	0	
9	Pool	75	.....	.....	.....	117,000	Six males, six females.
10	Large seine...	26	30	300	8	0	
12	....do	6	80	500	26	0	
12	Pool	100	.....	.....	.....	25,000	Two males and two females.
13	Large seine...	0	20	400	30	0	
	Total....	1,539	7,880	5,900	103	611,000	

* Large numbers of herring and perch; seine hung.

Record of fish hatching on board the United States Fish Commission Steamer Fish Hawk, season of 1882, *April* 12 *to June* 12, *inclusive.—Lieut. Z. L. Tanner, U. S. N., commanding.*

Date.	Station.	Fishery.	Kind of fish.	Number.			When deposited.	Number deposited.	Where deposited.	State of water.	Tide.	Remarks.
				Males.	Females.	Eggs taken.						
1882.												
April 12	Quantico Creek, Virginia	Stump Neck	Herring.	3	2	40,000	Apr. 20–21	39,500	Quantico Creek.	Muddy.	Low water.	
12	do	do	do	3	3	100,000	Apr. 20–21	99,500	do	do	do	
12	do	do	Perch	1	3	40,000	Apr. 20–21	30,000	do	do	do	
13	do	do	Herring.	3	4	250,000	Apr. 20–21	248,500	do	do	do	
13	do	Freestone Point	do	2	3	50,000	Apr. 20–21	45,500	do	do	do	
14	do	Stump Neck	do	3	3	300,000				do	do	Killed by cold water.
14	do	Freestone Point	do	4	5	300,000				do	do	Do.
14	do	Budd's Ferry	do	3	3	500,000				do	do	Do.
14	do	Stump Neck	do	2	2	100,000				do	do	Do.
14	do	Budd's Ferry	do	9	5	400,000				do	High water.	Do.
14	do	do	do	5	4	500,000				do	Low water.	Do.
14	do	Stump Neck	do	3	2	100,000				do	do	Do.
15	do	Freestone Point	do	12	11	1,200,000				do	do	Do.
15	do	Budd's Ferry	do	7	6	89,000				do	do	Do.
15	do	Stump Neck	do	5	5	50,000				do	do	Do.
15	do	do	Perch	2	2	50,000				do	do	Killed by fungus.
16	do	do	Herring.	7	6	600,000				do	do	Killed by cold water.
17	do	Freestone Point	do	25	26	2,500,000				do	do	Do.
17	do	do	Shad	1	1	20,000	Apr. 26	20,000	Quantico Creek.	do	do	
17	do	Budd's Ferry	Herring	5	8	1,400,000				do	do	Killed by cold water.
17	do	Stump Neck	do	12	9	1,200,000				do	do	Do.
17	do	do	Perch	2	2	100,000				do	do	Do.
17	do	do	Herring.	10	12	1,700,000				do	High water.	Do.
18	do	do	do	3	3	900,000				do	Low water.	Do.
18	do	Freestone Point	do	2	2	200,000				do	do	Do.
18	do	Budd's Ferry	do	2	3	300,000				do	do	Do.
18	do	Freestone Point	Shad	1	1	30,000				do	do	Kept for experiment.
18	do	Stump Neck	Herring.	12	10	1,000,000				do	High water.	Do.
18	do	do	Perch	4	3	100,000				do	do	Do.
19	do	Budd's Ferry	Herring.	5	5	2,100,000				do	Low water.	Do.
19	do	do	Perch	1	1	40,000				do	do	Do.
19	do	Freestone Point.	Shad	1	1	30,000	May 3	30,000	Potomac River.	do	do	
20	do	Stump Neck	Perch	4	3	150,000				do	do	Killed by cold water.
20	do	do	Herring.	2	2	450,000				do	do	Do.
20	do	Budd's Ferry	Perch	2	1	100,000				do	do	Do.
20	do	Clifton	Shad	1	1	20,000	May 4	20,000	Potomac River.	do	High water.	

	21	do	Stump Neck	Perch	1	2	50,000					do	Low water.	Killed by cold water.
	21	do	do	Herring	14	14	1,600,000					do	do	Do.
	21	do	Budd's Ferry	do	15	13	1,800,000					do	do	Do.
	23	do	Freestone Point	Perch	1	1	50,000					do	High water.	Do.
	23	do	Stump Neck	Herring	15	15	1,600,000					do	Low water.	Do.
	24	do	do	do	15	10	2,500,000					do	High water.	Do.
	24	do	Budd's Ferry	do	8	9	850,000					do	do	Do.
	24	do	Freestone Point	Shad	4	1	15,000	May	7	15,000	Quantico Creek	do	do	
	25	do	Stump Neck	Herring	6	6	750,000					do	do	Killed by cold water.
	25	do	Budd's Ferry	do	6	6	750,000					do	do	Do.
	25	do	Clifton Point	do	9	8	1,100,000					do	do	No fish hatched.
	25	do	Stump Neck	do	5	5	700,000					do	do	Killed by cold water.
	25	do	Budd's Ferry	do	7	8	700,000					do	do	Do.
	25	do	Stump Neck	do	25	26	2,200,000					do	Low water.	Do.
	25	do	Budd's Ferry	do	5	5	400,000					do	do	Do.
	26	do	do	do	16	16	1,400,000	May	7	800,000	Quantico Creek	do	High water.	
	26	do	do	do	8	8	700,000			500,000	do	do	Low water.	
	26	do	Stump Neck	do	15	16	1,500,000			800,000	do	do	do	
	26	do	do	do	5	5	700,000			500,000	do	do	do	
	26	do	Budd's Ferry	do	2	2	200,000			100,000	do	do	do	
	26	do	Freestone Point	Shad	1	1	25,000	May	7	25,000	do	do	do	
	26	do	Clifton Point	Perch	1	2	25,000							No fish hatched.
	27	do	Stump Neck	Herring	7	7	500,000	May	3	100,000	Quantico Creek	Muddy	Low water.	
	27	do	Budd's Ferry	do	8	8	700,000	May	3	200,000	do	do	do	
	27	do	do	do	20	19	1,200,000	May	3	500,000	do	do	do	
	27	do	Stump Neck	do	13	11	1,200,000	May	3	500,000	do	do	do	
	27	do	do	Perch	2	6	400,000					do	do	No fish hatched.
	28	do	Budd's Ferry	Herring	25	23	1,800,000					do	do	Do.
	28	do	Stump Neck	do	15	10	760,000					do	do	Do.
	28	do	do	Perch	3	2	75,000					do	do	Died in cones.
	28	do	do	Herring	10	9	850,000					do	do	Do.
	28	do	Budd's Ferry	do	35	30	2,580,000					do	do	Do.
	28	do	Stump Neck	do	8	10	1,800,000					do	High water.	Do.
	28	do	Freestone Point	Shad	1	1	15,000	May	8	15,000	Quantico Creek	do	do	
	29	do	do	do	1	1	15,000	May	8	15,000	do	do	Low water.	
	29	do	Budd's Ferry	Herring	17	17	1,550,000	May	6	500,000	do	do	do	
	29	do	Stump Neck	Perch	2	2	50,000					do	do	
	29	do	Freestone Point	Shad	4	3	147,000	May	8	147,000	Quantico Creek	do	do	
	29	do	Stump Neck	Herring	8	6	700,000	May	6	100,000	do	do	do	
	30	do	Budd's Ferry	do	15	15	1,200,000					do	do	
	30	do	Stump Neck	Perch	6	6	300,000	May	4	150,000	Quantico Creek	do	do	
	30	do	Freestone Point	Shad	4	6	175,000	May	9	115,000	do	do	do	
	30	do	do	do	11	8	280,000	May	9	255,000	do	do	do	
	30	do	Budd's Ferry	Herring	15	15	1,300,000	May	5	950,000	do	do	do	
May	1	do	Stump Neck	do	4	3	425,000	May	6	100,000	do	do	High water.	
	1	do	Budd's Ferry	do	21	21	2,123,000	May	6	800,000	do	do	Low water.	
	1	do	Stump Neck	do	15	12	1,123,000	May	6	500,000	do	do	do	
	1	do	Freestone Point	Shad	5	3	50,000	May	9	45,000	do	do	High water.	
	1	do	do	do	15	15	400,000	May	11	390,000	do	do	do	
	1	do	Budd's Ferry	Herring	21	21	2,125,000	May	5	500,000	do	do	do	
	2	do	Freestone Point	Shad	5	5	150,000	May	10	125,000	do	do	do	

Record of fish-hatching, on board the United States Fish Commission Steamer Fish Hawk, season of 1882, &c.—Continued.

