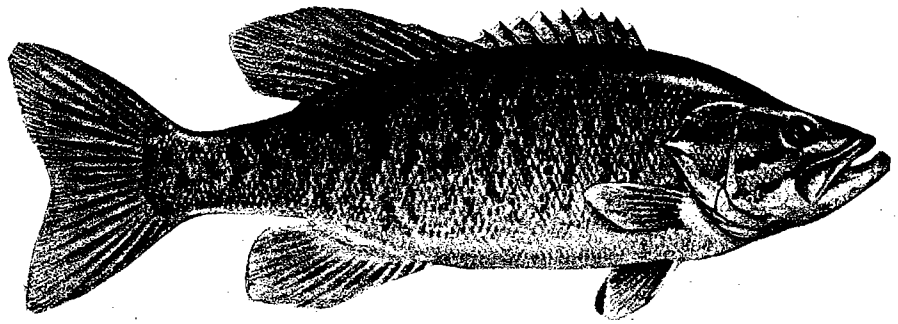
DISSOLVED OXYGEN CONTENT OF THE ELKHART RIVER SOUTH BRANCH

Jed Pearson, Fisheries Biologist



FISHERIES SECTION
INDIANA DEPARTMENT OF NATURAL RESOURCES
DIVISION OF FISH AND WILDLIFE
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The Elkhart River South Branch is currently under consideration for inclusion in Indiana's Natural Rivers Program, a program whereby certain rivers still in a largely natural condition can be protected from channelization, floodplain development, or other alterations.

The Elkhart River South Branch, along its 16 mile course, flows through wooded knobs of glacial till and a broad wetland floodplain. It is considered to be a part of one of the largest remaining wetland areas in Indiana.

In spite of its natural character, the Elkhart River South Branch supports a poor quality sport fish population. Species diversity is low, standing crop is low, and few catchable-size game fish are present. A 1980 northern pike stocking failed to boost the river's pike population. Even nongame rough fish, such as carp and suckers, are scarce. In fact, lower sections of the South Branch at times contain no fish.

The poor quality of the fish community in the South Branch is a result of the river's poor water quality. Low dissolved oxygen concentrations, not tolerated by most fish, have been recorded in the river on isolated occasions. However, there has not been, to my knowledge, a systematic summer seasonal examination of dissolved oxygen levels throughout the river.

To document the amount of dissolved oxygen in the South Branch, oxygen concentrations were monitored at eight stations during summer 1986. Also examined were oxygen concentrations in the Croft Ditch, a major tributary, and the Elkhart River North Branch and the Elkhart River mainstem. Objectives of the project were to determine periods of low oxygen levels. This information should form the basis of a followup investigation to determine the cause of low oxygen levels and to initiate a program to improve water quality in the Elkhart River South Branch.

The results are presented in this report.

THE ELKHART RIVER SOUTH BRANCH

The Elkhart River South Branch drains a large portion of Noble County in northeast Indiana. Its headwaters begin at several lakes and flow, via the Thumma Ditch, to Port Mitchell Lake, located 3 miles southwest of Albion (Figure 1). Downstream from Port Mitchell Lake, the South Branch meanders in a northerly direction through woodlands (Bender Woods Nature Preserve) and through extensive wetlands (Mallard Roost Wetland Area). It joins the Elkhart River North Branch near Ligonier. From this point the Elkhart River flows northwesterly to the St. Joseph River, which empties into Lake Michigan.

Several tributaries enter the South Branch. These include the Steffey Ditch, Croft Ditch, Long Ditch, and the outlets of Lower Long and Diamond Lakes. At Port Mitchell Lake, the South Branch drains 53½ square miles.

Croft Ditch, the largest tributary, drains 25 square miles and enters the South Branch 1½ miles downstream of Port Mitchell Lake. About ½ mile up Croft Ditch, the town of Albion sewage treatment facility is located. At the confluence with the North Branch, the South Branch drains 114 square miles.

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SAMPLING SITES AND METHODS

Dissolved oxygen concentrations were recorded at 12 locations (8 sites in the South Branch) on seven occasions from June 5-August 28, 1986. Oxygen levels, measured in parts per million (PPM), were determined by using a Hach portable field kit. Water samples were taken along roads or at bridge and culvert crossings. Where needed, samples were collected by using a Kemmerer water sampler.

Figure 1. Dissolved oxygen monitoring sites along the Elkhart River South Branch.

