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SPRING AND SUMMER TEMPERATURES OF STREAMS TRIBUTARY TO THE SOUTH SHORE OF LAKE SUPERIOR, 1950-60

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by

Bernard R. Smith
Fishery Research Biologist
Bureau of Commercial Fisheries
U. S. Fish and Wildlife Service
Ann Arbor, Michigan

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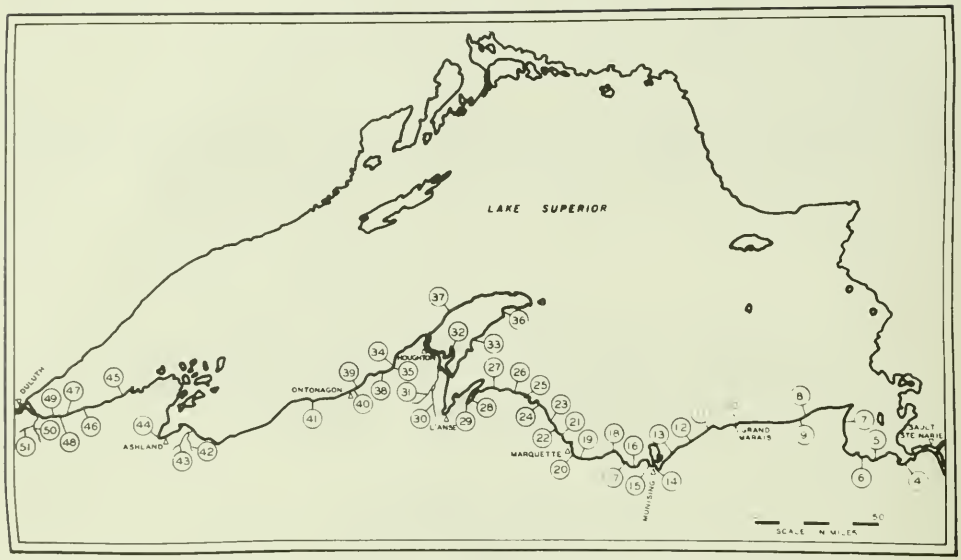

Location of Lake Superior tributaries where temperatures were recorded.

[Numbers on map correspond to table numbers of individual streams.]

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ALPHABETICAL INDEX TO STREAMS

ABSTRACT

Spring and summer water temperatures of streams tributary to the south shore of Lake Superior from 1950-60 have been recorded as part of the biological and limnological data collected at sea lamprey control devices. These data are presented by 10- or 11-day averages as a reference source for other fishery researchers.

Maximum-minimum readings and single pocket-thermometer temperatures gave closely similar averages.

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INTRODUCTION

The Bureau of Commercial Fisheries, contracting agent for the Great Lakes Fishery Commission, has operated sea lamprey control devices in streams tributary to the south shore of Lake Superior since 1950. These devices were intended primarily to block the upstream migration of spawning sea lamprey, Petromyzon marinus (Applegate, Smith, and Nielsen, 1952.[1/] Certain biological and limnological conditions have been measured in connection with the operation of these barriers since the first mechanical weir was installed in Pendills Creek, Chippewa County, Michigan, in 1950.

The purpose of this report is to assemble the water temperature data accumulated from 1950 to 1960, and to make them available for reference. These records can be useful to all fishery workers interested in the streams of the area. The relations of temperature to the time and extent of fish migrations and to changes of fish populations are always important in fishery management and research. No comments or recommendations are included as this report contains only temperature data.

Thermal records from the streams of Lake Superior were fragmentary in the early years of the study, but were more extensive for the summer months after 1954. Records were maintained on representative streams of all types and sizes from the Waiska River in Chippewa County, Michigan, west to the Nemadji River, Douglas County, Wisconsin. Most of these streams supported runs of spawning sea lampreys.

Forty-eight streams on which records were kept for 2 or more years have been included in this report. The tables of temperature records for these streams are in geographical sequence from east to west along the south shore of Lake Superior. Temperatures were taken for 1 year on the 16 additional streams listed below: [2/]

Ankodosh Creek, Chippewa County, Michigan
Baker Creek, Luce County, Michigan
Dead Sucker River, Luce County, Michigan
Fish Creek, Orienta Township, Bayfield County, Wisconsin
Graveraet River, Houghton County, Michigan
Iron River, Bayfield County, Wisconsin
Lily and Boston Creek, Houghton County, Michigan
Little Huron River, Marquette County, Michigan
Lowney Creek, Alger County, Michigan
Pilgrim River, Houghton County, Michigan
Reefer Creek, Bayfield County, Wisconsin
Roxbury Creek, Chippewa County, Michigan
Sand River, Marquette County, Michigan
Schlotz Creek, Houghton County, Michigan
Slate River, Baraga County, Michigan
Tobacco River, Keweenaw County, Michigan

The author is most grateful to the members of the sea lamprey control unit of the Bureau of Commercial Fisheries Biological Laboratory, Ann Arbor, Michigan, for gathering the large amount of data needed for this report. The guidance and assistance of the Laboratory Director, James W. Moffett, in preparation of the report is especially acknowledged.

METHODS AND EQUIPMENT

The following three types of instruments were used: recording thermographs; maximum-minimum thermometers; and hand or pocket thermometers. The thermographs recorded temperatures continuously for 7 days on a chart. These instruments were serviced and the charts changed weekly. The daily maximum and minimum readings were taken directly from the chart. Thermographs were adjusted for accuracy periodically with an electrical-resistance thermometer.

Maximum-minimum thermometers were read and reset daily.

1/ Applegate, Vernon C., Bernard R. Smith, and Willis L. Nielsen. 1952. Use of electricity in the control of sea lampreys. U.S. Department of the Interior, Fish and Wildlife Service, Special Scientific Report--Fisheries No. 92, 52 p.

2/ The records are not included in this report, but are available from the Field Station at Marquette, Michigan, as are daily records for all streams.

Pocket-thermometer temperatures are single readings taken daily when the lamprey-control devices were serviced. The time of day at which these temperatures were taken varied randomly according to the schedules of the weir attendants.

Thermal data in this report are presented in individual tables for each stream in the form of average temperature for each 10- or 11-day period. The volume of the data available made the presentation of daily readings impractical; furthermore, the temperature trends as indicated by averages are probably more useful than daily readings.

Data transcribed from field forms and thermograph charts have been recorded only to the nearest Fahrenheit degree. This level of accuracy has been selected as consistent with methods of collecting.

MAXIMUM-MINIMUM READINGS AND SINGLE READINGS WITH A POCKET THERMOMETER

The relative dependability of daily maximum-minimum temperatures as compared to single daily pocket-thermometer readings had been argued for some time. The data collected during lamprey-control operations supplied an opportunity to compare closely these two methods of recording temperatures. The daily pocket-thermometer temperatures and the daily mean of maximum-minimum readings as read from thermograph charts agreed closely. Data on temperatures taken by both methods on several streams yielded 10- or 11-day averages that never differed more than 4° F. and usually disagreed by less than 2° F. (See tables 1, 2, and 3 for examples of the records.) Daily readings differed by a maximum of 11° but were usually less than 5°.

These disagreements become even less consequential when the limitations of the two methods are considered. Thermograph charts were calibrated in 2° graduations, and the width of the pen line was usually 1° or more. The accuracy of interpretation was probably no closer than 1 or 2°. Furthermore the precision of these instruments displayed a tendency to vary under field operating conditions. Although the instruments were adjusted frequently, their readings undoubtedly were in error by several degrees at times.

Pocket thermometers, also, were calibrated in 2° graduations and hence could not be read closer than the nearest °F. The instruments used were very accurate within their limitations and did not vary in precision. The principal disadvantage of a single reading in computing averages is that it usually does not represent the true mean for the day. Apparently, these variations tend to equalize when used in computation of averages.

Table 1. --Comparison of two methods of obtaining temperature records in the Brule River, 1958

[Means of daily maximum-minimum readings from a recording thermograph; single readings taken once a day with pocket thermometer. Averages for 10- or 11-day periods based on days for which both maximum-minimum and single temperatures are available.]