Date.	Station.	Fishery.	Kind of fish.	Number.			When deposited.	Number deposited.	Where deposited.	State of water.	Tide.	Remarks.
				Males.	Females.	Eggs taken.						
1882.												
May 2	Quantico Creek, Virginia.	Freestone Point.	Shad	11	11	275,000	.....	.....	Quantico Creek.	Muddy..	High water.	600,000 shad and 2,000,000 herring sent to armory and 455,000 shad put in Potomac River on the 11th of May.
3	.....do	....do	....do ...	9	9	125,000	.....	.....	.....	....do ...	....do	
3	.....do	Budd's Ferry ...	Herring.	25	25	1,550,000	.....	.....	.....	....do ...	....do	
3	.....do	Stump Neck	....do ...	6	8	1,350,000	.....	.....	.....	....do ...	Low water	
3	.....do	Freestone Point.	Shad	6	6	130,000	May 11	455,000	Potomac River..	....do ...	....do	
4	.....do	Budd's Ferry ...	Herring.	6	4	500,000	.....	.....	.....	....do ...	... do	
4	.....do	Freestone Point.	Shad	2	2	50,000	.....	.....	.....	....do ...	....do	
4	.....do	....do	... do ...	3	3	70,000	.....	.....	.....	....do ...	....do	
5	.....do	....do	....do ...	2	2	40,000	.....	.....	.....	....do ...	....do	
5	.....do	Stump Neck	Perch...	2	3	100,000	.....	.....	.....	....do ...	....do	Killed.
5	.....do	... do	Herring.	3	4	360,000	.....	.....	.....	....do ...	....do	Killed by cold water.
5	.....do	Freestone Point.	Shad	1	1	35,000	.....	.....	.....	....do ...	....do	
6	.....do	....do	....do ...	8	8	255,000	May 12	50,000	Potomac River..	....do ...	High water.	200,000 shad sent to boat-house and 50,000 put in Potomac River on the 12th May.
7	.....do	Budd's Ferry ...	Herring.	14	15	1,400,000	.....	.....	.....	....do ...	.....	
7	.....do	Freestone Point.	Shad	1	1	15,000	May 12	13,000	Potomac River..	....do ...	.....	
8	.....do	Budd's Ferry ...	Herring.	7	6	500,000	.....	.....	.....	....do ...	.....	Killed by cold water.
8	.....do	Stump Neck	....do ...	11	9	850,000	.....	.....	.....	....do ...	.....	Do.
8	.....do	Budd's Ferry ...	....do ...	11	10	1,000,000	.....	.....	.....	....do ...	.....	Do.
9	.....do	... do	....do ...	12	10	1,000,000	.....	.....	.....	....do ...	.....	Do.
14	Navy-yard.....	Gill-boat from U. S. F. C. st'r *Lookout.*	Shad	3	3	40,000	May 22	20,000	Potomac River..	....do ...	.....	
23	Battery station	Old Bay Float...	....do ...	11	11	336,000	.....	.....	.....	....do ...	.....	
23	.....do	Gridiron	....do ...	7	8	170,000	.....	.....	.....	....do ...	.....	
24	.....do	....do	....do ...	6	7	147,000	.....	.....	.....	....do ...	.....	
24	.....do	Cruther's	....do ...	5	5	154,000	.....	.....	.....	....do ...	.....	
24	.....do	Red Point.....	....do ...	6	7	185,000	May 31	300,000	Off battery sta..	....do ...	.....	
25	.....do	Cruthers	....do ...	10	7	215,000	.....	.....	.....	.....	.....	
26	.....do	Gridiron.....	....do ...	3	2	77,000	.....	.....	.....	.....	.....	

1882.												
May 27	Battery Station	Gridiron	Shad	1	1	35,000						
27	do	do	do	2	3	60,000	June 1	200,000	Off Battery Sta'n			
27	do	do	do	2	1	40,000	2	668,000	do			
29	do	do	do	15	13	364,000						
30	do	do	do	10	8	220,000						
30	do	do	do	3	5	112,000						
30	do	Carpenter's Point	do	2	2	84,000						
30	do	Gill boat	do	6	5	112,000						150,000 shipment. 5th June.
June 2	do	do	do	2	1	40,000						
6	do	Pool	do	1	1	10,000						
6	do	do	do	1	1	25,000						
6	do	Gill boat	do	1	2	40,000	June 9	387,000	Off Battery Sta'n			
8	do	do	do	2	3	100,000						60,000 shipment 13th June.
12	do	Pool	do	1	1	25,000						Trans. Battery Station, 13th June.
	Total			909	871	72,794,000		11,373,000				

Meteorological record on board the United States Fish Commission steamer Fish Hawk, Lieut. Z. L. Tanner, commanding, from April 12 to June 14, 1882, inclusive.

APRIL 12 TO MAY 10, 1882, QUANTICO CREEK, VIRGINIA. MAY 10 TO 22, WASHINGTON, D. C. MAY 23 TO JUNE 14, HAVRE DE GRACE, MD.

Date.	Barometer.		Temp. air.		Water surf.		Bottom.		In cones.		State of water.	Winds.		Weather.
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.		Direction.	Force.	
1882.														
Apr. 12	30.17	30.03	59	33	54	45	54	45	.....	.....	Muddy.....	W. to N. W.	1-3	Clear.
13	30.14	30.01	76	41	56	49	55½	49	57	51	....do	N'd and W'd.	0-3	Do.
14	30.16	30.05	60	45	53	50	53	50	54	52	....do	N. W. to S. E.	0-3	Cloudy.
15	30.22	30.09	73	49	52½	50½	53	50½	54	52	....do	N. N. E. to W. N. W.	1-3	Rain.
16	30.27	30.12	61	46	53	51	53	51	55	53	....do	N'd and W'd.	0-5	Clear.
17	30.35	30.20	71	45	56	50	55	50	57	52	... do	N'd and W'd.	0-4	Do.
18	30.33	30.05	79	45	57	51	57	51	59	55	... do	N. N. W. to S. E.	0-2	Do.
19	30.00	29.59	68	57	56	54	56	54	58	56	....do	S. S. E. to S. W.	0-3	Cloudy.
20	29.73	29.55	78	60	60	53	59	55	60	57	....do	Variable.	1-5	Rain.
21	30.06	29.75	62	49	59½	54	59½	54	60	56	... do	N. W. to N. N. W.	2-6	Clear.
22	30.18	29.95	71	49	57	52	57	52	59	55	....do	Variable.	0-3	Rain.
23	30.00	29.90	52	42	55	50½	55	50½	57	54	....do	N. E. to W. N. W.	1-6	Do.
24	30.27	30.01	63	39	57	48	57	48	58½	50	....do	N'd and W'd.	1-3	Clear.
25	30.37	30.20	72	44	58	52	59	52	60	53	....do	W. N. W. to S. E.	1-3	Do.
26	30.20	29.85	64	53	56	53	55½	52	58	55½	....do	S'd and E'd.	1-4	Cloudy and rain.
27	30.12	29.87	73	49	60	54	60½	54	58	55	....do	Variable.	1-4	Cloudy.
28	30.17	30.05	73	47	58	55	58	55	61	56	....do	N. N. W. to N. N. E.	1-3	Do.
29	30.16	30.05	72	58	59	55	59	56	62	58	....do	N'd and E'd.	2-3	Rain.
30	30.12	30.00	67	54	60	56	60	57	60	58	....do	N. W.	1-5	Fair.
May 1	30.27	30.10	77	46	58	56	59½	56	61½	58	... do	N. W. to S. W.	1-4	Clear.
2	30.32	30.09	66	54	62	57½	62	57	64	58	....do	N'd and W'd.	1-6	Do.
3	30.49	30.15	70	39	59	55	59½	55	61	58	....do	Variable.	1-3	Do.
4	30.12	29.90	79	54	60½	57	60½	57	62	59	....do	S.	1-3	Cloudy.
5	30.01	29.92	70	59	60	58	60	58	63	60	... do	W. to N. N. E.	1-5	Cloudy and misty.
6	30.25	30.04	60	51	58	56	58	56	60	58	... do	N. N. E.	3-4	Rain.
7	30.49	30.25	62	51	57	51	57	54	58	56	....do	Variable.	1-4	Do.
8	30.45	30.20	69	55	56½	55	56½	55	59	57	....do	N. W. to S. E.	1-2	Cloudy.
9	30.16	29.90	88	59	66	56	66	56	70	58	....do	S. S. W. to S.	0-3	Clear.
10	30.02	29.87	76	64	65	59	63	59	66	62	... do	S. S. W. to S. E.	2-4	Rain.
11	29.94	29.83	63	49	63	57	62	58	65	57	....do	S. E. to N. N. E.	2-7	Do.
12	29.95	29.86	53	49	56	56	56	56	57	56	....do	N. N. E.	3-4	Do.
13	29.93	29.80	55	49	56	53	56	53	57	56	... do	N. N. E.	1-3	Do.
14	29.75	29.65	60	53	54	53	55	53	57	55	Muddy.....	Variable.	1-2	Do.
15	30.06	29.70	69	53	54	53	54	53	57	56	....do	W. N. W. to N. E.	1-3	Do.
16	30.20	30.07	64	56	55	54	54	53	57	56	....do	Variable.	0-3	Cloudy.
17	30.30	30.12	79	54	59	54	59	54	62	57	....do	S. W. to N. N. W.	1-4	Do.
18	30.48	30.30	74	51	62	57	62	57	63	59½	... do	N. N. E. to E.	1-4	Do.

