XXXII.—REPORT ON THE PROPAGATION OF SCHOODIC SALMON IN 1882–'83.

By Charles G. Atkins.

THE NEW BUILDINGS.

The changes in the buildings rendered necessary by establishment of headquarters at the hatchery at the cove were brought to completion this season, and these matters kept a small force of masons, carpenters, painters, and laborers at work during nearly the whole autumn and winter. We can now congratulate ourselves on being well prepared for the successful management of any stock of eggs we are likely to get, and on a probable suspension of the work of building and tearing down, which has unavoidably attended nearly every season's operations thus far, often to our serious inconvenience during the spawning season. The attendant expenses will likewise doubtless be materially reduced hereafter.

The superintendent's cottage has been moved to a new site, close by the main hatchery, and has received important repairs, extending to finishing and painting within and without.

The group of buildings at headquarters now comprises the main hatchery (No. 3), the superintendent's house, a keeper's lodge, a small ice-house, and a wood-house. Directly in front of the superintendent's house is the fishing ground, with the spawning house and a watch-house perched on a pier in a position commanding views of all the nets. About 50 rods down the stream stands the "river-house," or hatchery No. 2. The original hatchery in the woods completes the list.

2. SPAWNING.

The nets were placed to intercept the descending salmon, as usual, about the middle of September, and on the fourth day of November the arrangements for the capture of fish were completed.

In the early catches the males, as usual, largely predominated, constituting 66 per cent. of those taken November 5; 47 per cent. November 6 and 59 per cent. November 7. The females were in excess November 8 and on every other day to the close of the fishing season, November 20. The totals were 600 males and 1,004 females. In respect to size and condition, they were the finest fish we had ever taken. The males averaged 3.1 pounds in weight and 19.9 inches in length;

the females before spawning 3.2 pounds in weight and 19.3 inches in length. Those females that were ripe when they first came to hand outweighed by an average of one-fifth pound those that were ripe at the first trial, and exceeded them in length by an average of about three-tenths inch. Such differences have been observed before. As compared with the measurements for 1880, both sexes were eight-tenths inch longer this year, and excelled also in weight. As compared with 1876 (the year of smallest averages in our experience), we find this year an increase of 94 per cent. in weight and 28 per cent. in length among the males, while the females have increased 68 per cent. in weight and 22 per cent. in length.

The number of females yielding any eggs that were, on extrusion, white or otherwise evidently defective was smaller than ever before. No record was made of the frequency of the occurrence of this phenomenon until 1881, when 17 per cent. of the female fish were thus defective. This season there were but 7 per cent. The number of eggs affected was in most cases very small, sometimes but two or three from a single fish; but in rare cases the greater part or the entire litter was affected. No outward symptoms have yet been observed which mark the diseased fish. The phenomenon was quite as common in 1868 as in any recent year.

The exemption of the eggs from visible defects was not, however, attended by a better rate of fecundation than ordinary. The record of losses during the developing period enables me to fix the rate of impregnation at 90.9 per cent., the losses from all causes prior to shipment being 11.8 per cent. In 1881–'82 the percentage impregnated was 92.9 and the losses before shipment 9.2 per cent.—about the ordinary rates.

Of the 1,004 females taken, 945 yielded spawn, of which the total amount weighed 727 pounds 6 ounces, and numbered 1,681,000 eggs. The yield per female fish thus averaged 1,779 eggs, which is the highest average yet recorded at the station.

Details of the spawning operations will be given in Table I, and of the measurements of the fish in Table II.

3. SHIPMENT OF SPAWN

The first shipments were made January 16 and the last March 28.

As usual, the unimpregnated eggs were separated from the others by hand-picking after concussion, and 134,802 were thus removed. This number, added to 63,868 that had previously turned white and been picked out, made a total loss of 198,670, which reduced the stock to 1,482,330 eggs. There were reserved for planting in Grand Lake 374,330, and the remaining 1,108,000 were divided among the subscribers to the fund and shipped to the order of the several commissions interested.

