

**131.—REPORT OF SHAD-HATCHING OPERATIONS BY THE STEAMER
LOOKOUT, SEASON OF 1885.**

By JAMES A. SMITH,

Mate, U. S. N., Commanding.

I respectfully submit the following report, with appended record and meteorological tables, of the fish-hatching operations conducted on board this vessel during the past season, from May 13, to June 5, 1885, inclusive. On the return from the trip to Florida, arriving at Washington, D. C., May 8, took on board all the hatching equipment, consisting of 2 cone stands, 8 cones, and 24 McDonald hatching-jars, and proceeded at 1 p. m. on the 9th to Baltimore, Md. Arrived there on the 10th at 8 a. m. and made fast to Clark's machine-shop wharf, to have some needed repairs made to the boiler. By Wednesday, May 13, repairs to the boiler being completed, received orders from Assistant Commissioner T. B. Ferguson to proceed to Battery Station, Havre de Grace, Md., and begin operations in shad hatching in that vicinity. Left Baltimore, Md., at 6.50 a. m., and arrived at Battery Station at 11.40 a. m. Crew employed fitting up hatching cones and jars. As the crew of the vessel was not experienced in spawn-taking, two expert spawn-takers were detailed from the station for duty, and two of the crew were sent on shore in their places, to be instructed in spawn-taking. At 3.30 p. m. left Battery Station, steamed over to North East River and visited Carpenter's Point and Red Bank fisheries, also the gill-boat men, and made arrangements about getting spawn; at 6.15 p. m. anchored off Bull Mountain. At 7 p. m. sent spawn takers to tend gill-boats; at 10 p. m. spawn-takers returned with 217,000 shad eggs. Placed them in the McDonald jars.

Thursday, May 14.—At 6.30 a. m. we got under way and steamed over to Battery Station; at 3.30 p. m. returned to North East River, east side of the bay, and left spawn-takers at Carpenter's Point and Red Bank fisheries; at 6 came to anchor off Bull Mountain. During the evening the spawn-takers tended as many gill-boats as possible, and succeeded in procuring from fisheries and gill-boats 338,000 shad eggs. Put 173,000 in McDonald jars, and kept the remainder for Battery Station.

Friday, May 15.—At 6 a. m. got under way and steamed over to Battery Station, arriving at 7 a. m. Transferred 165,000 shad eggs to superintendent of Battery Station. At 3.30 p. m. left station and proceeded across the bay to North East River. Distributed spawn-takers to fisheries and gill-boats. During the evening spawn-takers returned, having succeeded in procuring 529,000 shad eggs. Gillers report fair catches.

Saturday, May 16.—At 6 a. m. steamed over to Battery Station and transferred all the spawn obtained last evening, 529,000, to superintend-

ent of Battery Station. At 11.30 a. m. cast off from wharf at Battery Station and proceeded to Havre de Grace, Md. Arrived and made fast to Hille's wharf and took on board five tons of coal. At 1 p. m. Asst. Com. T. B. Ferguson came on board, and at 3 we cast off and steamed down to Battery Station with a lighter in tow. Arrived at 4 p. m. Assistant Commissioner Ferguson went on shore. At 4.20 cast off from Battery Station and steamed over to North East River. Picked up two spawn-takers, who had gone over to Carpenter's Point fishery during the day, having procured 212,000 shad eggs, and at 5.45 came to anchor off Ball Mountain. Sent spawn-takers to tend gill-boats. Furnished John C. Ford, giller and an experienced spawn-taker, with pans, &c., and was authorized by Assistant Commissioner Ferguson to pay him at the rate of \$20 per 1,000,000 for all good impregnated shad eggs. At midnight spawn-takers returned, having failed to obtain any spawn. John C. Ford delivered 110,000, making 322,000 procured during the day.

Sunday, May 17.—At 5 a. m. steamed over to Battery Station and transferred 322,000 shad eggs to superintendent of Battery Station. At 7.45 a. m. Assistant Commissioner Ferguson came on board with two expert spawn-takers. Cast off from wharf; steamed up Elk River and through the Delaware and Chesapeake Canal. At noon locked out at Delaware City, and proceeded up the Delaware River. Visited Howell's fishery at Gloucester Point, New Jersey. Landed Assistant Commissioner Ferguson at Philadelphia. At 4.30 p. m. returned to Gloucester Point, New Jersey, and came to anchor to be ready to tend the hauls in the morning, and make an examination of the fishing shores between Philadelphia and Chester, for the purpose of establishing a hatching station. Shad eggs procured on the 13th from the Chesapeake began to hatch out this morning.