	19	30.40	30.25	77	55	62	59	63	58	64	66	....do	S'd and E'd.	1-3	Cloudy.
	20	30.23	30.05	82	57	66	60	64	60	67	62	....do	Variable.	0-3	Clear.
	21	30.14	30.01	83	60	65	62	67	62	69	65	....do	Variable.	0-3	Fair.
	22	30.15	30.05	76	68	66	62	66	65	68	68	....do	S'd and W'd.	0-5	Cloudy.
	23	30.25	30.05	75	60	68	60	66	64	66	66	....do	S. W. to N. W.	0-6	Changeable.
	24	30.32	30.16	71	59	67	62	66½	62	69	62	....do	N. W. to S. E.	0-5	Cloudy.
	25	30.19	30 08	64	58	65	62	64	62	66	63½	....do	S. E. to N. E.	2-5	Do.
	26	30.27	30.12	67	52	66	62	65	61	68	62	....do	N. W. to S. S. E.	1-4	Do.
	27	30.15	30.00	70	54	64	62	63	60½	66	62	....do	S. S. E. to W.	1-3	Do.
	28	30.00	29.79	76	66	66	62	65	61½	68	64	....do	S. S. E. to S. W.	0-7	Do.
	29	30.10	29.77	69	60	65	64	64	63	67	66	....do	N. W. to N. E.	1-6	Clear.
	30	30.22	30.04	75	57	66½	64	66½	63	68	64	....do	N. to S. S. W.	0-5	Do.
	31	30.05	29.82	77	65	69½	65	68½	64½	71	67	....do	S. W.	3-6	Do.
June	1	29.96	29.65	76	60	68	65	68½	65	70	67	....do	S. W. to N. W.	1-8	Do.
	2	30.15	29.96	70	58	68	65	67	65	69	67	....do	N. W. to S. S. W.	0-5	Do.
	3	30.07	29.87	75	60	67	65	67	65	71	65	....do	S. to S. W.	3-4	Do.
	4	29 95	29.85	74	65	68	67	68	67	70	69	....do	S'd and W'd.	3-5	Do.
	5	30.00	29.90	71	60	67	65	67	65	69	66	....do	N'd and W'd.	3-6	Do.
	6	30.12	30.00	74	57	66	63	66	63	68	65	....do	N'd and W'd.	2-5	Do
	7	30.17	30.01	80	61	66	63	66	63	72	65	....do	W.	1-5	Do.
	8	30.10	29.95	83	66	68	65	68	65	74	67	....do	S'd and W'd.	1-5	Do.
	9	30.03	29.91	86	66	70	67	70	67	74	68	....do	N'd and E'd.	1-8	Do.
	10	30.00	29.93	82	68	69	68	69	67	74	70	....do	N'd and E'd.	1-4	Cloudy and rain.
	11	30.17	29.92	76	66	71	68	71	67	76	71	....do	N'd and E'd.	0-5	Fair.
	12	30.37	30.18	80	62	80	69	74	68	74	70	....do	S. W. to S. E.	0-4	Cloudy.
	13	30.39	30.26	82	63	75	67	75	68	73	70	....do	S. W. to S. E.	1-3	Clear.
	14	30.34	30.06	81	64	70	70	73	71	.....	.....	....do	.....	.....	

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ABBREVIATIONS FOR KIND OF BOTTOMS.—M. for mud; S. for sand; G. for gravel; Sh. for shells; P. for white; rd. for red; yl. for yellow; gy. for gray; bu. for blue; dk. for dark; lt. for light; gn. for green; small; rky. for rocky.

Date.	Thermometer used.	Number of observations.	Locality.	Hour.	Tide.	Tempera		
						Air.	Surface.	5 fathoms.
1882.								
Feb. 27	N. Z. 46402 for surface and bottom, Signal service.	1050	Chesapeake Bay, Point No Point, N. N. E. 1¼.	2.00 p. m.	Ebb ..	50	41	....
27	.....	1051	Chesapeake Bay, Point No Point, N. by E. 1′.	2.15 p. m.	..do ...	50	41	....
27	.....	1052	Chesapeake Bay, Point No Point, N. N. E. ¾′.	2.30 p. m.	..do ...	50	41	....
27	.....	1053	Chesapeake Bay, Point No Point, N. by E. 1¼.	2.45 p. m.	..do ...	50	41	....
27	Ther. for air.....	1054	Chesapeake Bay, Point No Point, N. by E. 1¼.	2.50 p. m.	..do ...	50	41	....
28	....do	1055	Patuxent River, Drum Point, N. E. ½	10.40 a. m.	Flood .	46	40	....
28	....do	1056	Patuxent River, Drum Point, N. N. E. ¼′.	10.55 a. m.	..do ...	46	40	....
28	....do	1057	Chesapeake Bay, south end Barren Island, E. by S. 1¾.	12.00 m.	..do ...	49	40	....
28	....do	1058	Chesapeake Bay, south end Barren Island, S. E. by E. ½ E. 2′.	12.10 p. m.	..do ...	49	40	....
28	....do	1059	Chesapeake Bay, south end Barren Island, S, E. ½ E. 2′.	12.30 p. m.	..do ...	49	40	....
28	....do	1060	Chesapeake Bay, Smith's Point, S. S. W. 2′	4.20 p. m.	..do ...	48	41½	....
Mch. 2	....do	1061	Chesapeake Bay, Smith's Point Light-house, S. by W. ½ W. 1¼.	11.20 a. m.	Ebb ..	48	41½	....
2	....do	1062	Chesapeake Bay, Smith's Point Light-house, S. W. ½ S. 1¼.	11.40 a. m.	..do ...	48	41½	....
2	....do	1063	Chesapeake Bay, South Point, Tangier Island, N. by E ½ E. 2¼.	1.35 p. m.	Flood	50	44	....
2	....do	1064	Chesapeake Bay, South Point, Tangier Island, N. N. W. 1′.	2.17 p. m.	..do ...	50	42	....
6	....do	1065	Chesapeake Bay, Cherrystone Light-house, E. by N. 2′.	9.00 a. m.	..do ...	56	45	....
6	....do	1066	Chesapeake Bay, Cherrystone Light-house, E. by S. 3′.	9.20 a. m.	..do ...	56	45	....
6	....do	1067	Chesapeake Bay, Cherrystone Light-house, S. E. by E. ½ E. 3′.	9.40 a. m.	..do ...	56	45	....
11	....do	1068	Kent Island, Thomas Point Light-house, W. S. W. ½ W. 2′.	9.50 a. m.	Ebb ..	49	42	..
11	....do	1069	Kent Island, Thomas Point Light-house, S. W. by W. ½ W. 2½.	10.20 a. m.	..do ...	51	42	....
11	....do	1070	Kent Island, Thomas Point Light-house, W. by S. 2′.	10.45 a. m.	..do ...	45	42	....
11	....do	1071	Kent Island, Thomas Point Light-house, W. N. W. ½ W. 2¼.	11.22 a. m.	..do ...	49	42	....
11	....do	1072	Kent Island, Thomas Point Light-house, N. W. 2½.	12.00 m.	..do ...	50	42	....
11	....do	1073	Kent Island, Thomas Point Light-house, N. W. by N. 2½	12.25 p. m.	..do ...	50	42	....
11	....do	1074	Kent Island, Thomas Point Light-house, N. by W. ½ W. 4¾.	1.10 p. m.	..do ...	51	43	....
13	N. Z. 47, 995	1075	Sandy Point Light-house, N. by W. ½ W. 3¼.	9.45 a. m.	Flood .	45	43	....
13	....do	1076	Sandy Point Light-house, N. by W. ½ W.	10.15 a. m.	..do ...	45	43	....
13	....do	1077	Sandy Point Light-house, N. W. ½ W. 2½.	10.55 a. m.	..do ...	49	43	....
Aug. 2	N. Z. 47996 surface	1078	Cape Cod, Nauset beacons, N. W. ½ N. 10′.	7.30 a. m.	.....	72	63	56
2	N. Z. 47995, bottom and intermediate.	1079	Cape Cod, Nauset beacons, N. W. by W. ½ W. 8½.	8.40 a. m.	.....	69	63½	56½
2	....do	1080	Cape Cod, Nauset beacons, N. W. by W. ½ W. 6½.	9.40 a. m.	.....	69	61½	56
2	....do	1081	Cape Cod, Nauset beacons, W. by S. 5½.	10.50 a. m.	.....	69	59	....
2	....do	1082	Cape Cod Light-house, N. W. ¾ N. 11½	11.45 a. m.	.....	70	59	....

