

INSTITUTE FOR FISHERIES RESEARCH
DIVISION OF FISHERIES
MICHIGAN DEPARTMENT OF CONSERVATION
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DIRECTOR

November 27, 1953

ADDRESS
UNIVERSITY MUSEUMS ANNEX
ANN ARBOR, MICHIGAN

Report No. 1391

SUMMER (1953) TEMPERATURES OF THE MIDDLE BRANCH AU SABLE RIVER ABOVE
AND BELOW THE DAM AT HIGHWAY U.S.-27 IN GRAYLING, MICHIGAN

By

Leonard N. Allison

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Abstract

Water temperatures of the Middle Branch Au Sable River, Crawford County, were taken during periods of hot weather in the summer of 1953 at the dam at U.S.-27 bridge in Grayling, and at various locations in the stream above the impounded waters. Although temperatures taken on July 16, 1953 were not considered maximum because the water level was above normal, the temperature of the water passing through the impoundment was raised from 71° F. to a maximum of 78° F., a condition unfavorable for trout. The dam was formerly used by the City of Grayling as a water supply for fire protection, but was outmoded for this purpose by the erection of a water tower in about 1938.

To improve this famous stream for trout it is recommended that the Conservation Department remove the dam, install necessary channel improvements, and plant trees and shrubs along the stream to provide shade in the exposed bottom. The Grayling Sportsman's Club is in favor of this move because, in addition to biological reasons, it would (1) reduce mosquito breeding areas near town, (2) make additional water for fishing near town, (3) make possible a public canoe landing at the city park, and (4) eliminate the unsightly area at the west approach to Grayling on M-72.

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During the two periods of hot weather in the summer of 1953 water temperatures were taken of the Middle Branch Au Sable River, at the Highway U.S.-27 dam in Grayling, and at various locations upstream. This was done to determine to what extent the impoundment might influence water temperatures of this famous trout stream. Attempts were made to make observations at such times that maximum water temperatures could be expected, that is, after several days of air temperatures above 80° F. Because of the comparatively cool summer, and my occasional absence from Grayling for other duties, there were only two such opportunities when conditions were favorable, and neither one was considered to represent maximum summer water temperatures.

All water temperatures were taken with a Taylor pocket thermometer, and the readings were compared with those of the recording thermograph located a few feet above the dam at U.S.-27. Maximum and minimum air temperatures are those recorded by the maximum-minimum thermometer at the State Fish Hatchery in Grayling; these vary slightly from the ones recorded at streamside by the pocket thermometer.

Locations:

U.S.-27: Immediately above dam at Highway U.S.-27 in Grayling.

M-72: 100 feet upstream from house on north side of road, at M-72 bridge; short distance above waters impounded by U.S.-27 dam.

Outlet, Power Dam: At road bridge approximately 200 feet below old Consumer's Power dam.

R. R. Bridge: At railroad bridge across upper end of power dam.

Power dam lowered at this time, railroad bridge now above impounded waters; no shade for approximately $1/4$ mile upstream.

Pollack Bridge: Bridge above formerly impounded waters of old Consumer's Power dam. Normal stream conditions.

Because of the distances separating the various stations, all readings could not be made at the same time.

Refer to Tables 1 and 2, and Graph I.

Remarks

Although air temperatures reached the high 80's and 90° F. for three days during the first period, water temperatures taken on the fourth day, July 16, 1953, were not considered to represent a summer maximum because the water level and flow were above the average of the past ten years for July (Table 3).

Water level was lower when the second reading was made, August 27, but the preceding air temperatures were cooler than those during the first study, especially at night. However, even though observations were not made when ideal conditions prevailed for maximum temperatures, data obtained demonstrate the unfavorable effect of the impoundment upon the Au Sable River as a trout stream. Furthermore, the thermograph record shows that unfavorable high temperatures are prolonged until from 2:00 to 4:00 a.m.

Table 1

Observations made on July 16, 1953

Air temperature

Preceding weather:	July 13	<u>Max.</u> 90	<u>Min.</u> 50	Water levels:	
	July 14	89	54	July 16, 1953:	Elevation above
	July 15	88	53		sea level, 1125.09'
	July 16	91	53	Flow:	96 cubic feet per second (c.f.s.)
				July - 1942-1952	Average: 72.9 c.f.s.
					Maximum, June 2, 1943: 274 c.f.s.
					Minimum, April 21, 1946: 28 c.f.s.