Date	Temperatures (° F.)			Date	Temperatures (° F.)		
	Maximum-minimum	Single reading	Difference		Maximum-minimum	Single reading	Difference
April				May			
1	38	38	0	1	46	51	+5
2	37	40	+3	2	47	50	+3
3	37	39	+2	3	53	58	+5
4	38	41	+3	4	50	55	+5
5	37	40	+3	5	48	52	+4
6	36	38	+2	6	50	56	+6
7	37	37	0	7	55	61	+6
8	40	40	0	8	55	58	+3
9	40	44	+4	9	51	57	+6
10	42	41	-1	10	50	54	+4
Mean	38	40	+2	Mean	51	55	+4
11	43	44	+1	11	55	65	+10
12	43	47	+4	12	57	64	+7
13	47	50	+3	13	61	68	+7
14	50	51	+1	14	66	68	+2
15	53	56	+3	15	57	66	+9
16	52	58	+6	16	62	58	-4
17	55	59	+4	17	58	61	+3
18	52	51	-1	18	58	61	+3
19	54	59	+5	19	57	62	+5
20	54	58	+4	20	56	59	+3
Mean	50	53	+3	Mean	59	63	+4
21	47	50	+3	21	57	61	+4
22	44	48	+4	22	59	64	+5
23	45	50	+5	23	58	64	+6
24	43	47	+4	24	56	57	+1
25	46	49	+3	25	58	64	+6
26	43	48	+5	26	56	56	0
27	45	51	+6	27	56	58	+2
28	43	47	+4	28	57	62	+5
29	41	41	0	29	63	67	+4
30	45	44	-1	30	57	59	+2
...	...	...	...	31	53	53	0
Mean	44	48	+4	Mean	57	60	+3

(Continued)

Table 1. --Continued

Date	Temperatures (° F.)			Date	Temperatures (° F.)		
	Maximum-minimum	Single reading	Difference		Maximum-minimum	Single reading	Difference
June				July			
1	54	55	+1	1	...	...	...
2	51	55	+4	2	65	68	+3
3	53	54	+1	3	63	64	+1
4	54	56	+2	4	60	62	+2
5	59	61	+2	5	57	60	+3
6	59	63	+4	6	60	60	0
7	61	64	+3	7	61	64	+3
8	61	65	+4	8	62	66	+4
9	58	63	+5	9	59	61	+2
10	60	60	0	10	63	61	-2
Mean	57	60	+3	Mean	61	63	+2
11	58	61	+3	11	65	69	+4
12	58	58	0	12	64	65	+1
13	60	62	+2	13	68	68	0
14	58	62	+4	14	...	...	...
15	61	63	+2	15	64	65	+1
16	62	65	+3	16	63	64	+1
17	63	62	-1	17	65	65	0
18	63	62	-1	18	68	69	+1
19	63	64	+1	19	68	69	+1
20	63	60	-3	20	66	66	0
Mean	61	62	+1	Mean	66	67	+1
21	62	63	+1	21	67	66	-1
22	61	60	-1	22	70	70	0
23	60	59	-1	23	73	72	-1
24	66	59	-7	24	74	72	-2
25	59	56	-3	25	71	74	+3
26	65	58	-7	26	71	68	-3
27	66	63	-3	27	69	68	-1
28	68	67	-1	28	...	...	...
29	71	70	-1	29	...	...	...
30	63	63	0	30	...	...	...
...	...	...	...	31	...	...	...
Mean	64	62	-2	Mean	71	70	-1

(Continued)

Table 1. --Continued

Date	Temperatures (° F.)		
	Maximum - minimum	Single reading	Difference
August			
1	...	...	...
2	74	69	-5
3	72	69	-3
4	69	69	0
5	72	68	-4
6	71	67	-4
7	70	66	-4
8	69	67	-2
9	74	70	-4
10	73	71	-2
Mean	72	68	-4
11	72	72	0
12	...	...	...
13	...	...	...
14	...	...	...
15	68	66	-2
16	65	62	-3
17	66	64	-2
18	...	...	...
19	...	...	...
20	...	...	...
Mean	68	66	-2
21	65	62	-3
22	60	60	0
23	60	60	0
24	58	57	-1
25	56	55	-1
26	...	...	...
27	60	56	-4
28	63	60	-3
29	60	60	0
30	...	...	...
31	...	...	...
Mean	60	59	-1

Table 2. --Comparison of two methods of obtaining temperature records in the Brule River, 1959

[Means of daily maximum-minimum readings from a recording thermograph; single readings taken once a day with pocket thermometer. Averages for 10- or 11-day periods based on days for which both maximum-minimum and single temperatures are available.]

Date	Temperatures (° F.)			Date	Temperatures (° F.)		
	Maximum-minimum	Single reading	Difference		Maximum-minimum	Single reading	Difference
April				May			
1	...	44	...	1	54	58	+4
2	38	41	+3	2	55	59	+4
3	38	40	+2	3	53	57	+4
4	38	40	+2	4	54	57	+3
5	40	41	+1	5	56	57	+1
6	42	41	-1	6	52	53	+1
7	45	46	+1	7	49	53	+4
8	40	36	-4	8	51	54	+3
9	40	44	+4	9	55	56	+1
10	...	39	...	10	55	56	+1
Mean	40	41	+1	Mean	53	56	+3
11	...	42	...	11	55	56	+1
12	...	46	...	12	54	57	+3
13	43	46	+3	13	50	50	0
14	46	51	+5	14	49	52	+3
15	48	50	+2	15	49	48	-1
16	45	49	+4	16	52	51	-1
17	...	43	...	17	53	53	0
18	38	41	+3	18	54	55	+1
19	41	42	+1	19	61	60	-1
20	43	48	+5	20	54	54	0
Mean	43	46	+3	Mean	53	54	+1
21	44	51	+7	21	50	50	0
22	49	51	+2	22	51	51	0
23	50	52	+2	23	56	52	-4
24	45	50	+5	24	58	53	-5
25	48	52	+4	25	62	62	0
26	45	47	+2	26	60	62	+2
27	43	44	+1	27	62	64	+2
28	49	46	-3	28	57	56	-1
29	49	53	+4	29	59	58	-1
30	45	56	+11	30	55	57	+2
...	...	...	...	31	51	52	+1
Mean	47	50	+3	Mean	56	56	0

(Continued)

Table 2. --Continued

Date	Temperatures (° F.)			Date	Temperatures (° F.)		
	Maximum-minimum	Single reading	Difference		Maximum-minimum	Single reading	Difference
June				July			
1	56	55	-1	1	60	58	-2
2	61	64	+3	2	64	62	-2
3	61	63	+2	3	68	67	-1
4	66	68	+2	4	69	68	-1
5	72	69	-3	5	65	66	+1
6	65	65	0	6	66	64	-2
7	70	67	-3	7	67	65	-2
8	76	75	-1	8	68	67	-1
9	76	77	+1	9	65	65	0
10	70	71	+1	10	64	66	+2
Mean	67	67	0	Mean	66	65	-1
11	70	69	-1	11	63	62	-1
12	65	65	0	12	64	62	-2
13	65	64	-1	13	65	66	+1
14	64	62	-2	14	67	70	+3
15	62	62	0	15	70	75	+5
16	63	66	+3	16	71	72	+1
17	63	64	+1	17	72	72	0
18	63	63	0	18	73	70	-3
19	68	66	-2	19	70	68	-2
20	66	66	0	20	70	73	+3
Mean	65	65	0	Mean	69	69	0
21	63	61	-2	21	73	71	-2
22	62	61	-1	22	74	73	-1
23	61	61	0	23	73	74	+1
24	62	60	-2	24	71	69	-2
25	60	60	0	25	70	65	-5
26	58	60	+2	26	69	66	-3
27	62	59	-3	27	72	69	-3
28	68	65	-3	28	74	73	-1
29	62	64	+2	29	77	76	-1
30	57	59	+2	30	75	71	-4
...	...	...	...	31	73	69	-4
Mean	62	61	-1	Mean	73	71	-2

(Continued)

Table 2. --Continued

Date	Temperatures (° F.)		
	Maximum-minimum	Single reading	Difference
August			
1	72	69	-3
2	69	66	-3
3	71	68	-3
4	71	68	-3
5	72	70	-2
6	70	68	-2
7	...	...	...
8	...	...	...
9	...	...	...
10	66	69	+3
Mean	70	68	-4
11	65	67	+2
12	66	68	+2
13	63	63	0
14	61	63	+2
15	63	61	-2
16	61	62	+1
17	63	65	+2
18	64	66	+2
19	70	69	-1
20	71	72	+1
Mean	65	66	+1
21	69	69	0
22	65	64	-1
23	68	63	-5
24	67	72	+5
25	69	72	+3
26	68	73	+5
27	65	67	+2
28	66	65	-1
29	65	64	-1
30	67	65	-2
31	63	63	0
Mean	67	67	0

Table 3. --Comparison of two methods of obtaining temperature records in the Chocolay River, 1958-60

[Means of maximum-minimum temperatures from a recording thermograph; means of single readings taken once a day with pocket thermometer. All temperatures in ° F.]

