

XXIX.—REPORT OF SHAD OPERATIONS CONDUCTED AT FORT WASHINGTON, MARYLAND, IN THE SPRING OF 1883.

By LIEUT. WILLIAM C. BARCOCK, U. S. N.

I have the honor to make the following report of operations conducted at Fort Washington, Md., under the direction of the Commissioner, in the collection of shad eggs on the Potomac River during the spring of 1883:

The honorable Secretary of War having, at the request of the U. S. Commission of Fish and Fisheries, granted to it permission to occupy the buildings belonging to the United States at Fort Washington, Md., it was deemed best to establish there a station for the collection of fish eggs on the upper Potomac as far down as Chapman's Point, Md.

The method heretofore followed had been to quarter the spawn-takers on the fishing-shores, a steamer making daily visits to each to collect the eggs that had been procured. There were many objections to this, on account of expense, lack of system in collection, and bad feeling among the fishermen. Therefore, a station was established having Fort Washington, Md., as headquarters, with a force of nine men: 4 first-class spawn-takers, 3 second-class spawn-takers, 1 apprentice spawn-taker, and 1 cook; to which was afterwards added a steam-launch, with a crew of 2 men. Two tents, 7 bateaux, a large number of pans, crates, buckets, &c., completed the outfit. The men were comfortably quartered in barracks near the fort, and transported daily by the steam-launch to the several fishing-shores, returning to the fort with the eggs collected.

I found a decided prejudice existing among the fishermen because the elements had not been favorable last year. As it could not be attributed to anything else, in their minds, the fishermen seemed to have selected the Commission to bear all the blame, and therefore demanded exorbitant prices for the right of collecting fish eggs on their shores, saying the injury to the fish was great and the amount of damage could not be estimated. In one instance the owner of a fishing-shore declined to sell any fish to the employés of the United States Fish Commission for the full market-price at his shore. Matters were finally arranged in a satisfactory manner, and, as everything has been done to aid and conciliate the fishermen, even they in time must be convinced that the efforts of the Commission are intended for their benefit. Such antag-

onism, however, should lead the Commission to establish its own stations for seine-hauling and collecting fish eggs in certain places known to be well adapted to that purpose, thereby placing itself above any local prejudice.

There exists at Fort Washington, Md., a well-known fishing-shore, extending northeast from the light-house, between it and Swan Creek. The Commission intended to fish this shore with its own seine, in order to test its capabilities for a permanent station, but a man named L. G. Harron, having produced a permit from the commandant of the arsenal stating that he was fully prepared and had spent a great deal of money on his outfit, was granted permission to fish the shore, on the conditions of supplying fish for the employés of the Commission, agreeing to fish his seine until the 10th of June, unless it was mutually deemed a failure. The limits of the station were the Upper Potomac River as far as Chapman's Point, Maryland, afterwards reduced to and including White House, Va. Above Fort Washington there are no seines and consequently few gill-nets, although numerous pound-nets exist in the Georgetown channel near the Long Bridge.

At Fort Washington the channel of the river narrows to about a quarter of a mile, with a steep bluff on the Maryland side, the water suddenly deepening to 70 feet; from this point the river widens into a large, shallow bay extending to White House, Va., miles in length, and from 1 to 2 miles in breadth. Here are situated the fishing-shores of Mockley's and Bryan's Points, Terry Landing, and White House, besides numerous pound and gill nets. This bay has long been known as the favorite resort of spawning fish, which seem to run on the flats near Piscataway Creek seeking a place to spawn. It is here that most of the shad eggs on the Potomac are taken; in good seasons the yield should be from 30,000,000 to 50,000,000 of shad eggs; under most unfavorable conditions this year, it was nearly 22,000,000.

The general condition of the Potomac River, in regard to fisheries this season, has been bad—rains, sudden and frequent changes of temperature, and very muddy water. On the 14th of April the temperature of the river was unusually high, at 58° F., falling gradually on the 26th until it reached 51° F., the weather during the latter part of April being cold and rainy. During the month of May the temperature gradually increased from 53° F. to 68° F., and on June 20 it had reached 81° F.; the shad taken at this time were blighted or had already spawned.

