

XXIV.—REPORT OF OPERATIONS AT THE UNITED STATES SALMON-BREEDING STATION ON THE McCLOUD RIVER, CALI- FORNIA, DURING THE YEAR 1883.

By LIVINGSTON STONE.

Nothing of special interest or importance occurred at the salmon-breeding station during the winter and spring of 1883, unless the weather might be considered an exception—for during January and February the weather was unusually clear and cold. Although in the rainy season of 1880-'81 the rainfall amounted to over 9 solid feet of water all over Shasta County and the river rose 26 feet, this season so little rain fell that the river for a considerable time was not above its summer level. This was partly compensated for in March and April by a very heavy rainfall for those months, which raised the McCloud at one time to 8 feet above its summer level. About the middle of May the rain ceased and no more of any consequence fell till the next fall.

During the first part of the year the salmon were observed to come up the river about as usual, but after awhile it was noticed that the number of salmon in the lower portion of the river was rapidly decreasing, and it was also soon after observed that no salmon were coming up the river, as they usually do at that season.

Owing to my having been commissioned to make an exploring trip on the Columbia River, I did not arrive on the McCloud till the 1st of August. I found everything on my arrival in good order. Mr. Radcliff had been engaged for the last month or two in getting the place ready for taking salmon eggs, and everything seemed auspicious for a good season with one exception, which was an important one, to be sure, viz., there were no salmon in the river to amount to anything. The racks and bridge which are annually put across the river above the fishing ground were in place, but no salmon had collected below as had been usual in previous years. We unpacked the new seine, which had just come, and rigged it with floats and leads and ropes, and made a haul with it, going over the ground which we have always been accustomed to at the fishing season. Instead of catching five hundred or a thousand salmon, we caught but one, and that a small one. This was on the 7th of August. The next day, after supper, I went to a point where perhaps a hundred rods of the river could be seen at once, and looked for salmon jumping in the river. Instead of seeing from 6,000 to 8,000 jumping in an hour, as I have often seen before from this

point, I did not see one jump for several minutes. In the meantime all the Indians we met had the same story to tell—that there were no salmon in the river.

This fact was now not only evident, but it implied that some very unusual agencies were at work on a large scale somewhere below us to prevent the salmon ascending the river. On making inquiries, we were told that there were several thousand Chinamen, variously estimated at from 3,000 to 6,000, at work on the California and Oregon Railroad, on the Sacramento River, eight or ten miles below us, and that these Chinamen were doing a very large business in capturing fish by exploding giant powder in the water. As the McCloud flows into Pit River and the Pit into the Sacramento, the abundance of salmon in the McCloud River was, of course, directly affected by this destruction in the Sacramento. So, if the story about the Chinamen was true, this gave one reason why salmon were so scarce in the McCloud.

We also heard that the railroad company were putting in very heavy blasts of powder near the river, and it was possible that this heavy blasting kept the salmon back. Acting upon this information I sent a man to the scene of the blasting operations to make an examination and report on the subject. This man, on his return, stated that the Chinamen did kill what fish they could with giant powder, but he also gave such a description of the blasting operations of the railroad company as led me to think that while the Chinamen were doing some mischief killing salmon with giant powder, the heavy blasting on the railroad was the chief agency in keeping the salmon from ascending the river.*

I immediately telegraphed and wrote to Mr. Joseph D. Redding, the secretary of the California fish commission, apprising him of the state of affairs, and requesting him to use the influence of the State commission as far as possible to remedy the evil.

At Mr. Redding's suggestion the commission sent Mr. Adams to the Chinese camps and the scene of the blasting operations, with directions to make a speedy report on the situation.

Before Mr. Adams had reported, an Indian came to the fishery and said that some men had a rack across the river several miles below here for the purpose of stopping the salmon, and that they were drawing a seine below the rack and selling the salmon to the Chinamen.

The next morning I sent Mr. Radcliff down the river to inquire into the truth of this statement. Mr. Radcliff found some white men preparing a ground for drawing a seine, but did not find any rack or obstruction in the river. He reported also that in his opinion it was the Chinamen that were keeping the salmon back by exploding giant powder in the river, and not the blasting operations of the railroad. I

* I was told on good authority that two six-horse wagon loads of gunpowder (black powder) were put into one hole for a single blast, and that this blasting was kept up night and day as rapidly as the large force of Chinamen employed could prepare and fire off the blasts.

mention this in order to have the case fairly stated, though I am quite confident myself that it was the blasting on the railroad that is mainly responsible for the disturbance of the salmon in the river and their tributaries below the mouth of Pitt River, and I may add that before the season was over this was, I believe, the universal opinion.

While we were waiting for the salmon to come up, and were investigating the reasons for their not coming, I employed the time and the spare means at my disposal in putting up an addition to the hatching house for the purpose of obtaining greater facilities for hatching the young salmon for the river.

The hatching house was barely large enough to hatch 4,000,000 salmon in and keep them till the proper age for turning loose, and as the State fish commission proposed to have 6,000,000 hatched this season, and as many, very likely, in future seasons, it was necessary to provide additional room for the additional 2,000,000 salmon, and for this reason an enlargement of the hatching house had become a necessity. The annex to the hatching house was put up on the south side of the building and was 80 feet long by 8 feet wide, and when finished answered its purpose admirably.

I also attached a small current-wheel to the lower end of the flat-boats, which furnished power for working a Chinese pump in each one of the flat-boats, by which arrangement the boats were kept automatically bailed out. Thus the labor of bailing by hand was saved, to say nothing of the care and risk which were avoided.

