

XXXVI.—REPORT ON AN ATTEMPT TO COLLECT EGGS OF SEBAGO SALMON IN 1878.

BY CHARLES G. ATKINS.

1.—HABITAT OF SEBAGO SALMON.

Within the limits of the State of Maine there are known to be four distinct localities inhabited from olden times by fresh-water salmon, commonly called "landlocked salmon." The first of these districts is in the valley of the Saint Croix River, mainly in Grand Lake and connecting waters, on the west branch or Schoodic River, whence the name "Schoodic salmon." The second is Reed's Pond, Union River, Hancock County; the third is Sebec Lake and vicinity, tributary to the Penobscot; and the fourth is Sebago Lake and vicinity, tributary to the Presumpscot River.

Lake Sebago, the principal haunt of the salmon in this district, is the second largest body of fresh water in Maine. It has an area of about sixty square miles. Its depth is known to exceed 100 feet, and is reported to be in places not less than 400 feet deep. Its shores are for the most part sandy, but in some places gravelly and stony, and in a few places the solid ledge comes down steeply to the water's edge. A large portion of the country draining into the lake is also sandy and gravelly, and the streams are generally clear, though considerably discolored by peat swamps.

Though in the midst of a country long since settled, the immediate shores of the lake are almost wholly clothed with forests of recent growth, their sterile character forbidding any extensive attempt at farming.

Sebago Lake discharges its waters into the Presumpscot River, which empties into Casco Bay near Portland. The entire length of this river is about twenty-two miles. It descends rapidly, having a total fall of 247 feet between the lake and the sea, yet in its natural condition there was no impediment to the free passage of fish up and down. There were many rapids which were doubtless resorted to by spawning salmon. For many years, however, the river has been obstructed by many high mill-dams, which have entirely prevented the ascent of fish. The descent is of course still open, and the fresh-water salmon are occasionally taken on all parts of the river.

The principal affluent of Sebago Lake is Songo River, which drains the country lying to the north. Songo River itself is very short, forming merely the connecting link between Sebago Lake and an extensive chain of ponds (so called) above. In a straight line the distance from

the lake to the first pond (Brandy Pond) is not over three miles. By the course of the river, which is sinuous to an extraordinary degree, the distance may be twice or thrice as great. A short distance below Brandy Pond the river is crossed by a dam and lock to improve the navigation, which is pursued not only by freight boats, which formerly ran by canal to Portland, but now only across the lake to a station of the Portland and Ogdensburgh Railroad, but also by steamers conveying passengers as far as Bridgton, on Long Pond. Immediately below this lock the Songo receives its main affluent, Crooked River, a stream that rises nearly forty miles to the northward and follows a very sinuous course from a country of granite hills down through sandy and gravelly intervals.

The Songo itself affords no spawning-ground for the salmon, almost its whole sluggish course being through a low-lying country, and the entire fall, except at the lock, being but a few inches. The Crooked River, however, is rapid through its whole course, except where here and there interrupted by dams and mill-ponds. In old times, doubtless, the whole length of this stream formed the breeding-grounds of the salmon. At present only that portion is accessible which lies below the village of Edes Falls, not exceeding, probably, six miles in length. There are, however, in this short distance, many gravelly rapids where the salmon spawn.

Besides Songo River there is but one other stream known to be a breeding-ground for the salmon inhabiting Sebago Lake, namely, Northwest River. Mr. Buck visited this stream in November and found it accessible to fish for only about a mile from the lake, a mill-dam intercepting further progress. At that time the stream was about 20 feet wide and 18 inches deep, with a moderate current.

It is also currently reported that the salmon spawn on gravelly bars and beaches in the lake itself. This is not improbable, though Mr. Buck explored Sandy Beach, which is singled out by report as the special place for this sort of work, without finding any indications of fish having resorted to it in 1878.

Besides Sebago Lake itself, the same variety of salmon inhabit Long Pond, the most considerable body of water drained by Songo River, eleven miles long but quite narrow, having an area of nine or ten square miles. The principal breeding-ground of the Long Pond salmon is Bear Brook, which comes in from the north near the village of Harrison. Doubtless other streams were once frequented by them, but not in recent years.