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pebbles; Sp. for specks; C. for clay; St. for stone; R. for rock; Oy. oysters; bk. for black; wh. for br. for brown; hrd. for hard; sft. for soft; fne. for fine; ors. for coarse; brk. for broken; sml. for

ture of air and water.						Depth in fathoms.	Kind of bottom.	Wind.	Drift.	What used.	Specific gravities.			
10 fathoms.	20 fathoms.	30 fathoms.	50 fathoms.	100 fathoms.	Bottom.						Temperature.	Fathoms.	Specific gravity.	Corrected to standard of 60°.
...	...	...	...	...	...	3½	Bn. M., Sh., G.	S. E. 1.	.....	O. D	....	.....	.....	.....
...	...	...	...	...	40	2	Bn. M., grass.	S. E. 1.	.....	O. D	....	.....	.....	.....
...	...	...	...	...	40	1¾	....do	S. E. 1.	.....	O. D	....	.....	.....	.....
...	...	...	...	...	40	2¾	Bn. M., Sh., Oy.	S. E. 1.	.....	O. D	....	.....	.....	.....
...	...	...	...	...	40	2¾	....do	S. E. 1.	.....	O. D	....	.....	.....	.....
...	...	...	...	...	...	6	Br. M., Sh.	Calm.	.....	D	....	.....	.....	.....
...	...	...	...	...	...	6	....do	Calm.	.....	R. D	....	.....	.....	.....
...	...	...	...	...	40	17–20	Bn. M....	N. 1.	W. N. W. ½'.	T	....	.....	.....	.....
...	...	...	...	...	40	3–25	... do	N. 1.	W. N. W. ½'.	T	....	.....	.....	.....
...	...	...	...	...	40	2¾–25	....do	Calm.	W. N. W. ½'.	T	....	.....	.....	.....
...	...	...	...	...	40½	7	Bn. M., Sh	N. E. 2.	S. E. by S. ½'.	T	....	.....	.....	.....
...	...	...	...	...	41½	11–16	....do	N. W. 2.	S. ½'.	D	....	.....	.....	.....
...	...	...	...	...	41½	16–9½	....do	N. W. 2.	S. by W. 1'.	T	....	.....	.....	.....
...	...	...	...	...	42	10	....do	N. 2.	N. E. by E. ½'.	R. D	....	.....	.....	.....
...	...	...	...	...	42	20–9½	....do	N. W. 2.	N. E. by E. ½'.	R. D	....	.....	.....	.....
...	...	...	...	...	46½	25–12	S.....	S. S. W. 3.	.....	T	....	.....	.....	.....
...	...	...	...	...	45	12–25½	....do	S. S. W. 3.	.....	T	....	.....	.....	.....
...	...	...	...	...	47	12–20	....do	S. S. W. 3.	.....	T	....	.....	.....	.....
...	...	...	...	...	41	14–9	Bk. M	N. W. 4.	.....	T	....	.....	.....	.....
...	...	...	...	...	40	18	....do	N. W. 6.	.....	T	....	.....	.....	.....
...	...	...	...	...	42	15–10	....do	N. W. 6.	.....	T	....	.....	.....	.....
...	...	...	...	...	40	14–18	....do	N. W. 6.	.....	T	....	.....	.....	.....
...	...	...	...	...	42	16	....do	N. W. 5.	.....	R. D	....	.....	.....	.....
...	...	...	...	...	42	13	Bk. M., Sh	N. W. 3.	.....	R. D	....	.....	.....	.....
...	...	...	...	...	41	18–11	Bk. M.....	N. W. 3.	.....	T	....	.....	.....	.....
...	...	...	...	...	40	14–11	M	N. N. W. 5.	.....	T	....	.....	.....	.....
...	...	...	...	...	40	15	....do	N. N. W. 5.	.....	T	....	.....	.....	.....
...	...	...	...	...	40	11–12	....do	N. N. W. 5.	.....	T	....	.....	.....	1. 6040
40	...	...	...	...	37	55	Gn. M., fne S.	W. S. W. 3	S. by W. ½'.	T	....	.....	.....	.....
44	...	...	...	...	37	62	Fne S.....	W. S. W. 3	E. S. E. 1'.	T	....	.....	.....	.....
45	...	...	...	...	37	55	....do	W. S. W. 2	W. N. W. 1'.	T	....	.....	.....	.....
40	...	...	...	...	39	34	Crs. G. and P.	W. S. W. 2	N. W. by N. 1'.	T	....	.....	.....	.....
...	...	...	...	...	40	28	Crs. G.....	W. S. W. 1	N. W. by N. ½'.	T	....	.....	.....	.....

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Date.	Thermometer used.	Number of observations.	Locality.	Hour.	Tide.	Tempera		
						Air.	Surf.	5 fathoms.
1882. Aug. 2	N. Z. 47995, bottom and intermediate.	1083	Cape Cod Light-house, W. by N. 15′.	12.45 p. m.	.....	77	64	59
2	....do	1084	Cape Cod Light-house, W. N.W. ¾ W. 8′.	2.20 p. m.	.....	78	63	.....
3	....do	1085	Cape Cod Race Point Light-house, S. 33° E. 2′.	6.15 a. m.	.....	67	64	61
3	....do	1086	Cape Cod Race Point Light-house, S. 20° W. 2½.	7.00 a. m.	.....	74	64	.....
3	....do	1087	Cape Cod Light-house, S. S. W. 7′...	8.30 a. m.	.....	84	63	46
3	....do	1088	Cape Cod Light-house, S. W. ¾ W. 9½	9.50 a. m.	.....	83	62	59½
3	....do	1089	Cape Cod Light-house, S. W. ¾ W. 14′	11.10 a. m.	.....	78	63	.....
3	....do	1090	Cape Cod Light-house, S. W. ¾ W. 13′½.	11.50 a. m.	.....	81	62	56
			OFF MARTHA'S VINEYARD.					
11	N. Z. 47996, surface.	1091	Lat. 40° 03′ N., Long. 69° 44′ W.....	5.30 a. m.	.....	77	75	.....
11	N. Z. 47995, bottom and 5 and 10 fathoms.	1092	Lat. 39° 58′ N., Long. 69° 42′ W.....	6.54 a. m.	.....	79	75	.....
11	....do	1093	Lat. 39° 56′ N., Long. 69° 45′ W.....	8.35 a. m.	.....	82	75	.....
11	{ *N. Z. 47992 .... } { †N. Z. 47998 .... }	1094	Lat. 39° 57′ N., Long. 69° 47′ W.....	10.10 a. m.	.....	84	76	.....
11	....do	1095	Lat. 39° 55′ 28″ N., Long. 69° 47′ W..	11.55 a. m.	.....	82	76	75½
11	....do	1096	Lat. 39° 53′ N., Long. 69° 47′ W.....	1.39 p. m.	.....	78	75½	75½
11	....do	1097	Lat. 39° 54′ N., Long. 69° 44′ W.....	3.10 p. m.	.....	76	75½	.....
11	....do	1098	Lat. 39° 53′ N., Long. 69° 43′ W.....	4.35 p. m.	.....	78	75	72
			VINEYARD SOUND.					
18	....do	1099	Nobska Point Light-house, W. S. W. ¾ W. 1⅛.	11.06 a. m.	Flood.	76	72	.....
18	....do	1100	Nobska Point Light-house, W. S.W. ¾ W. 1¼.	11.47 a. m.	..do ...	77	72	.....
18	... do	1101	Nobska Point Light-house, W. by S. 1⅛.	12.15 p. m.	..do ...	78	72	.....
18	....do	1102	East Chop Light-house, N. W. ¾ W. 2¼.	1.10 p. m.	Slack .	73	70	.....
18	....do	1103	East Chop Light-house, N. W. by W. 2¾.	1.42 p. m.	..do ...	70	70	.....
18	....do	1104	East Chop Light-house, W. N. W. ½ W. 4′.	2.12 p. m.	..do ...	79	70	.....
18	N. Z. 47996, surface.	1105	Cape Poge Light-house, S. by W. 4′.	3.00 p. m.	Slack.	80	72	.....
18	N. Z. 47995, bottom and 5 and 10 fathoms.	1106	Cape Poge Light-house, S. by W. ½ W. 5′ ½.	3.35 p. m.	Ebb...	80	72½	.....
			OFF MARTHA'S VINEYARD.					
22	{ N. Z. 47992 } { N. Z. 47998 }	1107	Lat. 40° 02′ N., Long. 70° 35′ W.....	6.00 a. m.	.....	69½	71	71½

