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FISH POPULATIONS IN THE SALINE RIVER, WASHTENAW COUNTY, IN 1962[1]

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A fishery survey was made on the Saline River from a point about 2 miles above Saline to the vicinity of Milan in May 1962. This was a pilot study of a program for inventorying fish populations in polluted streams in southern Michigan. Five other streams were investigated similarly in the summer of 1963.

The Saline River was unpolluted above Saline in 1962, but effluent from the city's sewage plant entered the stream near the south boundary of the town. This facility, which began operating in November 1956, provides secondary treatment. Raw sewage entered the river previously. A die casting factory, which expanded its operation in 1948 to include electroplating, is also located in this area. Analysis on the effluent from this plant in December 1952 showed that it contained considerable amounts of cyanide, copper, chromium, and nickel.[2] Such contamination was subsequently reported eliminated,

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* Institute for Fisheries Research Report No. 1719.

1 A contribution from Dingell-Johnson Project F-27-R, Michigan.

2 Anderson, R. O. 1953. The effect of pollution on the invertebrate fauna of the Saline River, Washtenaw County, Michigan. M.S. thesis, Univ. of Mich., 40 p.

but a water sample collected below Station 6 in May 1962 contained 0.1 ppm of cyanide, which indicated some inflow of toxic industrial wastes.

In May 1962, E. E. Schultz and Fred Kent collected fish with a 230-volt, d-c shocker at two locations on a 2-mile stretch of clean water above Saline, at one location in clean water below the dam in Saline, and at four locations in approximately 7 miles of stream below the place of entry of the sewage effluent (Fig. 1). Pertinent physical and chemical data also were obtained at all these sites (Table 1). All fish collected were identified, measured, and weighed. To compare results between stations, the numbers of fish are expressed as number per hour of shocking, and weights as pounds per acre. Doubtless many fish in each sampling area escaped capture, so the numbers and weights are indices rather than actual measures of abundance and bulk. Electrofishing data from other streams of similar size suggest that no more than 40% of the fish present are caught.

The physical characteristics of the stream are quite similar at six of the seven stations. The river was somewhat wider and considerably deeper at the lowermost station.

The polluted and unpolluted areas differed widely with respect to the size and species composition of the fish collections (Tables 2 and 3). The only game fish taken in the polluted section was one bluegill, whereas six species of game fish (mostly rock bass) were collected in the unpolluted section. Coarse fish and forage species also were generally less abundant in the polluted area, although there

was little difference between the two areas in the numbers of white suckers, black bullheads, creek chubs, blacknose dace, and fathead minnows. Sticklebacks were obtained only in the polluted area. Many darters were found in clean water, but only four were collected in the polluted section. Furthermore, only half as many species were obtained at Station 4 in 1962 as were taken when this site was sampled in 1948 (Table 4).

Station 2 produced the smallest collection: 21 fish per hour of shocking, 4.7 pounds per acre. The largest number of fish (897 fish, 60.9 pounds per acre) were captured at Station 7, the uppermost collecting site.

Although more fish were obtained at the three sites below Station 2, these collections from the polluted water were far smaller than those taken at the three stations upstream from where wastes entered the river.

The evidence strongly points to pollution as being responsible for limiting the abundance and variety of fish in the 7-mile section of the Saline River below the sources of contamination.

