THREE MILE ISLAND AQUATIC STUDY

Monthly Report for November 1979

by

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INTRODUCTION

The ecology of York Haven Pond near the Three Mile Island Nuclear Station (TMINS) has been under investigation since February 1974. Studies initiated in April 1974 include analysis of ambient water quality, ichthyoplankton (far-field), ichthyoplankton entrainment, macroinvertebrates, fish population dynamics, impingement of fishes, creel survey, and thermal plume mapping.

This report discusses the progress of investigations conducted in November 1979.

COMPLIANCE WITH ENVIRONMENTAL TECHNICAL SPECIFICATIONS (ETS):

Objective: To determine compliance with the nonradiological (aquatic) environmental monitoring programs specified in sections 3.1.1.a.(4), 3.1.2.a, 4.2, and 4.6.1 of the ETS and to insure that said programs are performed as detailed in the applicable Generation Procedures.

Progress: Compliance with all programs specified in the ETS and detailed in the Generation Procedures was achieved in November (Table 1), except for impingement and creel survey.

The second impingement survey at Unit 2 was rescheduled when debris clogged the trash bin; the program was completed on the next practicable date. The third creel survey period (1700-2100 h) was not conducted throughout November at the East Dam, West Dam, and General Reservoir areas due to darkness.

A program by program summary of the progress for November follows.

MACROINVERTEBRATES

Objective: To describe the diversity and distribution of the benthic macroinvertebrates occurring at the five benthos sampling stations near TMINS.

Progress: Replicate (4) benthos samples were collected on 5 and 19 November (Table 1). Enumeration, determination of dry weights, and identification of the macroinvertebrates have been completed through 19 November.

ICHTHYOPLANKTON

Objectives: (1) To determine the species composition, abundance, and distribution of ichthyoplankton in York Haven Pond; and (2) To investigate ichthyoplankton entrained at TMINS Unit 1 and 2 Intakes.

Far-Field

Progress: Proofreading of computer generated tables for the 1979 report was begun.

Entrainment

Progress: Tables for the 1979 report were completed and proofread and the written section was started.

TRAPNET

Objectives: (1) To determine the distribution and relative abundance of fishes in the Three Mile Island area vulnerable to trapnet; (2) To monitor the occurrence of diseased fishes; (3) To provide specimens for radiation analysis; and (4) To determine reproductive status for fishes throughout the year.

Progress: Samples were taken on 12-14 and 26-28 November (Table 1). Thirty fish of seven species were taken on 12-14 November (Table 2). Most fish (11) occurred at Station 11A2 and most species (4) and greatest biomass (3.42 kg) at Station 1A3. The rock bass was most abundant and comprised 60.0% of the total catch. No fish were taken in the 12-13 November collection at Station 9B2.

A total of 111 fish of nine species was taken on 26-28 November (Table 3). Most fish (64) were taken at Station 11A2; most species (5)

at stations 1A3, 11A2, and 9B2; and greatest biomass (5.49 kg) at Station 11A2. The channel catfish was most abundant and comprised 72.1% of the total catch. Thirty-two channel catfish and one rock bass were parasitized by leeches. One previously tagged rock bass was recaptured.

No dead fish were observed in November.

SEINE

Objectives: (1) To determine the species composition of fish upstream and downstream from the TMINS Discharge vulnerable to seine; (2) To determine the relative condition factor for important species; and (3) To determine the reproductive status for fishes throughout the year.

Progress: Collections were made at the 10 stations on 12 and 27 November (Table 1). A total of 2,441 fish of 14 species was taken on 12 November (Table 4). Most fish (1,643) and greatest biomass (0.27 kg) occurred at Station 13B5 while most species (7) were found at Station 16A5. The spotfin shiner was most abundant and comprised 87.2% of the total catch. The following fishes exhibited slight black spot infections: spotfin shiner (95 specimens), bluntnose minnow (7), comely shiner (4), tessellated darter (2), and common shiner (1). Protozoan infections were observed on two bluntnose minnow. Two pumpkinseed exhibited tail rot. No pattern of parasite infection was observed with respect to the location of TMINS.