Commission steamer Fish Hawk, season of 1882.—Continued.

ture of air and water.						Depth in fathoms.	Kind of bottom.	Wind.	Drift.	What used.	Specific gravities.			
10 fathoms.	20 fathoms.	30 fathoms.	50 fathoms.	100 fathoms.	Bottom.						Temperature.	Fathoms.	Specific gravity.	Corrected to standard of 60°.
42	....	....	....	....	38	84	Not taken.	W. S.W. 1	W. S. W. ½′.	T	....	.....	.....	.....
44	....	....	....	....	38	38	Crs. G	W. S.W. 2	W. S. W. 1′.	T	....	.....	.....	.....
43	....	....	....	....	39	35	Gn. M., fne S.	W. S.W. 3	S. by E. 1′.	T	....	.....	.....	.....
44	....	....	....	....	39½	34	Fne S.....	W. S.W. 3	S. ¾′.	T	....	.....	.....	.....
41	....	....	....	....	39	44	Gy. S.....	N. W. 2.	W. S. W. ½′.	T	....	.....	.....	.....
...	....	....	....	....	38	90	Crs. S.....	N.W. 3.	N. W. 1½.	T	....	.....	.....	.....
...	....	....	....	....	38½	110	Gy. M.....	W. S.W. 1	N. W. by W. ½′.	T	....	.....	.....	.....
52	....	....	....	....	38½	110	....do	W. S.W. 1	W. S. W. ¾′,	T	....	.....	.....	.....
62	....	....	....	....	46	65	Gy. S. and ors. Sh.	N.W. 3.	N. W. by W. ½′.	T	....	.....	.....	.....
...	....	....	....	....	41	202	Gy. S	N.W. 3.	N. N. W. ¾′.	T	....	.....	.....	.....
...	....	....	....	....	40	349	S. and bu. M.	N.W. 3.	N. N. W. 1′.	T	....	.....	.....	.....
...	†51	*44	....	....	40	301	Bu M.....	N.W. 2.	N. W. by N. 1′.	D.S.T.	....	.....	.....	.....
72	49	†47	*45	....	40	321	Sft. gn. M .	N.W. 2.	N. N.W. ½ W. ¾′	D.S.T.	....	.....	.....	.....
65	....	....	....	....	40	317	....do	W.N.W.3	N. W. ½ N. ½′.	T	....	.....	.....	.....
..	....	....	....	....	45	158	Fne. S.....	W.N.W.3	N. ½ W. ½′.	T	....	.....	.....	.....
60	..	....	....	....	43½	156	....do	W.N.W.3	N. by E. ¾′.	T	....	.....	.....	.....
...	....	....	....	....	71½	6	S. and G...	N. 2.	N. E. by N. ½′.	T	....	.....	.....	.....
...	....	....	....	....	71½	4½	S., G., and Sh.	N. 2.	N. E. by N. ½′.	T	....	.....	.....	.....
...	....	....	....	....	71	5	Sh	N. 1.	N. E. 1′.	T	....	.....	.....	.....
...	....	....	....	....	69	5	Crs. S.....	E. 2.	E. by S. ½′.	T	....	.....	.....	.....
...	....	....	....	....	69	5	....do	N. E. 2.	E. by S. ½′.	T	....	.....	.....	.....
...	....	....	....	....	69	8½	Sh	E. N. E. 3.	N. W. by W. ¾ W. ½′.	T	...	.....	.....	.....
...	....	....	....	....	71	10	Gy. S.....	N. E. 3.	N.E. by E. ½ E. 2′	T	....	.....	.....	.....
...	....	....	....	....	72	5	S. and Sh .	N. E. 3.	N. E. by N. ½′.	T	....	.....	.....	.....
66	....	....	....	....	48	116	Gy. M.....	W. S.W. 2	N. W. 1′.	T	....	.....	.....	.....

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Date.	Thermometer used.	Number of observations.	Locality.	Hour.	Tide.	Tempera		
						Air.	Surface.	5 fathoms.
1882.								
Aug. 22	....do	1108	Lat. 40° 02′ N., Long. 70° 37′ 30″ W.	6.55 a. m.	.....	69½	71	....
22	....do	1109	Lat. 40° 03′ N., Long. 70° 38′ W.	7.55 a. m.	.....	70½	71	....
22	....do	1110	Lat. 40° 03′ N., Long. 70° 35′ W.	9.16 a. m.	.....	75	72	....
22	Surf. thermometer, N. Z. 46402.	1111	Lat. 40° 01′ 33″ N., Long. 70° 35′ W.	10.45 a. m.	.....	76	72	....
22	....do	1112	Lat. 39° 59′ N., Long. 70° 35′ W.	12.43 p. m.	.....	72	72	72
22	....do	1113	Lat. 39° 57′ N., Long. 70° 37′ W.	1.45 p. m.	.....	75	72	71½
22	N. Z. 47998	1114	Lat. 39° 58′ N., Long. 70° 38′ W.	2.40 p. m.	.....	74	72	71½
22	....do	1115	Lat. 39° 59′ N., Long. 70° 41′ W.	3.28 p. m.	.....	75	72½	72
22	....do	1116	Lat. 39° 59′ N., Long. 70° 44′ W.	4.20 p. m.	.....	77	72	72
22	....do	1117	Lat. 40° 02′ N., Long. 70° 45′ W.	5.30 p. m.	.....	78	72	73
22	....do	1118	Lat. 40° 03′ N., Long. 70° 45′ W.	6.20 p. m.	.....	74	72	....
			OFF NANTUCKET.					
26	N. Z. surf, 46402, bottom 5 and 10 fathoms.	1119	Lat. 40° 08′ N., Long. 68° 45′ W.	6.32 a. m.	.....	68	65	65
26	N. Z. No. 47995	1120	Lat. 40° 05′ N., Long. 68° 48′ W.	7.41 a. m.	.....	69	65	65
26	....do	1121	Lat. 40° 04′ N., Long. 68° 49′ W.	9.05 a. m.	.....	65	65	64
26	....do	1122	Lat. 40° 02′ N., Long. 68° 50′ W.	10.28 a. m.	.....	70	67	66
26	....do	1123	Lat. 39° 59′ 45″ N., Long 68° 54′ W.	12 m	.....	70	69	....
26	....do	1124	Lat. 40° 01′ N., Long. 68° 54′ W.	4.01 p. m.	.....	65	65	....
26	....do	1125	Lat. 40° 03′ N., Long. 68° 56′ W.	5.45 p. m.	.....	65	64	....
			VINEYARD SOUND.					
28	....do	1126	Gay Head Light-house, W. S. W. 2¾	1.46 p. m.	H'f ebb	72	66	....
28	....do	1127	Gay Head Light-house, W. by S. 3′	2.30 p. m.	Ebb	69	66	....
28	....do	1128	Gay Head Light-house, W. ¾ S. 2¾	3.10 p. m.	...do...	69	66	....
			OFF NO MAN'S LAND.					
Sept. 2	....do	1129	Fishing Village, S. ¾′	2.00 p. m.	.....	72	65	....
2	....do	1130	Fishing Village, S. ¾ E. ¾′	2.13 p. m.	.....	72	65	....
2	....do	1131	Fishing Village, S. E. by E. ¾′	2.29 p. m.	.....	72	65	....