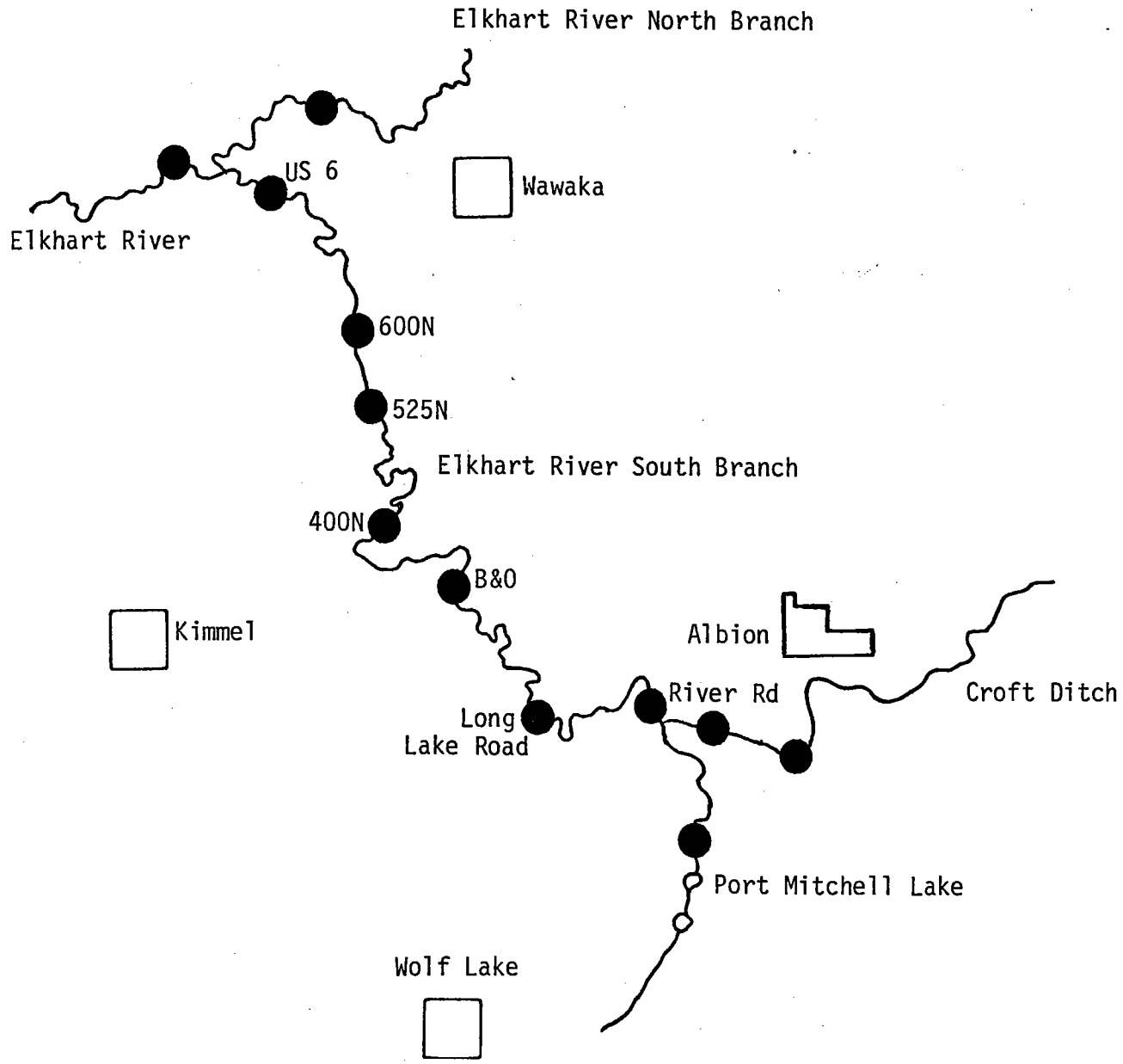


Table 1. Dissolved oxygen concentrations (ppm) in the Elkhart River South Branch, 1986.

Site	Date 6/5	6/17	7/3	7/18	7/31	8/15	8/28	Mean
Port Mitchell outlet	7	7	6	7	8	9	6	7
River Road	7	6	6	5	8	7	7	6½
Long Lake Road	4	6	7	5	6	6	7	6
B & O Railroad	5	7	4	2½	5	5	4	4½
400 North	5	6	4	3	5	7	4	5
525 North	6	6	5	4	5	7	5	5½
600 North	6	6	4	4	4½	5	5	5
Highway 6	6	6	5	3	3	8	4	5

Table 2. Dissolved oxygen concentrations (ppm) in the Croft Ditch, Elkhart River, and Elkhart River North Branch in 1986.

Site	Date 6/5	6/17	7/3	7/18	7/31	8/15	8/28	Mean
Croft Ditch State Road 9	6	11	9	7	11	6	8	8
Below treatment facility	6	10	10	6	10	17	9	9½
Elkhart River 600 West	7	7	7	4	5	6	7	6
North Branch 450 West	7	9	6	5	6	6	7	6½

DISSOLVED OXYGEN CONCENTRATIONS

At the eight Elkhart River South Branch stations, oxygen concentrations ranged from a low of 2½ ppm on July 18 near the B & O railroad bridge to a high of 9 ppm on August 15 at the Port Mitchell Lake outlet (Table 1). Overall, the average concentration was 5½ ppm.