Period	1958			1959			1960		
	Maximum-minimum	Single readings	Difference	Maximum-minimum	Single readings	Difference	Maximum-minimum	Single readings	Difference
April									
1-10	35	34	-1	34	33	-1	34	33	-1
11-20	40	37	-3	36	35	-1	36	34	-2
21-30	41	41	0	42	40	-2	38	40	+2
May									
1-10	46	45	-1	55	51	-4	36	39	+3
11-20	56	53	-3	54	50	-4	50	48	-2
21-31	51	51	0	59	56	-3	57	57	0
June									
1-10	55	54	-1	...	...	...	57	57	0
11-20	58	56	-2	63	61	-2	55	54	-1
21-30	59	60	+1	62	60	-2	60	59	-1
July									
1-10	60	59	-1	64	61	-3	61	59	-2
11-20	63	62	-1	66	63	-3	62	61	-1
21-31	66	65	-1	71	69	-2	63	61	-2
August									
1-10	68	67	-1	65	64	-1	63	62	-1
11-20	63	63	0	...	...	...	62	61	-1
21-31	58	58	0	...	...	...	...	...	...

Table 4. --Average water temperature (° F.) by 10- or 11-day periods in the Waiska River, Chippewa county, Michigan, 1954-60

[Thermometer readings were taken at mouth of West Branch, Sec. 27, T. 46 N., R. 2 W.]

Period	1954	1955	1956	1957	1958	1959	1960	Average
April								
1-10	...	...	...	...	36	...	...	...
11-20	...	...	...	...	48	...	...	...
21-30	...	51	41	50	45	43	44	46
May								
1-10	...	54	46	53	48	52	49	50
11-20	55	54	50	52	57	56	55	54
21-31	54	56	53	55	52	61	58	56
June								
1-10	58	60	60	57	58	63	59	59
11-20	66	64	66	62	59	66	57	63
21-30	60	60	60	64	61	62	60	61
July								
1-10	59	68	61	61	62	62	61	62
11-20	62	68	63	63	66	65	63	64
21-31	...	70	62	...	66	69	63	66
August								
1-10	...	...	61	...	68	67	61	64
11-20	...	...	...	...	65	66	...	66

Table 5. --Average water temperature (° F.) by 10- or 11-day periods in the Pendills Creek, Chippewa County, Michigan, 1950-60

[Thermometer readings were taken near mouth, Sec. 28, T. 47 N., R. 4 W.]

Period	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	Average
April												
1-10	...	...	...	...	...	40	36	36	40	39	41	39
11-20	...	...	...	...	37	42	38	38	45	44	41	41
21-30	...	...	...	...	41	50	39	48	44	43	45	44
May												
1-10	...	...	...	49	42	48	45	48	48	50	44	47
11-20	...	57	...	53	46	50	45	49	60	52	51	51
21-31	60	59	...	...	48	54	49	52	55	57	57	55
June												
1-10	60	56	...	56	51	58	54	54	57	61	58	57
11-20	58	61	...	58	59	63	59	60	57	58	57	59
21-30	60	59	...	...	57	56	60	59	57	62	58	59
July												
1-10	60	60	...	...	55	62	58	...	57	64	59	59
11-20	62	62	...	...	57	63	59	60	61	63	62	61
21-31	62	66	...	...	57	63	59	...	63	64	60	62
August												
1-10	56	61	...	...	...	...	60	...	64	63	59	61
11-20	...	60	...	...	...	...	...	...	60	62	...	61
21-31	...	61	...	...	...	...	...	...	...	...	...	61
September												
1-10	...	57	...	...	...	...	...	...	...	...	...	57
11-20	...	59	...	...	...	...	...	...	...	...	...	59
21-30	...	51	...	...	...	...	...	...	...	...	...	51

Table 6.--Average water temperature (° F.) by 10- or 11-day periods in the Halfaday Creek, Chippewa County, Michigan, 1954-58

[Thermometer readings were taken near mouth, Sec. 14, T. 47 N., R. 5 W.]

Period	1954	1955	1956	1957	1958	Average
April						
1-10	...	37	37	36	39	37
11-20	36	42	37	39	45	40
21-30	40	46	39	47	43	43
May						
1-10	40	46	43	45	45	44
11-20	43	44	44	46	52	46
21-31	45	49	47	49	48	48
June						
1-10	47	48	50	49	50	49
11-20	53	50	51	52	49	51
21-30	53	48	52	53	50	51
July						
1-10	49	51	50	...	51	50
11-20	50	52	52	51	51	51
21-31	49	...	...	...	52	51

Table 7. --Average water temperature (° F.) by 10- or 11-day periods in the Betsy River, Chippewa County, Michigan, 1953-60

[Thermometer readings were taken at weir site above mouth of South Branch, Sec. 33, T. 50 N., R. 6 W.]

Period	1953	1954	1955	1956	1957	1958	1959	1960	Average
April									
1-10	...	...	...	...	...	39	37	38	38
11-20	...	39	...	38	40	49	40	39	41
21-30	42	42	52	41	48	45	41	47	45
May									
1-10	52	42	56	49	53	47	49	47	49
11-20	52	50	57	50	54	58	54	54	54
21-31	54	54	59	56	56	53	61	59	57
June									
1-10	55	58	64	61	59	57	65	62	60
11-20	61	65	64	68	65	59	65	59	63
21-30	...	62	62	61	65	61	62	62	62
July									
1-10	...	63	72	62	...	59	64	61	64
11-20	...	65	72	64	66	63	68	63	66
21-31	...	67	72	64	...	69	70	63	68
August									
1-10	...	...	...	65	...	69	66	62	66
11-20	...	...	...	...	...	65	65	62	64

Table 8. --Average water temperature (° F.) by 10- or 11-day periods in the Little Two Hearted River, Luce County, Michigan, 1957-60

[Thermometer readings were taken near mouth, Sec. 24, T. 50 N., R. 9 W.]

Period	1957	1958	1959	1960	Average
April					
1-10	...	...	...	37	37
11-20	...	45	38	37	40
21-30	...	42	39	42	41
May					
1-10	...	46	50	45	47
11-20	53	57	53	55	55
21-31	56	51	59	57	56
June					
1-10	58	57	62	58	59
11-20	63	58	62	56	60
21-30	62	59	62	60	61
July					
1-10	60	59	63	60	61
11-20	63	61	66	60	63
21-31	65	65	68	62	65
August					
1-10	65	66	63	61	64
11-20	60	63	63	62	62
21-31	59	60	66	...	62
September					
1-10	60	56	64	...	60

Table 9. --Average water temperature (° F.) by 10- or 11-day periods in the Two Hearted River, Luce County, Michigan, 1953-60

[Thermometer readings were taken near mouth, Government Lot 4, Sec. 27, T. 50 N., R. 9 W.]