2.—CHARACTERISTICS OF SEBAGO SALMON.

First of all the Sebago salmon are distinguished from the sea-going salmon on the one hand, and from the Schoodic and Sebec salmon on the other, by their size. As exhibiting the result of my own observation in 1867 and such researches as I was able to make at that time, I extract

the following from the Maine Fisheries Report for 1867: "The average of those taken in the fall is, for the males, 5 pounds; for the females, a little more than three pounds. A female 25 inches long weighs 5 pounds, a male of the same length weighs 7 pounds. Of two males 29 inches long, one weighed 9 pounds 14 ounces, the other 11 pounds 4 ounces. Some extreme weights may be given. One was taken the past season (1867) at Edes Falls that dressed 14½ pounds. The largest on record was caught by Mr. Sawyer, of Raymond. Its weight was 17½ pounds, and is vouched for by Franklin Sawyer, esq., of Portland. These old fish are seldom caught with the hook, and of those taken in the spring and summer, when they are in season, the average weight would be less than indicated by the above." I have been told of still larger specimens having been taken, but am unable now to give any authority. Thus it will be seen that the Sebago salmon average about one-third the size of the sea-going Atlantic salmon and twice the size of the Schoodic salmon. I am aware that from the naturalist's standpoint the matter of size is not important, yet with the fish-culturist it is of the very first moment. It is not, perhaps, a very reliable characteristic, being so much influenced often by the character of the range and feeding-ground, but in the present case there are reasons for thinking that the Sebago salmon have inherited a tendency to rapid growth and the attainment of a large size not possessed by those of the Schoodic Lakes; for not alone in the Sebago Lake and the Sango and Crooked Rivers are fish of such large size found. Those of Long Pond are little, if any, inferior in this respect to those of the Sebago, though Long Pond is a much smaller body of water than several of the Schoodic Lakes, and is not known to offer in depth, in the character of the water, or in food, any special advantages.

In form and color the Sebago salmon approach more nearly to the sea salmon than do the Schoodic or the Sebec fish. In the breeding season the males are much brighter colored and the hook on the lower jaw is more developed. The males, at least, judging from the few specimens measured, are stouter in proportion to their length than any other salmon I have ever examined. The single specimen mentioned above as weighing 11½ pounds was 29 inches long. An average Penobscot male salmon of an equal weight would have been 32 inches long.

The habits of the Sebago salmon are identical, so far as observed, with those of other fresh-water salmon. They dwell and feed in the lakes, occasionally running into the larger streams after food, and at spawning time, which begins the last of October, they seek the gravelly rapids of the streams and there excavate nests, in which they deposit their eggs. The old fish abstain from food at spawning time, but young males are taken with eggs in their mouths and stomachs. The males are found frequenting the spawning-beds when only 6 inches long, retaining still the dark bars and red spots on the sides, and these little fish yield milt abundantly. The females, however, are not found till well grown up.

At the feeding season both sexes take bait and rise to the fly, and are taken in Songo and Crooked Rivers and in Sebago Lake. In Long Pond they are never taken except at the spawning season, while ascending the stream or near its mouth.

3.—FORMER EFFORTS AT CULTIVATION.

But very little has been done in this direction. I myself visited Bear Brook in 1867 and secured about 8,000 eggs, but, being an utter novice in the art, succeeded in impregnating but a very small percentage, and nothing practical ever came of them. Shortly after that Mr. A. B. Crockett, of Norway, and a Mr. Holmes, associated with him, secured small quantities of spawn several seasons in succession, but with what result is unknown. In 1870 Mr. Brackett, of the Massachusetts commission, visited Songo Lock and obtained a number of large fish, which he transported alive to Winchester, Mass., and from these were obtained several thousand eggs.

Several years later Mr. Joseph R. Dillingham, of Songo Lock, began to take spawn of these fish for the Maine commission. He followed it up for several years, but never with any great degree of success.

4.—ORGANIZATION OF OPERATIONS IN 1878.