Commissson steamer Fish Hawk, season of 1882—Continued.

Temperature of air and water.						Depth in fathoms.	Kind of bottom.	Wind.	Drift.	What used.	Specific gravities.			
10 fathoms.	20 fathoms.	30 fathoms.	50 fathoms.	100 fathoms.	Bottom.						Temperature.	Fathoms.	Specific gravity.	Corrected to standard of 60°.
...	....	....	....	....	48	101	Gy. M. fne S.	W.S.W.2.	N.W. ¾'.	T....	....	.....	.....	.....
...	...	....	....	....	40	89	Gy. S.....	N. 2.	N. N. W. 1'.	T.....	....	.....	.....	.....
...	....	....	....	....	47	100	Gn. M. fne S.	N. 2.	N. by W. ½ W. 1'	T.....	....	.....	.....	.....
...	....	....	....	....	47	124	Fne S.....	N. E. 2.	N. N. E. ½ E. 1'.	D.S.T.	....	.....	.....	.....
65	49	....	....	....	48	245	S. and Gn. M.	N. E. 2.	N. W. by N. 1'.	D.S.T.	....	.....	.....	.....
65½	49	46	....	....	48	192	Gn M.....	N. E. 2.	N. 1'.	D.S.T.	....	.....	.....	.....
65	....	.. {	43 49	} ..	45	171	Gn M.....	N. E. 2.	N. by W. 1'.	D.S.T.	....	.....	.....	.....
70	....	....	....	....	45	146	S. and gn M	N. E. 2.	W. by N. ¾'.	D.....	....	.....	.....	.....
68	....	....	....	....	46	144	Hd S. gn M	S. E. 2.	N. W. by W. 1'.	D.....	....	.....	.....	.....
62	....	....	....	....	48	80	Fne S	N. 3.	N. by E. 1'.	D.....	....	.....	.....	.....
...	....	....	....	....	49	70	Fne S	N. 2.	N. N. W. ¼'.	D.....	....	.....	.....	.....
...	....	....	....	....	48	97	S. and brk. Sh.	N.N.E.3.	N. E. ½ N¾'.	T.....	....	.....	.....	.....
56	....	....	....	....	43½	194	Fne S. and St.	N.N.E.3.	N. W. 1½'.	T.....	....	.....	.....	.....
56	....	...	....	...	41½	234	Fne S. and St.	N.N.E.4.	W. N. W. 1'.	T.....	....	.....	.....	.....
60	...	....	....	....	40½	351	S. and St	N.N.E.4.	N. W. 1'.	T.....	....	.....	.....	.....
...	....	...	....	....	39	787	S. and gn M	N.N.E.4.	N. N. W. 1'.	D.S.T.	....	.....	.....	.....
...	....	....	....	....	39	640	Fne S. and gn. M.	N.N.E.4.	N. W. by N. 1'.	D.S.T.	....	.....	.....	.....
...	....	....	....	....	40	291	S. and M ..	N.N.E.4.	N. W. by N. 1'.	D.S.T.	....	.....	.....	.....
...	....	....	....	....	63½	14	S. and blk M.	S. S. E. 3.	S. E. by E. ¾'.	T.....	....	.....	.....	.....
...	....	....	....	....	64	10	Gy S	S. S. E. 4.	E. S. E. ½'.	T.....	....	.....	.....	.....
...	....	....	....	....	65	0	M. and gy S.	S. S. E. 4.	S. by E. ¼'.	D.....	....	.....	.....	.....
...	....	....	....	....	62	4	S. and St..	E.N.E.4.	N. E. by E. ¼'.	D.....	....	.....	.....	.....
...	....	....	....	....	62	4	S. and St..	E.N.E.4.	N. W. by N. ½'.	D.....	....	.....	.....	.....
...	....	....	....	....	63	4½	S.....	E.N.E.4.	E. by N. ¼'.	D.....	....	.....	.....	.....

Dredging and trawling record of the United States Fish

Date.	Thermometer used.	Number of observations.	Locality.	Hour.	Tide.	Tempera		
						Air.	Surface.	5 fathoms.
			OFF NO MAN'S LAND.					
1882. Sept. 2	N. Z. 46402 surf. bottom 5 and 10 fathoms.	1132	Fishing Village, S. E. by E. ½'	2.45 p. m.	.....	72	65	....
2	N. Z. No. 47995....	1133	Fishing Village, S. E. ½'	3.10 p. m.	.....	72	65	....
			MENEMSHA BIGHT, VINEYARD SOUND.					
6	....do.....	1134	Gay Head Light-house, W. S. W. ¾ W. 2¾'	1.26 p. m.	Ebb...	76	66	....
6	....do.....	1135	Gay Head Light-house, W. ¾ S. 3'...	2.20 p. m.	Slack..	71	66	....
6	....do.....	1136	Gay Head Light-house, W. S. W. ⅞ W. 3'	3.50 p. m.	Flood.	70	66	....
			OFF BLOCK ISLAND.					
8	....do.....	1137	Lat. 39° 40' N., Long. 71° 52' W.	6.00 a. m.	.....	68	70	69
8	....do.....	1138	Lat. 39° 39' N., Long. 71° 54' W. ...	7.24 a. m.	.....	72	71	70
8	*N. Z. 47993 †N. Z. 47992 ‡N. Z. 47996	1139	Lat. 39° 37' N., Long. 71° 55' W.....	8.48 a. m.	.....	74	72	70
8	....do.....	1140	Lat. 39° 34' N., Long. 71° 56' W.....	10.35 a. m.	.....	78	73	72
8	....do.....	1141	Lat. 39° 32' N., Long. 71° 57' W.	12.27 p. m.	.....	80	74	73
8	....do.....	1142	Lat. 39° 32' N., Long. 72° W.	0.52 p. m.	.....	80	74	74
8	....do.....	1143	Lat. 39° 29' N., Long. 72° 01' W.	3.36 p. m.	.....	80	74	73
8	....do.....	1144	Lat. 39° 33' N., Long. 72° 06' W.	6.00 p. m.	.....	75	74	73
			OFF MARTHA'S VINEYARD.					
Oct. 4	N. Z. surf., 46402 bottom 5, 10, and 20 fathoms.	1150	Lat. 39° 58' N., Long. 70° 37' W.	6.35 a. m.	.....	65	62	62
4	N. Z. No. 47998 No. 25 F. 47993	1151	Lat. 39° 58' 30" N., Long. 70° 37' W.	7.45 a. m.	.....	66	62	62
4	45 F. No. 47992 95 F. No. 47995	1152	Lat. 39° 58' N., Long. 70° 35' W.	8.42 a. m.	.....	68	62	62
4	....do.....	1153	Lat. 39° 54' N., Long. 70° 37' W.....	10.45 a. m.	.....	70	62½	62
4	....do.....	1154	Lat. 39° 55' 31" N., Obs. Long. 70° 39' W.	12.10 p. m.	.....	72	62½	....
4	....do.....	1155	Lat. 39° 52' N., Long. 70° 30' W.....	4 06 p. m.	.....	64	63	62

Commission steamer Fish Hawk, season of 1882—Continued.