The following schedule shows the amount contributed by each party and their respective shares of eggs:

Contributor.	Contribution.	Share of eggs.
United States	$1,400	478,000
Maine	500	175,000
Massachusetts	500	175,000
Connecticut	500	175,000
New Hampshire	300	105,000
Totals	3,200	1,108,000

Entire success attended the transportation of the eggs, which was performed in the ordinary method and by the accustomed route. A detailed statement of this part of the work will be found in Table III.

4. HATCHING AND PLANTING.

The eggs retained at Grand Lake Stream, 374,330 in number, had been already, in common with those shipped, freed from the presence of unimpregnated individuals, as well as all the imperfect eggs taken out by the pickings previous to the time of shipment. They hatched and came through the yolk-sack period with the trifling additional loss of 568 eggs and 697 fish; and 373,065 young salmon were therefore planted in Grand Lake between June 8 and 22, 1883.

The hatching at other stations was also accomplished with less than the usual loss, in most cases, and a large number of fry planted in various waters as shown in detail in Table IV.

TABLE I.—*Spawning operations at Grand Lake Stream, Maine, in November*, 1882.

Date.	When caught.	Fish at first handling.						Females spawned.			Eggs taken.	
		Total, both sexes.	Males.	Females.				First time.	Second time.	Females with some defective eggs.	Weight.	Number.
				Ripe.	Unripe.	Spent.	Total.					
1882.											*Lbs. oz.*	
Nov. 6	Night of November 4–5	148	98	30	20	..	50	30	.....	6	36 6	90,000
6	Night of November 5–6	103	48	29	26	..	55	29	.....	2		
6	Night of November 6–7	168	99	42	27	..	69	42	.....	4	27 9	68,000
8	Respawning	.....	.....	.....	.....	.....	.....	.....	72	.....	11 13	
8	Night of November 7–8	160	61	48	41	..	89	48	.....	6	41 6	120,000
8	Previously found unripe	.....	.....	.....	.....	.....	.....	22	.....	.....		
9	Respawning	.....	.....	.....	.....	.....	.....	.....	67	.....	8 10	
9	Night of November 8–9	200	74	70	54	2	126	70	.....	7	40 3	110,000
10	Respawning	.....	.....	.....	.....	.....	.....	.....	66	.....	8 12	
11	Night of November 9–10	147	35	73	39	..	112	73	.....	8	40 12	117,000
11	Respawning	.....	.....	.....	.....	.....	.....	.....	71	.....	12 0	
11	Night of November 10–11	143	50	64	28	1	93	64	.....	2	33 13	194,000
11	Previously found unripe	.....	.....	.....	.....	.....	.....	54	.....	3	38 0	
13	Respawning	.....	.....	.....	.....	.....	.....	.....	110	.....	21 15	
13	Last two nights	220	48	135	32	5	172	135	.....	12	92 2	265,000
14	Respawning	.....	.....	.....	.....	.....	.....	.....	134	.....	14 5	
14	Since yesterday	144	25	88	28	3	119	88	.....	3	56 8	100,000
15	Respawning	.....	.....	.....	.....	.....	.....	.....	95	.....	9 11	
15	Night of November 14–15	88	22	47	16	3	66	47	.....	2	31 2	285,000
15	Previously found unripe	.....	.....	.....	.....	.....	.....	133	.....	(*)	84 2	

* Possibly an error of omission.

TABLE I.—*Spawning operations at Grand Lake Stream, Maine, in November*, 1882—Cont'd.

Date.	When caught.	Fish at first handling.						Females spawned.			Eggs taken.	
		Total, both sexes.	Males.	Females.				First time.	Second time.	Females with some defective eggs.	Weight.	Number.
				Ripe.	Unripe.	Spent.	Total.					
1882.											*Lbs. oz.*	
Nov. 16	Previously found unripe	.....	.....	.....	.....	.....	.....	45	.....	2	20 9	97,000
16	Night of November 15–16	38	17	13	4	4	21	13	.....	0	12 5	
17	Respawning	.....	.....	.....	.....	.....	.....	.....	243	.....	39 7	
17	Last night	30	11	15	1	3	19	15	.....	0	11 0	133,500
17	Previously found unripe	.....	.....	.....	.....	.....	.....	16	.....	0	9 8	
18	Respawning	.....	.....	.....	.....	.....	.....	.....	31	.....	2 10	
18	Last night	9	2	6	1	..	7	6	.....	.....	4 10	28,500
18	Previously found unripe	.....	.....	.....	.....	.....	.....	10	.....	.....	5 10	
20	Last two nights	6	0	5	1	..	6	5	.....	.....	2 14	7,000
	Total	1,604	600	665	268	21	1,004	945	918	57	727 6	1,681,000

