

A Biological Survey of the Pine River above Alma to Michigan to Determine
Effects of Pollution, May 3, 1955

00340
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Bottom samples were collected with a 6' x 6" Ekman Dredge at the following stations:

1. Above Alma, opposite Alma City Golf Course, Gratiot County.
2. About 1/2 mile above Iron Bridge, Section 25, Township 12 north, Range 3 West below Alma, Gratiot County.
3. Below Michigan Chemical Company; impoundment north of St. Louis S. E. Quarter, Section 24, Township 12 north, Range 3 West, Gratiot County.
4. Iron Bridge, 1.75 miles below St. Louis, Middle of Section 18, Township 12 north, Range 2 West, Gratiot County.
5. Porter Road, Middle of Section 17, Township 13 north, Range 1 West, about 12.5 miles below St. Louis, Midland County.
6. 0.6 miles above M-30 Bridge Section 36, Township 14 north, Range 1 West, about 18 miles below St. Louis.

All samples were sieved with a U. S. Standard No. 30 Sieve.

At the station below Alma the bottom muds were black and very oily. Pollution-tolerant aquatic earth worms were able to live there in spite of the oil.

Three samples were collected in the impoundment above the dam at St. Louis. On the right side of the river below the Michigan Chemical Company the bottom was covered with DDT crystals at sampling station 7 (Table 1). There were no bottom animals present at this station. In mid river the bottom was of black very oily mud with a refinery odor. The debris in the sample was saturated with oil. A few pollution tolerant aquatic earth worms were found here. On the left side of the river in the same cross section, the bottom was a black oily mud. Some Sprogyra a rather pollution-tolerant form of green algae was present on the bottom. It was in all stages of decomposition. No bottom animals were present.

At the Iron Bridge below St. Louis a large number of aquatic earth worms (Tubificidae) were present. These organisms reflect the organic pollution from untreated sewage entering the river at St. Louis. At Porter Road approximately 12.5 miles below St. Louis, the river shows improved conditions but the samples showed an unusual number of Tubificids and pollution-tolerant midgeflies of Tendipes decorus.

At the final station on the Pine River 0.6 miles above M-30 bridge, the abundance of aquatic earth worms (Tubificids) further decreased in numbers indicating a further reduction in organic pollution. There were larger numbers of the midgefly, Tendipes decorus, a pollution-tolerant midge, indicating some improvement in bottom conditions over the Porter Road station.

The results of the bottom sampling are given in detail in Table 1. In this table the bottom animals are classified according to their pollutional status.

Above Alma two of the three stations showed a predominance of pollution-tolerant forms. However, the shoreward samples were collected at least 30 feet from shore and the samples did not include many littoral species such as mayflies, dragonflies, damselflies, and water boatmen. The latter were particularly abundant above Alma. These animals cannot live where considerable quantities of oil are present since they must come to the surface periodically for air. Below Alma the water boatmen which were very abundant near the golf course were entirely absent probably due to oil films on the surface at some time.

Above Alma the number of species of bottom animals range from 3 to 13, whereas below Alma the highest number of species record was 5. The abundance of Tubificidae is an indication of the degree of pollution. When their number exceeds 100 to 300 per square foot, pollution with organic wastes is indicated. Their complete absence below the Michigan Chemical Company is an indication of severe pollution.

Conclusions

1. Severely polluted conditions are indicated at the stations below Alma;

below the Michigan Chemical Company at St. Louis; and at the Iron Bridge below St. Louis.

2. Moderate pollution exists at Porter Road.
3. Virtually all of the bottom animals in the Pine River samples below Alma were pollution-tolerant animals.
4. The scarcity of species in the samples below Alma is another indication of adverse pollution effects.
5. Severely polluted conditions exist in the impoundment area below the Michigan Chemical Company where DDT crystals were found on the bottom of the river in one area.