The salmon continued as scarce as ever, and there was no improvement seen in their number, during the rest of the season. The result was that we caught fewer salmon and took less eggs this year than ever before since the station was established on the bank of the river in 1873, the total outcome of the season's operation being only 1,000,000 eggs. On the 19th of September an accident happened to the wheel which made it necessary to take the eggs from the hatching house and place them in floating boxes in the river, this operation causing a loss of perhaps 25 per cent of the eggs. A short time after, when there was water enough running in the reserve flume which comes from a spring near the house, the eggs were returned to the hatching house, where they remained till they were turned over to the California fish commission on the 16th of October.

They were afterwards hatched by the State commission and the young fish deposited in the McCloud River.

Following this report will be found—

- (1) A record of the hauls made with the seine.
- (2) A daily record of the salmon, eggs taken.
- (3) A record of the temperatures of air and water at the station.

CHARLESTOWN, N. H., December 31, 1883.

TABLE I.—Record of seining (salmon) operations conducted at United States fishery, Baird, Cal., on the McCloud River, from August 30 to September 14, inclusive, 1883, on account of United States, by Livingston Stone.

Date.	Hour.	Temperature of—		Fish taken.		Ripe fish.	
		Air.	Water.	Males.	Females.	Males.	Females.
August 30	10.00 a. m.	59	59	50	25		17
August 30	7.45 p. m.	59	59	29	2		2
August 30	9.00 p. m.	59	58	20	3		8
August 30	9.45 p. m.	59	58	30	1		0
August 31	6.00 a. m.	58	55	3			1
August 31	6.30 a. m.	58	55	1	0		0
August 31	7.15 a. m.	58	55	7	2		2
August 31	8.15 a. m.	62	55	2	1		0
August 31	4.30 p. m.	72	58	3	0		0
August 31	4.40 p. m.	71	58	9	0		1
August 31	5.40 p. m.	70	58	3	3		1
August 31	6.00 p. m.	70	58	13	3		2
August 31	7.15 p. m.	66	57	13	2		0
August 31	7.45 p. m.	65	57	20	3		0
August 31	8.15 p. m.	64	56	25	2		1
August 31	9.15 p. m.	64	56	15	3		2
August 31	10.00 p. m.	64	56	17	4		2
September 1	6.00 a. m.	58	53	15			1
September 1	6.30 a. m.	58	53	50			2
September 1	7.45 a. m.	65	53	0			1
September 1	8.30 a. m.	67	53	25	1		3
September 1	4.30 p. m.	86	58	27			1
September 1	5.00 p. m.	80	58	15	1		0
September 1	5.45 p. m.	73	58	20			1
September 1	7.00 p. m.	68	57	17			2
September 1	7.15 p. m.	65	56	15	2		1
September 1	7.45 p. m.	62	56	9	0		0
September 1	8.15 p. m.	60	56	12	1		1
September 1	10.00 p. m.	55	56	12	1		1
September 2	6.00 a. m.				3		3
September 2	9.35 a. m.	66	55	4	2		1
September 2	4.35 p. m.	76	57	10	8		3
September 2	5.05 p. m.	72	57	25	0		0
September 2	5.35 p. m.	70	57	12	0		0
September 2	6.35 p. m.	70	56	3			2
September 2	7.20 p. m.	70	56	12	0		0
September 2	8.20 p. m.	68	56	15	1		1
September 2	9.25 p. m.	68	56	25	1		1
September 3	5.15 a. m.	54	55	8	2		2
September 3	5.35 a. m.	54	55	8	2		2
September 3	7.20 a. m.	64	54	70			4
September 3	7.40 a. m.	64	54	3			
September 3	8.30 a. m.	74	54	8			0
September 3	9.30 a. m.	80	55	9	0		1
September 3	4.30 p. m.	94	59	50	8		8
September 3	5.00 p. m.	92	59	10	1		0
September 3	5.15 p. m.	88	59	3	0		1
September 3	7.00 p. m.		59	150	5		5
September 3	8.00 p. m.	66	59	20	5		3
September 3	8.45 p. m.	64	58	8	2		2
September 3	9.50 p. m.	58	58	10	4		4
September 4	5.00 a. m.	54	56	12	5		5
September 4	6.00 a. m.	56	56	8	2		2
September 4	6.30 a. m.	58	56	5	1		0
September 4	7.30 a. m.	64	54	0	0		1
September 4	9.00 a. m.	76	56	1	2		1
September 4	5.00 p. m.	98	62	12	3		3
September 4	5.40 p. m.	96	60	7	1		1
September 4	7.10 p. m.	94	60	45	4		4
September 4	7.25 p. m.	94	60	15	1		1
September 4	8.00 p. m.	91	60	1	1		1
September 4	9.00 p. m.	92	60	8			
September 4	9.45 p. m.	92	60	8			1
September 5	4.30 a. m.	54	56	80	5		5
September 5	5.10 a. m.	52	56	12	1		1
September 5	5.35 a. m.	52	56	8	2		2
September 5	7.15 a. m.	56	56	5	4		4
September 5	7.35 a. m.	58	56	6	2		1
September 5	8.00 a. m.	62	56	0	0		0
September 5	8.20 a. m.	64	56	2	0		0

TABLE I.—Record of seining (salmon) operations conducted at United States fishery, Baird, Cal., on the McCloud River, &c.—Continued.