The first shad eggs, 64,000 in number, were taken on April 14, five days earlier than the previous year; the greatest number of eggs, 1,140,000, were taken on May 19, and delivered in Washington in fine condition. During the first part of the season the condition of the eggs was not good; sometimes they were kept nearly twenty-four hours awaiting transportation to the hatching station at the Armory Build-

ing, Washington, D. C. The bad condition of the eggs, in my opinion, was due also to the use of pans with strainer bottoms, many of the eggs being thus broken; as soon as this was discovered the use of these pans was discontinued.

On May 8 the steamer *Lookout* reported for service, and thereafter made daily trips from Washington to the fishing grounds, returning with the eggs collected. Most of the eggs were taken between the hours of 4 and 11 p. m., and when transported to the hatchery as soon as possible, they were invariably found to be in good condition.

During the month of April the temperature at night was frequently as low as 49° F., which destroyed the eggs if they were kept overnight; during the month of June great heat caused the same effect. The temperature of 60° to 65° F. is the most favorable for the preservation of shad eggs; above or below that the loss increases rapidly for comparatively small changes of temperature. The eggs were invariably transported on the trays, both for convenience and safety, as they had to be carried in a wagon from the steamer to the hatchery one-half a mile over a roughly paved street; the greatest care was taken at all times to protect them from exposure.

Written instructions were furnished the spawn-takers and the utmost care taken in the manipulation of the eggs, uniformity being insured by a daily report from the hatchery as to the condition of the eggs taken on the day previous; this was furnished to the spawn-taker who could then tell in what condition his eggs were received.

All the haul-seines had been removed by May 28, leaving the gill-nets as the only means of supply. Very few male shad were taken in gill-nets, but numerous females; there being no milt it was impossible to impregnate the eggs; for this reason the losses which occur every year at the best spawning time of the fish are very great and finally cause an end to spawn-taking.

On the 21st of May, without any consultation, Mr. Harron removed his seine, thus violating the contract with the Commission. His seine was 110 fathoms in length and 24 feet deep; it worked well enough but yielded poor results, only 752 shad and 24,226 herring having been taken between April 14 and May 21. It was a good thing that he left, for directions were then issued to prepare a seine to be worked by employes of the Commission. The seine berth was sounded out and found to have a depth varying from 10 to 71 feet, thus showing that the lead line of Harron's seine hardly ever touched bottom. We had previously discovered that most of the fish taken in gill-nets were found at the bottom of the net; consequently we made preparations to fish the berth so as to reach the bottom.

A seine was rigged 115 fathoms in length and 40 feet deep, having for a lead line 3-inch bolt-rope, this heavy lead line sinking it to the bottom. It was ready on June 5 and worked admirably, there being but one ob-

struction in the berth. The shad taken were placed in large live-boxes. The females invariably died a few hours afterwards; the male shad were kept for a week in fine condition, an accident to the live-boxes causing their escape. Compared with Harron's seine, the new seine was a great success; it caught 231 shad in eight days, at the end of the season; his caught only 752 in forty-one days at the best time of the year. We were too late, however, to realize any great results, for most of the female shad taken were blighted or had already spawned; had we been ready a week sooner we could have saved from 2,000,000 to 3,000,000 of shad eggs by keeping the male shad alive in the boxes. A few herring, small rock, mullets, and catfish were the only other fish taken in the seine.

The seine is now complete and on hand; it can be put into the water in a few days if necessary; to work it will cost the Commission about \$11 per day; if it is hauled from May 1 to June 10 it ought to yield very good results, especially when the other seines are removed. A seine-boat will be required, costing about \$250, and two capstans at \$8 each; these articles, with the material on hand, will complete the outfit.

About 300 yards to the northward and eastward of the light-house there is a bank of iron ore projecting out on the east side of the channel at the depth of 54 feet; soundings right off the bank show 72 feet; if two iron bells (mushroom anchors) are placed upon it they will keep the seine from fouling. The seine can be hauled well only at dead high water or on the ebb tide; when the ebb tides are early the hauls are not favorable for spawning fish. The range of the seines near Fort Washington is such that there is almost a regular succession of hauls during the entire day.

In view of the comparatively small expense and the advantages offered by the Fort Washington seine, especially as to the capture of male shad at a time of the year—*i. e.*, at the end of the fishing season—when it is well-nigh impossible to obtain them, I think it would be well for the Commission to maintain a seine from May 1 to the end of the season. If it is desired to continue the experiment in regard to penning shad, it might be well to haul the seine as soon as the season opens.

