

XXIV.-REPORT ON THE SHAD WORK OF THE STEAMER FISH HAWK DURING THE SEASON OF 1886.*

BY MATE JAMES A. SMITH, U. S. N.

The shad work prosecuted by the U. S. Fish Commission steamer Fish Hawk during the season of 1886 covers the period from April 25 to June 3, inclusive. Most of the operations were conducted on the Delaware River, though some of the work in the first part of the season was done on the northern end of Chesapeake Bay.

On April 24 the Fish Hawk arrived at Battery Station from Wood's Holl, Mass., and on the 25th preparations for the season's work were begun. On the 26th the vessel proceeded across to the east side of the bay and took up a position in the mouth of North East River, from which the spawn-takers could conveniently visit the fishing-shores and the gilliers in the vicinity, and arrangements were made for paying the fishermen for the ripe shad furnished. This work was continued until May 1, when orders were received to proceed to the Delaware River. Up to this time 2,192,500 eggs had been taken, which, on May 2, were transferred to Battery Station, and on the 3d the vessel proceeded down Chesapeake Bay bound for the Delaware.

On May 5 arrived in the Delaware River, and at 1 p. m. anchored off Gloucester City, N. J. This point was the headquarters for most of the subsequent operations on the river, as from it most of the gilliers and fisheries could easily be reached by the spawn-takers. Found the U. S. Fish Commission steamer Lookout at anchor at this place, and on the 6th received from her 1,156,000 eggs. The Lookout was of assistance also by towing the spawn-boats to and from some of the various fishing-shores, and by transporting the spawn-takers. On May 6 the Fish Hawk steamed down the river, stopping at the different shores, where the proprietors were seen and arrangements made about paying them for shad spawn taken. At 10.30 p. m. of the 7th the vessel grounded on the mud-flats off the mouth of Mantua Creek, where she remained till 4 a. m. of the 8th.

On May 11 transferred to Dr. E. G. Shortlidge, of the Delaware fish commission, 660,000 eggs; while in the channel off Gloucester, deposited 1,140,000 fry from eggs obtained on the river. On the 12th went down the river to Wilmington, Del., where arrangements were made to

* This report was compiled from the records of Lieut. L. W. Piepmeyer, U. S. N., who was in charge of the vessel when the work was done.

repair steam-launch No. 55, just arrived from Battery Station. Sent to Dr. Shortlidge* 450,000 more eggs, after which returned to the usual anchorage off Gloucester. On the 13th launch No. 55 arrived from Wilmington and began to render service in distributing spawn-takers and tending the different fishing-shores. The fishermen reported a great decrease in the catch of shad for the week ending May 15, and attributed this to the constant easterly weather. Almost daily deposits of fry were made in the river, as will be seen from the appended table.

Owing to heavy rains the river was very muddy during the middle part of May, and some of the eggs in the jars and cones were covered with a muddy sediment and died. This led to the use of raw cotton in the jars for the purpose of filtering the water.

On May 27 William P. Sauerhoff reported for duty from Battery Station, to assist in shad-hatching work. On the 31st orders were received to discontinue gathering spawn.

On June 3 transferred to Dr. E. G. Shortlidge 180,000 fry; a shipment was also made to Philadelphia, in launch No. 55, of fifteen cans containing 1,940,000 fry, which were delivered to U. S. Fish Commission car No. 2. As there were no more eggs or fry on hand, this terminated the shad-hatching operations of the Fish Hawk for the season of 1886. Appended will be found a table giving details of the work, showing especially the number of eggs taken, the number of fish hatched, the number deposited, and the times and places of deposit, with other statements of particulars in this connection.

U. S. FISH COMMISSION STEAMER FISH HAWK,
Wood's Holl, Mass., October 11, 1886.

* Dr. Shortlidge reported that the general condition of the 1,110,000 eggs which he received from the Fish Hawk on May 11 and 12 was bad, as at least one-third were found dead on unpacking. The subsequent loss on these eggs was about one-eighth. All the fry were planted in the Brandywine Creek, near Wilmington. July 21 a small shad was caught in Brandywine Creek, supposed to have been one of those planted in May.