ture of air and water.						Depth in fathoms.	Kind of bottom.	Wind.	Drift.	What used.	Specific gravities.			
10 fathoms.	20 fathoms.	30 fathoms.	50 fathoms.	100 fathoms.	Bottom.						Temperature.	Fathoms.	Specific gravity.	Corrected to standard of 60°.
...	....	...	....	....	62	4	S. St	E. N. E. 4.	N. N. E. ½'.	D	....	.....	.....	.....
...	....	....	....	....	62	4	....do	E. N. E. 4.	E. by S. ½'.	D	....	.....	.....	.....
...	....	....	....	....	64	9½	S. and M. .	N. E. 4.	N. W. by N. ½'.	T.....	....	.....	.....	.....
...	....	....	....	....	64	7½	....do	N. E. 4.	N. E. ½'.	T.....	....	.....	.....	.....
...	....	....	....	....	63	10	M.....	N. E. 3.	N. E. ½'.	D	....	.....	.....	.....
62½	....	...	....	....	46	176	Fne. S.....	Calm.	N. N. W. ½'.	T.....	....	.....	.....	.....
...	....	....	....	....	46	168	S.....	....do ...	N. W. 1'.	D.S.T.	....	.....	.....	.....
64	....	47*	49½	48½‡	44	291	M.....	N. W. 1.	N. W. by W. 1'½.	D.S.T.	....	.....	.....	.....
68	....	53	49	49	40	374	S. sft M. G	N. W. 2.	N. 1'.	D.S.T.	....	.....	.....	.....
70	....	59	53	51	40	389	S. and M. .	N. W. 2.	W. by N. ½ N. 1'	D.S.T.	....	.....	.....	.....
72	....	71	48	50	41	322	M.....	N. W. 1.	W. by S. ½'.	D.S.T.	....	.....	.....	.....
73	....	55	49	50½	40	452	....do	W. 1.	N. W. 2.	D.S.T.	....	.....	.....	.....
72	....	60	50	50	41	386	Sft M.....	W. S. W. 1.	N. 1.	D.S.T.	....	.....	.....	.....
61	....	....	....	....	47	140	S.....	W. N. W. 2	E. ½'.	T	....	.....	.....	.....
62	....	...	....	....	48	125	....do	W. N. W. 2	E. 2'.	T.....	....	.....	.....	.....
62	....	45	44½	....	48	115	....do	W. N. W. 3	E. 1'½.	T.....	....	.....	.....	.....
61	....	52	44	45	44	225	S. and gn M.....	W. N. W. 3	N. ½ W. 1'½.	T.....	....	.....	.....	.....
...	....	48	46	60	....	193	....do	N. W. 3.	N. by W. 1'½.	T.....	....	.....	.....	.....
61	48½	47	54	48	40	554	....do	N. W. 3.	N. N. W. ½'.	D.S.T.	....	.....	.....	.....

Table of distances made under steam by the United States Fish Commission steamer Fish Hawk, for the year 1882.

Date.	Where bound.	Daily distance.	Distance between ports.
1882.		*Miles.*	*Miles.*
Feb. 25	From Washington to Cornfield Harbor	88	88.00
27	From Cornfield Harbor to Saint Jerome's Creek	28	28.00
28	Dredging trip	44	44.00
Mar. 1	Shifting berth	6	6.00
2	Dredging trip	40	40.00
3	Cod Harbor to Cherrystone Inlet	51	51.00
5	Setting nets	23	23.00
6	Dredging trip	126	126.00
7	Shifting anchorage	3	3.00
11	Dredging trip	25	25.00
13	..... do	26	26.00
21	..... do	14	14.00
22	Annapolis to Washington	78	.....
23	..... do	79	157.00
30	Navy-yard to Emery's coal wharf and return	4	4.00
Apr. 10	Washington to Quantico	28	28.00
May 10	Quantico to Washington	28	28.00
22	Washington to Havre de Grace, Md.	113	.....
23	..... do	72	185.00
June 10	Havre de Grace to Baltimore and return	53	.....
11	..... do	27	80.00
14	Shifted berth	5	5.00
15	Havre de Grace to Washington	124	.....
16	..... do	70	194.00
19	Washington to Annapolis, by way of Saint Jerome's Creek	70	.....
20	..... do	21	.....
21	..... do	68	159.00
22	Annapolis to Saint Jerome's Creek	57	57.00
24	Saint Jerome's Creek to Point Lookout and return; Saint Jerome's to Annapolis Roads	71	71.00
25	Annapolis Roads to Annapolis Harbor	3	3.00
26	Annapolis to Point Lookout, thence to Saint Jerome's	71	71.00
28	Steamed out to make compass observations	6	6.00
29	Steamed out to make compass observations and from Saint Jerome's to Washington	36	.....
30	From Saint Jerome's to Washington	66	102.00
July 8	Washington to Wilmington, Del.	150	.....
9	..... do	181	.....
10	..... do	25	356.00
11	Wilmington, Del., to Havre de Grace, Md.	121	.....
12	Wilmington, Del., to Saint Jerome's Creek	186	.....
13	..... do	61	368.00
14	Saint Jerome's to Baltimore and return	86	86.00
15	Saint Jerome's to Washington, D. C	60	.....
16	..... do	51	111.00
21	Washington to Wood's Holl, Mass.	99	.....
22	..... do	225	.....
23	..... do	223	.....
24	..... do	1	548.00
Aug. 1	Dredging trip	34	.....
2	..... do	65	.....
3	..... do	99	198.00
10	..... do	66	.....
11	..... do	99	.....
12	..... do	59	224.00
14	Wood's Holl to New Bedford	14	14.00
15	New Bedford to Wood's Holl	14	14.00
18	Dredging trip	35	35.00
21	..... do	47	.....
22	..... do	114	.....
23	..... do	45	206.00
25	..... do	81	.....
26	..... do	103	.....
27	..... do	90	274.00
28	..... do	25	25.00
Sept. 2	..... do	38	38.00
6	..... do	25	25.00
7	..... do	70	.....
8	..... do	125	.....
9	..... do	94	289.00
11	Wood's Holl to New Bedford	14	14.00
13	New Bedford to Wood's Holl	14	14.00
28	Shifted berth	‡	.25
29	..... do	‡	.25
30	..... do	‡	.25
Oct. 3	Dredging trip	49	.....
4	..... do	125	.....

Table of distances made under steam by the United States Fish Commission steamer Fish Hawk, for the year 1882—Continued.

Date.	Where bound.	Daily distance.	Distance between ports.
1882.		*Miles.*	*Miles.*
Oct. 5	Dredging trip	48	222.00
12	Wood's Holl to Bristol, R. I	65	65.00
17	Bristol to Newport, R. I	8	.....
18	..... do	4	12.00
19	Newport to New York	92	.....
20	..... do	54	146.00
21	New York to Wilmington, Del	17	.....
22	..... do	13	.....
23	..... do	1	.....
24	..... do	64	.....
25	..... do	136	231.00
27	Wilmington, Del., to Washington, D. C	103	.....
28	..... do	201	.....
29	..... do	50	351.00
	Total	.....	5,493 75

SYNOPSIS OF THE STEAM LOG FOR THE YEAR ENDING DECEMBER 31, 1882.

Stroke of piston, in feet	2½
Number of condensing cylinders	2
Diameter of condensing cylinders, in inches	22
Mean point of steam cut-off from commencement of stroke of piston, in inches	6.75
Mean number of holes of throttle-valve open	6.4
Mean vacuum in condenser, in inches of mercury	24.8
Mean steam pressure in boilers while engines were in operation	22.5
Mean temperature of engine room	93
Mean temperature on deck	67
Mean temperature of injection water	62
Mean temperature of discharge water	96
Mean temperature of feed water	82
Total time fires were lighted, in hours and minutes	4,543.20
Total time fires were lighted for hatching, in hours and minutes	1,487.40
Total time engines were in operation, in hours and minutes	785.44
Total time engines were in operation for dredging, in hours and minutes	123
Total number of revolutions of starboard engine	3,640,730
Total number of revolutions of port engine	3,505,090
Mean number of revolutions per minute *en route*	88.61
Mean piston speed, in feet per minute	409.5
Total number of knots run	5,493.75
Mean number of knots per hour	6.8
Mean number of knots per hour *en route*	8.6
Total weight of coal consumed for engineer's department	$471\frac{1048}{2240}$
Total weight of coal consumed while engines were in operation	$238\frac{884}{2240}$
Total weight of coal consumed for galley	$24\frac{560}{2240}$
Total weight of coal refuse	$97\frac{1520}{2240}$
Mean number of pounds of coal consumed per hour while engines were in operation	667
Total number of gallons of oil consumed	371
Total number of pounds of tallow consumed	112
Total number of pounds of wiping stuff	221
Mean draft forward, in feet and inches	7.9
Mean draft aft, in feet and inches	7.6

Number of screws	2
Kind of screws	True.
Mean pitch of screw, in feet and inches	12.3
Diameter of screw, in feet and inches	6.8
Length of screw, in inches, parallel to axis	20
Number of blades on each screw	4
Maximum indicated horse-power	277
Mean indicated horse-power	252.7
Mean number of pounds of coal per horse-power	2.21
Maximum number of pounds of coal per square foot of grate	13.9
Mean number of pounds of coal per square foot of grate	12.8
Maximum speed attained under steam alone in knots per hour	10
Number of hours maintained	5.30
Slip of screw at maximum speed, in per cent	12
State of tide and sea	Smooth.
Mean slip of screw, in per cent. *en route*	19.57

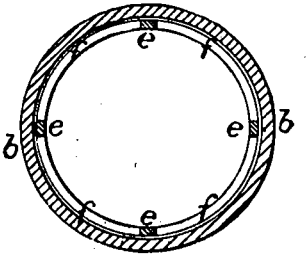

Fig. 2.