Period	1953	1954	1955	1956	1957	1958	1959	1960	Average
April									
1-10	...	...	...	...	...	36	38	38	37
11-20	...	...	41	37	41	43	39	38	40
21-30	...	42	47	40	45	43	38	44	43
May									
1-10	...	44	51	43	51	46	47	44	47
11-20	52	48	52	45	52	56	52	51	51
21-31	51	51	57	50	55	52	57	56	54
June									
1-10	54	56	61	59	58	54	60	57	57
11-20	57	...	61	62	62	58	61	55	59
21-30	...	58	57	58	61	58	60	59	59
July									
1-10	...	56	66	...	60	58	62	58	60
11-20	...	59	64	...	64	61	63	60	62
21-31	...	58	63	...	64	64	67	60	63
August									
1-10	...	...	...	59	65	65	63	59	62
11-20	...	...	...	61	60	61	63	60	61
21-31	...	...	...	...	59	59	64	...	61
September									
1-10	...	...	...	...	58	55	62	...	58
11-20	...	...	...	...	...	...	51	...	51

Table 10. --Average water temperature (° F.) by 10- or 11-day periods in the Sucker River, Alger County, Michigan, 1953-60

[Thermometer readings were taken below mouth of Grand Marais Creek, Sec. 3, T. 49 N., R. 13 W]

Period	1953	1954	1955	1956	1957	1958	1959	1960	Average
April									
1-10	...	...	...	...	...	36	36	...	36
11-20	...	39	36	34	...	41	37	...	37
21-30	...	42	45	36	46	42	38	43	42
May									
1-10	...	44	53	41	52	44	48	42	46
11-20	53	50	55	43	52	53	50	52	51
21-31	52	52	56	48	54	52	56	57	53
June									
1-10	56	58	63	54	57	56	60	58	58
11-20	59	65	61	61	62	55	57	55	59
21-30	...	63	60	55	61	57	58	60	59
July									
1-10	...	61	69	54	61	57	59	60	60
11-20	...	64	68	55	64	59	59	59	61
21-31	...	64	69	57	65	61	62	62	63
August									
1-10	...	63	...	58	66	60	57	60	61
11-20	...	...	...	58	61	59	59	62	60
21-31	...	...	...	54	60	57	66	61	60
September									
1-10	...	...	...	52	59	52	59	...	55

Table 11. --Average water temperature (° F.) by 10- or 11-day periods in the Hurricane River, Alger County, Michigan, 1954-60

[Thermometer readings were taken at mouth, Government Lot 4, Sec. 23, T. 49 N., R. 15 W.]

Period	1954	1955	1956	1957	1958	1959	1960	Average
April								
11-20	...	38	37	...	...	...	36	37
21-30	...	45	37	...	...	...	40	41
May								
1-10	...	48	43	48	41	...	39	44
11-20	47	52	42	47	50	45	48	47
21-31	52	53	47	50	48	53	52	51
June								
1-10	55	58	...	51	52	56	53	54
11-20	...	56	60	59	51	55	49	55
21-30	59	56	53	57	55	56	54	56
July								
1-10	56	61	...	57	56	56	53	57
11-20	59	63	...	59	57	59	55	59
21-31	...	62	...	59	61	61	56	60
August								
1-10	...	...	56	61	60	59	...	59
11-20	...	...	59	57	58	60	...	59
21-31	...	...	...	...	...	62	...	62

Table 12. --Average water temperature (° F.) by 10- or 11-day periods in the Beaver Lake Outlet, Alger County, Michigan, 1953-58

[Thermometer readings were taken at outlet of Beaver Lake, Sec. 7, T. 48 N., R. 16 W.]

Period	1953	1954	1955	1956	1957	1958	Average
April							
21-30	...	...	...	...	...	44	44
May							
1-10	49	44	58	49	52	47	50
11-20	56	51	61	49	54	59	55
21-31	57	57	66	55	60	56	59
June							
1-10	60	60	69	61	61	61	62
11-20	67	70	68	70	72	64	69
21-30	...	67	70	66	69	64	67
July							
1-10	...	...	79	65	70	65	70
11-20	...	...	...	66	74	70	70
21-31	...	...	...	...	75	75	75
August							
1-10	...	...	...	...	...	78	78

Table 13. --Average water temperature (° F.) by 10- or 11-day periods in the Miners River, Alger County, Michigan, 1953-60

[Thermometer readings were taken near mouth, Sec. 3, T. 47 N., R. 18 W.]

Period	1953	1954	1955	1956	1957	1958	1959	1960	Average
April									
11-20	37	38	...	38	...	...	...	37	38
21-30	40	41	47	40	46	41	...	41	42
May									
1-10	47	41	52	45	49	44	49	40	46
11-20	51	49	56	46	50	54	49	52	51
21-31	51	53	57	53	55	51	55	54	54
June									
1-10	53	55	61	56	52	56	60	58	56
11-20	59	62	63	61	62	57	60	54	60
21-30	61	61	60	59	60	56	59	59	59
July									
1-10	60	58	68	57	63	58	61	60	61
11-20	61	60	...	57	64	61	63	60	61
21-31	60	58	...	...	66	63	67	60	62
August									
1-10	...	...	...	...	69	65	63	61	65
11-20	...	...	...	...	66	63	63	61	63
21-31	...	...	...	...	60	...	65	...	63
September									
1-10	...	...	...	...	...	...	62	...	62

Table 14. --Average water temperature (° F.) by 10- or 11-day periods in the Anna River, Alger County, Michigan, 1954 and 1958-60

[Thermometer readings were taken above M-28 bridge in 1954, and near mouth, Sec. 2, T. 46 N., R. 19 W., in 1958-60]

Period	1954	1958	1959	1960	Average
April					
1-10	37	...	...	...	37
11-20	40	...	...	41	41
21-30	43	...	...	43	43
May					
1-10	42	44	49	43	45
11-20	47	52	47	54	50
21-31	48	49	51	54	51
June					
1-10	50	52	55	56	53
11-20	55	54	52	53	54
21-30	53	53	53	55	54
July					
1-10	51	56	55	55	54
11-20	52	57	54	54	54
21-31	51	56	57	56	55
August					
1-10	52	56	55	56	55
11-20	50	53	57	56	54
21-31	50	...	63	...	57
September					
1-10	48	...	...	...	48
11-20	48	...	...	...	48

Table 15. --Average water temperature (° F.) by 10- or 11-day periods in the Furnace Creek, Alger County, Michigan, 1953-60

[Thermometer readings were taken near mouth, Sec. 29, T. 47 N., R. 19 W.]

Period	1953	1954	1955	1956	1957	1958	1959	1960	Average
April									
1-10	...	36	37	37	36	37	36	35	36
11-20	38	39	42	39	38	43	37	37	39
21-30	42	43	51	42	48	45	41	43	44
May									
1-10	50	42	55	48	54	48	54	41	49
11-20	54	49	59	49	52	56	53	52	53
21-31	54	55	59	54	57	53	60	58	56
June									
1-10	55	56	64	61	59	56	64	60	59
11-20	63	66	61	63	65	60	65	56	62
21-30	63	63	63	63	63	61	62	63	63
July									
1-10	63	62	71	62	65	62	64	63	64
11-20	66	64	...	59	66	65	66	63	64
21-31	65	62	...	...	67	66	70	62	65
August									
1-10	...	...	...	...	68	68	65	63	66
11-20	...	...	...	61	62	64	66	64	63
21-31	...	...	...	...	62	60	68	64	64
September									
1-10	...	...	...	...	60	60	64	...	61

Table 16.--Average water temperature (° F.) by 10- or 11-day periods in the Au Train River, Alger County, Michigan, 1953-60

[Thermometer readings were taken at bridge, Sec. 32, T. 47 N., R. 20 W.]

Period	1953	1954	1955	1956	1957	1958	1959	1960	Average
April									
1-10	...	36	39	39	38	36	36	35	37
11-20	38	40	40	40	38	41	38	39	39
21-30	40	43	48	41	46	43	39	41	43
May									
1-10	48	42	56	46	49	46	53	42	48
11-20	54	50	58	51	53	56	55	50	53
21-31	55	56	61	55	56	52	62	56	57
June									
1-10	57	59	66	61	60	56	69	64	62
11-20	64	69	66	70	68	60	69	61	66
21-30	66	69	67	66	67	63	69	66	67
July									
1-10	67	68	76	66	69	65	68	66	68
11-20	72	72	73	65	71	67	70	64	69
21-31	73	71	75	68	72	69	73	68	71
August									
1-10	70	70	...	68	73	73	69	69	70
11-20	72	68	...	69	68	69	69	69	69
21-31	75	68	...	66	68	70	71	...	70
September									
1-10	72	62	...	...	66	...	68	...	67
11-20	61	57	...	...	62	...	...	...	60

Table 17. --Average water temperature (° F.) by 10- or 11-day periods in the Rock River, Alger County, Michigan, 1955-60

[Thermometer readings were taken above M-28 Bridge, Sec. 15, T. 47 N., R. 21 W.]