Water temperatures:

Time	Air temp.	U.S.-27	M-72	Outlet Power dam	R. R. Bridge	Pollack Bridge
11:45 a.m.	87°		70.0°			
12:00 m.	87°	∇ 70.0°			68.0°	
12:45 p.m.	87°		70.0°			
1:10 p.m.					70.0°	
1:50 p.m.	90°				70.0°	
2:00 p.m.	90°	∇ 72.0°	71.0°			
2:10 p.m.						∇ 70.0°
2:50 p.m.	90°		71.0°			
3:00 p.m.		∇ 73.0°			71.0°	∇ 70.0°
3:30 p.m.						∇ 70.5°
3:45 p.m.	90°		71.0°			
4:10 p.m.		∇ 74.5°				71.0°
4:30 p.m.		∇ 75.0°		71.5°		
5:15 p.m.		∇ 77.0°				
6:00 p.m.						71.0°
6:30 p.m.	80°	∇ 77.0°	71.0°			
9:00 p.m.		∇ 78.0°	(Maximum for the day)			
2:00 a.m. (July 17)		∇ 77.0°				

∇ Readings taken from recording thermographs

∇ Readings taken by Mr. Dale Pettengill, U.S.G.S.

Table 2

Observations made on August 27, 1953

Air temperature

	<u>Max.</u>	<u>Min.</u>	
Preceding weather: August 24	82	48	Water levels:
August 25	76	44	August 27, 1953: Elevation above sea level, 1124.84'
August 26	90	56	Flow: 68 cubic feet per second (c.f.s.)
August 27	92	53	August - 1942-1952 Average: 61.4 c.f.s.
			Maximum, June 2, 1943: 274 c.f.s.
			Minimum, April 21, 1946: 28 c.f.s.

Water temperatures:

Time	Air temp.	U.S.-27	M-72	Outlet Power dam	Pollack Bridge
9:15 a.m.		↘ 68.0°			
9:35 a.m.			↘ 66.0°		
9:50 a.m.				↘ 67.0°	
10:00 a.m.					↘ 63.0°
12:00 m.					↘ 66.0°
12:45 p.m.	88.0°	↘ 69.0°			
1:00 p.m.	88.0°	↘ 70.0°			
2:00 p.m.		↘ 69.5°	68.0°		↘ 68.5°
2:30 p.m.				↘ 69.5°	
3:00 p.m.		↘ 69.5°			↘ 69.5°
3:30 p.m.				↘ 70.0°	
4:00 p.m.	86.0°	↘ 70.0°	70.0°		↘ 70.0°
4:30 p.m.				↘ 70.0°	
5:00 p.m.	84.0°	↘ 71.0°	70.0°		↘ 70.5°
6:00 p.m.		↘ 71.5°	69.0°		
9:00 p.m.		↘ 72.0° (Maximum for the day)			
4:00 a.m. (August 28)		↘ 71.0°			

↘ Readings taken from recording thermographs

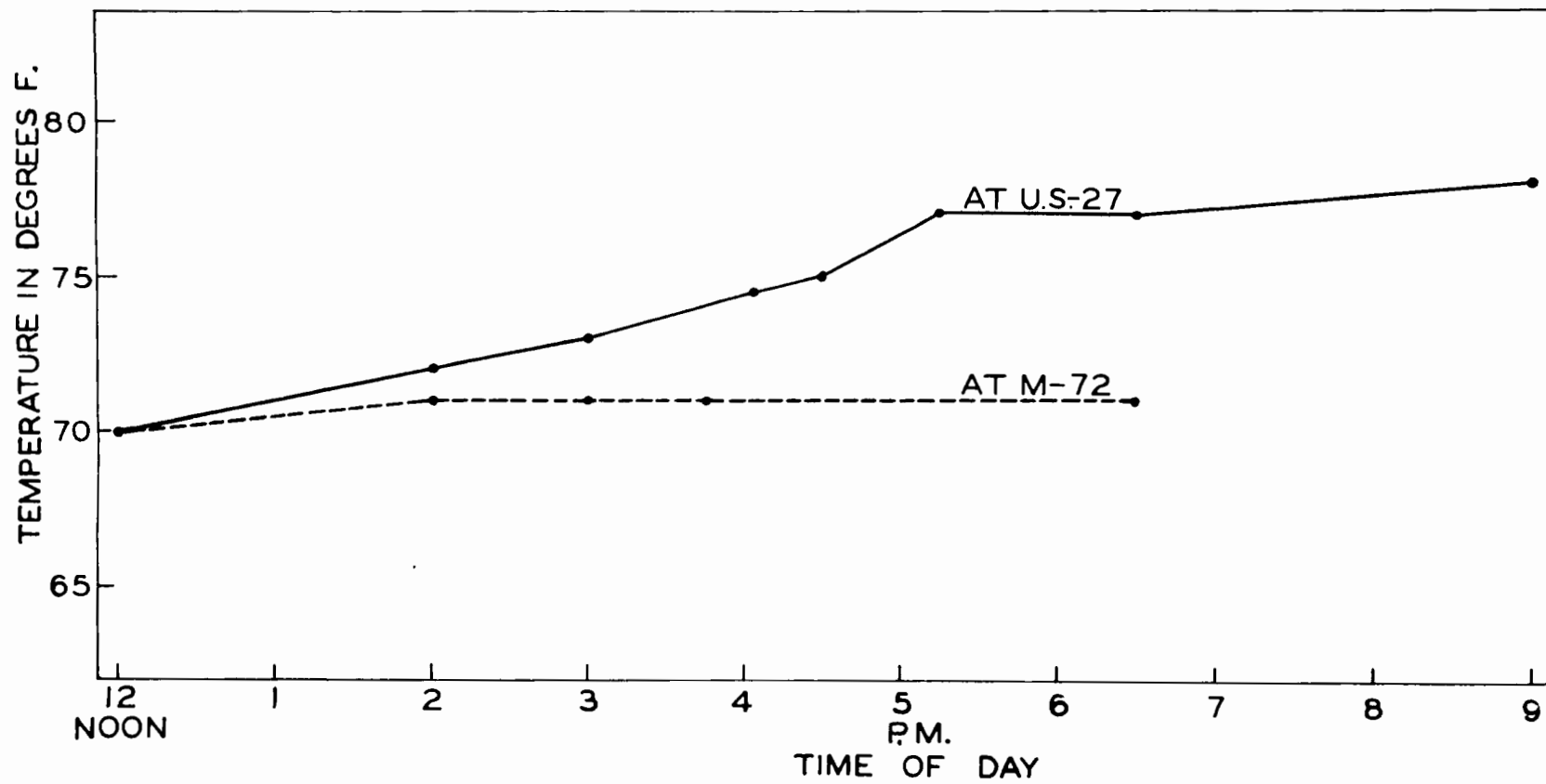
↙ Readings taken by Mr. Thomas Robertson, U.S.G.S.