Date.	Hour.	Temperature of—		Fish taken.		Ripe fish.	
		Air.	Water.	Males.	Females.	Males.	Females.
September 5	4. 25 p. m.	92	60	25	0		5
September 5	5. 00 p. m.	86	60	6	0		0
September 5	5. 40 p. m.	80	60	7	2		1
September 5	7. 10 p. m.	68	60	15	1		1
September 5	7. 30 p. m.	66	60	10	1		1
September 5	8. 10 p. m.	64	60	10	1		1
September 5	9. 00 p. m.	60	58	8	0		0
September 5	5. 45 a. m.	48	50	20	5		5
September 6	6. 15 a. m.	50	56	12	1		1
September 6	8. 00 a. m.	62	56	15	6		6
September 6	8. 25 a. m.	70	56	10	2		2
September 6	6. 35 p. m.	78	56	9	1		1
September 6	4. 10 p. m.	90	60	20	7		7
September 6	4. 35 p. m.	90	60	12	2		2
September 6	5. 10 p. m.	82	60	8	3		3
September 6	5. 50 p. m.	74	60	6	1		1
September 6	7. 10 p. m.	68	58	15	3		3
September 6	7. 30 p. m.	66	58	13	2		2
September 6	8. 30 p. m.	62	58	10	1		1
September 6	9. 15 p. m.	60	58	8	0		0
September 7	4. 45 a. m.	48	50	13	5		5
September 7	5. 10 a. m.	48	50	15	7		7
September 7	5. 45 a. m.	48	50	12	1		1
September 7	7. 20 a. m.	52	54	10	1		1
September 7	7. 30 a. m.	53	54	9	2		2
September 7	9. 25 a. m.	71	55	8	1		1
September 7	4. 23 p. m.	88	59	10	1		1
September 7	4. 40 p. m.	87	58	21			
September 7	5. 10 p. m.	82	58	10	1		1
September 7	6. 00 p. m.	75	58	12			
September 7	7. 10 p. m.	69	59	10	1		1
September 7	7. 48 p. m.	67	59	5			
September 7	8. 55 p. m.	64	59	5			
September 7	9. 25 p. m.	61	57	4	1		1
September 8	4. 56 a. m.	49	54	4	5		5
September 8	5. 15 a. m.	49	54	12	4		4
September 8	5. 45 a. m.	48	54	25	8		8
September 8	7. 55 a. m.	55	53	15	8		8
September 8	8. 15 a. m.	60	53	10	1		1
September 8	9. 30 a. m.	70	55	12	3		
September 8	4. 35 p. m.	86	59	8	3		3
September 8	5. 00 p. m.	79	59	9	0		0
September 8	5. 50 p. m.	70	59	4	1		1
September 8	7. 35 p. m.	68	59	12	1		1
September 8	8. 30 p. m.	60	59	13	2		2
September 8	9. 45 p. m.	58	53	8	1		1
September 8	5. 00 a. m.	50	54	6	2		2
September 9	5. 30 a. m.	49	54	15	5		5
September 9	6. 05 a. m.	48	54	6	1		1
September 9	7. 15 a. m.	50	50	3	0		0
September 9	9. 10 a. m.	87	55	4		0	0
September 9	3. 50 p. m.	87	55	15		2	2
September 9	4. 55 p. m.	91	59	2		0	0
September 9	8. 55 p. m.	70	60	20		1	1
September 9	9. 00 p. m.	65	60	8		1	1
September 9	5. 00 a. m.	54	54	12		3	3
September 10	5. 35 a. m.	50	54	20		4	4
September 10	6. 15 a. m.	50	54	5		5	5
September 10	7. 40 a. m.	55	54	8		2	2
September 10	7. 58 a. m.	56	54	6		1	1
September 10	4. 35 p. m.	90	60	12			
September 10	5. 35 p. m.	81	50	5			1
September 10	7. 01 p. m.	73	50	10		2	2
September 10	7. 30 p. m.	73	50	12		1	1
September 10	8. 40 p. m.	67	50	3		0	0
September 10	4. 30 a. m.	56	56	3		1	1
September 11	5. 15 a. m.	53	50	12		5	5
September 11	5. 50 a. m.	51	50	1		1	1
September 11	6. 00 a. m.	51	56	6		6	6
September 11	7. 40 a. m.	59	55	1		0	0
September 11	8. 15 a. m.	60	55	5		1	1
September 11	7. 25 p. m.	70	59	2		1	1
September 11	7. 00 p. m.	76	59	6		0	0
September 11	9. 15 p. m.	61	59	5		1	1

TABLE I.—Record of seining (salmon) operations conducted at United States fishery, Baird, Cal., on the McCloud River, &c.—Continued.