Period	1955	1956	1957	1958	1959	1960	Average
April							
11-20	...	37	...	...	36	36	36
21-30	48	40	51	...	41	41	44
May							
1-10	54	46	52	46	53	40	49
11-20	55	48	50	55	51	50	52
21-31	57	53	54	50	56	55	54
June							
1-10	62	59	56	55	62	57	59
11-20	61	63	62	57	61	54	60
21-30	63	63	60	58	60	59	61
July							
1-10	70	59	63	60	60	58	62
11-20	...	58	64	61	62	61	61
21-31	...	...	66	64	66	61	64
August							
1-10	...	...	66	65	62	61	64
11-20	...	64	61	63	63	61	62
21-31	...	...	...	59	65	...	62
September							
1-10	...	...	...	...	64	...	64

Table 18. --Average water temperature (° F.) by 10- or 11-day periods in the Laughing Whitefish River, Alger County, Michigan, 1953-60

[Thermometer readings were taken near mouth, Sec. 26, T. 48 N., R. 22 W.]

Period	1953	1954	1955	1956	1957	1958	1959	1960	Average
April									
1-10	...	33	...	...	32	...	...	...	33
11-20	...	37	...	...	36	38	37	34	36
21-30	37	41	47	38	49	41	40	40	42
May									
1-10	46	40	55	44	51	44	54	39	47
11-20	51	48	58	48	49	54	53	50	51
21-31	52	53	60	53	56	51	58	57	55
June									
1-10	54	57	65	59	58	56	65	59	59
11-20	63	65	64	65	66	59	63	57	63
21-30	63	65	67	65	64	59	62	62	63
July									
1-10	62	63	76	61	65	60	63	63	64
11-20	67	65	...	61	66	63	66	64	65
21-31	68	64	...	...	68	68	69	63	67
August									
1-10	...	...	...	...	...	68	66	66	67
11-20	...	...	...	...	...	66	65	65	65
21-31	...	...	...	...	...	...	68	...	68

Table 19. --Average water temperature (° F.) by 10- or 11-day periods in the Chocolay River, Marquette County, Michigan, 1951-60

[Thermometer readings were taken at Highway M-28 bridge in Sec. 8, T. 47 N., R. 24 W., in 1951-54 and at Mangum Bridge, Sec. 24, T. 47 N., R. 24 W., in 1955-60.]

Period	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	Average
April											
1-10	35	36	40	35	35	...	34	34	34	34	35
11-20	38	43	40	41	40	36	38	40	36	36	39
21-30	43	53	44	45	49	39	50	41	42	38	44
May											
1-10	52	55	53	43	55	45	53	46	55	36	49
11-20	54	53	53	51	57	49	50	56	54	50	53
21-31	56	56	53	55	58	53	51	52	59	57	55
June											
1-10	53	60	56	55	60	61	58	55	...	57	57
11-20	57	61	61	64	59	66	65	59	63	55	61
21-30	58	60	64	62	61	62	62	59	62	60	61
July											
1-10	59	65	62	62	68	61	66	60	64	61	63
11-20	59	65	64	66	66	...	66	64	66	62	64
21-31	62	64	67	64	67	...	65	66	71	63	65
August											
1-10	57	59	58	62	66	64	68	69	65	63	63
11-20	55	63	59	61	66	62	62	64	65	62	62
21-31	57	61	61	63	...	...	...	58	68	68	62
September											
1-10	55	58	59	...	...	57	...	56	64	63	59
11-20	55	59	53	52	57	52	...	...	...	52	54
21-30	49	52	51	52	53	50	...	...	...	...	51

Table 20. --Average water temperature (° F.) by 10- or 11-day periods in the Carp River, Marquette County, Michigan, 1954-60

[Thermometer readings were taken near mouth, Sec. 36, T. 48 N., R. 25 W.]

Period	1954	1955	1956	1957	1958	1959	1960	Average
April								
1-10	35	37	37	...	...	...	...	36
11-20	38	41	39	...	...	...	...	39
21-30	43	47	41	50	...	...	...	45
May								
1-10	42	54	46	52	...	...	...	49
11-20	45	56	49	50	57	51	...	51
21-31	53	58	53	54	54	52	...	54
June								
1-10	54	61	60	57	58	57	...	58
11-20	62	61	64	60	61	56	56	60
21-30	62	63	62	58	60	60	61	61
July								
1-10	63	69	59	58	63	62	60	62
11-20	66	67	59	59	64	64	61	63
21-31	...	...	...	...	66	65	63	65
August								
1-10	...	...	...	...	66	...	63	65

Table 21. --Average water temperature (° F.) by 10- or 11-day periods in the Harlow Creek, Marquette County, Michigan, 1954-60

[Thermometer readings were taken above County Road 550 bridge, Sec. 19, T. 49 N., R. 25 W.]

Period	1954	1955	1956	1957	1958	1959	1960	Average
April								
1-10	33	35	34	36	...	...	34	34
11-20	37	39	37	37	...	...	35	37
21-30	42	47	38	49	...	...	40	43
May								
1-10	39	53	44	53	44	...	40	46
11-20	48	53	46	49	58	52	47	50
21-31	52	57	53	55	53	58	57	55
June								
1-10	53	61	58	58	56	61	59	58
11-20	61	61	64	64	60	62	58	61
21-30	63	63	61	63	61	63	62	62
July								
1-10	63	70	61	66	61	64	63	64
11-20	69	68	...	66	64	66	65	66
21-31	67	...	...	69	69	69	67	68
August								
1-10	...	...	...	69	70	67	67	68
11-20	...	...	...	66	67	67	...	67
21-31	...	...	...	...	...	69	...	69
September								
1-10	...	...	...	...	...	67	...	67

Table 22. --Average water temperature (° F.) by 10- or 11-day periods in the Little Garlic River, Marquette County, Michigan, 1954-55

[Thermometer readings were taken at bridge near mouth, Sec. 35, T. 50 N., R. 26 W.]

Period	1954	1955	Average
April			
11-20	38	...	38
21-30	42	47	45
May			
1-10	38	53	46
11-20	47	54	51
21-31	50	55	53
June			
1-10	52	59	56
11-20	60	59	60
21-30	63	61	62
July			
1-10	62	67	65
11-20	67	65	66
21-30	63	...	63

Table 23. --Average water temperature (° F.) by 10- or 11-day periods in the Garlic River, Marquette County, Michigan, 1954-60

[Thermometer readings were taken near mouth, Sec. 21, T. 50 N., R. 26 W.]

Period	1954	1955	1956	1957	1958	1959	1960	Average
April								
1-10	...	36	35	37	38	34	34	36
11-20	38	40	37	37	42	38	35	38
21-30	43	50	40	49	45	42	41	44
May								
1-10	42	58	46	57	47	52	42	49
11-20	48	61	51	56	60	56	49	54
21-31	55	62	56	64	57	61	58	59
June								
1-10	56	65	63	62	59	68	...	62
11-20	66	67	70	67	65	70	...	68
21-30	66	69	67	68	64	68	...	67
July								
1-10	69	73	68	70	65	68	...	69
11-20	73	75	...	71	69	72	...	72
21-31	72	...	...	74	73	74	...	73
August								
1-10	...	...	...	73	75	71	...	73
11-20	...	...	...	70	71	70	...	70
21-31	...	...	66	65	64	73	...	67

Table 24. --Average water temperature (° F.) by 10- or 11-day periods in the Iron River, Marquette County, Michigan, 1954-60

[Thermometer readings were taken below Lake Independence, Sec. 13, T. 51 N., R. 27 W.]