TABLE II.—*Measurement of Schoodic salmon at Grand Lake Stream, Maine, November, 1882.*

Date.	Males.							Females gravid (before spawning).							Females measured after spawning.									
	Number weighed and measured.	Weight.			Length.			Number weighed and measured.	Weight.			Length.			Number weighed and measured.	Weight of egg from same.	Weight after spawning.				Length.			Computed original weight of same.
		Average.	Heaviest.	Lightest.	Average.	Longest.	Shortest.		Average.	Heaviest.	Lightest.	Average.	Longest.	Shortest.			Aggregate.	Average.	Heaviest.	Lightest.	Average.	Longest.	Shortest.	
1882.		*Lbs.*	*Lbs.*	*Lbs.*	*In.*	*In.*	*In.*		*Lbs.*	*Lbs.*	*Lbs.*	*In.*	*In.*	*In.*		*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*In.*	*In.*	*In.*	*Lbs.*
Nov. 6	145	3.1	4.5	1.9	19.6	23.5	16.5	42	3.0	4.4	2.2	19.3	21.5	17.0	59	39.8	157.8	2.7	3.9	2.1	19.7	23.0	17.0	3.3
7	96	3.1	4.6	2.0	20.3	23.5	17.5	27	3.1	4.9	2.4	19.4	22.5	17.5	41	27.6	108.6	2.6	3.6	1.9	19.8	21.5	17.5	3.3
8	54	3.2	4.5	2.0	19.7	22.5	17.5	41	3.0	4.4	2.5	19.4	22.0	17.5	48	29.1	136.0	2.8	4.4	2.0	19.7	22.0	17.5	3.4
9	74	3.4	4.9	2.0	20.6	23.0	18.0	54	3.1	4.4	2.3	19.2	21.5	17.5	72	38.6	191.8	2.7	3.8	1.8	19.9	21.0	17.0	3.2
10	35	3.1	4.5	2.3	20.0	23.0	17.5	39	3.1	4.4	1.8	18.9	22.0	16.0	73	40.8	199.8	2.7	4.3	2.1	19.3	22.0	17.0	3.3
11	40	3.1	4.9	2.0	20.3	23.5	17.5	28	3.1	4.4	2.4	19.1	21.0	17.5	54	27.6	141.6	2.6	3.5	1.9	18.9	21.0	17.0	3.1
13	47	3.1	4.4	1.4	20.0	23.3	15.5	31	3.1	4.3	2.5	19.0	21.0	17.5	139	92.1	363.1	2.6	3.8	1.1	19.4	22.0	16.0	3.3
14	25	2.9	4.7	2.1	19.6	23.3	17.5	28	3.3	4.4	2.5	19.2	22.0	17.0	91	56.5	240.3	2.6	4.1	1.7	19.2	22.8	16.0	3.3
15	22	3.0	4.2	1.7	19.6	22.5	16.0	14	3.2	4.3	2.3	19.6	22.0	18.0	50	25.1	133.3	2.7	4.1	1.8	19.3	22.5	17.0	3.2
16	15	2.8	3.8	2.1	19.6	22.0	17.0	4	2.3	2.9	1.3	18.1	19.0	16.0	17	12.5	41.7	2.5	3.1	1.8	19.0	20.5	16.5	3.2
	553	3.1	4.9	1.4	19.9	23.5	15.5	308	3.08	4.9	1.3	19.1	22.5	16.0	644	389.7	1,714.0	2.7	4.4	1.1	19.4	23.0	16.0	3.27

TABLE III.—*Transfer of Schoodic salmon eggs from Grand Lake Stream, Maine, January–March*, 1883.