Date.	Hour.	Temperature of—		Fish taken.		Ripe fish.	
		Air.	Water.	Males.	Females.	Males.	Females.
September 12	5.00 a. m	54	54	20		11	11
September 12	5.35 a. m	54	54	10	3		3
September 12	6.14 a. m	53	54	12	1		1
September 12	7.10 a. m	57	54	6	0		0
September 12	7.05 a. m	73	59	15	2		2
September 12	7.25 a. m	70	59	5	0		0
September 12	8.25 a. m	74	59	3	0		0
September 12	3.30 p. m	89	55	0	0		0
September 13	4.15 a. m	56	54	2	1		1
September 13	5.00 a. m	56	54	0	1		1
September 13	5.40 a. m	60	54	0	0		0
September 13	7.16 a. m	71	54	8	1		1
September 13	7.45 a. m	71	54	10	2		2
September 13	4.27 p. m	91	59	25	5		5
September 13	4.58 p. m	85	59	5	0		0
September 13	7.05 p. m	07	59	3	1		1
September 13	7.30 p. m	64	59	4	1		1
September 13	8.30 p. m	61	59	0	0		0
September 14	4.30 a. m	51	54	2	0		0
September 14	5.55 a. m	47	52	12	7		7
September 14	6.25 a. m	46	52	5	0		0
September 14	7.15 a. m	69	54	3	1		1
September 14	7.40 a. m	67	54	10	5		5
September 14	8.10 a. m	69	54	5	1		1
September 14	8.45 a. m	74	54	3	0		0
September 14	4.10 p. m	84	58	8	1		1
September 14	5.30 p. m	73	58				
September 14	7.30 p. m	64	58			1	1
September 14	8.00 p. m	62	58	2		0	0
September 14	8.52 p. m	61	58			1	1
September 15	4.40 a. m	50	54	5		4	4
September 15	5.35 a. m	50	54	4		0	0
September 15	7.20 a. m	57	54	6		1	1
September 15	7.55 a. m	63	54	8		1	1
September 15	8.40 a. m	82	54	5		0	0

TABLE II.—Salmon eggs taken at the United States salmon-breeding station, McCloud River, California, during the season of 1883.

Date.	No. of eggs taken.	No. of salmon spawned.	Date.	No. of eggs taken.	No. of salmon spawned.
August 30	40,000	13	September 11	26,500	9
August 31	19,000	6	September 12	64,500	21
September 1	31,750	9	September 13	22,500	5
September 2	37,500	11	September 14	78,250	21
September 3	44,000	15	September 16	15,750	5
September 4	100,000	27			
September 5	62,500	17	Total	940,750	287
September 6	70,500	24	Add 10 per cent for error in unit of measure	94,075	
September 7	122,000	38	Corrected total	1,034,825	
September 8	63,500	20			
September 9	79,500	25			
September 10	63,000	21			

TABLE III.—Temperatures of air and water taken at the McCloud River salmon-breeding station, California, from October 7, 1882, to December 31, 1883.

Date.	7 a. m.		3 p. m.			7 p. m.		Remarks.
	Air.	Water.	Shade.	Sun.	Water.	Air.	Water.	
1882.	°	°	°	°	°	°	°	
Oct. 7.....	50	46	68	70	40	58	47	Cleared at 9 a. m.
Oct. 8.....	42	46	74	85	40	50	47	Clear.
Oct. 9.....	48	46				57	47	Do.
Oct. 10.....	52	46	64	69	51	54	50	Rained until noon.
Oct. 11.....								Do.
Oct. 12.....	40	47	64		50	62	40	Cloudy.
Oct. 13.....	52	48	62		52	57	50	Clear.
Oct. 14.....	39	47	62	76	49	52	48	Do.
Oct. 15.....	42	47	68	83	50	58	49	Do.
Oct. 16.....	44	48	70	85	50	59	49	Do.
Oct. 17.....	40	47	70	80	50	58	40	Do.
Oct. 18.....	49	48	76	90	50	52	49	Do.
Oct. 19.....	36	47	70	92	50	50	40	Do.
Oct. 20.....	40	47	82	105	50	52	48	Do.
Oct. 21.....	48	47	88	98	50	51	40	Do.
Oct. 22.....	50	48	66	92	50	52	40	Do.
Oct. 23.....	40	48	85	90	49	52	40	Do.
Oct. 24.....	48	48	80	89	50	50	40	Do.
Oct. 25.....	44	47	82	88	50	56	40	Do.
Oct. 26.....	48	48	62		40	50	48	Rain.
Oct. 27.....	52	47	80	95	50	60	40	Do.
Oct. 28.....	52	49	65		60	52	40	Cloudy.
Oct. 29.....	50	48	70	90	50	50	40	Do.
Oct. 30.....	37	47	56		48	48	47	Rainy a. m.; cloudy p. m.
Oct. 31.....	32	44	51		46	46	45	Clear.
Nov. 1.....	42	44	50		45	47	45	Rain.
Nov. 2.....	44	44	46		45	47	44	Do.
Nov. 3.....	42	44	48		45	47	44	Do.
Nov. 4.....	48	44	62	82	45	46	44	Clear.
Nov. 5.....	49	45	82	90	47	52	46	Do.
Nov. 6.....	45	45	78		46	50	45	Cloudy.
Nov. 7.....	47	45	62		40	47	45	Do.
Nov. 8.....	49	45	52		48	40	47	Rain.
Nov. 9.....	47	46	56		47	48	46	Clear.
Nov. 10.....	45	40	58	78	48	38	47	Do.
Nov. 11.....	28	44	48		44	32	44	Do.
Nov. 12.....	26	43	66	65	44	32	44	Do.
Nov. 13.....	26	43	66	82	44	40	43	Do.
Nov. 14.....	30	48	66	84	44	42	44	Do.
Nov. 15.....	40	44	58	78	45	47	44	Do.
Nov. 16.....	40	44	62	82	46	40	43	Do.
Nov. 17.....	30	44	62	80	45	42	44	Do.
Nov. 18.....	20	42	64	80	44	50	43	Do.
Nov. 19.....	26	43	62	76	45	52	44	Do.
Nov. 20.....	20	48	64	80	45			Rain p. m.
Nov. 21.....								
Nov. 22.....								
Nov. 23.....	28	43	66	88	46	50	44	Clear.
Nov. 24.....	42	44	72	90	46	60	45	Do.
Nov. 25.....	33	43	70	86	45	60	44	Do.
Nov. 26.....	42	44	74	90	45	60	44	Do.
Nov. 27.....	40	43	64	82	44	54	44	Do.
Nov. 28.....	33	43	72	81	45	58	44	Do.
Nov. 29.....	34	43	64		45	50	44	Cloudy.
Nov. 30.....	42	44	58		48	52	46	Rainy.
Dec. 1.....	44	45	74	90	48			Clear.
Dec. 2.....	44	44	70	80	45	50	44	Do.
Dec. 3.....	43	44	68	78	44	48	44	Do.
Dec. 4.....	42	48	68	75	44	50	44	Do.
Dec. 5.....	44	43	70	80	44	52	44	Do.
Dec. 6.....	40	42	68	78	44	54	44	Do.
Dec. 7.....	38	42	60	70	43	48	43	Do.
Dec. 8.....	40	42	66	76	43	54	45	Do.
Dec. 9.....	48	43	53	58	44	52	44	Rain.
Dec. 10.....	50	44	64	68	45	56	45	Do.
Dec. 11.....	50	44	62	64	45	60	45	Do.
Dec. 12.....	42	44	70	74	44	56	44	Cloudy.
Dec. 13.....	40	43	68	76	44	50	45	Clear.
Dec. 14.....	38	42	60	66	43	48	43	Do.
Dec. 15.....	40	42	62	70	43	46	43	Do.
Dec. 16.....	36	42	60	74	43	48	48	Do.
Dec. 17.....	34	41	58	68	42	50	43	Cloudy.
Dec. 18.....	42	42	64		43	54	43	Clear.
Dec. 19.....	50	44	52	52	44	52	44	Do.
Dec. 20.....	52	44	66	80	45	46	45	Do.
Dec. 21.....	44	43	64	76	44	46	44	Do.