Record of shad operations by the Fish Hawk on the Susquehanna and Delaware Rivers, during the season of 1886.

| Date. | Fishery. | Number of— | | | Time put in cones. | Time began hatching. | Number hatched. | Number deposited. | Time deposited. | State of water. | Temperature of surface. | | Temperature in cones. | |
|---------|------------------------|------------|----------|-------------|--------------------|----------------------|-----------------|-------------------|-------------------|-------------------|-------------------------|------|-----------------------|------|
| | | Males. | Females. | Eggs taken. | | | | | | | Max. | Min. | Max. | Min. |
| | | | | | | | | | | | | | | |
| 1886. | | | | | | | | | | | | | | |
| Apr. 26 | Red Bank..... | 1 | 1 | 30,000 | 9.15 p. m. | | (*) | | Clear..... | 67 | 65 | 64 | 63 | |
| 27 | do..... | 1 | 1 | 30,000 | 9.15 p. m. | | | | do..... | 65 | 65 | 65 | 64 | |
| 28 | Gillers..... | 5 | 8 | 150,000 | 1.50 a. m. | | | | do..... | 66 | 65 | 65 | 64 | |
| 28 | do..... | 9 | 6 | 180,000 | 3.00 a. m. | | | | do..... | 65 | 64 | 65 | 64 | |
| 28 | Carpenter's Point..... | 3 | 3 | 128,000 | 8.15 p. m. | | | | Partly muddy..... | 63 | 61 | 65 | 64 | |
| 28 | Gillers..... | 4 | 4 | 120,000 | 9.30 p. m. | | | | do..... | 61 | 60 | 65 | 64 | |
| 29 | do..... | 2 | 2 | 72,000 | 2.00 a. m. | | | | do..... | 62 | 61 | 65 | 64 | |
| 29 | do..... | 6 | 6 | 262,500 | 8.00 p. m. | | | | do..... | 62 | 60 | 63 | 63 | |
| 29 | do..... | 7 | 8 | 400,000 | 11.20 p. m. | | | | do..... | 62 | 60 | 63 | 63 | |
| 29 | do..... | 9 | 9 | 330,000 | 11.30 p. m. | | | | do..... | 62 | 60 | 63 | 63 | |
| 29 | do..... | 2 | 3 | 82,500 | 10.00 p. m. | | | | do..... | 63 | 61 | 63 | 63 | |
| 30 | do..... | 3 | 3 | 127,500 | 11.30 p. m. | | | | do..... | 63 | 61 | 61 | 62 | |
| May 1 | do..... | 9 | 9 | 280,000 | 4.30 a. m. | | | (†) | do..... | 61 | 60 | 61 | 62 | |
| 5 | Faunce's..... | 5 | 5 | 200,000 | 11.00 p. m. | May 10 | 160,000 | 160,000 | May 11 | Muddy..... | 61 | 59 | 61 | 61 |
| 5 | Eagle Point..... | 1 | 1 | 40,000 | 11.00 p. m. | May 10 | 35,000 | 35,000 | May 11 | do..... | 61 | 59 | 63 | 61 |
| 6 | Lookout..... | 10 | 12 | 568,000 | | May 9 | 465,000 | 465,000 | May 11 | do..... | 62 | 61 | 63 | 61 |