Date of shipment.	Consignee.	Address.	Final destination.	Number of cases.	Weight.	Number of eggs.			Miles transported.	Hours en route.	Condition on unpacking.	Dead on unpacking.
						Belonging to States.	Belonging to United States.	Total.				
1883.					*Lbs.*							
Jan. 16	E. A. Brackett	Winchester, Mass	Winchester, Mass	1	136	50,000		50,000	389	70	"Excellent, could not be better."	20
16	George Jelliffe	Westport, Conn	Westport, Conn	1	136	50,000		50,000	570	80	"First rate"	3
17	E. A. Brackett	Winchester, Mass	Winchester, Mass	1	164	60,000		60,000	389	70	"Excellent; impossible to be better."	23
17	H. J. Fenton	Windsor, Conn	Poquonock, Conn	1	164	60,000		60,000	502	74	"Good; no frost, no indented eggs."	26
18	Superintend't Druid Hill Fish Hatchery.	Baltimore, Md	Baltimore, Md	1	64½		15,000	15,000	805	98	"Good"	3
18	E. G. Blackford	Fulton Market, New York.	Cold Spring Harbor, N. Y.	1	84		25,000	25,000	640	170	"Excellent"	23
22	E. A. Brackett	Winchester, Mass	Winchester, Mass	1	143	50,000		50,000	389	73	"Excellent"	90
22	E. B. Hodge	Plymouth, N. H	Plymouth, N. H	1	161	60,000		60,000	508	142	"Good"	163
23	E. G. Blackford	Fulton Market, New York.	Cold Spring Harbor, N. Y.	1	201		75,000	75,000	640	98	"Good"	231
23	George Jelliffe	Westport, Conn	Westport, Conn	1	122	37,500		37,500	570	80	"Good"	37
24	H. J. Fenton	Windsor, Conn	Poquonock, Conn	1	120	20,000	20,000	40,000	502	73	"Good"	11
24	E. A. Brackett	Winchester, Mass	Winchester, Mass	1	90	15,000	10,000	25,000	389	73	"Excellent"	19
25	S. F. Baird	Washington, D. C	Washington, D. C	1	30½		5,000	5,000	848	99	"Very good"	16
25	Seth Weeks	Corry, Pa	Corry, Pa	1	73		20,000	20,000	972	120	"Good; one-fourth of eggs indented."	123
25	B. F. Shaw	Anamosa, Iowa	Anamosa, Iowa	1	94		25,000	25,000	1,607		"Good"	
25	R. O. Sweeny	Saint Paul, Minn	Saint Paul, Minn	1	103		25,000	25,000	1,789	166	"Very good"	132
29	E. B. Hodge	Plymouth, N. H	Plymouth, N. H	1	181	45,000	20,000	65,000	508	69	"Good"	120
29	A. R. Fuller	Malone, N. Y	Meacham Lake, New York.	1	30		5,000	5,000	583	387	"Good"	51
29	J. G. Romine	South Bend, Cass County, Nebraska.	South Bend, Cass County, Nebraska.	1	30		5,000	5,000	1,925	132	"Good"	19
Feb. 5	O. M. Chase	Detroit, Mich	Cheboygan, Mich	1	87		25,000	25,000	1,405		"Good"	
6	O. A. Dennen	Mount Kineo, Maine	Mount Kineo, Maine	1	214½	73,500		73,050	232	146	"Good"	50
28	Fred. Mather	25 Hill street, Newark, N. J.	Europe	1	161		50,000	50,000	645*	93	"Good"	*67
Mar. 6												
6	O. A. Dennen	Mount Kineo, Maine	Mount Kineo, Maine	1	67	16,500		16,500	232		Good	
6	A. J. Darling	Enfield, Me	Enfield, Me	1	95	25,000		25,000	103	44	"Good"	5
6	E. A. Brackett	Winchester, Mass	Winchester, Mass	1	52		10,000	10,000	389	120	"Excellent"	13
6	H. J. Fenton	Windsor, Conn	Poquonock, Conn	1	43	7,500		7,500	502	97	"Good"	13