Table 3

Flow of the Middle Branch Au Sable River at Grayling, Michigan

Year	Month	Average c.f.s.	Average	Year	Month	Average c.f.s.	Average
1943	July	89.5		1943	August	71.0	
1944	"	66.1		1944	"	55.8	
1945	"	63.7		1945	"	61.2	
1946	"	67.0		1946	"	54.5	
1947	"	73.7		1947	"	60.4	
1948	"	79.1		1948	"	60.6	
1949	"	64.7		1949	"	55.5	
1950	"	61.1		1950	"	61.0	
1951	"	69.4		1951	"	59.4	
1952	"	94.3	72.9	1952	"	74.2	61.4

Fig. 1. Water temperatures above (at Highway M-72) and below (at dam at U.S.-27) the Grayling impoundment, Middle Branch Au Sable River, on July 16, 1953.



At a meeting of the Grayling Sportsman's Club on October 21, 1953, the subject of removing the dam at U.S.-27 was discussed and a committee assigned to the problem. At the time of the meeting, there was no one who could offer any objections to removing the dam, and among the reasons mentioned in favor of removal of the structure were (1) reduction of mosquito-breeding area, (2) increase in stream area for fishing near town, (3) elimination of the dam would make possible a public canoe landing above the U.S.-27 bridge in the city park, (4) the unsightly area below the M-72 bridge (extensive shallow backwaters with stumps and dead trees, and the west entrance to Grayling) would be hidden by new growth of trees and shrubs. Mr. Hans Peterson and I explained the effect of high water temperature on a trout stream.

According to Mr. Hans Peterson the dam was installed originally during lumbering days to serve as a storage pond for logs to supply the saw mill that once stood on the south side of the river near the location of the dam. After the saw mill was abandoned, the dam was rebuilt by the State Highway Department in 1933 as part of the bridge at U.S.-27. The impoundment served as a water supply for fire protection of the city of Grayling until about 1938, when a water tower was erected for city water supply. Since that time the impoundment ceased to be essential to the city.

Recommendations

The dam in the Au Sable River, Middle Branch, at U.S.-27 in Grayling should be removed because of at least two biological reasons, in addition to the esthetic reasons mentioned at the meeting of the Grayling Sportsman's Club. The dam causes water temperatures in summer to rise to a level unfavorable for trout, and maintains relatively unproductive trout water in the impoundment for a distance of approximately one mile upstream.

If the dam is removed, and after the water has receded to the original stream bed, plantings of willow, tag-alder, or other suitable shrubs and trees

should be made along the stream to provide shade to keep water temperatures lower, and it is likely that some improvement of the channel may be necessary. It is further recommended that the work be done by the Conservation Department. Labor might be obtained from Camp Lehman, the Department of Corrections camp at the Hartwick Pines State Park.

Before the project is undertaken, contact should be made with interested parties. Since the dam is built into the U.S.-27 bridge, the State Highway Department should be consulted. The Grayling City Council and Sportsman's Club should be contacted for their opinion of the proposed work. Much of the land along the impoundment is owned by the Hanson Trust Company, represented by Mr. John Bruun of Grayling, who also should be contacted.

The work should be done, if possible, before the spring run-off so that the greater volume of water would aid in flushing and stabilizing the stream bed.

The assistance of Mr. Dale Pettengill, in charge, U.S.G.S. Water Resources Office at Grayling, and members of his staff, in recording temperatures and supplying pertinent data, is gratefully acknowledged.

INSTITUTE FOR FISHERIES RESEARCH

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