TABLE III.—Temperatures of air and water, &c.—Continued.

Date.	7 a. m.		3 p. m.			7 p. m.		Remarks.
	Air.	Water.	Shade.	Sun.	Water.	Air.	Water.	
1882.	°	°	°	°	°	°	°	
Dec. 22.....	40	42	64	80	43	44	42	Clear.
Dec. 23.....	40	42	58	70	42	48	43	Do.
Dec. 24.....	38	41	54	.....	42	40	42	Do.
Dec. 25.....	40	41	56	68	41	44	42	Do.
Dec. 26.....	44	42	60	.....	42	50	.....	Cloudy.
Dec. 27.....	38	42	50	.....	42	48	44	Do.
Dec. 28.....	46	43	64	.....	44	56	44	Rain.
Dec. 29.....	40	42	60	70	43	50	43	Cloudy.
Dec. 30.....	36	42	64	78	43	44	42	Clear.
Dec. 31.....	30	40	58	60	41	44	42	Do.
1883.								
Jan. 1.....	52	42	58	82	42	53	42	Clear.
Jan. 2.....	40	40	56	82	41	40	41	Do.
Jan. 3.....	30	38	58	76	40	40	39	Do.
Jan. 4.....	26	38	50	70	40	40	39	Do.
Jan. 5.....	24	38	54	76	40	40	39	Do.
Jan. 6.....	24	38	50	68	39	40	38	Do.
Jan. 7.....	25	38	54	70	39	38	38	Do.
Jan. 8.....	32	38	60	80	40	44	39	Do.
Jan. 9.....	34	38	66	84	41	46	39	Do.
Jan. 10.....	30	40	64	78	41	40	40	Do.
Jan. 11.....	28	40	60	70	41	36	40	Do.
Jan. 12.....	24	39	56	68	40	38	40	Do.
Jan. 13.....	30	38	44	70	40	40	40	Do.
Jan. 14.....	26	40	44	82	42	50	42	Do.
Jan. 15.....	27	38	52	62	40	40	41	Do.
Jan. 16.....	28	38	40	.....	39	42	40	Cloudy.
Jan. 17.....	36	42	46	58	42	36	42	Do.
Jan. 18.....	23	40	46	60	42	38	41	Clear.
Jan. 19.....	21	40	44	56	41	38	41	Do.
Jan. 20.....	25	40	48	56	41	38	40	Do.
Jan. 21.....	17	37	48	58	40	38	40	Do.
Jan. 22.....	18	36	50	76	38	40	40	Do.
Jan. 23.....	20	37	50	75	38	40	40	Do.
Jan. 24.....	38	30	50	.....	40	46	42	Rain.
Jan. 25.....	36	40	46	.....	42	52	42	Do.
Jan. 26.....	36	42	50	.....	44	48	44	Cloudy.
Jan. 27.....	34	42	50	.....	44	46	44	Do.
Jan. 28.....	36	42	60	70	43	50	49	Do.
Jan. 29.....	40	40	44	.....	42	54	41	Rain.
Jan. 30.....	30	40	58	68	42	52	41	Clear.
Jan. 31.....	40	42	62	78	42	48	41	Do.
Feb. 1.....	30	40	68	82	42	42	41	Do.
Feb. 2.....	22	38	50	60	40	38	39	Do.
Feb. 3.....	20	36	60	70	39	34	38	Do.
Feb. 4.....	21	36	40	52	38	35	38	Do.
Feb. 5.....	24	38	42	60	38	34	39	Do.
Feb. 6.....	24	38	38	60	38	30	38	Cloudy.
Feb. 7.....	22	36	42	42	38	36	38	Clear.
Feb. 8.....	18	38	50	54	39	40	38	Do.
Feb. 9.....	24	37	52	56	38	42	38	Do.
Feb. 10.....	28	38	58	58	38	42	38	Do.
Feb. 11.....	30	38	44	58	42	36	37	Cloudy.
Feb. 12.....	38	38	50	.....	40	42	41	Rain.
Feb. 13.....	40	42	40	.....	42	46	42	Do.
Feb. 14.....	36	41	42	.....	42	42	42	Do.
Feb. 15.....	30	42	44	60	42	40	42	Do.
Feb. 16.....	22	42	44	68	42	42	42	Do.
Feb. 17.....	22	38	42	68	40	38	40	Do.
Feb. 18.....	30	40	72	76	42	44	41	Clear.
Feb. 19.....	40	42	80	90	43	50	43	Do.
Feb. 20.....	42	42	82	88	43	52	42	Do.
Feb. 21.....	40	42	76	84	43	52	41	Do.
Feb. 22.....	38	42	78	84	43	52	42	Do.
Feb. 23.....	40	40	58	84	42	56	42	Do.
Feb. 24.....	38	43	66	76	42	50	42	Do.
Feb. 25.....	32	42	66	76	42	54	42	Do.
Feb. 26.....	35	42	64	73	42	50	42	Do.
Feb. 27.....	36	42	70	72	42	56	42	Do.
Feb. 28.....	36	42	76	84	42	56	42	Do.
Mar. 1.....	32	42	74	78	40	52	44	Do.
Mar. 2.....	36	42	76	82	44	58	43	Do.
Mar. 3.....	34	41	80	88	44	60	43	Do.
Mar. 4.....	34	41	78	80	44	58	43	Do.
Mar. 5.....	36	42	80	82	45	59	43	Do.
Mar. 6.....	40	42	82	84	46	60	44	Do.
Mar. 7.....	38	42	78	80	44	50	43	Do.