Sampling on 27 November yielded 443 fish of 15 species (Table 5). Most fish (128) and most species (11) occurred at Station 4A2 while

greatest biomass (0.24 kg) was found at Station 9A1. The spotfin shiner (58.9% of the total catch), bluntnose minnow (18.7%), and spottail shiner (10.2%) were common. The following fishes exhibited slight black spot infections: spotfin shiner (45 specimens), bluntnose minnow (27), and golden shiner and spottail shiner (1 each). One spottail shiner was parasitized by an anchor worm and one bluntnose minnow by protozoans. No pattern of parasite infection was observed with respect to the location of TMINS.

IMPINGEMENT OF FISH

Objectives: (1) To determine the numbers and species impinged on the river water intake screens; (2) To determine day-night differences in impingement frequency; and (3) To determine the extent of mortality of impinged fish.

Progress: Impingement surveys were conducted at the Unit 1 Intake on 14-15 and 28-29 November (Table 1). A total of 50 fish of 4 species weighing 62.5 g was collected (Tables 6 through 9). Forty-eight fish were taken on 28-29 November during high river flow conditions. Young fish accounted for 7 specimens, juveniles for 24, and adults for 19. Twenty-four fish were alive and 26 were dead. The total estimated impingement for November from Unit 1 was 750 fish weighing 937.5 g (2.1 lb).

Surveys were conducted at the Unit 2 Intake on 14-15 November and 30 November - 1 December (Table 1). The latter Unit 2 survey was not concurrent with that at Unit 1 due to trash bin problems at Unit 2.

During the 30 November - 1 December survey the Unit 2 screens were on continuous run. Unit 2 impinged 31 fish of 9 species weighing 50.9 g (Tables 10 through 13). The second survey yielded 25 fish during high river flow conditions. Young fish comprised 27 individuals, juveniles 3, and adults 1; 4 fish were alive and 27 were dead. The total estimated impingement from Unit 2 for November was 465 fish weighing 763.5 g (1.7 lb).

The total estimated impingement for TMINS in November was 1,215 fish weighing 1,701 g (3.8 lb).

ELECTROFISHING

Objectives: (1) To provide specimens for radiation analysis; and (2) To determine the relative abundance of fishes vulnerable to electrofishing in various parts of York Haven Pond.

Progress: Sampling was conducted on 5, 6, 19, and 20 November (Table 1). Twenty-four collections in 12 zones yielded 711 specimens of 19 species (Table 14). The walleye (178 specimens), rock bass (105), quillback (81), and pumpkinseed (61) were most abundant.

CREEL SURVEY

Objectives: (1) To determine the extent and success of sport fishing; and (2) To determine information on angler residence and use of catch.

Progress: Creel surveys were conducted in all areas on 2, 10, 18, and 27 November (Table 1). No surveys were conducted at the General Reservoir, West Dam, or East Dam during the 1700-2100 h period due to

darkness. The 79 anglers interviewed fished 169.30 hours and caught 235 fish (Tables 15 through 18). The actual harvest was 120 fish or 51.1% of the total catch. The mean catch per effort (c/e) was 1.39. Most anglers (35), largest total catch (104), largest total harvest (86), and most hours fished (84.40) were recorded at the York Haven Generating Station. The highest mean c/e (3.87) occurred at the East Dam.

Walleye (79 specimens) were caught in greatest numbers. Other common species included the smallmouth bass (58), unidentified crappies (40), black crappie (31), and white crappie (11). Approximately 73% of the anglers interviewed lived in York or Dauphin counties. Most of the anglers reported they eat some of their catch.

AMBIENT WATER QUALITY

Objective: To determine the concentrations of selected water quality parameters in ambient river areas and the TMINS effluent.

Progress: Water quality samples were collected on 5 and 19 November at the five river stations (Table 1). Data were analyzed and tabulated; results are presented in Table 19.

On 5 November values for water temperature, dissolved copper, and dissolved zinc were highest at Station 9B1 (1975 m downstream from the TMINS Discharge); pH and total dissolved solids were highest at 1A2 (upstream of the Discharge). Values for turbidity and total zinc were highest at Station 11A1 (TMINS Discharge).

On 19 November values for dissolved oxygen and total zinc were highest at Station 11A2; turbidity and sulfate were highest at 9B1.