Monday, May 18.—At 5 a. m. sent spawn-takers to tend hauls at Rice's and Howell's fisheries. Catch of fish very large, but no ripe fish to be found. At 4 p. m. left two spawn-takers at Howell's fishery; steamed down the river and anchored near Faunce's fishing shore, and sent spawn-takers to tend the sundown hauls. At 6.30 p. m. spawn-takers returned with 878,000 shad eggs from Faunce's fishery and 268,000 from Howell's, making a total of 1,146,000. From information received from the fishermen and from our own observation I concluded that in a few days a great many ripe fish would be found. The spawning season had just commenced in this vicinity, and large numbers of shad were being captured. The assistant commissioner, to arouse interest among the fishermen, directed me to pay at the rate of \$10 per 1,000,000 for good eggs, and his instructions were carried out. At sundown deposited in the river opposite Faunce's fishery 100,000 shad fry, hatched out from eggs procured on the Chesapeake. At 7.50 p. m. steamed up to Philadelphia, landed the assistant commissioner, returned to Gloucester Point, and at 11.30 and came to anchor.

Tuesday, May 19.—Spawn-takers tended all the hauls at Rice's and Howell's fisheries during the day, but found no ripe fish. At 5 p. m. steamed down the river, and came to anchor near Faunce's fishery. Spawn-takers returned from sundown hauls with 950,000 shad eggs. At sundown deposited in the river opposite Faunce's fishing-shore 75,000 shad fry, from eggs procured in Chesapeake Bay.

Wednesday, May 20.—Having received orders from Assistant Commissioner Ferguson to return to Battery Station, Havre de Grace, Md., this morning, got under way at 5 a. m. and steamed down the Delaware River. At 8 a. m. locked into Chesapeake and Delaware Canal, and at noon locked out at Chesapeake City, and proceeded down Back Creek and Elk River. At 1 p. m. deposited 75,000 shad fry in middle of Elk River opposite the mouth of Bohemia Creek; arrived at Battery Station at 2 p. m., and transferred to superintendent of Battery Station 348,000 shad eggs; eggs procured on the 13th and 14th nearly all hatched out. On account of a severe rain-storm did not go over to east side of bay; sent spawn-takers to tend gill boats near Battery Station. At 11.30 p. m. spawn-takers returned with 30,000 shad eggs; transferred them to superintendent of station.

Thursday, May 21.—At 4 p. m. left Battery Station and steamed over to North East River, and came to anchor off Bull Mountain. Sent out spawn-takers; at 11 p. m. spawn-takers returned without any eggs. Eggs received on the 18th and 19th began to hatch out in hatching-jars. Those of the same dates, which were put in the cones, do not seem to do so well, as I find very many dead ones; changing the water from the Delaware River to the Susquehanna, also passing through the canal, where one part of it is strongly impregnated with iron, may be the cause—the result of which, only about 50 per cent are hatching out. At sundown deposited 50,000 shad fry in North East River.

Friday, May 22.—At 6 a. m. steamed over to Battery Station; during the afternoon deposited in the channel opposite the station 25,000 shad fry. At 5 p. m. left Battery Station, steamed over to North East River, and anchored in the usual place. Sent out spawn-takers; at midnight they returned, but failed to get any eggs; the weather being so overcast and rainy, very few gillers were out.

Saturday, May 23.—At 6 a. m. steamed over to Battery Station. At 9 a. m. left station, took lighter in tow, and proceeded to Havre de Grace, Md., made fast to Hille's wharf, and took on board 5 tons of coal. At noon Assistant Commissioner Ferguson came on board; cast off and steamed down to Battery Station; transferred 348,000 shad eggs and 277,000 shad fry to superintendent of station. At 2 p. m. left station and proceeded to Baltimore, Md.; at 6 p. m. arrived and made fast to wharf at Chester River Steamboat Company.

Sunday, May 24.—At 11 a. m. Asst. Com. T. B. Ferguson came on board; cast off and proceeded to Battery Station; at 3.45 p. m. arrived;

at 5.45 cast off and returned to Baltimore, arriving there at 10 p. m.; made fast to same wharf.

Monday, May 25.—At 11.40 left Baltimore, Md., and returned to Battery Station, arriving there at 4 p. m. At 4.45 steamed over to North East River and anchored in the usual place, off Bull Mountain; sent out spawn-takers; spawn-takers returned at midnight with 35,000 shad eggs; fish getting very scarce; fishing shores at Carpenter's Point and Red Bank cut out, and quite a number of the gillers have stopped fishing.