| 6 | do..... | 8 | 10 | 588,000 | | May 9 | 480,000 | 480,000 | May 11 | do..... | 62 | 61 | 63 | 61 |
| 6 | Faunce's..... | 3 | 3 | 195,000 | 5.30 p. m. | May 10 | 170,000 | 170,000 | May 12 | do..... | 62 | 61 | 63 | 61 |
| 6 | Howell's Cove..... | 8 | 3 | 161,000 | 6.30 p. m. | May 10 | 140,000 | 140,000 | May 12 | do..... | 62 | 61 | 63 | 61 |
| 6 | Gloucester Point..... | 4 | 4 | 262,500 | 8.00 p. m. | May 10 | 220,000 | 220,000 | May 12 | do..... | 62 | 61 | 63 | 61 |
| 6 | Howell's Cove..... | 16 | 10 | 573,000 | 9.00 p. m. | May 10 | 470,000 | 470,000 | May 12 | do..... | 62 | 61 | 63 | 61 |
| 6 | Eagle Point..... | 3 | 3 | 157,500 | 11.00 p. m. | May 10 | 135,000 | 135,000 | May 12 | Partly muddy..... | 62 | 61 | 63 | 61 |
| 6 | Faunce's..... | 6 | 6 | 268,000 | 11.00 p. m. | May 10 | 166,000 | 166,000 | May 14 | do..... | 62 | 61 | 63 | 61 |
| 6 | Woodbury..... | 7 | 7 | 397,500 | 11.00 p. m. | May 10 | 320,000 | 320,000 | May 14 | do..... | 62 | 61 | 63 | 61 |
| 7 | Lookout..... | | | 560,000 | 7.00 a. m. | May 10 | 400,000 | 400,000 | May 14 | do..... | 62 | 62 | 63 | 62 |
| 7 | Howell's Cove..... | 2 | 2 | 75,000 | 7.30 p. m. | May 11 | 65,000 | 65,000 | May 15 | do..... | 62 | 62 | 63 | 62 |
| 7 | Gloucester Point..... | 8 | 8 | 533,000 | 7.30 p. m. | May 11 | 480,000 | 480,000 | May 15 | do..... | 62 | 62 | 63 | 62 |
| 7 | Woodbury..... | 5 | 5 | 240,000 | 11.00 p. m. | May 11 | 200,000 | 200,000 | May 15 | do..... | 62 | 62 | 63 | 62 |
| 7 | Eagle Point..... | 1 | 1 | 45,000 | 11.00 p. m. | May 11 | 40,000 | 40,000 | May 15 | do..... | 62 | 62 | 63 | 62 |
| 8 | Faunce's..... | 9 | 9 | 380,000 | 3.30 p. m. | May 12 | 345,000 | 345,000 | May 17 | do..... | 61 | 61 | 61 | 60 |
| 10 | Howell's Cove..... | 10 | 10 | 630,000 | 7.00 p. m. | May 15 | 450,000 | 450,000 | May 17 | do..... | 61 | 61 | 61 | 60 |
| 10 | Faunce's..... | 13 | 13 | 548,000 | 7.30 p. m. | May 15 | 400,000 | 400,000 | May 17 | do..... | 62 | 61 | 62 | 60 |
| 10 | Bennett's..... | 15 | 15 | 855,000 | Midnight... | May 15 | 400,000 | 400,000 | May 17 | do..... | 62 | 61 | 62 | 60 |
| 10 | Woodbury..... | 4 | 4 | 255,000 | 10.00 p. m. | May 15 | 160,000 | 160,000 | May 17 | do..... | 62 | 61 | 62 | 60 |
| 10 | Howell's Cove..... | 14 | 14 | 1,042,000 | Midnight... | May 15 | 191,000 | 191,000 | May 17 | do..... | 62 | 61 | 62 | 60 |