It was evidently very desirable to cultivate on a large scale a variety of salmon of such superior character. Previous attempts had been on a small scale, and had not demonstrated the existence of great numbers of breeding fish, but there were not wanting reasons for believing that only efficient means of capture were wanting to develop an ample supply. It was finally arranged between the Commissioners of Fisheries of the United States and of the State of Maine that at their joint expense a new attempt should be made by a party well fitted out with all the appliances deemed necessary to a thorough trial of the locality. The management of the affair was placed in my hands. I selected Mr. Harry H. Buck, of Orland, to conduct the experiment, my own presence during the spawning season being impracticable.

On the 14th of August I visited the locality with Mr. Buck for the purpose of selecting sites for fishing and for developing the eggs, and deciding other general questions. There seemed to be no doubt, taking all the testimony at our command, that the most promising site for fishing operations was at Songo Lock, and it was decided to construct here, at the junction of the Songo and Crooked Rivers, a set of pounds, on the principle of an ordinary fish-weir, of fine-meshed nets suspended on stakes and weighted at the bottom by chains. The main net was to cross the mouth of the Crooked River and intercept the ascent of fish and lead them into the pounds, which were built immediately below the Songo dam, aside from the current of Crooked River, and supplied with Songo water. The best evidence we could collect assured us that there

was no probability of such a rise of either river as would endanger our work. Should they stand and prove as efficient as we hoped, we should be in position to take almost every fish that entered the river, for all the spawning ground lay above our nets.

No little difficulty was experienced in fixing upon a convenient site for a hatching-house. Mr. Joseph R. Dillingham, whose premises were occupied, had a very good hatching-house of small size fed by a small spring brook, but our anticipations were so great that his supply of water appeared insufficient. After a deal of searching we finally, a few weeks later, found an admirable site at the outlet of Trickey's Pond, a short distance to the westward from the lock.

5.—THE SEASON'S WORK.

Mr. Buck returned to the scene of operations on the 22d of August with a supply of apparatus, and immediately set about the construction of the works. The main net was sufficiently advanced to prevent fish passing up by us on September 12, the date when, we had been assured, the fish invariably made their appearance here. We were ardently expecting to see great numbers of them in the lock, where they can always be seen if present, and where many of them, it is said, always turn aside from Crooked River; but neither on the 12th nor for many days afterwards did any salmon make their appearance. Mr. Buck's diary shows that the first one was taken in the pounds September 20. From this date they continued to straggle in, one or two at a time, at intervals, until the *large number* of 15 were secured. Of these, nine were males and six were females. This was the entire catch.

But meanwhile disasters had occurred. On October 24 a freshet occurred which bore down our net until the top line was three feet under water. Some salmon undoubtedly passed by at that time. The net was again in complete order on the 27th, and so remained until November 24, when the river had again risen to such a height and brought down such an accumulation of leaves, brush, trees, and logs as to completely wreck the net. It was again repaired and kept in position until December 1, when it became evident that it was a hopeless case, and the enterprise was brought to a close.

Among the reasons for our failure, I place, first, an absolute dearth of fish; second, the inability of our fixtures to withstand the freshets. The result of Mr. Buck's observations and other testimony collected satisfies me that there was really a very small number of fish in the river that season. The net was in place and efficient until October 24, nearly six weeks after the date when we were warned to expect the advent of the salmon, and during that time neither did they come into our inclosures, nor did they enter Songo Lock, nor did they accumulate in any considerable numbers below our barrier. Had there been many fish in the river they surely could have been seen. The fatal gap of two or three days after October 24 doubtless allowed some salmon to pass,

but I think not a very great number. It cannot be supposed that all the breeding salmon passed up in that brief space so early in the season. Yet during a whole month thereafter the net continued in place and still no great number of fish to be seen anywhere; and during the whole season but two fish were seen in the lock, where they were wont to be taken plentifully. Evidently this was a year of scarcity.

The freshets demonstrated the insufficiency of our fixtures. Had there been no greater rise of water than testimony led us to expect, our barrier would have remained secure to the season's close. But the season's experience has given us new light on this point, and in future it would be unwise to risk the result of a season's work on the chance of such fixtures being able to stand in the current of Crooked River.

I do not doubt that some efficient means of taking Sebago salmon in Songo or Crooked River could be devised after possibly some more unsuccessful experimenting; but unless there were some better reason than now exists with myself to expect a good run of fish, the prospect of success would hardly justify the risk.