Tuesday, May 26.—At 6 a. m. steamed over to Battery Station; transferred 35,000 shad eggs to superintendent of station. Owing to the stormy weather did not go over to the east side of bay; spawn-takers tended gillers in vicinity of station, but failed to get any eggs.

Wednesday, May 27.—At 8 a. m. left station and steamed up to Havre de Grace, Md., with Assistant Commissioner Ferguson, coaled ship and returned to station. Received orders from Assistant Commissioner Ferguson to proceed to the Delaware River and make an investigation of the fisheries above Philadelphia, as far as Bordentown, N. J.; spawn-taker S. J. Talbott was detailed to go with us to assist. At 11.30 left Battery Station and steamed up Elk River to canal. At 1.40 locked in at Chesapeake City. At 5 p. m. arrived at Delaware City; received telegraphic orders from Commissioner S. F. Baird to wait for launch Cygnet and force of spawn-takers; locked out of canal and came to anchor in the stream; interviewed fishermen on shore and found that very few shad were being caught in this vicinity, and what were captured were down-runners.

Thursday, May 28.—At anchor in river opposite Delaware City; at 3.30 p. m. launch Cygnet and spawn-takers arrived; got under way; took her in tow and proceeded up the Delaware River; at sundown came to anchor off Red Bank, N. J., near to U. S. Fish Commission steamer Fish Hawk; communicated with her, and found that her force of spawn-takers could tend to all the fishing shores in the vicinity.

Friday, May 29.—At 8 a. m. steamed up the Delaware River, passing Philadelphia at 9 a. m.; arrived at Riverton, opposite Ten-mile Point, at 10 a. m. Interviewed William Faunce, who fishes a 200-fathom seine at this point, making nine hauls a day, between sunrise and sunset. The season was an average one in the yield of shad, but for the past two weeks no ripe fish had been observed. Previous to that time they had been abundant. On this day, up to the time of our interview, five hauls had been made, yielding 90 shad. Mr. Faunce informed me that he had been catching about 200 shad a day; was here informed that there were about 25 gillers who operated between Petty's Island and Riverton. About ten days previous to the visit of the Lookout these gillers had been very successful, but since that time the catch had greatly diminished. Left Riverton and pro-

ceeded up the Delaware, stopping at fishing shore on Hawk Island, near the entrance to Rancocas Creek. This shore is owned and operated by George Rice & Sons. They work a 150-fathom seine, and make thirteen hauls a day. Up to 12.30 p. m. had made six hauls, and caught 22 shad. The catch for the season had been rather small. This shore, however, is not considered a very good one, but about this locality 30 or more gilliers operate; was informed that most of them had done well during the season. Attempts were made to obtain spawn from the Rice shore, as the seine was just about being landed, but with no success. At 1.30 continued up the river, passing "frog-pond" fishery on the Pennsylvania side of the river, about 1 mile below Beverly, which at this time was not in operation. The owner represented that he had made a very successful season before stopping operations; very few gilliers operate here. At 2.30 arrived at Badger's Island fishery, on Badger's Island, half a mile below Burlington, N. J. This shore is owned and fished by Captain Dwyer; works a 200-fathom seine, averaging ten hauls a day. Herring very plentiful, but shad scarce at this fishery. At 2.30 seven hauls had been made and 40 shad captured; no spawn obtained. Continued up river, and at 3.30 arrived at Hayes's fishing shore, half a mile above Burlington Island, on the Jersey shore; owned and fished by Captain Van Skiver; seine 200 fathoms, and makes eight hauls a day; at time of visit six hauls had been made and 16 shad caught, with very good catch of herring. Left a spawn-taker here to examine the hauls made at sundown. At 4 p. m. continued up river; stopped at 4.30 and visited two shores half a mile apart, opposite Florence, owned and fished by Captain Powell. One seine measured 150 fathoms, the other 80; hauled only on ebb tide. Reported season's catch of shad very small, but an average catch of herring. About 1 mile above Florence, on the Pennsylvania shore, is Ivens's fishery, owned and fished by William J. Ivens; seine 150 fathoms; fishes it on high water, and all the ebb tide; catch of shad and herring about an average for the season. Had spawn-takers tend hauls at fisheries all the way up, but no ripe fish were found. After examination of Ivens's fishery steamed down the river and anchored off Burlington for the night.