In this report allusion has been made to the collection of shad eggs only, as they could be procured in large numbers. Attempts were made at the end of the shad season to obtain eggs of the sturgeon and other fishes, but they were unsuccessful, as none of those taken were found to be in spawning condition. On the 9th of June we stopped seining, and on the 20th, the fishing season being entirely ended, the station was closed and the outfit returned to Washington.

In conclusion, I wish to speak most favorably of the merits of Mr. James Carswell, who had immediate charge of the spawn-taking force. His ability and energy in the position he occupied were such that I would especially recommend him to your consideration.

Mr. John Luckett was in charge of the haul-seine and gill-nets. Having had many years' experience on the Potomac River, his services and information were most valuable. The abilities and conduct of the other employés at the station were such that I would unhesitatingly recommend them for future employment.

Messrs. C. W. Mitchell, of Chapman's Point, Maryland, and Wm. E. Stuart, of White House, Va., owners of those shores, have been of great service and assistance to the employés of the Commission. Being men of education and intelligence, they have aided us on all occasions.

Accompanying this report will be found a daily meteorological record; also a record of the spawn-taking operations conducted this season on the Potomac River.

Record of meteorological observations made at Fort Washington, Maryland, on the Potomac River, from April 14 to June 20, 1883, by James Carstell.

Date.		Temperature of—						Wind.			Condition of—			
		Air.	Surface water.	Bottom.	Air.	Surface water.	Bottom.	Direction.	Intensity.	Direction.	Intensity.	Skyl.	Skyl.	Water.
Day of week.	Day of month.	Depth of water at						Wind.			Condition of—			
		Air.	Surface water.	Bottom.	Air.	Surface water.	Bottom.	Direction.	Intensity.	Direction.	Intensity.	Skyl.	Skyl.	Water.
Saturday	Apr. 14	59	60	58	56	60	58	SE.	Mild	SE.	Mild	Clear	Clear	Muddy
Sunday	Apr. 15	60	59	58	56	60	59	S	Heavy	S	do	do	do	do
Monday	Apr. 16	50	56	56	49	54	54	NE.	do	NE.	Moderate	Cloudy	Cloudy	do
Tuesday	Apr. 17	58	58	57	59	53	57	W.	do	W.	do	do	do	do
Wednesday	Apr. 18	64	60	58	60	60	59	SE.	do	SE.	Heavy	Cloudy	Cloudy	do
Thursday	Apr. 19	61	60	59	60	60	59	W.	do	W.	do	do	do	do
Friday	Apr. 20	56	58	57	56	54	52	NW.	do	NW.	do	do	do	do
Saturday	Apr. 21	57	59	58	56	54	52	SE.	do	SE.	do	do	do	do
Sunday	Apr. 22	54	57	56	52	56	55	NE.	do	NE.	do	do	do	do
Monday	Apr. 23	54	56	55	46	56	55	SE.	do	SE.	do	do	do	do
Tuesday	Apr. 24	41	53	54	50	52	54	NE.	do	NE.	do	do	do	do
Wednesday	Apr. 25	39	49	50	45	52	52	SW.	do	SW.	do	do	do	do
Thursday	Apr. 26	49	50	51	48	50	51	N.	do	N.	do	do	do	do
Friday	Apr. 27	56	50	51	58	53	54	SE.	do	SE.	Moderate	do	do	do
Saturday	Apr. 28	58	52	53	58	52	53	SE.	do	SE.	do	do	do	do
Sunday	Apr. 29	54	50	51	50	50	51	SW.	do	SW.	do	do	do	do
Monday	Apr. 30	46	50	51	49	50	51	SE.	do	SE.	do	do	do	do
Tuesday	May 1	49	53	53	53	54	54	SE.	do	SE.	do	do	do	do
Wednesday	May 2	55	54	53	56	57	56	NE.	do	NE.	do	do	do	do
Thursday	May 3	60	57	56	65	59	59	SE.	do	SE.	do	do	do	do
Friday	May 4	69	62	60	68	63	62	S	do	S	do	do	do	do
Saturday	May 5	59	60	61	65	61	60	SE.	do	SE.	do	do	do	do
Sunday	May 6	64	61	62	66	61	62	E.	do	E.	do	do	do	do
Monday	May 7	66	62	63	68	63	63	S.	do	S.	do	do	do	do
Tuesday	May 8	68	64	63	70	65	65	SE.	do	SE.	do	do	do	do
Wednesday	May 9	68	66	65	68	67	68	SE.	do	SE.	do	do	do	do
Thursday	May 10	66	68	68	67	68	68	SE.	do	SE.	do	do	do	do
Friday	May 11	70	69	68	69	68	68	SE.	do	SE.	do	do	do	do
Saturday	May 12	63	65	66	69	68	68	NE.	do	NE.	do	do	do	do
Sunday	May 13	65	68	68	65	68	68	NE.	do	NE.	do	do	do	do
Monday	May 14	65	68	68	65	68	68	NE.	do	NE.	do	do	do	do
Tuesday	May 15	67	65	66	64	63	64	E.	do	E.	do	do	do	do
Wednesday	May 16	64	60	60	64	60	60	NE.	do	NE.	do	do	do	do
Thursday	May 17	65	60	61	69	60	60	NE.	do	NE.	do	do	do	do
Friday	May 18	68	66	64	69	67	66	SE.	do	SE.	do	do	do	do
Saturday	May 19	67	67	66	69	67	66	SE.	do	SE.	do	do	do	do