Values for pH and dissolved zinc were highest at stations 1A1 and 1A2, respectively.

Parameters, for which state water quality criteria have been established, were not exceeded at any station in November.

Table 1

Sampling conducted in compliance with applicable Generation Procedures in November 1979.

PROGRAM	Nov 1-3	Nov 4-10	Nov 11-17	Nov 18-24	Nov 25-30
Macroinvertebrates		X		X	
Ichthyoplankton:					
Far-Field [1]					
Entrainment [1]					
Trapnet			X		X
Seine			X		X
Impingement of Fish			X		X
Electrofishing		X		X	
Creel Survey	X	X		X	X
Ambient Water Quality		X		X	

1 Program terminated for 1979 as of 31 August.

Table 2

Fishes taken by trapnet on 12-14 November 1979 near TMINS.

Station	TM-AQF-1A3		TM-AQF-11A2		TM-AQF-11A3		TM-AQF-9B2		Total	%
Date	12-13	13-14	12-13	13-14	12-13	13-14	12-13	13-14		
Time	1433-1350	1352-1404	1414-1336	1340-1346	1404-1322	1327-1333	1353-1311	1314-1319		
Air Temp. (C)	9.5, 7.5	7.5, 7.5	9.5, 7.5	7.5, 7.5	9.0, 7.0	7.0, 7.5	9.5, 7.5	7.5, 8.0		
Water Temp. (C)	9.0, 8.0	8.0, 8.0	9.0, 8.5	8.5, 8.0	9.0, 8.0	8.0, 8.0	9.0, 8.5	8.5, 8.5		
Dissolved Oxygen (mg/l)	9.8, 10.6	10.6, 11.2	10.2, 10.8	10.8, 11.4	10.2, 11.2	11.2, 11.4	12.0, 14.1	14.1, 11.0		
pH	7.6, 7.7	7.7, 7.7	7.3, 8.0	8.0, 7.7	7.5, 8.1	8.1, 7.6	7.7, 8.1	8.1, 7.6		
Secchi Disc (cm)	97, 104	104, 61	94, 107	107, 61	81, 97	97, 61	79, 102	102, 61		
River Stage (m)	1.51, 1.48	1.48, 1.45	1.51, 1.48	1.48, 1.45	1.51, 1.48	1.48, 1.45	1.51, 1.48	1.48, 1.45		
Weather	Partly Cloudy, Light Rain	Light Rain, Partly Cloudy	Partly Cloudy, Light Rain	Light Rain, Partly Cloudy	Partly Cloudy, Light Rain	Light Rain, Partly Cloudy	Partly Cloudy, Light Rain	Light Rain, Partly Cloudy		
No. of Specimens	2	4	5	6	6	4	-	3	30	
No. of Species	2	2	1	1	2	3	-	3	7	
Carp	1	-	-	-	-	-		-	1	3.3
Shorthead redhorse	-	-	-	-	1	2	NO	-	3	10.0
Channel catfish	-	-	-	-	-	-		1	1	3.3
Rock bass	-	3	5	3	5	1	FISH	1	18	60.0
Redbreast sunfish	1	-	-	-	-	-		-	1	3.3
Yellow perch	-	-	-	2	-	-	TAKEN	-	2	6.7
Walleye	-	1	-	1	-	1		1	4	13.3

Table 3

Fishes taken by trapnet on 26-28 November 1979 near TMINS.