Saturday, May 30.—Sent spawn-takers to tend the hauls at all the fisheries within reach during the day, using launch Cygnet to distribute them at the different stations. At 9 a. m. got under way with Look-out and proceeded up the river to continue the investigation as far as Bordentown, N. J.; at 10 arrived at and anchored near Ellis's fishing shore, situated on Pennsylvania shore, opposite north end of Newhold Island, owned and fished by E. Burt Davis, of Trenton, N. J.; fishes a 120-fathom seine; hauls on high water, and all the ebb tide. While there four hauls were made, 7 shad were caught (3 of which were down-runners), and about 300 herring. The catch of shad for the season had

been so far about 2,500, herring 5,000. As there were no more fishing shores between here and Bordentown I interviewed the gillers, and found that but 5 were fishing in this vicinity, although during the season some 15 had operated. They use a very large mesh, $5\frac{1}{2}$ to $5\frac{1}{2}$, so that nothing but very large fish are caught. They reported an average season. At 1 p. m. got under way with Lookout and steamed down the river to Burlington, picking up the spawn-takers on the way down, as all the shores stop fishing from Saturday noon until Monday morning. At 2.30 p. m. came to anchor, and concluded to locate in the vicinity, it being near the center, and within easy reach of all the principal fishing shores. Launch Cygnet returned at 4 p. m. with the remainder of spawn-takers, but were not successful in procuring spawn from any of the fishing shores during the day.

Sunday, May 31.—At 5 p. m. sent one spawn-taker down by train to Rivington, near Faunce's fishing shore, to be on hand to tend morning hauls, and to remain there during next Monday.

Monday, June 1.—At 4 a. m. launch Cygnet started with spawn-takers and boats and distributed them at all the fishing shores in the immediate vicinity; at 1.30 p. m. got under way with Lookout and visited the fishing shores. All reported a fair Monday's catch of shad, but no spawning fish were found; at 5 p. m. came to anchor at Torresdale, 4 miles below Burlington, and concluded to tend the gillers at the sundown drift; at 7 p. m. spawn-takers returned with 149,000 shad eggs, obtained from the gillers; at 8 p. m. launch Cygnet returned from Faunce's fishing shore with 159,000 shad eggs, and reported that seine cut out. Placed eggs in McDonald hatching-jars; spawn-takers tended gillers during ebb tide, but failed to procure any spawn. I am pleased to state that the fishermen take a great interest in the work, and seem willing to assist in every way possible. According to instructions from Assistant Commissioner Ferguson, I paid the fishing shores and gillers at the rate of \$10 per 1,000,000 for all good impregnated shad eggs.

Tuesday, June 2.—At 6.30 a. m., when spawn-takers returned from tending gillers at morning high water, steamed up the river to Burlington and anchored; at 8.45 got under way, and proceeded up river with launch Cygnet in tow; at 10 arrived at Bordentown, anchored Lookout, and started up river in launch Cygnet to make an investigation of the fisheries as far as Trenton; visited Shamptown fishery, about 1 mile above Bordentown shore, owned and fished by John Seeds, seine 115 fathoms long, season's catch of shad about 2,500; fish reported very scarce now. Had made several hauls, but no shad were caught and but 150 herring. Two other small seines, one on Biles Island and the other on Moon Island, which had operated at those points during the season, I found had cut out. The gillers had nearly all cut out, not more than 10 operating the whole distance from Bordentown to Trenton. All the gillers I interviewed reported a fair season's work; at 1.30

p. m. arrived back to Lookout, got her under way, but in turning in the narrow channel; got aground sent launch Cygnet with boats and spawn-takers down the river, to be in time for sundown drift of gillers near Torresdale; at 4.45 p. m. vessel afloat, and proceeded down the river; at 6 p. m. anchored near Torresdale; at 7 p. m. spawn-takers returned to vessel with 233,000 shad eggs; sent spawn-takers out again, but returned at midnight without any spawn.

Wednesday, June 3.—At 6.30 a. m. got under way and steamed up to Burlington and came to anchor. Had numerous visits from the inhabitants of the place, who seem to take a great interest in the work. At 4.45 p. m. steamed down the river and anchored near Torresdale. Sent launch Cygnet with spawn-takers and boats 8 miles down the river to tend on the gillers in the vicinity of Ten Mile Point. At 7.30 spawn-takers from gillers in the vicinity of vessel returned with 301,000 shad eggs. As all available jars were occupied, I placed some eggs in hatching cones. At 11.30 p. m. launch Cygnet returned with spawn-takers, but failed to procure any spawn. Young fish from eggs obtained on the 1st instant began to hatch out this evening.