Sunday	69	67	66	70	68	68	68	68	40	NE.	do	do	do	do	do	do	do	do	do
Monday	20	66	65	67	67	67	66	65	40	NE.	do	do	do	do	do	do	do	do	do
Tuesday	21	66	66	66	66	66	66	65	40	NE.	do	do	do	do	do	do	do	do	do
Wednesday	22	65	64	64	64	64	64	63	40	NE.	do	do	do	do	do	do	do	do	do
Thursday	23	65	64	63	63	62	62	63	40	NW.	Light	do	do	do	do	do	do	do	do
Friday	24	65	62	62	62	62	62	64	40	NW.	Light	do	do	do	do	do	do	do	do
Saturday	25	65	62	62	62	62	62	64	40	W.	do	do	do	do	do	do	do	do	do
Sunday	26	65	66	67	67	67	67	68	40	SW.	do	do	do	do	do	do	do	do	do
Monday	27	68	68	68	68	68	68	68	40	SW.	do	do	do	do	do	do	do	do	do
Tuesday	28	70	68	64	64	64	64	66	40	SW.	do	do	do	do	do	do	do	do	do
Wednesday	29	68	67	67	67	67	67	68	40	SE.	do	do	do	do	do	do	do	do	do
Thursday	30	68	67	67	67	67	67	68	40	SE.	do	do	do	do	do	do	do	do	do
Friday	31	67	68	67	67	67	67	68	40	W.	do	do	do	do	do	do	do	do	do
Saturday	1	68	68	68	68	68	68	69	40	NW.	do	do	do	do	do	do	do	do	do
Sunday	2	70	68	68	68	68	68	68	40	do	do	do	do	do	do	do	do	do	do
Monday	3	72	70	70	70	70	70	70	40	E.	do	do	do	do	do	do	do	do	do
Tuesday	4	72	73	73	73	73	73	74	40	SE.	do	do	do	do	do	do	do	do	do
Wednesday	5	71	73	73	73	73	73	74	40	S.	do	do	do	do	do	do	do	do	do
Thursday	6	78	77	76	76	76	76	76	40	E.	do	do	do	do	do	do	do	do	do
Friday	7	78	75	75	75	75	75	78	40	SE.	do	do	do	do	do	do	do	do	do
Saturday	8	75	77	77	77	77	77	78	40	SE.	do	do	do	do	do	do	do	do	do
Sunday	9	70	78	78	78	78	78	79	40	W.	do	do	do	do	do	do	do	do	do
Monday	10	76	78	77	76	76	76	79	40	SW.	do	do	do	do	do	do	do	do	do
Tuesday	11	70	76	76	76	76	76	82	40	SE.	do	do	do	do	do	do	do	do	do
Wednesday	12	75	77	77	77	77	77	84	40	S.	Heavy	do	do	do	do	do	do	do	do
Thursday	13	80	79	79	79	79	79	86	40	SE.	do	do	do	do	do	do	do	do	do
Friday	14	78	78	78	78	78	78	82	40	SE.	do	do	do	do	do	do	do	do	do
Saturday	15	72	76	76	76	76	76	77	40	S.	do	do	do	do	do	do	do	do	do
Sunday	16	75	76	76	76	76	76	76	40	SE.	do	do	do	do	do	do	do	do	do
Monday	17	80	79	79	79	79	79	86	40	S.	do	do	do	do	do	do	do	do	do
Tuesday	18	80	79	79	79	79	79	86	40	SE.	do	do	do	do	do	do	do	do	do
Wednesday	19	83	81	81	81	81	81	85	40	E.	do	do	do	do	do	do	do	do	do
Thursday	20	80	80	80	80	80	80	86	40	SE.	do	do	do	do	do	do	do	do	do

† Rain.