INSTITUTE FOR FISHERIES RESEARCH

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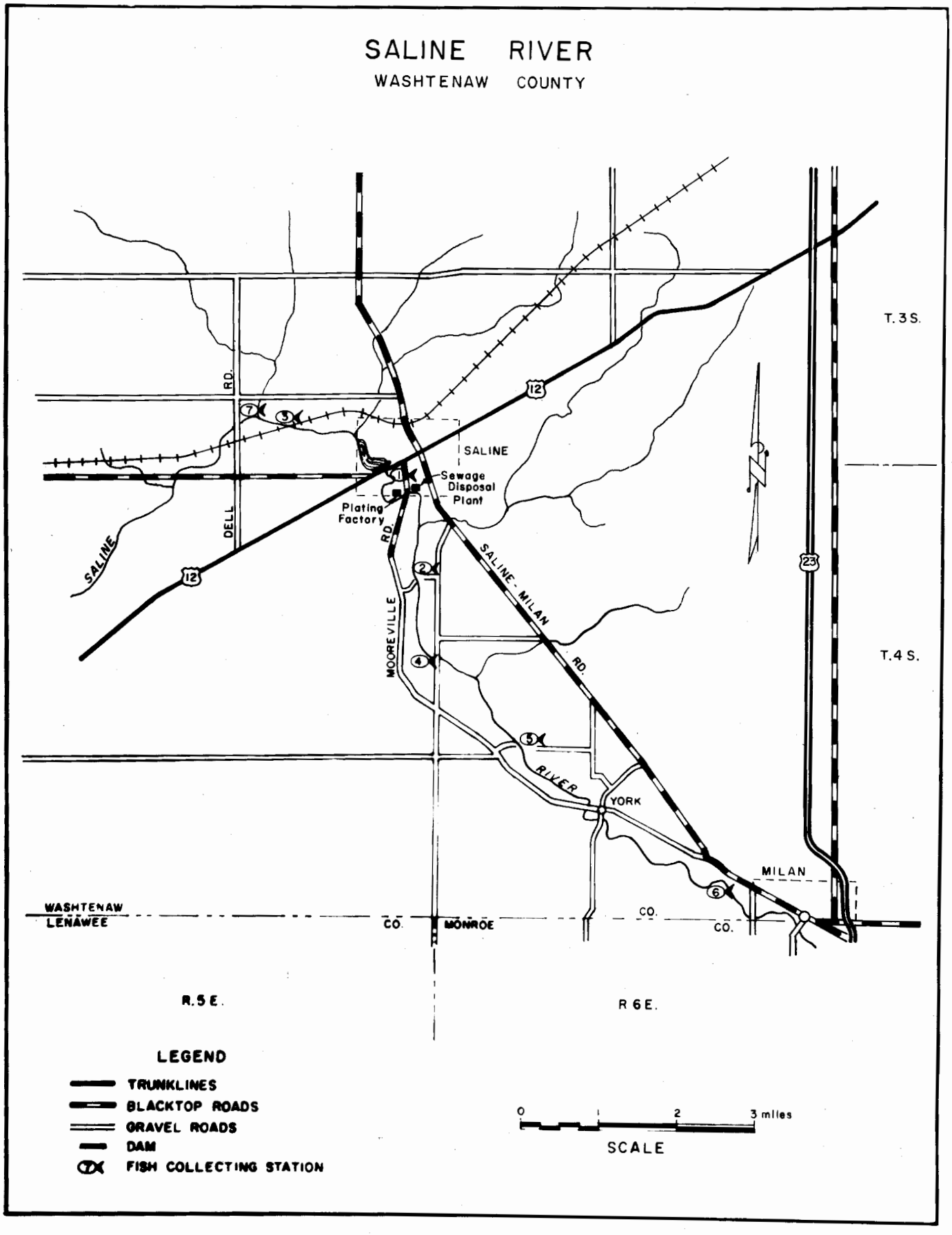

Figure 1.--The upper portion of the Saline River, showing sites where fish were collected in May 1962.

Table 1.--Physical and chemical features of seven fish-collection stations, Saline River, 1962

Item	Unpolluted stations			Polluted stations			
	7	3	1	2	4	5	6
Location of station (Town[N] -Range[E] - Section)	3-5-34	3-5-35	4-5-1	4-5-12	4-5-13	4-6-19, 20	4-6-34
Miles from pollution source	2.5 above	1.5 above	0.2 above	1.5 below	3 below	4.5 below	7 below
Collection date	5-28	5-7	5-1	5-4	5-9	5-11	5-14
Minutes of shocking	35	60	30	60	60	60	60
Length shocked, feet	800	1,000	450	1,400	1,900	2,700	1,000
Area shocked, acres	0.46	0.80	0.26	0.96	1.1	1.94	1.03
Average depth, inches	8	10	12	12	14	10	40
Average width, feet	25	35	25	30	25	35	45
Current flow	Moderate	Moderate	Slow	Moderate	Moderate	Moderate	Slow
Water clarity	Turbid	Turbid	Very turbid	Very turbid	Very turbid	Turbid	Very turbid
Conductivity [a]	...	575	770	770	840	770	770
Air temperature (°F)	82	62	65	76	62	68	85
Water temperature (°F)	70	63	64	66	56	62	64
Bottom soil (estimated percentage):							
Clay	20	...	15	10	15	15	15
Silt	15	30	...	25	40	15	20
Sand	55	50	55	55	35	65	65
Gravel	...	...	15	5	8	3	...
Rubble	10	20	15	5	2	2	...
Dissolved oxygen (ppm)	11.5	10.8	7.0	10.0	12.1	10.0	7.4
pH	8.2	8.3	8.0	8.2	7.9	8.2	8.0
Aquatic vegetation	Sparse	None	None	Sparse	None	Sparse	None
Fish cover	Poor	Poor	Fair	Poor	Fair	Fair	Poor

[a] Reciprocal ohms (18 C).