* All fry were deposited in the Delaware River, except as otherwise indicated.
 † The 2,192,500 eggs taken in the Chesapeake were transferred to Battery Station on May 1.
 ‡ Delivered 600,000 eggs to Dr. E. G. Shortidge on May 11.

Record of shad operations by the Fish Hawk on the Susquehanna and Delaware Rivers, during the season of 1936—Continued.

| Date. | Fishery. | Number of— | | | Time put in cones. | Time began hatching. | Number hatched. | Number deposited. | Time deposited. | State of water. | Temperature of surface. | | Temperature in cones. | |
|--------|-----------------------|------------|----------|-------------|--------------------|----------------------|-----------------|-------------------|-----------------|-----------------|-------------------------|------|-----------------------|------|
| | | Males. | Females. | Eggs taken. | | | | | | | Max. | Min. | Max. | Min. |
| | | | | | | | | | | | | | | |
| 1886. | | | | | | | | | | | | | | |
| May 10 | Gloucester Point..... | 4 | 4 | 210,000 | 1.00 a. m... | May 15 | 170,000 | 170,000 | May 17 | Muddy | 62 | 61 | 62 | 60 |
| 10 | Faunce's..... | 12 | 12 | 420,000 | 11.30 p. m... | May 15 | 335,000 | 335,000 | May 17 | do | 62 | 61 | 62 | 60 |
| 11 | Gloucester Point..... | 1 | 1 | 37,000 | 4.00 p. m... | May 15 | 20,000 | 20,000 | May 17 | do | 61 | 59 | 60 | 59 |
| 11 | Howell's Cove..... | 20 | 20 | 1,288,000 | 10.30 p. m... | May 16 | 1,040,000 | 1,040,000 | May 17 | do | 61 | 59 | 60 | 59 |
| 11 | Faunce's..... | 12 | 12 | 457,500 | 11.00 p. m... | May 10 | 367,000 | 367,000 | May 18 | do | 61 | 59 | 60 | 59 |
| 12 | Woodbury..... | 3 | 3 | 150,000 | 7.00 a. m... | May 17 | 120,000 | 120,000 | May 18 | do | 59 | 59 | 60 | 59 |
| 12 | Bennett's..... | 22 | 22 | 684,000 | 7.00 a. m... | | | | | do | 59 | 59 | 60 | 59 |
| 12 | Faunce's..... | 7 | 7 | 300,000 | 7.30 p. m... | May 17 | 240,000 | 240,000 | May 18 | do | 59 | 59 | 60 | 59 |
| 12 | Howell's Cove..... | 7 | 7 | 349,000 | 7.30 p. m... | May 17 | 280,000 | 280,000 | May 18 | do | 59 | 59 | 60 | 59 |
| 12 | Gillers..... | 3 | 3 | 90,000 | 7.30 p. m... | May 17 | 80,000 | 80,000 | May 18 | do | 59 | 59 | 60 | 59 |
| 13 | Faunce's..... | 13 | 13 | 510,000 | 9.00 p. m... | May 18 | 280,000 | 280,000 | May 20 | do | 59 | 59 | 59 | 59 |
| 13 | Howell's Cove..... | 4 | 4 | 220,000 | 9.30 p. m... | May 18 | 110,000 | 110,000 | May 20 | do | 59 | 59 | 59 | 59 |
| 14 | Bennett's..... | 7 | 7 | 345,000 | 9.30 p. m... | May 19 | 315,000 | 315,000 | May 21 | do | 59 | 58 | 59 | 58 |
| 14 | Woodbury..... | 1 | 1 | 40,000 | 9.30 p. m... | May 19 | 32,000 | 32,000 | May 22 | do | 59 | 58 | 59 | 58 |
| 14 | Faunce's..... | 6 | 6 | 190,000 | 9.30 p. m... | May 19 | 190,000 | 190,000 | May 22 | do | 59 | 58 | 59 | 58 |