Station	TM-AQF-1A3		TM-AQF-11A2		TM-AQF-11A3		TM-AQF-9B2		Total	%
Date	26-27	27-28	26-27	27-28	26-27	27-28	26-27	27-28		
Time	0931-0955	0958-0951	0920-0925	0929-0922	0913-0906	0912-0908	0904-0844	0849-0845		
Air Temp. (C)	17.0, 10.0	10.0, 11.5	17.5, 10.0	10.0, 11.5	17.5, 10.0	10.0, 12.0	17.0. 10.5	10.5, 11.5		
Water Temp. (C)	13.5, 12.5	12.5, 10.5	13.5, 12.5	12.5, 11.0	13.5, 12.5	12.5, 11.0	13.5, 12.5	12.5, 11.0		
Dissolved Oxygen (mg/l)	9.2, 9.4	9.4, 9.4	9.6, 9.5	9.5, 9.4	12.2, 9.4	9.4, 9.6	12.2, 9.2	9.2, 9.5		
pH	7.7, 7.5	7.5, 7.2	7.7, 7.4	7.4, 7.2	7.7, 7.5	7.5, 7.1	7.7, 7.5	7.5, 7.5		
Secchi Disc (cm)	117, 28	28, 10	76, 30	30, 10	86, 38	38, 10	86, 33	33, 10		
River Stage (m)	1.29, 1.63	1.63, 3.05	1.29, 1.63	1.63, 3.05	1.29, 1.63	1.63, 3.05	1.29, 1.63	1.63, 3.05		
Weather	Light Rain, Clear	Clear, Overcast	Light Rain, Clear	Clear, Overcast	Light Rain, Clear	Clear, Partly Cloudy	Light Rain, Clear	Clear, Partly Cloudy		
No. of Specimens	7	2	50	14	12	3	20	3	111	
No. of Species	5	2	4	2	3	2	5	2	9	
Quillback	-	-	-	-	-	-	2	-	2	1.8
White sucker	-	-	1	-	-	-	-	-	1	0.9
Brown bullhead	1	-	-	-	-	-	-	-	1	0.9
Channel catfish	2	1	45	13	7	1	9	2	80	72.1
Margined madtom	1	-	-	-	-	-	-	-	1	0.9
Rock bass	2	1	3	-	3	2	1	1	13	11.7
Pumpkinseed	-	-	1	-	2	-	6	-	9	8.1
Black crappie	-	-	-	-	-	-	2	-	2	1.8
Walleye	1	-	-	1	-	-	-	-	2	1.8

Table 4

Fishes taken by seine on 12 November 1979 near TMINS.

Station	TM-AQF-13B5	TM-AQF-10B5	TM-AQF-16A5	TM-AQF-1A2	TM-AQF-16A1	TM-AQF-10A2	TM-AQF-9B6	TM-AQF-9A1	TM-AQF-9B3	TM-AQF-4A2	Total	% Catch
Time	0849	1147	0917	1000	1015	1037	1055	1112	1126	0940		
Air Temp. (C)	6.5	3.5	5.5	6.5	6.0	6.5	6.5	6.5	6.5	7.5		
Water Temp. (C)	9.0	9.5	8.0	8.0	8.0	8.5	8.5	8.5	8.5	9.0		
Dissolved Oxygen (mg/l)	11.2	11.2	10.5	10.2	10.2	10.7	10.3	10.2	10.2	9.8		
pH	8.0	7.9	8.0	8.1	7.7	7.7	7.8	7.7	7.7	7.8		
Secchi Disc (cm)	122	66*	130	94	94	91	112	112	102	142		
River Stage (m)	1.51	1.51	1.51	1.51	1.51	1.51	1.51	1.51	1.51	1.51		
Weather	Overcast	Partly Cloudy	Partly Cloudy	Partly Cloudy	Partly Cloudy	Overcast	Overcast	Overcast	Overcast	Overcast		
No. of Specimens	1643	90	99	9	157	44	82	3	271	43	2441	
No. of Species	6	4	7	2	5	5	6	2	6	5	14	
No. of Hauls	4	4	6	4	4	4	4	4	4	4	42	
Golden shiner	-	1	-	-	-	-	-	-	-	-	1	+
Comely shiner	6	-	-	-	6	-	1	1	11	-	25	1.0
Common shiner	-	-	-	-	-	1	-	-	-	-	1	+
Spottail shiner	-	-	7	-	-	1	-	-	-	-	8	0.3
Swallowtail shiner	18	-	3	-	-	2	1	-	-	2	26	1.1
Rosyface shiner	-	-	-	-	2	-	-	-	-	-	2	0.1
Spotfin shiner	1462	87	81	-	146	34	75	-	235	8	2128	87.2
Mimic shiner	122	1	-	-	-	-	1	-	17	-	141	5.8
Bluntnose minnow	34	-	3	-	-	-	1	-	4	20	62	2.5
Fallfish	-	-	1	-	-	-	-	-	-	-	1	+
Rock bass	-	1	-	-	-	-	-	-	-	-	1	+
Pumpkinseed	-	-	-	2	2	-	-	-	1	10	15	0.6
Tessellated darter	1	-	3	7	1	6	3	2	3	3	29	1.2
Banded darter	-	-	1	-	-	-	-	-	-	-	1	+

* Clear to bottom at indicated depth.
\+ Less than 0.05%.