In conclusion, I will merely add that I made several visits to the scene of operations early in the season, and myself fixed upon the main points in the schedule for operations. The plans formed were well carried out by Mr. Buck and his assistants, and such matters as were left to his discretion were judiciously managed.

I present Mr. Buck's diary and weather record, which will be found to contain many interesting details.

6.—H. H. BUCK'S DIARY AT SONGO LOCK, 1878.

August 22, 1878.—Commenced working on behalf of Sebago salmon-breeding establishment. Took from Penobscot establishment about 726 feet of chain, 570 pounds of netting, corks, 1 car for transportation of fish alive, 1 punt, 1 pair oars, trays for eggs, 1 shovel, 1 hoe, and 2 net-bows.

August 23.—Proceeded to Portland on steamer City of Richmond.

August 24.—Through courtesy of J. Hamilton, superintendent of the Portland and Ogdensburgh Railroad, was enabled to get everything to foot of Sebago Lake. As the steamer could not delay, left the freight, and arrived at Songo Lock at 3 p. m.

August 25.—Think the water below the lock is more than a foot lower than upon the 14th. It is reported to have fallen $\frac{3}{4}$ inch per day lately. Above the lock it is apparently at the same height as upon the 14th. Selected as a permanent mark to which to refer the height of water above the lock the lowest block of granite in the upper end of the wing at the north end of the dam. Selected as a water-mark below the dam the top of the largest of a group of stones on the east side of Songo River, below the junction.

August 26.—Made partial survey of the premises, and sent sketch to Mr. Atkins. Freight came to hand, with exception of one tent.

August 27.—Stowed away the car; went to Naples village for sundries, and caulked and puttied punt.

August 28.—Commenced clearing bottom of the stream.

August 29.—Continued clearing bottom of the stream.

August 30.—Continued clearing and cut stakes.

August 31.—Continued cutting stakes.

September 2.—Continued clearing stream.

September 3.—Continued clearing stream. Mr. Atkins came, and we visited brook $1\frac{1}{2}$ miles to westward; found no water.

September 4.—Went to Mr. Dillingham's hatching-house; found but very little water running; commenced setting stakes.

September 5.—Continued setting stakes.

September 6, 7, 8.—Absent on trip to Boston.

September 9.—Returned from Boston; find water still falling. Mr. Mitchell reports having seen two salmon up in Crooked River.

September 10, 11, 12.—Worked getting net across Crooked River, assisted by Dillingham and Mitchell. Afternoon of 12th got so far arranged that I think no fish can pass.

September 17.—Completed arrangement of trap on lower side of main pound.

September 19.—This morning found in the trap two brook-trout, weighing about 2 pounds and $\frac{1}{2}$ pound, respectively, four or five suckers, one bream.

September 20.—Found in the trap this morning one land-locked salmon 20 inches long, apparently a female, not in very good condition; one brook-trout, about $1\frac{1}{2}$ pounds, apparently a female, as was also the one taken yesterday.

September 21.—Steamer Mount Pleasant stopped running to-day; water is so low that she cannot pass the lock. Went to Andrew Gray's brook; found no good site for a hatching-house.

September 22.—Took from trap this morning five brook-trout weighing 2 pounds and less; saved two of them, think one of each sex; returned three to the stream, one above net, two below.

September 27.—Two brook-trout this morning, one of each sex.

September 28.—One brook-trout this morning.

September 29.—Took from trap six brook-trout, two fine ones weighing 4 pounds each, I should think. Called four of the fish males, two females. One of the latter got meshed in the dip-net, and was hurt considerably, so killed her. Found she was very full of eggs, and there was apparently nothing in her stomach.

September 30.—Took four brook-trout this morning; saved all.

October 1.—Took four brook-trout; saved three of them. Perry Harri-man came this afternoon.

October 2.—One small brook-trout this morning. Having heard several times that Crooked River was full of salmon above our net, to-day

got J. B. Mitchell to go up and explore. He reports having seen two brook-trout and large numbers of suckers, but no salmon.

October 2.—Sam. Shane reported thousands of salmon in a deep place below the lock; went down there and saw five large fish, four of which I think were salmon. Took two brook-trout from trap at 9 p. m.