Thursday, June 4.—Spawn-takers tended gillers on several drifts during the night, but did not get any more spawn. At 6 a. m. got under way and steamed up to Burlington and came to anchor. Received telegraphic instructions from Assistant Commissioner Ferguson to send launch Cygnet, two spawn-takers, and one boat to Trenton, N. J., to co-operate with Mr. Ellis in gathering spawn for hatching purposes in Fish Commission car No. 3, and also to continue operations on the river with Lookout and proceed to Havre de Grace, Md. I regretted exceedingly that I could not remain in the vicinity a few days longer so as I could show the young fish to the people of Burlington and this vicinity hatched out from spawn obtained here. At 11 a. m. steamed over to Bristol, Pa., took on board 2 tons of coal, and at 1 p. m. steamed down the river, stopping at different points on the way and paying the fishermen for spawn obtained from them. At 3.30 p. m. passed Philadelphia. At 4.30 came to anchor off Gloucester Point, New Jersey. Young fish hatching out very fast.

Friday, June 5.—At 4.30 a. m. deposited 15,000 shad fry in the middle of river opposite Gloucester Point. At 5 a. m. got under way and steamed down the river. At 9 a. m. entered the Chesapeake and Delaware Canal. At noon locked out at Chesapeake City, and steamed down Back Creek and Elk River. I have to report that during the time of passing the canal the temperature of the hatching room reached 100°, the temperature of the water in hatching jars increasing accordingly, so that with the great heat and the change of water in the canal 150,000 young fish died. At 3.30 p. m. arrived at Battery Station, Havre de Grace, Md.; transferred 338,000 eggs and 177,000 young shad fry to superintendent of station; dismantled hatching apparatus,

sent it on shore, and put it in store-room at station, taking receipt for same.

I beg to state that I consider the vicinity of Burlington, N. J., and down the river toward Petty's Island, just above Philadelphia, a good locality for the purpose of procuring spawn for hatching shad. And I would also state that if a party should be sent to that vicinity they should be on the ground ready for work not later than May 10, as from that time to the end of the fishing season a great many ripe fish will be found.

U. S. F. C. STEAMER LOOKOUT,
Port Jefferson, Long Island, N. Y., August 23, 1885.

TABLE I.—Record of shad-hatching operations conducted at Havre de Grace, Md., and on the Delaware River, on the U. S. Fish Commission steamer Lookout, from May 13 to June 5, 1885, by James A. Smith, U. S. N.

| Date. | | Ripe fish. | | Eggs obtained. | Transferred to Battery Station. | | Fish deposited. | |
|--------------|---------------|------------|----------|----------------|---------------------------------|---------|-----------------|--|
| Day of week. | Day of month. | Males. | Females. | | Eggs. | Fish. | Number. | Place. |
| | 1885. | | | | | | | |
| Wednesday | May 13 | 7 | 8 | 217,000 | | | | |
| Thursday | May 14 | 9 | 11 | 338,000 | | | | |
| Friday | May 15 | 10 | 14 | 529,000 | 165,000 | | | |
| Saturday | May 16 | 8 | 9 | 322,000 | 529,000 | | | |
| Monday | May 18 | 12 | 19 | 1,146,000 | 322,000 | | 100,000 | Middle of Delaware River, opposite Faunce's fishery. |
| Tuesday | May 19 | 10 | 14 | 950,000 | 378,000 | | 75,000 | Middle of Delaware River, opposite Faunce's fishery. |
| Wednesday | May 20 | 1 | 1 | 30,000 | 348,000 | 277,000 | 75,000 | Middle of Elk River, Md., opposite mouth of Bohemia Creek. |
| Monday | May 25 | 1 | 1 | 35,000 | 35,000 | | 50,000 | Opposite Bull Mountain, North East River, Md. |
| | | | | | | | 25,000 | Opposite Battery Station, in channel. |
| Monday | June 1 | 9 | 10 | 308,000 | | | | |
| Tuesday | June 2 | 8 | 9 | 233,000 | | | | |
| Wednesday | June 3 | 10 | 12 | 301,000 | | | | |
| Friday | June 5 | | | | 338,000 | 177,000 | 15,000 | Middle of river, opposite Gloucester Point, New Jersey. |
| Total | | 85 | 108 | 4,400,000 | 2,115,000 | 454,000 | 340,000 | |