TABLE III.—Temperatures of air and water, &c.—Continued.

Date.	7 a. m.		3 p. m.			7 p. m.		Remarks.
	Air.	Water.	Shade.	Sun.	Water.	Air.	Water.	
1883.	°	°	°	°	°	°	°	
Mar. 8.....	38	42	82	98	46	58	44	Clear.
Mar. 9.....	40	42	70	82	48	60	46	Do.
Mar. 10.....	36	42	74	78	48	56	46	Do.
Mar. 11.....	42	44	74	78	47	62	46	Do.
Mar. 12.....	38	42	74	78	46	60	45	Do.
Mar. 13.....	40	42	82	86	46	60	45	Do.
Mar. 14.....	38	42	82	90	48	56	46	Do.
Mar. 15.....	36	42	82	94	48	62	46	Do.
Mar. 16.....	36	44	82	96	48	60	46	Do.
Mar. 17.....	44	44	84	80	48	64	46	Do.
Mar. 18.....	36	43	82	84	47	62	46	Do.
Mar. 19.....	42	44	80	88	48	62	46	Do.
Mar. 20.....	38	42	86	100	48	66	46	Do.
Mar. 21.....	36	44	82	90	48	72	46	Do.
Mar. 22.....	50	44	82	96	48	70	46	Do.
Mar. 23.....	52	45	60	96	46	50	46	Do.
Mar. 24.....	44	44	62	.....	46	54	45	Cloudy.
Mar. 25.....	50	46	56	.....	46	52	45	Do.
Mar. 26.....	52	46	54	.....	46	54	45	Rain.
Mar. 27.....	52	44	56	.....	46	64	45	Do.
Mar. 28.....	52	44	52	.....	46	54	45	Do.
Mar. 29.....	42	44	50	.....	46	46	45	Do.
Mar. 30.....	42	44	50	.....	46	44	45	Do.
Mar. 31.....	34	42	50	.....	44	44	45	Do.
Apr. 1.....	42	43	56	.....	44	54	44	Cloudy.
Apr. 2.....	42	43	50	.....	44	52	44	Do.
Apr. 3.....	40	42	60	.....	44	50	44	Rain.
Apr. 4.....	38	42	64	.....	43	60	43	Do.
Apr. 5.....	38	42	70	70	41	58	43	Clear.
Apr. 6.....	50	44	74	.....	44	60	43	Do.
Apr. 7.....	54	46	56	78	45	52	43	Do.
Apr. 8.....	52	44	56	.....	44	52	43	Rain.
Apr. 9.....	34	44	62	64	44	50	43	Clear.
Apr. 10.....	36	42	60	70	43	54	43	Do.
Apr. 11.....	46	43	54	.....	43	46	43	Cloudy.
Apr. 12.....	30	42	50	70	43	50	43	Do.
Apr. 13.....	38	42	56	70	43	48	43	Do.
Apr. 14.....	40	42	52	75	43	52	43	Do.
Apr. 15.....	46	44	64	80	40	62	45	Do.
Apr. 16.....	44	43	66	82	48	52	46	Clear.
Apr. 17.....	38	43	50	84	45	52	45	Do.
Apr. 18.....	40	44	50	86	45	46	45	Do.
Apr. 19.....	46	44	48	.....	45	56	45	Rain.
Apr. 20.....	40	44	44	.....	45	60	45	Do.
Apr. 21.....	40	44	46	.....	45	52	45	Do.
Apr. 22.....	40	44	50	84	46	52	45	Clear.
Apr. 23.....	38	44	46	86	45	54	45	Do.
Apr. 24.....	38	44	40	86	45	64	45	Do.
Apr. 25.....	50	45	70	86	46	60	46	Do.
Apr. 26.....	48	45	72	88	46	62	46	Do.
Apr. 27.....	46	45	76	90	46	66	46	Do.
Apr. 28.....	48	46	74	90	47	64	46	Do.
Apr. 29.....	50	46	76	88	48	55	47	Do.
Apr. 30.....	50	46	70	89	48	50	47	Do.
May 1.....	46	50	60	72	52	52	51	Do.
May 2.....	46	49	66	82	53	56	51	Do.
May 3.....	50	50	52	.....	50	56	51	Cloudy.
May 4.....	44	50	50	.....	50	50	50	Rain.
May 5.....	42	49	45	.....	50	52	50	Do.
May 6.....	46	48	60	.....	50	52	50	Cloudy.
May 7.....	50	46	62	.....	48	52	49	Rain.
May 8.....	50	48	66	.....	49	52	49	Do.
May 9.....	52	48	70	.....	51	64	50	Do.
May 10.....	60	49	76	84	52	68	51	Clear.
May 11.....	54	48	60	.....	51	60	50	Cloudy.
May 12.....	42	48	54	.....	51	54	50	Rain.
May 13.....	40	46	50	82	50	55	49	Clear.
May 14.....	42	40	60	.....	48	56	48	Cloudy.
May 15.....	46	40	52	.....	46	52	48	Do.
May 16.....	50	46	50	.....	46	46	48	Rain.
May 17.....	40	45	60	67	48	52	47	Clear.
May 18.....	36	45	70	88	48	62	47	Do.
May 19.....	44	46	86	94	49	63	46	Do.
May 20.....	50	50	74	86	52	60	51	Do.
May 21.....	56	50	80	90	52	66	52	Do.
May 22.....	54	50	66	72	52	51	51	Do.
May 23.....	48	48	70	75	52	54	52	Do.