October 3.—Took two male brook-trout this morning. One of them had the peculiar formation of lower jaw indicative of male fish, well developed; the first instance I have noticed this season. Large numbers of fish being reported in the river below the nets, went down this afternoon and explored. Looked very carefully the entire length of the river and saw six salmon. For the first two miles had a favorable chance to see them, as the weather was calm and bright. Took one male brook-trout at 9.30 p. m.; think he would weigh nearly 4 pounds.

October 4.—Got the outside pound completed to-day.

October 8.—Took one small brook-trout this evening.

October 9.—Took one male brook-trout this evening.

October 11.—Took two male salmon this morning, length 19 inches; also one fine brook-trout.

October 12.—One female salmon in morning; one male and one female salmon at 9 p. m.

October 13.—Went to the trap about 2 a. m., and took out two male and one female brook-trout. At 9 p. m. got one female salmon 17 inches long. Heavy shower last night; did not raise the water any; continued to fall to-day.

October 14.—Two female *Salmo fontinalis* this morning, and two of the same at 10 p. m.

October 15.—One male *Salmo sebago* this morning.

October 18.—This morning found that some one had been trying to destroy the nets. The new net across Crooked River was cut or torn in several places, and the poles and stakes which supported it disarranged. The net above it used for stopping leaves was dragged out and very badly torn, then thrown back into the water. An attempt had also been made to let the fish out of the inclosure.

October 19.—One eel about 24 inches long.

October 20.—At 10 a. m. one female *Salmo sebago*. Perry thought it would weigh 10 pounds.

October 22.—Three female and one male *Salmo fontinalis*.

October 23.—One male salmon; three female brook-trout.

October 24.—One male brook-trout in evening. Last night we had a very heavy storm of wind and rain, and this morning Perry made the usual round and thought everything was in proper condition. Found that Crooked River had risen 4 inches. During the forenoon it continued rising and was very thick with brown earthy matter; probably immense numbers of leaves came with it below the surface. Our plans with regard to the direction of the current were found wrong. Instead of rushing on and expending its force in the cove (on the north of the

lock), turned and ran down throughout the entire length of our net. The net for leaves was not, therefore, in position to get more than half that came, and they went into the main net in large quantities. We also supposed there would be an eddy at the east end of the main net, and so had not braced it very securely upon the lower side. About noon we noticed the leaf-net had partly discharged its contents into the main net, and that the braces upon the lower side of the latter were beginning to give way. Immediately got all the spare line to be had and stayed the hedge to the shore as thoroughly as possible, but could not save it, and by 10 o'clock p. m. it was pretty thoroughly wrecked. To prevent a recurrence of the accident, think it will be necessary to have two strong nets for leaves and a windlass upon the bank for drawing them alternately. Songo River, above the dam, has risen 4 inches, and its flow through the lock and our inclosures east of lock amounts to nothing in checking the force of Crooked River at the main net.

October 25.—Water continued to rise in Crooked River and reached its height at evening. Did not rise any more above the dam. Our main net seems to be whole and in position, except that the top line is about 3 feet under water—its whole length nearly. There has been no outward current (or, at most, very little) through our traps since the first of the rise.

October 26.—Repairs progressing rapidly as possible under the direction of Perry Harriman. I have been unwell and not able to work for several days.

October 27.—Got the main net in place again to-night; found one or two small holes, but it was not much damaged.

November 1.—Swept the main pound to-day for the purpose of turning the brook-trout up into Crooked River. We should have had forty-five on hand, but only found six, and could not account for their disappearance otherwise than by supposing that they went out when the attempt was made to release the fish. The record showed that ten salmon had been taken, but we found thirteen in the pound.

November 3.—Found one salmon in the trap this morning. Have not been able to see any fish from the pier for several days. Reports have come in of Crooked River being "full of them," and Perry Harriman and Dillingham went up to-day, but did not see any.

November 9.—Have seen no fish for a week. The three females in the pound have begun to spawn at its lower side, or at least the fish are doing a good deal of work there. There has been ice in Crooked River all of the past week, and more or less on all of our nets.

November 12.—One male salmon last night.