Table 2. --Fish collected with electric shocker, Saline River, 1962; expressed as numbers per hour

Species	Unpolluted stations			Polluted stations			
	7	3	1	2	4	5	6
Game fish							
Largemouth bass	...	...	2	...	...	...	...
Black crappie	...	...	6	...	...	...	...
Bluegill	...	...	...	1	...	...	...
Pumpkinseed	...	1	2	...	...	...	...
Rock bass	33	19	2	...	...	...	...
Longear sunfish	2	20	...	...	...	...	...
Coarse fish							
Carp	10	3	42	1	1	4	18
White sucker	43	5	30	1	29	12	42
Hog sucker	43	25	58	...	...	...	...
Golden redhorse	2	...	2	...	...	...	...
Black bullhead	...	...	6	3	4	...	...
Stonecat	3	4	...	...	...	...	...
Forage fish							
Creek chub	58	6	6	5	46	46	14
Hornyhead chub	51	11	20	...	...	...	...
River chub	26	6	4	...	...	...	...
Blacknose dace	...	2	...	1	13	...	...
Common shiner	170	81	126	...	19	4	32
Rosyface shiner	3	10	46	...	1	...	...
Golden shiner	...	...	...	...	1	1	12
Bluntnose minnow	43	31	224	...	...	...	...
Fathead minnow	...	...	18	4	11	4	4
Stoneroller	230	49	52	...	1	2	...
Mudminnow	...	1	...	...	...	...	...
Johnny darter	19	36	12	...	...	...	...
Blackside darter	14	23	...	...	...	...	...
Greenside darter	29	16	8	...	...	...	...
Rainbow darter	39	45	12	...	...	2	...
Fantail darter	67	49	12	2	...	...	...
Least darter	...	1	...	...	...	...	...
Iowa darter	...	1	...	...	...	...	...
Mottled sculpin	12	2	...	...	9	1	...
Brook stickleback	...	...	...	3	...	3	...
American brook lamprey	...	5	...	...	1	...	...
Totals	897	452	690	21	136	79	122

Table 3.--Summary of fish collections taken at seven stations on the Saline River, 1962, expressed as numbers of fish per hour of shocking and pounds per surface acre of water

Type of fish	Unpolluted stations					
	7		3		1	
	Number	Pounds	Number	Pounds	Number	Pounds
Game	35	5.7	40	2.7	12	3.0
Coarse	91	29.4	34	5.2	96	14.0
Carp	10	7.9	3	3.8	42	73.1
Forage	761	17.9	375	9.3	540	15.0
Totals	897	60.9	452	21.0	690	105.1

Type of fish	Polluted stations							
	2		4		5		6	
	Number	Pounds	Number	Pounds	Number	Pounds	Number	Pounds
Game	1	0.2	...	...	...	...	...	...
Coarse	4	0.4	33	13.0	12	2.0	42	3.0
Carp	1	3.9	1	0.1	4	7.2	18	7.8
Forage	15	0.2	102	1.9	63	0.5	62	0.3
Totals	21	4.7	136	15.0	79	9.7	122	11.1

Table 4.--Species of fish collected at Station 4 on the Saline River in 1948 and 1962

Species	1948 [a]	1962 [b]
Game fish		
Largemouth bass	X	-
Smallmouth bass	X	-
Black crappie	X	-
Bluegill	X	-
Pumpkinseed	X	-
Coarse fish		
White sucker	X	X
Redhorse	X	-
Black bullhead	-	X
Green sunfish	X	-
Grass pickerel	X	-
Carp	X	X
Forage fish		
Creek chub	X	X
Hornyhead chub	X	-
Blacknose dace	X	X
Common shiner	X	X
Rosyface shiner	X	X
Redfin shiner	X	-
Spotfin shiner	X	-
Golden shiner	X	X
Bluntnose minnow	X	-
Fathead minnow	-	X
Stoneroller	X	X
Mudminnow	X	-
Johnny darter	X	-
Rainbow darter	X	-
Mottled sculpin	X	X
American brook lamprey	-	X

[a] Collected by a fish biology class from the University of Michigan on September 30. The area was seined for 2 hours and 15 minutes with a bag seine (25' x 6') and a common sense minnow seine (15' x 6').

[b] Sampled with electrofishing gear, May 9.