8	F. N. Clark	Northfield, Mich	Northfield, Mich	1	80		20,000	20,000	1,158	98	"Good"	21
19	E. B. Hodge	Plymouth, N. H	Plymouth, N. H	1	28		5,000	5,000	508	73	"Good"	4
19	A. J. Darling	Enfield, Me.	Enfield, Me	1	148	10,000	39,000	49,000	103	68	"Good"	15
26	H. G. Parker	Carson City, Nev	Carson City, Nev	1	67		15,000	15,000	3,560	217	"In first-class shape"	200
27	F. C. Hervey	Rangely, Me	Rangely, Me	1	145	50,000		50,000	300	120	"Good"	50
28	do	do	do	1	156		50,000	50,000	300	120	Good	
						630,000	464,000	1,094,000				

[1] This refers to the transportation to Newark only; of the success that attended them on the passage to Europe I have only the report of those sent to Germany, 25,000, addressed to Herr von Behr, and transported in Mr. Mather's apparatus. They left New York March 10, and arrived at Bremerhaven March 23, were unpacked March 24, and found in "very good" condition, but 103 being dead.

TABLE IV.—*Planting of Schoodic salmon hatched from eggs collected in November*, 1882.

State.	Where hatched.	Waters stocked.	Tributary to—	Locality of deposit.	Date of transfer.	Number of fish.
					1883.	
Connecticut	Poquonock	Snipsic Lake	Heckanum and Connecticut Rivers.	Rockville, Tolland County	From April 24 to June 1.	10,000
		Windsorville Pond	Connecticut River	Windsorville, Hartford County		8,000
		Gardner's Lake	Yantic and Thames Rivers	Salem		8,000
		Preston City Lake	Thames River	Preston, New London County		8,000
		East Lyme Lake		East Lyme		8,000
		East Hampton Lake	Pine Brook and Connecticut River	East Hampton, Middlesex County		8,000
		Hog Pond	Connecticut River	Lyme, New London County		8,000
		Higganum Reservoir	do	Higganum, Middlesex County		8,000
		Ida Lake	do	Portland, Middlesex County		8,000
		Crystal Lake	Willimantic River	Stafford Springs, Tolland County		8,000
		Square Pond	do	Square Pond, Tolland County		8,000
		Mountain Lake		New London		8,000
		Cranberry Pond	Farmington River	North Granby, Hartford County		8,814
	Westport	Goshen Pond	Bantam and Housatonic Rivers	Goshen, Litchfield County	Mar. 26	8,000
		Twin Lakes	Housatonic River	Salisbury, Litchfield County	Mar. 26	8,000
		Lake Wanonscoponous	do	Lakeville, Litchfield County	Mar. 26	8,000
		West Hill Pond	Farmington River	New Hartford, Litchfield County	Apr. 2	8,000
		Ball's Pond	Housatonic River	Danbury, Fairfield County	Apr. 4	8,000
		Waramaug Lake	do	New Preston, Litchfield County	Apr. 6	8,000
		Stream	Quinnebaug River	Norwich, New London County	Apr. 9	8,000
		Mashapaug Lake	Shetucket River	Union, Tolland County	Apr. 11	8,000
		Streams	Housatonic River	New Milford, Litchfield County	Apr. 13	8,000
Iowa	Anamosa	Cedar Lake	Des Moines River	Eldon, Wapello County	Mar. 20	8,000
		Clear Lake	Cedar River	Clear Lake, Cerro Gordo County	Apr. 16	10,000
		Round Lake	Des Moines River	Booneville, Dallas County	June 12	3,000
Maine	Enfield	Cold Stream Pond	Passadumkeag River	Enfield, Penobscot County	June 4	15,000
		Mattaconk Lake	East Branch Penobscot River	Medway, Penobscot County	June 6	20,000
		Crane's Pond	Penobscot River	South Lincoln, Penobscot County	June 8	20,000
		Cold Stream Pond	do	Enfield, Penobscot County	June 16	10,000
	Grand Lake Stream	Grand Lake	Schoodic River	Hinkley, Washington County	June 8 to 22.	373,065
	Mount Kineo	Socatean River	Moosehead Lake	Tomhegan Township, Somerset County.	June 15	45,000
		Moosehead Lake	Kennebec River	Near Kineo Mountain		30,000
		Hebron Pond	Piscataquis River	Monson, Piscataquis County		15,000
	Rangely	Rangely Lakes and tributaries	Androscoggin River	Franklin and Oxford Counties	July 1–4	98,000
Maryland	Baltimore	Principio Creek		Cecil County		4,000
		Perch Creek		Elton, Cecil County		4,000
		King's Creek		Talbot County		4,000
		Unnamed waters		Garrett County		500
Massachusetts	Winchester					