Oxygen concentrations less than 5 ppm were never recorded at the two uppermost stations, Port Mitchell outlet and at River Road, despite the fact the Albion sewage treatment effluent discharges into the Croft Ditch only 1 mile upstream of the River Road station. In fact, oxygen levels within the Croft Ditch, above and below the effluent discharge site, were typically higher than concentrations in the South Branch, North Branch or Elkhart River mainstem (Table 2).

Oxygen concentrations less than 5 ppm were found in the South Branch on six of eight occasions and at least once at all stations below River Road. However, oxygen levels less than 5 ppm did not occur regularly until July, beginning at the B & O railroad site and extending downstream through the Mallard Roost Wetland Area to the Highway 6 site. Oxygen levels less than 3 ppm, considered dangerous to fish, occurred only once at the B & O railroad site but were as low as 3 ppm on two occasions in July at the Highway 6 site.

Oxygen levels in the South Branch increased by August, apparently associated with greater flow during the last half of July. According to the National Weather Service at Fort Wayne, a record amount of rain (11 inches) fell in July, 7½ inches above normal. The largest rainfall occurred on July 15-16 (2½ inches).

In the Elkhart River mainstem, oxygen levels were higher than they were just upstream in the South Branch on all but one occasion, apparently due to the influence of the North Branch. Average oxygen levels in the North Branch

(6½ ppm) were 1½ ppm greater than the average level at the Highway 6 site in the South Branch (5 ppm). On three occasions, the difference was as much as 3 ppm between the North and South Branches.

MANAGEMENT IMPLICATIONS

Unlike previous occasions, oxygen concentrations in the Elkhart River South Branch during summer 1986 seldom decreased to levels inadequate for warmwater fish (less than 3 ppm) but did drop to levels considered stressful to fish (less than 5 ppm).

On June 10, 1982, no oxygen was present at the Highway 6 site. In early July 1981, oxygen levels were 1 ppm at the Highway 6 site and 2 ppm at the 600N site. In 1971, the oxygen concentration was 2½ ppm at the Highway 6 site on June 30 and 3½ ppm at the 600N site on June 2. As far back as 1967, oxygen levels of 1 ppm were recorded at these sites.

Higher amounts of oxygen at these sites in 1986 may be due to greater flow as a result of heavier rains. As shown, oxygen levels did increase after July's record rainfall. Yet heavy rains in June 1981 fell about 2 weeks prior to low oxygen recordings that year. So it is not known to what extent flow actually determines the amount of oxygen in the South Branch.

This project, while not adequately defining the timing or location of low oxygen levels, did show us the South Branch does not always experience dangerously low oxygen levels as was originally suspected. The data also serve as a reference point for further checks of oxygen concentrations in the river.

It is recommended that this project be repeated during summer 1987.

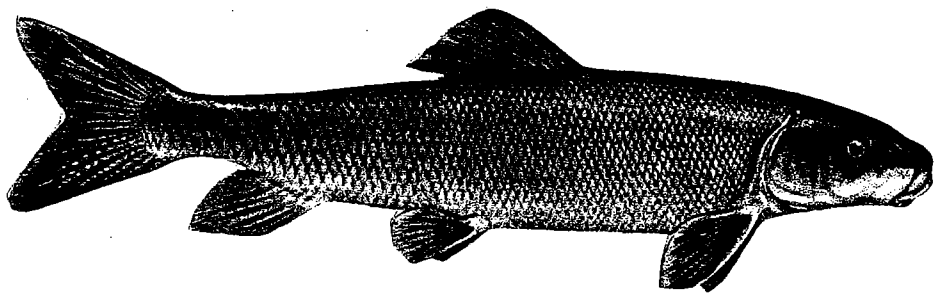
Submitted by: Jed Pearson, Fisheries Biologist
Date: 9/9/86

Approved by: Gary Hudson
Gary Hudson, Fisheries Supervisor
Date: 9/18/86

REFERENCES

Pearson, J. 1981. Elkhart River South Branch Fishery Survey. Indiana Department of Natural Resources.

Peterson, R. 1971. Elkhart River Basin stream survey report. Indiana Department of Natural Resources.



Appendix. Water temperatures (°F) at various sites in the Elkhart River South Branch watershed in 1986.

Site	Date 6/5	6/17	7/3	7/18	7/31	8/15	8/28	Mean
Port Mitchell outlet	70	69	69	80	80	74	67	73
River Road	72	69	65	79	78	73	62	71
Long Lake Road	72	69	65	79	75	71	61	70
B & O Railroad	71	70	65	80	78	71	60	71
400 North	71	70	65	81	78	72	59	71
525 North	72	70	66	82	78	73	60	72
600 North	72	70	66	82	78	73	60	72
Highway 6	73	71	66	83	77	74	61	72
Croft Ditch State Road 9	76	73	68	79	82	76	66	74
Below treatment facility	72	70	64	80	80	68	63	71
Elkhart River 600 West	73	70	66	80	78	74	61	72
North Branch 450 West	76	70	67	80	79	73	64	73