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A FURTHER CHECK OF THE EFFECT OF THE OPERATION OF BOND FALLS DAM ON SUMMER WATER TEMPERATURES IN THE MIDDLE BRANCH OF THE ONTONAGON RIVER

by

A. S. Hazzard

From March 5 to August 22, 1942 a detailed study was made by District Fisheries Biologist Paul Eschmeyer of the effect of various flows released at the Bond Falls dam upon conditions for trout in the river below (Institute for Fisheries Research Report No. 830). Air temperatures that summer were relatively low so that the influence of the bottom draw-off at the dam was not fully demonstrated. Induction into the armed forces prevented further studies of this problem by Eschmeyer during the summer of 1943.

On August 22, 1943, during a period of warm weather, the writer accompanied by District Fisheries Supervisor Florin Warren took a series of temperatures on the Middle Branch of the Ontonagon River above and below Bond Falls Reservoir and a series of water temperatures and water analyses at various depths in Bond Falls Reservoir at a point about 200 yards out from the spillway of the dam. Following are the findings:

At water recording gage just above Agate Falls - air 86°F., water 69°F. -- time 3:30 p.m.

At highway bridge between the dam and Bond Falls - air 86°F., water 65°F. -- time 4:50 p.m.

At surface of reservoir at spillway - air 86°F., water 75°F. -- time 5 p.m.

Temperature and oxygen content in reservoir at various depths and alkalinity and pH at 29 foot depth (Secchi disk reading 5 feet):

At 1 foot below surface	73°	
At 10 feet " "	70°	
At 15 feet " "	70°	
At 20 feet " "	63°	6.3 p.p.m. of oxygen
At 25 feet " "	52°	
At 29 feet (1 foot above bottom)	49°	1.0 p.p.m. oxygen, M.O. Alkalinity 48, pH 6.8

At water recording gage at Interior - air temperature 78° (drop in air temperature caused by passing thunderstorm), water 72° - time 6:30 p.m.

It will be noted that the stream temperature at Interior just above the head of the reservoir was three degrees lower than the surface temperature at the spillway. Impoundment could be expected to increase surface temperatures. However, the temperature of the water released from the reservoir (temperature at highway bridge between the dam and Bond Falls) was ten degrees lower than the surface of the reservoir and seven degrees colder than the stream at Interior. This difference is accounted for by the bottom draw-off (said to be at 30 feet when the reservoir is full). Judging by the temperature series taken in this reservoir, the water was being removed from an actual depth of from between 15 and 20 feet below the surface at the time the study was made. The level of the reservoir was considerably below the high water mark.

The above temperatures confirm those taken by Eschmeyer in August, 1942. The range in the cooling effect of the bottom draw-off, which he found, varied from 3.3 to 9°F. The oxygen values in the thermocline and at one foot from the bottom were also similar to those found at similar depths on September 1, 1942.

The temperature of 69° recorded just above Agate Falls shows that the river warmed by 4° in passing between the two falls. As pointed out by Eschmeyer, it would be difficult to determine the effect of the size of the flow released on the water temperatures in the section between the falls, but it seems likely that the larger the flow of cold water released at the dam, the lower the temperatures would be between the falls.

From the data presented by Eschmeyer, supported by the information secured in 1943, there is little question but that the Bond Falls impoundment with a bottom draw-off materially lowers the summer temperature between the falls at least during periods of relatively high reservoir level. However, as pointed out by Eschmeyer, there are other effects on fish life caused by this impoundment which are harmful, such as the largely avoidable fluctuation in flow and the unavoidable increase in warm-water fish.

INSTITUTE FOR FISHERIES RESEARCH

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