Table 5

Fishes taken by seine on 27 November 1979 near TMINS.

Station	TM-AQF-12B5	TM-AQF-10B5	TM-AQF-16A5	TM-AQF-1A2	TM-AQF-16A1	TM-AQF-10A2	TM-AQF-9B6	TM-AQF-9A1	TM-AQF-9B3	TM-AQF-4A2	Total	% Catch
Time	1538	1218	1517	1501	1405	1335	1315	1257	1238	1435		
Air Temp. (C)	12.0	12.0	14.5	13.5	11.0	13.5	13.5	12.5	12.5	13.5		
Water Temp. (C)	13.0	13.5	12.5	13.0	13.0	13.0	13.5	13.0	13.5	13.5		
Dissolved Oxygen (mg/l)	9.6	10.3	10.4	9.6	9.6	9.9	9.8	9.6	9.6	9.0		
pH	7.4	7.5	7.2	7.3	7.4	7.3	7.3	7.2	7.4	7.1		
Secchi Disc (cm)	61	61	107	33	33	33	33	30	36	30		
River Stage (m)	1.63	1.63	1.63	1.63	1.63	1.63	1.63	1.63	1.63	1.63		
Weather	Clear	Partly Cloudy	Clear	Clear	Partly Cloudy	Partly Cloudy	Overcast	Partly Cloudy	Partly Cloudy	Partly Cloudy		
No. of Specimens	37	12	63	10	65	78	28	2	20	128	443	
No. of Species	3	5	4	5	7	8	3	2	2	11	15	
No. of Hauls	4	5	4	4	5	5	5	5	5	3	45	
Golden shiner	1	1	-	-	1	-	-	-	-	3	6	1.4
Comely shiner	-	-	-	-	-	2	-	-	-	-	2	0.5
Spottail shiner	-	2	-	1	1	17	17	-	1	6	45	10.2
Swallowtail shiner	-	-	2	-	1	-	-	-	-	-	3	0.7
Rosyface shiner	-	-	1	-	-	-	-	-	-	-	1	0.2
Spotfin shiner	31	7	59	6	58	52	8	-	19	21	261	58.9
Mimic shiner	-	-	-	-	-	1	-	-	-	2	3	0.7
Bluntnose minnow	-	1	1	1	-	3	-	-	-	77	83	18.7
Quillback	-	-	-	-	-	1	-	-	-	-	1	0.2
Rock bass	-	-	-	-	-	-	-	-	-	3	3	0.7
Pumpkinseed	-	-	-	-	1	-	-	-	-	6	7	1.6
Bluegill	5	-	-	-	-	-	-	-	-	7	12	2.7
Smallmouth bass	-	-	-	1	1	1	-	1	-	1	5	1.1
White crappie	-	-	-	-	-	-	-	-	-	1	1	0.2
Tessellated darter	-	1	-	1	2	1	3	1	-	1	10	2.3

Table 6

Numbers of fishes impinged at the Unit 1 Intake during a 24-hr impingement survey on 14-15 November 1979.

Date	14		15		15			
Time	2000		0400		1200			
Volumetric Flow Rate (m^3/s)	1.71		1.71		1.71			
Number of River Water Pumps:								
Nuclear Service	2		2		2			
Secondary Service	1		1		1			
Decay Heat	1		1		1			
Intake Velocity (cm/s)	-20		-20		-20			
River Flow (m^3/s)	812.7		798.5		791.5			
Air Temp. (C)	5.0		4.0		5.0			
Water Temp. (C)	8.0		7.0		7.0		Total	
Condition of Fish	Alive	Dead	Alive	Dead	Alive	Dead	Alive	Dead
Margined madtom	-	-	-	-	1	-	1	-
Tessellated darter	-	-	-	-	1	-	1	-
Total	-	-	-	-	2	-	2	-

Table 7

Summary of lengths, weights, breeding condition, and numbers of fishes impinged at the Unit 1 Intake on 14-15 November 1979.