* Rain all day

Record of spawn-taking operations conducted at Fort Washington, Maryland, on the Potomac River, from April 14 to June 13, 1883, by James Carswell.

Date.		Total length of haul-seines visited.	Fish taken by—			Ripe fish.		Eggs obtained.
Day of week.	Day of month.		Haul-seines.		Gill-nets.	Males.	Females.	
			No. shad.	No. herring.	No. shad.			
		<i>Fathoms.</i>						
Saturday	Apr. 14	450	450	200		7	4	65,000
Sunday	Apr. 15	450	240	100		15	8	300,000
Monday	Apr. 16	450	450	50	50	10	5	140,000
Tuesday	Apr. 17	450	187	150	80	25	18	460,000
Wednesday	Apr. 18	450	125	175	25	7	5	85,000
Thursday	Apr. 19	1,450	250	700	40	20	13	410,000
Friday	Apr. 20	450	200	100	55	9	5	210,000
Saturday	Apr. 21	1,750	150	400	36	17	11	465,000
Sunday	Apr. 22							
Monday	Apr. 23	1,250	95		15	8	3	
Tuesday	Apr. 24	600	50		20			
Wednesday	Apr. 25	1,750	75		25			
Thursday	Apr. 26	1,750	125		55	2	1	48,000
Friday	Apr. 27	1,750	150		00			
Saturday	Apr. 28	1,750	133					32,000
Sunday	Apr. 29	1,750	50					74,000
Monday	Apr. 30	1,750	450			1	1	32,000
Total								2,321,000
Tuesday	May 1	1,750	350			10	8	235,000
Wednesday	May 2	1,750	425			16	16	717,000
Thursday	May 3	1,750	415			17	15	724,000
Friday	May 4	1,750	475			16	14	708,000
Saturday	May 5	1,750	500			9	10	450,000
Sunday	May 6	1,500	313			18	16	956,000
Monday	May 7	1,500	305			21	19	755,000
Tuesday	May 8	1,500	425			17	24	725,000
Wednesday	May 9	1,500	407			19	24	655,000
Thursday	May 10	1,500	385			9	13	484,000
Friday	May 11	1,500	563			26	29	979,000
Saturday	May 12	1,500	342			20	24	743,000
Sunday	May 13	400	175			9	12	364,000
Monday	May 14	1,500	333			13	15	673,000
Tuesday	May 15	1,500	282			6	8	315,000
Wednesday	May 16	1,400	529			19	23	764,000
Thursday	May 17	1,500	655			20	28	865,000
Total								11,152,000
Friday	May 18	1,500	527			25	28	770,000
Saturday	May 19	1,500	437			31	35	1,140,000
Sunday	May 20	1,250	533			26	30	870,000
Monday	May 21	1,250	477			23	29	880,000
Tuesday	May 22	1,250	391			19	21	720,000
Wednesday	May 23	1,250	311			13	15	433,000
Thursday	May 24	1,250	273			11	12	307,000
Friday	May 25	1,250	125			4	5	180,000
Saturday	May 26	1,250	125			3	3	75,000
Sunday	May 27	(*)	113			10	14	375,000
Monday	May 28		78			17	9	268,000
Tuesday	May 29		100			7	14	380,000
Wednesday	May 30		54			5	18	218,000
Thursday	May 31		45			2	3	50,000
Friday	June 1		75			9	11	288,000
Saturday	June 2		109			6	14	550,000
Sunday	June 3		88			4	10	228,000
Total								7,692,000
Monday †	June 4					2	4	85,000
Tuesday	June 5	115	23			5	9	240,000
Wednesday	June 6	115	27			2	2	45,000
Thursday	June 7	115	80					300,000
Friday	June 8	115	123					
Saturday	June 9							
Sunday	June 10	115	20			6	14	15,000
Monday	June 11	115	1				1	
Tuesday	June 12	115	57			20	37	
Wednesday	June 13	(*)						
Total								685,000
Grand total								21,850,000

* Seining discontinued. † June 4 to 11, seine belonging to United States Fish Commission, Fort Washington, Md. ‡ All females.