| 14 | Howell's Cove..... | 6 | 6 | 315,000 | 9.30 p. m... | May 19 | 283,000 | 283,000 | May 21 | do | 59 | 58 | 59 | 58 |
| 15 | Gloucester Point..... | 2 | 2 | 120,000 | 6.00 a. m... | May 20 | 96,000 | 96,000 | May 22 | do | 59 | 58 | 59 | 58 |
| 15 | Howell's Cove..... | 3 | 3 | 165,000 | 5.00 p. m... | May 20 | 140,000 | 140,000 | May 24 | do | 59 | 58 | 59 | 58 |
| 15 | Woodbury..... | 1 | 1 | 23,000 | 8.00 p. m... | May 20 | 19,000 | 19,000 | May 24 | do | 59 | 58 | 59 | 58 |
| 15 | Faunce's..... | 6 | 6 | 258,000 | 8.00 p. m... | May 20 | 206,000 | 206,000 | May 24 | do | 59 | 58 | 59 | 58 |
| 17 | Gloucester Point..... | 2 | 2 | 106,000 | 5.30 p. m... | (1) | | | | do | 59 | 58 | 59 | 58 |
| 17 | Howell's Cove..... | 9 | 9 | 330,000 | 7.30 p. m... | May 22 | 265,000 | 260,000 | May 24 | Muddy | 60 | 58 | 60 | 59 |
| 17 | Faunce's..... | 7 | 7 | 350,000 | 7.30 p. m... | May 22 | 280,000 | 275,000 | May 24 | do | 60 | 58 | 60 | 59 |
| 17 | Woodbury..... | 5 | 5 | 155,000 | 8.00 p. m... | May 22 | 120,000 | 118,000 | May 24 | do | 60 | 58 | 60 | 59 |
| 18 | Gloucester Point..... | 4 | 4 | 242,000 | 6.30 p. m... | May 22 | 205,000 | 200,000 | May 24 | do | 60 | 59 | 60 | 59 |
| 18 | Gillers..... | 1 | 1 | 63,000 | 7.00 p. m... | May 22 | 55,000 | 55,000 | May 24 | do | 60 | 59 | 61 | 60 |
| 18 | Howell's Cove..... | 22 | 22 | 1,160,000 | 8.00 p. m... | May 22 | 880,000 | 870,000 | May 24 | do | 60 | 59 | 61 | 60 |
| 18 | Faunce's..... | 7 | 7 | 375,000 | 8.30 p. m... | May 22 | 310,000 | 300,000 | May 24 | do | 60 | 59 | 61 | 60 |
| 18 | Woodbury..... | 1 | 1 | 46,000 | 8.30 p. m... | May 22 | 38,000 | 37,000 | May 24 | do | 60 | 59 | 61 | 60 |
| 19 | Gloucester Point..... | 6 | 6 | 246,000 | 8.30 p. m... | May 23 | 208,000 | 205,000 | May 25 | do | 64 | 60 | 61 | 60 |
| 19 | Gillers..... | 4 | 4 | 164,000 | 8.30 p. m... | May 23 | 150,000 | 150,000 | May 25 | do | 64 | 60 | 60 | 60 |
| 19 | Howell's Cove..... | 36 | 36 | 1,815,000 | 8.30 p. m... | May 23 | 1,455,000 | 1,450,000 | May 25 | do | 64 | 60 | 60 | 60 |
| 19 | Faunce's..... | 8 | 8 | 344,000 | 9.00 p. m... | May 23 | 290,000 | 290,000 | May 25 | do | 64 | 60 | 60 | 60 |
| 19 | Woodbury..... | 2 | 2 | 67,000 | 8.30 p. m... | May 23 | 57,000 | 57,000 | May 25 | do | 64 | 60 | 60 | 60 |
| 20 | Gloucester Point..... | 2 | 2 | 79,000 | 8.30 p. m... | May 24 | 70,000 | 70,000 | May 26 | do | 61 | 60 | 61 | 61 |
| 20 | Gillers..... | 1 | 1 | 39,000 | 8.30 p. m... | May 24 | 36,000 | 36,000 | May 26 | do | 61 | 60 | 61 | 61 |
| 20 | Howell's Cove..... | 21 | 21 | 1,149,000 | 9.30 p. m... | May 24 | 1,025,000 | 1,025,000 | May 26 | do | 61 | 60 | 61 | 61 |
| 20 | Faunce's..... | 6 | 6 | 300,000 | 10.00 p. m... | May 24 | 275,000 | 275,000 | May 26 | do | 61 | 60 | 61 | 61 |