TABLE — Results of a Biological Survey of the Pine River above Alma to M-30, May 31, 1955
Number of Bottom Animals per Square Foot

Station Number	Pollutional Status	Above Alma 125 yds. below bridge at Golf Club			Below Alma Above Iron Bridge			Below Michigan Co.		
		Right 1	Middle 2	Left 3	Right 4	Middle 5	Left 6	Right 7	Middle 8	Left 9
Depth in feet:		3	6.5	4.5	3.5	9.0	8.0	9.0	8.0	11.0
Aquatic Earthworms										
<u>Limnodrilus</u>	P	8	76	40	2,472	1,632	652	-	-	-
<u>Tubifex</u>	P	-	4	12	76	32	8	-	40	-
<u>Dero</u>	P	-	-	20	-	-	-	-	-	-
<u>Stylaria</u>	F	8	-	8	-	16	-	-	-	-
Leeches:										
<u>Glossiphonia stagnalis</u>	P	-	-	-	-	-	-	-	-	-
Mayflies										
<u>Hexagenia limbata</u>	F	12	24	28	-	-	-	-	-	-
Dragonflies										
<u>Gomphus</u>	C	-	-	4	-	-	-	-	-	-
Water Boatmen										
Corixidae	C	4	-	4	-	-	-	-	-	-
Unknown Dipterous larvae ?	P (?)	-	-	-	-	-	-	-	-	-
Biting Flies										
Heleidae (<u>Palpomyia?</u>)	F	8	-	8	-	-	-	-	-	-
Midgeflies										
<u>Tendipes decorus</u>	P	56	-	4	-	4	-	-	-	-
<u>Calopsectra dives</u>	F	-	-	-	-	-	-	-	-	-
<u>Tanytarsus tendens</u>	C (?)	-	-	-	-	-	-	-	4	-
<u>Polypedilum convictum</u>	F	8	-	76	-	-	-	-	-	-
<u>Cryptochironomus digitatus</u>	C	-	-	12	-	-	-	-	-	-
<u>Micotopus bicinctus</u>	F	-	-	-	-	-	-	-	-	-
<u>Procladius sp.</u>	P	32	-	4	-	-	-	-	-	-
<u>Pelopia sp.</u>	C	8	-	-	-	-	-	-	-	-
Unknown midgefly larvae	C	-	-	4	-	-	-	-	-	-
Total animals per square foot		144	104	224	2,548	1,684	660	0	44	5.
Number of species		9	3	13	2	4	2	0	2	
Percentage clean-water	(C)	8.3	0.0	10.7	0.0	0.0	0.0	0.0	0.0	
" Facultative	(F)	25.0	23.1	53.6	0.0	1.0	0.0	0.0	0.0	
" pollution-tolerant	(P)	66.7	76.9	35.7	100.0	99.0	100.0	0.0	100.0	

Co.

Iron Bridge Below St. Louis

Porter Road

0.6 Mile above M-30 Bridge

Left Bank	Bridge	Above Bridge Left Bank	Above Bridge Left Bank	Left Bank	Left Bank	Left Bank	Left Bank	Left Bank
9	10	11	12	13	14	15	16	17
11.0	2.5	3.0	2.5	2.5	3.0	2.0	2.5	2.5
	620	2,432	1,488	1,048	284	888	124	40
	4,640	18,172	28,272	232	68	480	32	4
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
	-	-	-	4	-	-	-	-
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
	-	-	68	-	-	-	-	-
	-	-	-	-	-	-	-	-
	-	-	-	188	160	152	292	376
	-	-	-	-	-	-	-	8
	32	8	120	60	4	8	8	40
	-	-	-	-	-	-	-	-
	8	-	36	-	-	-	-	-
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
	5,300	20,612	29,984	1,532	516	1,528	456	468
	4	3	5	5	4	4	4	5
	0.6	0.1	0.4	3.9	0.8	0.5	1.8	8.5
	0.2	0.0	0.0	0.0	0.0	0.0	-	1.7
	1.2	99.9	99.6	96.1	99.2	99.5	98.2	89.7