Period	1954	1955	1956	1957	1958	1959	1960	Average
April								
1-10	35	38	35	37	39	34	35	36
11-20	38	40	37	37	42	39	37	39
21-30	42	48	39	45	44	42	40	43
May								
1-10	42	55	44	51	45	51	42	47
11-20	49	59	50	54	56	53	48	53
21-31	54	62	54	57	55	59	57	57
June								
1-10	55	66	62	60	58	65	63	61
11-20	64	67	68	66	62	69	63	66
21-30	69	69	67	66	62	68	66	67
July								
1-10	69	74	68	70	65	69	67	69
11-20	71	75	...	70	68	72	70	71
21-31	72	75	...	74	73	75	71	73
August								
1-10	...	...	...	74	75	72	72	73
11-20	...	...	...	70	72	71	...	71
21-31	...	...	66	66	65	73	...	68
September								
1-10	...	...	...	67	63	70	...	67

Table 25.--Average water temperature (° F.) by 10- or 11-day periods in the Salmon Trout River, Marquette County, Michigan, 1954-56 and 1959-60

[Thermometer readings were taken at weir site, Sec. 36, T. 52 N., R. 29 W.]

Period	1954	1955	1956	1959	1960	Average
April						
1-10	34	...	...	...	34	34
11-20	38	...	...	...	37	38
21-30	42	49	39	...	41	43
May						
1-10	38	52	43	...	40	43
11-20	48	56	49	...	47	50
21-31	53	56	54	...	56	55
June						
1-10	53	60	60	...	57	58
11-20	60	61	64	60	55	60
21-30	61	62	59	61	60	61
July						
1-10	60	68	60	61	61	62
11-20	63	65	...	64	61	63
21-31	...	...	...	67	63	65

Table 26. --Average water temperature (° F.) by 10- or 11-day periods in the Pine River, Marquette County, Michigan, 1954-60

[Thermometer readings were taken below Pine Lake, Sec. 21, T. 52 N., R. 28 W.]

Period	1954	1955	1956	1957	1958	1959	1960	Average
April								
1-10	35	38	35	36	37	34	35	36
11-20	37	39	37	36	39	37	36	37
21-30	40	45	39	40	41	40	39	41
May								
1-10	40	52	41	48	44	49	40	45
11-20	48	57	48	53	54	51	46	51
21-31	54	62	54	55	54	58	58	56
June								
1-10	56	67	63	60	57	66	62	62
11-20	62	67	67	66	62	68	63	65
21-30	67	69	67	65	62	68	66	66
July								
1-10	69	75	68	67	66	67	67	68
11-20	69	75	...	68	68	71	70	70
21-31	...	74	...	72	72	74	72	73
August								
1-10	...	...	...	72	73	71	...	72
11-20	...	...	...	68	70	70	...	69
21-31	...	...	...	66	...	72	...	69

Table 27. --Average water temperature (° F.) by 10- or 11-day periods in the Huron River, Baraga County, Michigan, 1954-60

[Thermometer readings were taken below Erickson's Bridge, Sec. 14, T. 52 N., R. 29 W.]

Period	1954	1955	1956	1957	1958	1959	1960	Average
April								
1-10	...	...	...	...	35	33	32	33
11-20	...	...	...	33	39	35	35	36
21-30	...	48	38	45	41	41	40	42
May								
1-10	...	49	42	50	43	53	39	46
11-20	...	54	46	47	56	50	49	50
21-31	54	55	54	53	50	55	56	54
June								
1-10	57	59	60	55	54	62	55	57
11-20	62	58	66	61	56	60	55	60
21-30	66	61	63	60	57	61	60	61
July								
1-10	65	70	63	65	60	61	62	64
11-20	68	68	60	66	60	64	64	64
21-31	67	68	61	69	65	70	67	67
August								
1-10	62	69	64	68	69	65	66	66
11-20	...	...	65	64	63	65	66	65
21-31	...	...	62	61	59	66	65	63
September								
1-10	...	...	...	58	...	62	...	60
11-20	...	...	...	56	...	...	...	56

Table 28.--Average water temperature (° F.) by 10- or 11-day periods in the Ravine River, Baraga County, Michigan, 1954-60

[Thermometer readings were taken near mouth, Sec. 4, T. 51 N., R. 31 W.]

Period	1954	1955	1956	1957	1958	1959	1960	Average
April								
11-20	...	...	35	...	...	...	36	36
21-30	41	49	38	...	...	42	41	42
May								
1-10	37	52	43	...	...	52	40	45
11-20	48	52	49	49	...	50	51	50
21-31	53	57	56	54	...	54	56	55
June								
1-10	56	60	59	57	58	62	57	58
11-20	60	60	66	64	58	60	55	60
21-30	65	62	61	61	57	59	59	61
July								
1-10	62	70	61	66	60	59	62	63
11-20	67	69	59	65	61	61	63	64
21-31	66	69	61	67	65	67	66	66
August								
1-10	62	...	61	65	66	62	64	63
11-20	...	...	...	61	60	63	62	62
21-31	...	...	...	58	57	66	...	60
September								
1-10	...	...	...	...	...	62	...	62

Table 29. --Average water temperature (° F.) by 10- or 11-day periods in the Silver River, Baraga County, Michigan, 1954-60

[Thermometer readings were taken above Aura Road Bridge
Sec. 13, T. 51 N., R. 32 W.]

Period	1954	1955	1956	1957	1958	1959	1960	Average
April								
1-10	...	...	...	...	35	33	33	34
11-20	...	...	35	36	42	37	38	38
21-30	...	51	38	47	42	41	41	43
May								
1-10	38	52	42	53	46	52	41	46
11-20	46	54	49	51	57	50	52	51
21-31	51	57	55	55	53	57	57	55
June								
1-10	55	61	61	58	55	66	58	59
11-20	61	60	66	64	57	61	58	61
21-30	63	58	61	61	60	59	62	61
July								
1-10	60	69	62	67	63	61	63	64
11-20	65	68	60	...	65	65	65	65
21-31	63	68	63	...	69	69	67	67
August								
1-10	61	...	63	68	73	65	66	66
11-20	61	...	64	65	66	64	66	64
21-31	...	...	61	64	59	66	66	63
September								
1-10	...	...	...	56	...	62	...	59
11-20	...	...	...	...	...	50	...	50

Table 30. --Average water temperature (° F.) by 10- or 11-day periods in the Sturgeon River, Houghton County, Michigan, 1954-60

[Thermometer readings were taken below county road bridge, Sec. 2, T. 51 N., R. 34 W., Baraga County, Michigan.]

Period	1954	1955	1956	1957	1958	1959	1960	Average
April								
1-10	...	...	...	...	38	36	36	37
11-20	...	...	...	...	45	38	36	40
21-30	...	...	...	...	45	42	41	43
May								
1-10	...	...	...	...	47	52	43	47
11-20	...	61	...	...	54	54	51	55
21-31	52	62	...	58	54	59	60	58
June								
1-10	55	64	64	63	60	70	62	63
11-20	62	68	69	68	65	67	62	66
21-30	64	70	67	65	62	66	65	66
July								
1-10	65	78	65	70	63	69	70	69
11-20	69	76	64	68	65	71	69	69
21-31	68	...	68	68	69	75	70	70
August								
1-10	...	...	...	...	72	69	66	69
11-20	...	...	...	...	71	68	65	68
21-31	...	...	...	...	...	70	...	70

Table 31. --Average water temperature (° F.) by 10- or 11-day periods in the Otter River, Houghton County, Michigan, 1954-58

[Thermometer readings were taken below county road bridge, Sec. 34, T. 52 N., R. 34 W.]

Period	1954	1955	1956	1957	1958	Average
May						
11-20	...	59	...	...	...	59
21-31	49	60	...	58	52	55
June						
1-10	55	61	68	62	58	61
11-20	59	64	67	67	61	64
21-30	62	67	63	62	61	63
July						
1-10	61	73	64	68	61	65
11-20	65	72	63	66	62	66
21-31	62	...	65	65	65	64
August						
1-10	...	...	...	...	68	68
11-20	...	...	...	...	66	66

Table 32. --Average water temperature (° F.) by 10- or 11-day periods in the Traprock River, Houghton County, Michigan, 1954-55

[Thermometer readings were taken at weir site, Sec. 32, T. 56 N., R. 32 W.]