| | | | | | | | | | | | | | | |
|------------|-----------------------|-----|-----|------------|-------------|--------|------------|------------|--------|------------|----|----|----|----|
| 20 | Woodbury..... | 3 | 3 | 135,000 | 10.00 p. m. | May 24 | 123,000 | 125,000 | May 26 | ...do..... | 61 | 60 | 61 | 61 |
| 21 | Fauces's..... | 4 | 4 | 240,000 | 7.00 p. m. | May 24 | 225,000 | 225,000 | May 26 | ...do..... | 62 | 60 | 62 | 60 |
| 21 | Gloucester Point..... | 5 | 5 | 202,000 | 8.30 p. m. | May 24 | 245,000 | 245,000 | May 26 | ...do..... | 62 | 60 | 62 | 60 |
| 21 | Howell's Cove..... | 23 | 28 | 1,350,000 | 10.30 p. m. | May 24 | 830,000 | 830,000 | May 26 | ...do..... | 62 | 60 | 62 | 61 |
| 22 | Gloucester Point..... | 1 | 1 | 30,000 | 9.00 a. m. | May 25 | 25,000 | 25,000 | May 27 | ...do..... | 64 | 64 | 66 | 64 |
| 22 | Fauces's..... | 2 | 2 | 70,000 | 4.60 p. m. | May 25 | 60,000 | 60,000 | May 27 | ...do..... | 64 | 64 | 66 | 64 |
| 22 | Howell's Cove..... | 5 | 5 | 890,000 | 5.00 p. m. | May 25 | 215,000 | 214,000 | May 27 | ...do..... | 64 | 64 | 66 | 64 |
| 22 | Gloucester Point..... | 2 | 2 | 95,000 | 8.60 p. m. | May 25 | 85,000 | 85,000 | May 27 | ...do..... | 64 | 64 | 66 | 64 |
| 24 |do..... | 1 | 1 | 35,000 | 9.00 a. m. | (?) | | | | | 68 | 67 | 68 | 68 |
| 24 | Howell's Cove..... | 38 | 38 | 1,637,000 | 9.30 p. m. | May 27 | 1,050,000 | | | | 68 | 67 | 68 | 68 |
| 24 | Fauces's..... | 23 | 23 | 1,024,000 | 9.30 p. m. | May 27 | 625,000 | 1,844,000 | May 30 | ...do..... | 68 | 67 | 68 | 68 |
| 24 | Gloucester Point..... | 7 | 7 | 378,000 | 10.30 p. m. | May 27 | 169,000 | | | | 68 | 67 | 68 | 68 |
| 25 | Fauces's..... | 20 | 20 | 632,000 | 9.30 p. m. | May 29 | 428,000 | | | | 66 | 65 | 66 | 65 |
| 25 | Howell's Cove..... | 22 | 22 | 1,110,000 | 10.00 p. m. | May 29 | 742,000 | 1,495,000 | June 2 | ...do..... | 66 | 65 | 66 | 65 |
| 26 |do..... | 9 | 9 | 465,000 | 8.00 p. m. | May 30 | 325,000 | | | | 64 | 64 | 65 | 64 |
| 27 | Fauces's..... | 6 | 6 | 301,000 | 7.30 p. m. | May 30 | 252,000 | | | | 65 | 65 | 65 | 65 |
| 27 | Howell's Cove..... | 20 | 29 | 1,111,000 | 7.30 p. m. | May 30 | 918,000 | | | | 65 | 65 | 65 | 65 |
| 28 | Fauces's..... | 5 | 5 | 176,000 | 7.00 p. m. | May 31 | 160,000 | (?) | | | 65 | 65 | 65 | 65 |
| 28 | Howell's Cove..... | 16 | 16 | 718,000 | 8.30 p. m. | May 31 | 610,000 | | | | 65 | 65 | 65 | 65 |
| 29 |do..... | 4 | 4 | 133,000 | 4.30 p. m. | May 31 | 90,000 | | | | 65 | 65 | 65 | 65 |
| 29 | Bennett's..... | 4 | 4 | 115,000 | 5.30 p. m. | May 31 | 90,000 | | | | 65 | 65 | 65 | 65 |
| Total..... | | 720 | 726 | 34,454,500 | | | 23,193,000 | 21,018,000 | | | | | | |

* Four hundred and thirty-four thousand died, and 430,000 eggs were delivered to Dr. Shortlidge on May 12.

† All died.

‡ Lost overboard.

§ On June 3, 1,840,000 fry were shipped to U. S. Fish Commission car No. 2, and 180,000 fry were sent to Dr. Shortlidge.