November 14.—To-day went up by land to Edes's Falls and examined Crooked River pretty thoroughly for fish and their work; saw fifteen salmon and forty-two nests or ridds. I think most of them were made this year; many of the nests seemed to be in an unfinished state, as

though the fish had been speared before completing them; found two boats arranged for spearing.

November 15.—Went to Sandy Beach and Northwest River; saw no fish; saw no sign of fish having spawned at Sandy Beach. There is a small brook at the north extremity which is said to have been dry previous to the recent rains. A native said he had not seen any fish there this fall; subsequently, Sam. Nason said only brook-trout were speared there. Explored Northwest River from the mill to the lake; saw 10 nests apparently made by land-locked salmon. At this time, in places where there is a moderate current, the stream is about 20 feet wide and has an average depth of 18 inches. When the mill is running, the stream is raised about 6 inches; in time of freshet the volume is more than double; judge the distance from the mill to the lake by stream to be about one mile; direct line, one-half that distance.

November 16.—Visited the old mouth of Songo River; saw no signs of fish having been there. There was no current coming from it, and the water thereabouts is very shoal.

November 19.—A man on the canal-boat said the net had been cut near the bottom, and we pulled it up and examined it to-day; found it in good condition. Took one small brook-trout this afternoon—a male with milt.

November 20.—Took one male salmon to-night; was in bad condition; evidently had been struck with spear; gave some milt.

November 24.—Wet and rainy weather has kept Crooked River gradually rising for several days past. We have kept the nets in good condition, but last night leaves, pine foliage, and drift and brush of all kinds began to accumulate in the upper net. We went out about midnight and drew it up, cleared and returned it, but to no purpose. We left it about 3 a. m., and by daylight it was full again and badly wrecked. We cleared it the best we could and secured the main hedge as thoroughly as possible.

November 25.—Water continued rising, and this morning the whole of our works except the main pound and upper trap were completely wrecked. Do not think any arrangement of nets of ordinary strength could have been kept in place. Passed the day clearing the wreck; could not get the main net, but cleared away stakes, braces, &c., so that we hope it has gone nearly to bottom.

June 25, 1880.—After the wrecking of the works above described, we cleared out two or three boat-loads of brush, drift-wood, &c., and got everything in place again about the 27th of November, and kept on exploring the river for fish and watching the traps until December 1, when word came to abandon the enterprise, and we stored everything with Dillingham. (The apparatus was afterwards transported to Bucksport.)

At Trickey's Pond we left a small house, 11 by 15 feet, on the land of L. L. Crockett, and he says it may stand there without paying rent.

Before we began to get any fish, I feared that we should not find it

worth while to open the hatching-house. Wrote to Mr. Atkins and received orders to take eggs when we had caught fifteen female fish.

As the season advanced found we were not likely to get that number, and the few on hand were allowed to deposit their eggs in our inclosure just east of Songo Lock.

The following table shows the length and weight of the spent fish released December 1:

Males.		Females.	
Length.	Weight.	Length.	Weight.
<i>Inches.</i>	<i>Pounds.</i>	<i>Inches.</i>	<i>Pounds.</i>
22	5½	18½	2½
15	1½	16½	2
21	3½	18½	2½
20	8½	18½	2½
14½	1½	20	3½
17½	2½	29½	8
17	2		
16			
19			

7.—OBSERVATIONS ON TEMPERATURE AND WEATHER AT SONGO LOCK, MAINE, 1878.