Period	1954	1955	Average
May			
1-10	41	55	48
11-20	51	63	57
21-31	53	61	57
June			
1-10	56	64	60
11-20	57	66	61
21-30	60	65	63
July			
1-10	56	70	63

Table 33. --Average water temperature (° F.) by 10- or 11-day periods in the Traverse River, Houghton County, Michigan, 1954-59

[Thermometer readings were taken at county road bridge, Sec. 4, T. 55 N., R. 31 W.]

Period	1954	1955	1956	1957	1958	1959	Average
April							
21-30	...	...	36	39	...	...	38
May							
1-10	39	51	39	48	45	51	46
11-20	49	56	45	47	54	49	50
21-31	60	56	50	51	51	54	54
June							
1-10	56	59	55	52	54	59	56
11-20	71	60	61	58	59	58	61
21-30	63	63	57	58	59	61	60
July							
1-10	62	69	58	60	58	62	62
11-20	...	69	58	60	61	66	63
21-31	...	...	59	62	65	69	64
August							
1-10	...	...	60	62	67	65	64
11-20	...	...	61	59	64	64	62
21-31	...	...	...	...	57	65	61
September							
1-10	...	...	...	...	...	60	60

Table 34. --Average water temperature (° F.) by 10- or 11-day periods in the Elm River, Houghton County, Michigan, 1954-60

[Thermometer readings were taken near mouth, Sec. 30, T. 54 N., R. 36 W.]

Period	1954	1955	1956	1957	1958	1959	1960	Average
April								
21-30	42	...	38	...	...	...	...	40
May								
1-10	39	53	41	51	...	...	...	46
11-20	52	56	48	50	56	49	...	52
21-31	54	55	55	53	51	55	57	54
June								
1-10	58	59	59	53	53	60	58	57
11-20	61	60	62	58	56	57	56	59
21-30	63	59	58	55	58	58	60	59
July								
1-10	60	66	58	53	57	60	60	59
11-20	...	65	57	60	62	62	62	61
21-31	...	63	59	60	64	65	63	62
August								
1-10	...	64	58	62	64	61	62	62
11-20	...	61	59	57	60	62	62	60
21-31	...	...	57	56	54	65	61	59
September								
1-10	...	...	...	54	...	...	...	54

Table 35. --Average water temperature (° F.) by 10- or 11-day periods in the Elm River, South Branch, Houghton County, Michigan, 1954-55

[Thermometer readings were taken near mouth, Sec. 30, T. 54 N., R. 36 W.]

Period	1954	1955	Average
April			
21-30	43	...	43
May			
1-10	40	53	47
11-20	52	55	54
21-31	54	56	55
June			
1-10	57	59	58
11-20	60	58	59
21-30	62	60	61
July			
1-10	59	66	63
11-20	...	64	64
21-31	...	64	64
August			
1-10	...	64	64
11-20	...	63	63

Table 36. --Average water temperature (° F.) by 10- or 11-day periods in the Little Gratiot River, Keweenaw County, Michigan, 1954-59

[Thermometer readings were taken at bridge above Lac La Belle, Sec. 31, T. 58 N., R. 29 W.]

Period	1954	1955	1956	1957	1958	1959	Average
April							
21-30	39	...	36	...	...	...	37
May							
1-10	40	45	38	46	...	...	42
11-20	48	51	44	46	...	50	48
21-31	51	56	50	51	...	55	53
June							
1-10	56	64	56	54	54	61	58
11-20	64	63	62	59	58	62	61
21-30	65	65	60	60	58	62	62
July							
1-10	65	66	60	61	60	63	63
11-20	...	66	61	61	64	65	63
21-31	...	...	61	64	66	68	65
August							
1-10	...	...	61	64	67	64	64
11-20	...	...	61	61	63	...	62
21-31	...	...	...	...	57	...	57

Table 37. --Average water temperature (° F.) by 10- or 11-day periods in the Gratiot River, Keweenaw County, Michigan, 1954-59

[Thermometer readings were taken near mouth, Sec. 11, T. 57 N., R. 33 W.]

Period	1954	1955	1956	1957	1958	1959	Average
May							
1-10	...	49	...	49	...	...	49
11-20	49	56	48	50	...	52	51
21-31	53	55	51	54	...	57	54
June							
1-10	55	53	57	53	53	63	56
11-20	62	56	61	57	52	61	58
21-30	61	57	56	59	56	57	58
July							
1-10	60	60	57	59	58	59	59
11-20	...	62	58	59	61	60	60
21-31	...	...	55	61	66	64	62
August							
1-10	...	...	60	63	65	61	62
11-20	...	...	58	58	60	...	59
21-31	...	...	...	...	56	...	56

Table 38. --Average water temperature (° F.) by 10- or 11-day periods in the Misery River, Ontonagon County, Michigan, 1955-60

[Thermometer readings were taken at weir site, Sec. 15, T. 53 N., R. 37 W.]

Period	1955	1956	1957	1958	1959	1960	Average
April							
1-10	...	...	...	33	33	32	33
11-20	...	35	34	39	36	34	36
21-30	...	38	48	41	41	41	42
May							
1-10	52	42	49	45	53	41	47
11-20	55	47	51	55	51	52	52
21-31	57	54	53	50	55	56	54
June							
1-10	59	58	54	53	61	58	57
11-20	58	63	58	56	59	56	58
21-30	60	58	57	58	59	61	59
July							
1-10	66	58	60	58	61	60	61
11-20	65	57	62	59	64	63	62
21-31	65	60	62	64	66	64	64
August							
1-10	63	58	62	65	61	63	62
11-20	62	60	58	61	63	63	61
21-31	...	56	58	55	66	63	60
September							
1-10	...	...	55	55	61	...	57

Table 39. --Average water temperature (° F.) by 10- or 11-day periods in the Firesteel River, Ontonagon County, Michigan, 1954 and 1956-60

[Thermometer readings were taken below county road bridge, Sec. 7, T. 52 N., R. 38 W.]

Period	1954	1956	1957	1958	1959	1960	Average
April							
1-10	...	...	...	35	33	...	34
11-20	...	...	...	43	36	35	38
21-30	...	38	48	41	43	43	43
May							
1-10	...	42	53	49	55	41	48
11-20	...	47	53	60	55	55	54
21-31	53	53	57	55	55	57	55
June							
1-10	56	64	63	59	64	60	61
11-20	66	70	63	59	63	61	64
21-30	66	64	...	59	62	66	63
July							
1-10	65	64	69	...	66	66	66
11-20	69	63	72	...	70	67	68
21-31	67	66	72	68	71	69	69
August							
1-10	...	64	71	...	69	68	68
11-20	...	65	67	63	65	66	65
21-31	...	68	65	...	68	66	67
September							
1-10	...	60	...	...	63	...	62

Table 40.--Average water temperature (° F.) by 10- or 11-day periods in the Flintsteel River, Ontonagon County, Michigan, 1954-60

[Thermometer readings were taken below county road bridge, Sec. 25, T. 52 N., R. 39 W.]

Period	1954	1955	1956	1957	1958	1959	1960	Average
April								
11-20	...	...	...	...	...	...	31	31
21-30	...	...	40	...	...	...	45	43
May								
1-10	...	54	44	...	...	...	42	47
11-20	...	59	52	52	...	53	55	54
21-31	56	60	56	59	56	57	57	57
June								
1-10	58	63	62	60	56	64	61	61
11-20	68	64	69	64	58	65	61	64
21-30	66	64	66	62	61	62	66	64
July								
1-10	67	73	64	68	64	63	66	66
11-20	71	75	64	71	62	67	69	68
21-31	68	73	65	70	69	70	70	69
August								
1-10	...	...	64	70	70	68	...	68
11-20	...	...	63	...	65	...	...	64

Table 41. --Average water temperature (° F.) by 10- or 11-day periods in the Union River, Ontonagon County, Michigan, 1954-55

[Thermometer readings were taken at weir site, Sec. 15, T. 51 N., R. 42 W.]