Michigan	Cheboygan	Teal Lake	Carp River and Lake Superior	Negaunee, Marquette County	June 1	18,000
	Northville	Union Lake		Oakland County	May 22	8,000
		Cooley Lake		do	May 28	2,000
		Union Lake		do	June 13	7,000
		Breeding ponds		Paris	June 14	1,800
Minnesota	Saint Paul	Lake Minnetonka	Mississippi River	Hennepin County	May 14	5,000
		Streams	do	Winona County	June 1	6,000
		Pickwick Lake and Pond	(Landlocked)	Dakota County	June 8	5,000
		White Bear Lake	do	Ramsey and Washington Counties	June 18	3,000
Nebraska	[All the fry saved, about 1,600, retained for breeding.]					
Nevada	Carson City	Truckee River			June 10	7,000
		Carson River			June 15	7,000
New Hampshire	Plymouth	Squam Lake	Penrigewassett River	Holderness, Grafton County	June 1	10,000
		Long Pond	Connecticut River	Haverhill, Grafton County	June 9	5,000
		Nutt's Pond	Merrimack River	Manchester, Hillsborough County	June 12	5,000
		Massabesic Lake	do	do	June 12	11,500
		Newfound Lake	Penrigewassett River	Bridgwater, Grafton County	June 15	15,000
		Sanbornton Bay	Merrimack River	Laconia, Belknap County	June 16	5,000
		—— Lake	do	Francistown, Hillsborough County	June 16	4,650
		—— Lake	do	Hillsborough, Hillsborough County	June 16	5,000
		Sunapee Lake	Connecticut River	Newbury, Merrimack County	June 18	15,000
		Pleasant Pond	Merrimack River	Pittsfield, Merrimack County	June 23	4,850
		Mink Pond		Lisbon, Grafton County	June 25	5,000
		Bradley Pond	Merrimack River	Andover, Merrimack County	June 25	5,000
		Long Pond	do	Hancock, Hillsborough County	June 29	4,769
		Woodward's Pond	Connecticut River	Roxbury, Cheshire County	July 2	5,000
		Dan Hole Pond	Winnepesaukee Lake	Tuftonborough, Carroll County	June 20	10,000
		Shaw's Pond		New Durham, Strafford County	June 20	5,000
		Tri-echo Lake	Piscataqua River	Milton, Strafford County	June 20	10,000
New York	Cold Spring Harbor	Mill Pond	Long Island Sound	Cold Spring Harbor	May 3	3,500
		Fulton Chain Lakes	Moose River	Near Booneville, Oneida County	May 6	40,000
		Great Pond	Atlantic Ocean	Montauk Point	May 7	5,000
		Bisby and Woodhull Lakes	Black River	Wilmurt, Herkimer County	May 19	20,000
		Mill Pond	Long Island Sound	Cold Spring Harbor	May 25	2,500
		Greenwood Lake	Passaic River	Orange County	June 11	5,000
		South Side Club Ponds	Great South Bay	Oakdale, Suffolk County	June 13	5,000
		Roosevelt's Pond	do	Sayville, Suffolk County	June 13	4,000
	Meacham Lake	Meacham Lake	Saint Regis River	Franklin County	May 1	4,000
Pennsylvania	Corry	Lake Pleasant	Allegheny River	Wattsburg, Erie County	May 28	6,500
		Lake Giles	Delaware River	Millville, Pike County	June 2	12,000

NOTE.—I have been unable to obtain from the Massachusetts Commissioners any statement of the distribution of Schoodic salmon, except that contained in their printed report, which unfortunately does not afford data from which to fill the columns of this table.—C. G. A.