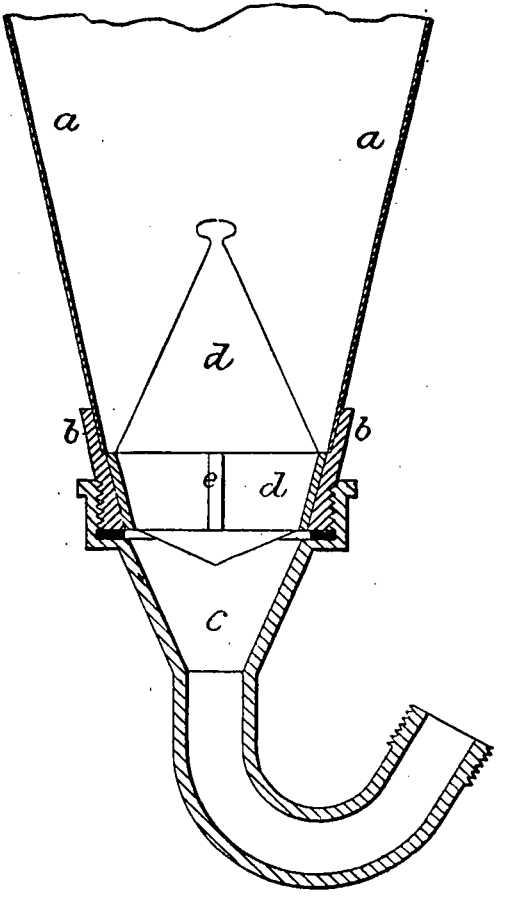

Fig. 1.

Shad-hatching cone.

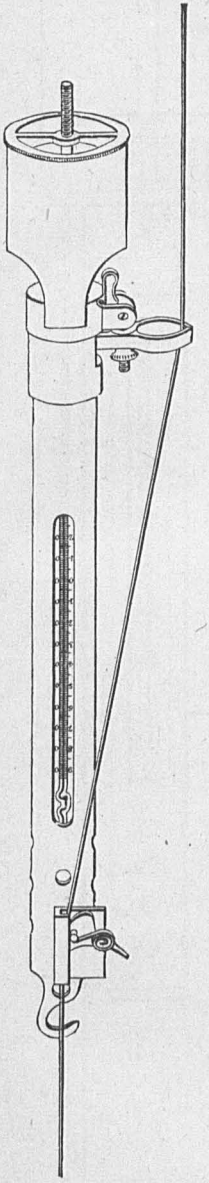

Fig. 1.

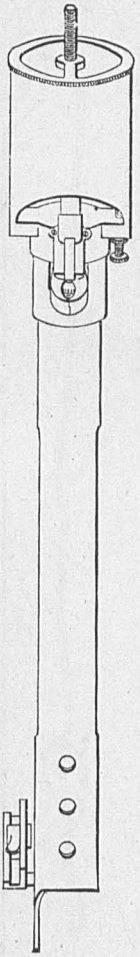

Fig. 2.

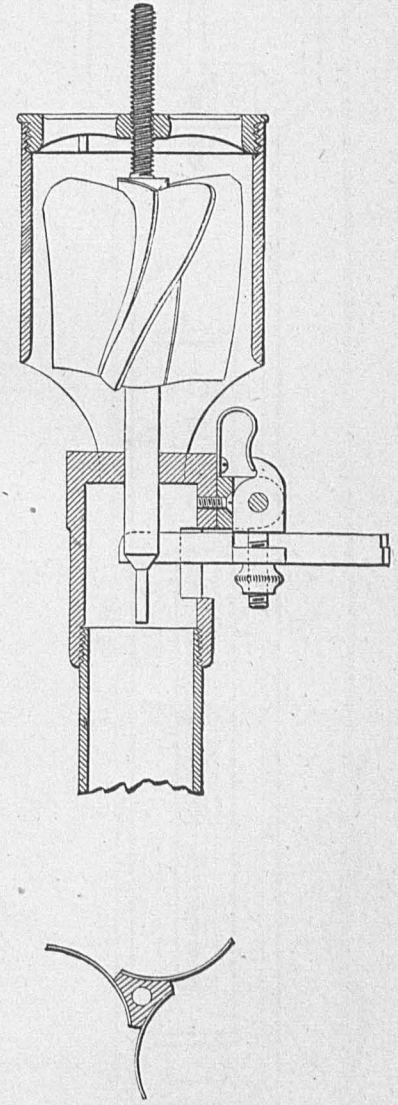

Fig. 3.

The Bailie-Tanner deep-sea thermometer case.

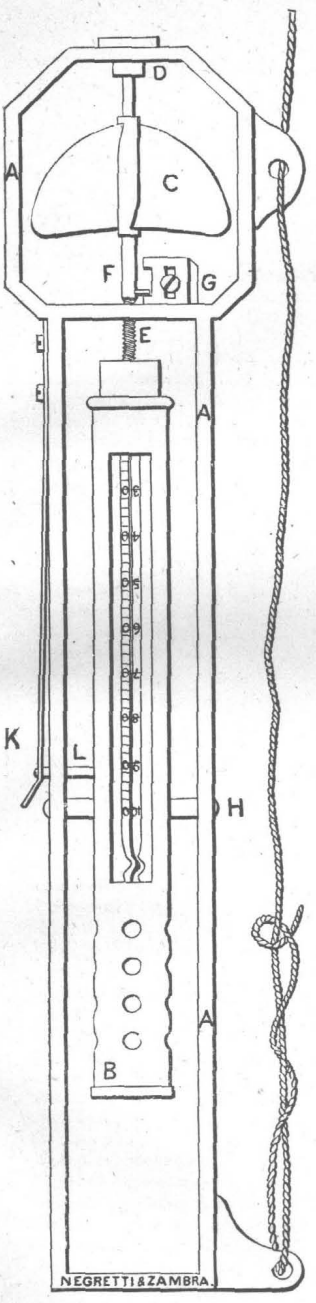

Fig. 1.

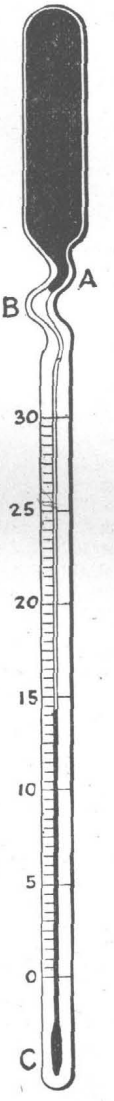

Fig. 3.

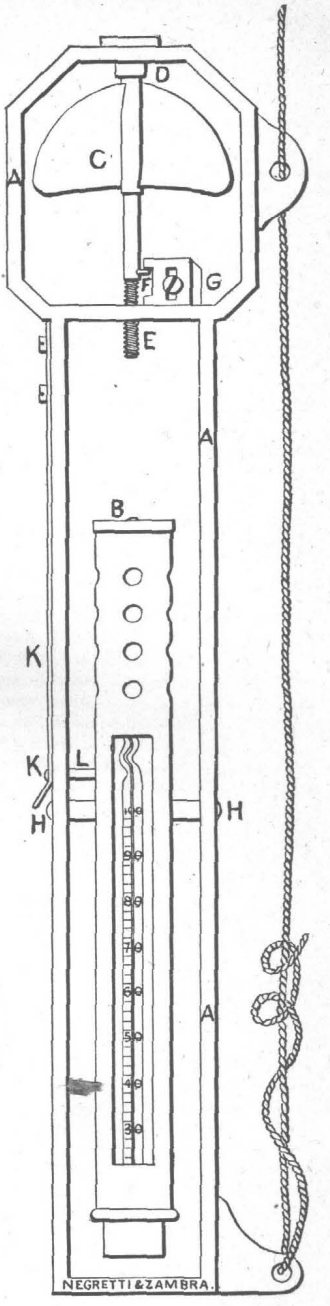

Fig. 2.

The Negretti-Zambra deep-sea thermometer.

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