Period	1954	1955	Average
May			
1-10	...	49	49
11-20	46	51	49
21-31	49	53	51
June			
1-10	52	57	55
11-20	60	56	58
21-30	60	59	60
July			
1-10	59	65	62
11-20	63	...	63
21-31	61	...	61

Table 42. --Average water temperature (° F.) by 10- or 11-day periods in the Bad River, Ashland County, Wisconsin, 1956-59

[Thermometer readings were taken at weir site, Sec. 25, T. 47 N., R. 3 W.]

Period	1956	1957	1958	1959	Average
April					
1-10	...	...	38	36	37
11-20	...	40	51	43	45
21-30	41	55	46	49	48
May					
1-10	49	60	56	57	56
11-20	53	55	64	55	57
21-31	62	60	62	59	61
June					
1-10	69	64	63	70	67
11-20	72	70	68	72	71
21-30	70	66	69	66	68
July					
1-10	...	72	66	69	69
11-20	...	73	68	76	71
21-31	...	76	76	77	76
August					
1-10	...	...	78	73	76
11-20	...	...	72	72	72

Table 43. --Average water temperature (° F.) by 10- or 11-day periods in the White River, Ashland County, Wisconsin, 1956-60

[Thermometer readings were taken below State Highway 13 bridge, Sec. 26, T. 47 N., R. 4 W.]

Period	1956	1957	1958	1959	1960	Average
April						
1-10	...	...	42	41	...	42
11-20	39	40	55	44	40	44
21-30	43	53	48	49	44	47
May						
1-10	48	56	53	58	45	52
11-20	52	53	62	56	58	56
21-31	61	57	60	60	57	59
June						
1-10	60	62	61	70	60	63
11-20	70	65	65	71	65	67
21-30	65	63	66	66	66	65
July						
1-10	68	70	66	68	67	68
11-20	...	69	67	71	70	69
21-31	...	71	70	76	70	72
August						
1-10	...	...	73	70	...	72
11-20	...	...	72	...	...	72

Table 44. --Average water temperature (° F.) by 10- or 11-day periods in the Fish Creek, Eileen Township, Bayfield County, Wisconsin, 1957-60

[Thermometer readings were taken below railroad bridge, Sec. 2, T. 47 N., R. 5 W.]

Period	1957	1958	1959	1960	Average
April					
1-10	36	38	40	35	37
11-20	40	47	44	42	43
21-30	48	42	44	43	44
May					
1-10	49	46	52	44	48
11-20	47	51	48	54	50
21-31	52	51	52	52	52
June					
1-10	55	51	60	53	55
11-20	56	52	57	52	54
21-30	56	54	56	57	56
July					
1-10	57	57	59	55	57
11-20	59	55	60	57	58
21-31	59	56	60	58	58
August					
1-10	58	57	56	56	57
11-20	54	55	58	...	56
21-31	53	52	60	...	55

Table 45. --Average water temperature (° F.) by 10- or 11-day periods in the Cranberry River, Bayfield County, Wisconsin, 1958-60

[Thermometer readings were taken at weir site, Sec. 8, T. 50 N., R. 7 W.]

Period	1958	1959	1960	Average
April				
1-10	...	...	36	36
11-20	48	...	42	45
21-30	43	...	46	45
May				
1-10	46	...	45	46
11-20	53	...	53	53
21-31	51	55	52	53
June				
1-10	50	59	56	55
11-20	52	56	59	56
21-30	55	55	59	56
July				
1-10	54	59	61	58
11-20	55	57	60	57
21-31	59	61	63	61
August				
1-10	65	60	61	62
11-20	62	57	60	60
21-31	...	61	...	61
September				
1-10	...	60	...	60

Table 46. --Average water temperature (° F.) by 10- or 11-day periods in the Brule River, Douglas County, Wisconsin, 1957-60

[Thermometer readings were taken near mouth at weir site, Sec. 10, T. 49 N., R. 10 W.]

Period	1957	1958	1959	1960	Average
April					
1-10	...	38	40	...	39
11-20	...	50	43	...	47
21-30	...	44	47	46	46
May					
1-10	...	50	53	46	50
11-20	...	59	53	57	56
21-31	54	57	56	59	57
June					
1-10	57	57	67	62	61
11-20	61	61	65	65	63
21-30	61	63	61	67	63
July					
1-10	67	61	65	69	66
11-20	64	66	68	71	67
21-31	...	70	73	74	71
August					
1-10	...	71	70	71	71
11-20	...	67	65	69	67
21-31	...	59	66	...	63

Table 47. --Average water temperature (° F.) by 10- or 11-day periods in the Poplar River, Douglas County, Wisconsin, 1957-60

[Thermometer readings were taken at weir site, Sec. 31, T. 49 N., R. 11 W.]

Period	1957	1958	1959	1960	Average
April					
1-10	35	35	36	...	35
11-20	37	47	40	39	41
21-30	51	43	47	42	46
May					
1-10	58	47	50	43	50
11-20	57	54	51	54	54
21-31	59	55	54	54	56
June					
1-10	62	55	66	57	60
11-20	64	62	63	60	62
21-30	61	65	60	63	62
July					
1-10	70	...	65	71	69
11-20	65	66	67	70	67
21-31	67	68	73	70	70
August					
1-10	67	73	67	68	69
11-20	...	70	67	66	68
21-31	...	65	...	...	65

Table 48. --Average water temperature (° F.) by 10- or 11-day periods in the Middle River, Douglas County, Wisconsin, 1957-60

[Thermometer readings were taken at weir site, Sec. 36, T. 49 N., R. 12 W.]

Period	1957	1958	1959	1960	Average
April					
1-10	35	37	35	32	35
11-20	38	49	41	40	42
21-30	55	45	46	43	47
May					
1-10	58	49	49	44	50
11-20	55	59	51	54	55
21-31	57	57	55	55	56
June					
1-10	63	56	66	58	61
11-20	63	62	64	62	63
21-30	63	65	62	63	63
July					
1-10	70	...	65	69	68
11-20	66	66	68	72	68
21-31	67	69	75	71	71
August					
1-10	69	75	69	70	71
11-20	66	73	67	68	69

Table 49. --Average water temperature (° F.) by 10- or 11-day periods in the Amnicon River, Douglas County, Wisconsin, 1957-60

[Thermometer readings were taken at weir site, Sec. 4, T. 48 N., R. 12 W.]

Period	1957	1958	1959	1960	Average
April					
1-10	42	36	34	32	36
11-20	39	51	42	40	43
21-30	55	45	44	41	46
May					
1-10	55	50	52	44	50
11-20	51	61	52	54	55
21-31	55	58	56	56	56
June					
1-10	62	57	66	60	61
11-20	62	63	64	64	63
21-30	64	64	62	64	64
July					
1-10	71	...	67	71	70
11-20	67	67	68	72	69
21-31	68	72	75	72	72
August					
1-10	70	74	70	70	71
11-20	66	72	66	67	68
21-31	...	65	...	...	65

Table 50. --Average water temperature (° F.) by 10- or 11-day periods in the Black River, Douglas County, Wisconsin, 1958-60

[Thermometer readings were taken at weir site, Sec. 5, T. 47 N., R. 14 W.]

Period	1958	1959	1960	Average
May				
11-20	62	...	...	62
21-31	58	57	...	58
June				
1-10	58	65	61	61
11-20	59	63	62	61
21-30	58	61	64	61
July				
1-10	...	65	69	67
11-20	65	69	69	68
21-31	71	...	72	72
August				
1-10	...	...	70	70

Table 51. --Average water temperature (° F.) by 10- or 11-day periods in the Nemadji River, Douglas County, Wisconsin, 1958-60

[Thermometer readings were taken above bridge, Sec. 4, T. 47 N., R. 14 W.]

Period	1958	1959	1960	Average
May				
1-10	55	...	...	55
11-20	65	...	...	65
21-31	64	...	...	64
June				
1-10	57	64	62	61
11-20	63	66	65	65
21-30	62	62	65	63
July				
1-10	...	69	71	70
11-20	66	72	72	70
21-31	72	...	77	75
August				
1-10	...	...	73	73

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