Date.	Temperature.								Wind.	Other phenomena.
	Air.			Songo River water.		Crooked River water.				
	7 a. m.	1 p. m.	6 p. m.	7 a. m.	1 p. m.	7 a. m.	1 p. m.			
Aug. 26	59	72	70	68	70	67	70	Southerly, light.	Clear.	
27	58	77	78	69	71	68	70	Southerly, light.	Clear.	
28	57	...	65	70	...	68	...	Southerly, light.	Clear; cloudy towards evening.	
29	63	69	69	70	71	69	71	Southerly, light.	Cloudy morning; then clear.	
30	63	81	79	70	72	70	72	Gentle northerly, p. m.	Clear.	
31	61	79	74	73	74	72	73	Gentle northerly.	Clear.	
Sept. 1	66	78	70	70	71	72	72	Light southerly.	Rainy a. m.; clear p. m.; thunder shower in evening.	
2	70	79	74	72	74	72	74	Light southerly.	Partly cloudy; thunder shower at 6 p. m.	
3	68	...	...	73	...	74	...	Southerly	Partly cloudy.
4	72	...	61	71	...	73	...	Southerly and easterly	Rainy and foggy.	
5	61	64	66	71	71	70	70	Calm	Cloudy, foggy, and rainy.	
6	65	...	...	71	...	69	...	...	...
10	58	70	67	68	70	66	67	...	...
11	65	78	71	69	70	67	69	...	...
12	65	69	71	70	71	...	70	Southerly and easterly	Cloudy.	
13	67	74	71	71	71	70	70	Southerly and easterly	Very wet, with occasional showers.	
14	62	71	65	69	70	68	69	Northwest, fresh	Very wet, with showers.	
15	58	60	69	68	60	67	68	Northwest, fresh	Clear.	
16	45	64	67	65	67	63	64	Southerly	Clear.	
17	51	67	65	65	67	62	63	...	Clear.	
18	57	78	73	66	68	63	65	Southerly	Clear.	
19	56	...	65	68	...	64	...	Northerly a. m., southerly p. m.	Clear.	
20	59	80	78	66	68	65	66	...	Clear.	
21	66	...	72	67	...	67	...	...	Clear.
22	56	70	67	67	67	67	67	Northwest, fresh	Clear.	
23	40	65	56	63	65	61	63	Southerly, light	Clear.	
24	40	...	60	63	...	60	...	Southerly, light	Clear.	
25	58	70	65	64	66	60	63	...	Clear.	
26	56	65	64	65	60	63	65	...	Cloudy all day; shower at 5 p. m.	
27	48	63	51	63	63	59	60	Strong northwest	Clear.	
28	39	62	56	59	60	56	57	...	Clear.	
29	...	61	...	...	61	...	58	Southerly	Clear.
30	40	66	61	59	62	53	57	Gentle northerly, a. m.	Clear.	

7.—OBSERVATIONS ON TEMPERATURE AND WEATHER AT SONGO LOCK, &c.—Cont'd.