TABLE III.—Temperatures of air and water, &c.—Continued.

Date.	7 a. m.		8 p. m.			7 p. m.		Remarks.
	Air.	Water.	Shade.	Sun.	Water.	Air.	Water.	
1883.	°	°	°	°	°	°	°	
May 24.....	52	50	74	80	52	54	52	Clear.
May 25.....	46	50	70	76	52	54	51	Do.
May 26.....	50	50	76	84	52	58	51	Do.
May 27.....	54	50	80	90	53	56	52	Do.
May 28.....	54	50	82	92	53	56	52	Do.
May 29.....	50	50	84	96	53	60	52	Do.
May 30.....	50	50	86	100	53	64	52	Do.
May 31.....	48	50	80	93	52	60	52	Do.
June 1.....	50	51	80	98	53	62	52	Do.
June 2.....	52	51	84	101	53	64	52	Do.
June 3.....	53	51	86	106	53	66	52	Do.
June 4.....	53	52	82	100	53	64	53	Do.
June 5.....	54	52	78	108	53	70	53	Do.
June 6.....	52	52	78	98	52	60	52	Do.
June 7.....	52	52	90	100	53	70	52	Do.
June 8.....	54	52	92	106	53	68	54	Do.
June 9.....	56	52	94	110	56	72	53	Do.
June 10.....	55	52	92	104	55	70	54	Do.
June 11.....	55	52	93	104	65	66	54	Do.
June 12.....	55	52	94	102	55	66	54	Do.
June 13.....	56	52	96	100	54	70	53	Do.
June 14.....	55	52	94	98	54	72	54	Do.
June 15.....	55	52	90	96	56	74	55	Do.
June 16.....	56	53	91	100	57	78	56	Do.
June 17.....	57	53	98	108	57	80	56	Do.
June 18.....	57	53	98	104	57	80	56	Do.
June 19.....	50	53	98	103	57	81	56	Do.
June 20.....	58	54	92	101	58	80	57	Do.
June 21.....	54	56	90	110	56	82	57	Do.
June 22.....	56	53	98	106	56	82	57	Do.
June 23.....	57	53	94	102	56	82	57	Do.
June 24.....	57	53	98	100	56	80	57	Do.
June 25.....	58	54	91	112	56	82	57	Do.
June 26.....	59	54	93	104	56	84	57	Do.
June 27.....	60	55	100	115	57	90	57	Do.
June 28.....	58	56	101	111	58	88	56	Do.
June 29.....	60	56	102	114	59	92	57	Do.
June 30.....	62	56	104	118	59	94	57	Do.
July 1.....	62	56	98	104	58	74	57	Do.
July 2.....	62	56	98	108	58	76	57	Do.
July 3.....	60	57	100	107	58	80	57	Do.
July 4.....	62	57	92	100	59	78	58	Do.
July 5.....	64	56	96	106	60	82	58	Do.
July 6.....	66	56	98	106	60	77	59	Do.
July 7.....	70	59	100	112	62	80	60	Do.
July 8.....	68	59	102	113	62	80	60	Do.
July 9.....	68	59	102	110	62	84	61	Do.
July 10.....	66	59	104	111	62	84	61	Do.
July 11.....	68	59	102	108	62	84	61	Do.
July 12.....	69	59	100	107	62	80	61	Do.
July 13.....	69	59	104	118	63	78	62	Do.
July 14.....	70	60	108	124	63	79	62	Do.
July 15.....	71	60	106	120	64	85	62	Do.
July 16.....	69	60	100	118	64	84	63	Do.
July 17.....	70	60	104	120	64	86	63	Do.
July 18.....	70	60	106	116	64	84	63	Do.
July 19.....	68	60	98	108	64	80	63	Do.
July 20.....	70	60	94	102	66	78	64	Do.
July 21.....	72	70	99	108	66	80	64	Do.
July 22.....	70	70	98	106	66	79	64	Do.
July 23.....	73	70	100	108	66	79	64	Do.
July 24.....	69	60	100	106	64	75	62	Do.
July 25.....	70	60	100	110	64	82	62	Do.
July 26.....	74	60	100	110	64	82	62	Do.
July 27.....	70	60	98	110	64	84	62	Do.
July 28.....	68	60	96	110	62	76	62	Do.
July 29.....	64	59	94	105	60	74	59	Do.
July 30.....	60	59	96	106	59	74	59	Do.
July 31.....	58	59	94	100	60	74	59	Do.
Aug. 1.....	56	59						Do.
Aug. 2.....	55	67	96	102	62	80	61	Do.
Aug. 3.....	56	66	97	101	62	82	61	Do.
Aug. 4.....	55	56	98	103	62	79	61	Do.
Aug. 5.....	57	56	97	104	62	84	61	Do.
Aug. 6.....	56	56	98	110	62	80	61	Do.
Aug. 7.....	54	56	98	115	62	82	61	Do.
Aug. 8.....	55	58	97	112	62	80	61	Do.