Date.	Temperature.								Wind.	Other phenomena.
	Air.			Songo River water.		Crooked River water.				
	7 a. m.	1 p. m.	6 p. m.	7 a. m.	1 p. m.	7 a. m.	1 p. m.			
Oct. 1	48	70	07	61	62	56	60	Light southwest	Clear.	
2	46	68	65	61	62	58	60	Fresh southwest	Clear; foggy morning.	
3	57	72	64	62	63	59	62	Light northerly	Clear.	
4	51	...	65	62	64	61	62	...	Clear.	
5	40	65	...	62	63	59	61	Southerly and westerly, light.	Clear.	
6	50	53	50	61	61	56	56	Northeast veering to west.	Light rain; clearing at night.	
7	39	58	52	59	60	55	58	Southerly	Clear; cloudy evening.	
8	51	62	57	60	60	56	58	...	Clear; cloudy morning.	
9	49	59	67	59	59	56	57	Westerly	Clouding up towards night; thunder shower in evening.	
10	49	55	51	58	58	53	54	Strong northerly	Clear.	
11	39	...	...	55	...	...	51	Light southerly	Clear.
12	42	46	48	55	55	52	50	Northeast	Cloudy a. m.; rainy p. m.	
13	48	60	...	53	54	48	50	Strong northwest	Clear.	
14	42	61	53	53	54	50	52	Westerly a. m.; southerly p. m.	Clear.	
15	42	66	64	54	55	50	52	...	Clear in a. m.; clouds and rain in p. m.	
16	50	66	61	55	56	52	54	Fresh southwest	Clear weather.	
17	49	66	05	55	56	54	56	Southerly	Clear; foggy forenoon.	
18	58	63	00	57	57	50	57	Southerly	Cloudy.	
19	56	58	50	57	57	57	58	Southwest	Cloudy.	
20	...	...	...	...	...	...	...	...	Clear.
21	50	67	59	53	56	52	55	...	Clear.	
22	46	...	...	53	...	52	...	...	Clear.
23	46	...	...	54	...	53	...	Easterly	Cloudy; commenced raining at 6 p. m.
24	52	50	50	54	54	53	53	Strong northeast	Cloudy.	
25	45	...	...	53	...	52	...	...	Clear.
26	43	...	...	52	...	50	...	...	Clear.
27	48	...	51	54	...	50	...	...	Cloudy.
28	46	53	41	52	54	50	...	Strong northerly	Clear.	
29	28	50	40	50	...	48	...	...	Clear.
30	37	...	42	40	...	47	...	Southeasterly	Rainy.	
31	40	...	44	48	...	46	...	...	Clear.
Nov. 1	39	40	39	48	40	46	45	...	...
2	37	57	46	48	49	45	45	...	Clear.	
3	39	45	38	48	48	45	43	Westerly	Clear.	
4	20	...	26	45	...	40	...	Northerly	Cloudy, with spits of snow.	
5	20	...	27	43	...	34	...	Northerly	Clear.	
6	14	35	...	40	...	32	...	Northerly	$\frac{1}{2}$ -inch snow nearly last night.	
7	14	...	...	40	41	32	33	Northerly	Clear a. m.; cloudy p. m.
8	28	...	80	40	...	32	...	Strong northerly	Snow in a. m.	
9	30	...	...	40	...	32	...	...	...
10	32	...	...	39	...	32	...	...	...
11	32	...	...	80	...	83	...	Light southerly	Clear.
12	39	...	48	39	...	34	...	...	Clear.
13	35	...	48	39	...	36	...	...	...
14	39	...	...	39	...	33	...	Northerly	Clear.
15	20	...	...	38	...	32	...	Light southerly	Clear.
16	26	...	...	38	...	32	...	Light southerly	Clear.
17	...	40	...	39	...	36	...	...	Clear.
18	...	...	...	...	...	...	...	...	...
19	35	...	...	39	...	36	...	Easterly	Rainy.
20	35	...	...	39	...	36	...	Northerly	Clear.
21	32	...	...	39	...	34	...	Northwest	Cloudy.
22	38	...	...	39	...	36	...	Easterly	Rainy.
23	44	...	...	39	...	37	...	...	Cloudy, with showers; $1\frac{1}{2}$ -inch rain last night and to-day.
24	...	...	...	...	...	...	...	Northerly	Cloudy.
25	26	...	...	38	...	36	...	Northerly	Commenced snowing and raining middle of p. m.
26	...	...	...	...	...	...	...	Southerly	Cloudy and wet.

General summary of observations on temperature at Songo Lock, Me., from August 26 to November 28, 1878, inclusive.

Date.	Air.									
	7 a. m.		1 p. m.		6 p. m.		Max.		Min.	
	Number of observations.	Average degrees.	Number of observations.	Average degrees.	Number of observations.	Average degrees.	Date of observation.	Number of degrees.	Date of observation.	Number of degrees.
1878.										
August	6	60.16	5	75.60	6	71.66	30	81	28	57
September	26	57.23	21	69.33	24	64.98	20	80	29	29
October	30	46.23	21	60.38	23	55.04	3	73	28	28
November	23	30.87	5	43.40	8	37.12	2	57	6	14

Date.	Songo River water.							
	7 a. m.		1 p. m.		Max.		Min.	
	Number of observations.	Average degrees.	Number of observations.	Average degrees.	Date of observation.	Number of degrees.	Date of observation.	Number of degrees.
1878.								
August	6	70	5	71.60	31	74	26	68
September	26	57.04	21	67.48	2	74	30	59
October	30	55.73	21	58.09	4	64	31	48
November	23	40.60	5	45.20	1	49	15	38

Date.	Crooked River water.							
	7 a. m.		1 p. m.		Max.		Min.	
	Number of observations.	Average degrees.	Number of observations.	Average degrees.	Date of observation.	Number of degrees.	Date of observation.	Number of degrees.
1878.								
August	6	69	5	71.20	31	73	26	67
September	25	65.24	21	65.57	2	74	30	53
October	29	53.13	21	56	3	63	31	48
November	23	35.69	5	40.40	1	45	17	38