TABLE III.—Temperatures of air and water, &c.—Continued.

Date.	7 a. m.		3 p. m.			7 p. m.		Remarks.
	Air.	Water.	Shado.	Sun.	Water.	Air.	Water.	
1883.	°	°	°	°	°	°	°	
Oct. 24								
Oct. 25								
Oct. 26								
Oct. 27								
Oct. 28								
Oct. 29								
Oct. 30								
Oct. 31								
Nov. 1								
Nov. 2								
Nov. 3								
Nov. 4								
Nov. 5	32	42						
Nov. 6	38	43	56		44	52	44	
Nov. 7	47	45	50		44	51	44	Cloudy.
Nov. 8	49	46	52		48	52	48	Rain.
Nov. 9	42	46	64	82	48	48	47	Do.
Nov. 10	38	45	68	84	48	50	47	Clear.
Nov. 11	50	45	76	94	48	52	48	Do.
Nov. 12	40	46	72	74	48	52	48	Do.
Nov. 13	43	45	76	82	48	54	48	Do.
Nov. 14	38	44	76	78	48	50	40	Do.
Nov. 15	36	44	78	80	46	48	45	Do.
Nov. 16	40	44	68	72	46	48	40	Do.
Nov. 17	34	44	66	80	46	46	38	Do.
Nov. 18	36	44				44	38	Do.
Nov. 19	36	44	62	80	46	44	38	Do.
Nov. 20	36	44	58		44	42	38	Do.
Nov. 21	36		64	76	46	44	38	Do.
Nov. 22	30	43					38	Do.
Nov. 23			62		46	50	38	Do.
Nov. 24	46	45	52	60	43	46	45	Do.
Nov. 25	28	42						Do.
Nov. 26	28	41	54	60	42			Do.
Nov. 27	32	40	64	70	44	44	44	Do.
Nov. 28	38	42	68	82	44	43	44	Do.
Nov. 29	34	42	64					Do.
Nov. 30	32	41	64	84	44			Do.
Dec. 1	33	41	64	70	44			Do.
Dec. 2			58	70	44	46	44	Do.
Dec. 3	44	44	58	66	46	44	46	Do.
Dec. 4	32	44	68	82	40	50	46	Do.
Dec. 5	48	44	53		45	49	45	Do.
Dec. 6			61		40	48	45	Do.
Dec. 7	48	44	70	86	40	48	45	Do.
Dec. 8	30		01		44	44		Do.
Dec. 9								Do.
Dec. 10	32	42	64	70	44	42		Do.
Dec. 11	28		70	76	44			Do.
Dec. 12	48	44	76	80	44	50		Do.
Dec. 13	48	42	76	94	45	48	45	Do.
Dec. 14	48	48	70	08	45	58	45	Do.
Dec. 15	50	43	80	96	44			Do.
Dec. 16								Do.
Dec. 17			66		44	46		Do.
Dec. 18	32	43			44	46	45	Do.
Dec. 19	38	44	60		46	42		Do.
Dec. 20	38	44	66	81	46			Do.
Dec. 21	33	43						Do.
Dec. 22	28	45	52	80	44			Do.
Dec. 23	38	44						Snow.
Dec. 24	43	44	45		44			Do.
Dec. 25	49	45	52		45			Rain.
Dec. 26	53	47	53		47	54	47	Do.
Dec. 27	49	46	51		48	41	47	Do.
Dec. 28	34	44	45			43	45	Snow.
Dec. 29	38	44	54					Rain.
Dec. 30	43	44	46			46	45	Do.
Dec. 31	39	43	48		45			Cloudy.