Species	Fork Length Range (5 mm groups)	Reproductive Status	Total Weight (g)	Total Number
Margined madtom	71-75	1 Juvenile	3.3	1
Tessellated darter	51-55	1 Adult	1.4	1
Total			4.7	2

Table 8

Numbers of fishes impinged at the Unit 1 Intake during a 24-hr impingement survey on 28-29 November 1979.

Date	28		29		29			
Time	2000		0400		1200			
Volumetric Flow Rate (m^3/s)	1.71		1.71		1.71			
Number of River Water Pumps:								
Nuclear Service	2		2		2			
Secondary Service	1		1		1			
Decay Heat	1		1		1			
Intake Velocity (cm/s)	-27		-27		-27			
River Flow (m^3/s)	4502.4		4502.4		4190.9			
Air Temp. (C)	5.0		3.5		4.0			
Water Temp. (C)	9.5		9.0		7.0		Tot.	
Condition of Fish	Alive	Dead	Alive	Dead	Alive	Dead	Alive	Dead
Channel catfish	-	-	-	1	2	-	2	1
Margined madtom	1	-	1	-	1	-	3	-
Tessellated darter	2	9	8	6	7	9	17	24
Banded darter	-	1	-	-	-	-	-	1
Total	3	10	9	7	10	9	22	26

Table 9

Summary of lengths, weights, breeding condition, and numbers of fishes impinged at the Unit 1 Intake on 28-29 November 1979.

Species	Fork Length Range (5 mm groups)	Reproductive Status	Total Weight (g)	Total Number
Channel catfish	46-55	3 Young	4.5	3
Margined madtom	41-50, 56-60	2 Young, 1 Juvenile	3.5	3
Tessellated darter	36-65	2 Young, 21 Juvenile, 18 Adult	49.2	41
Banded darter	36-40	1 Juvenile	0.6	1
Total			57.8	48

Table 10

Numbers of fishes impinged at the Unit 2 Intake during a 24-hr impingement survey on 14-15 November 1979.

Date	14		15		15			
Time	2000		0400		1200			
Volumetric Flow Rate (m^3/s)	3.17		3.17		3.17			
Number of River Water Pumps:								
Nuclear Service	2		2		2			
Secondary Service	2		2		2			
Intake Velocity (cm/s)	-5		-5		-5			
River Flow (m^3/s)	812.7		798.5		791.5			
Air Temp. (C)	5.0		4.0		5.0			
Water Temp. (C)	8.0		7.0		7.0		Total	
Condition of Fish	Alive	Dead	Alive	Dead	Alive	Dead	Alive	Dead
Channel catfish	-	1	1	-	-	1	1	2
Pumpkinseed	-	-	-	2	-	-	-	2
Bluegill	1	-	-	-	-	-	1	-
Total	1	1	1	2	-	1	2	4

Table 11

Summary of lengths, weights, breeding condition, and numbers of fishes impinged at the Unit 2 Intake on 14-15 November 1979.

Species	Fork Length Range (5 mm groups)	Reproductive Status	Total Weight (g)	Total Number
Channel catfish	46-60	3 Young	4.7	3
Pumpkinseed	36-40, 46-50	2 Young	3.2	2
Bluegill	36-40	1 Young	0.8	1
Total			8.7	6

Table 12

Numbers of fishes impinged at the Unit 2 Intake during a 24-hr impingement survey on 30 November - 1 December 1979.

Date	30		1		1			
Time	2000		0400		1200			
Volumetric Flow Rate (m^3/s)	2.09		2.09		2.09			
Number of River Water Pumps:								
Nuclear Service	1		1		1			
Secondary Service	2		2		2			
Intake Velocity (cm/s)	-15		-15		-15			
River Flow (m^3/s)	2945.0		2435.3		2237.0			
Air Temp. (C)	0.5		-2.0		4.0			
Water Temp (C)	5.5		5.0		6.5			
Condition of Fish	Alive	Dead	Alive	Dead	Alive	Dead	Total Alive	Total Dead
Common shiner	-	1	-	-	-	-	-	1
Swallowtail shiner	-	1	-	-	-	-	-	1
Spotfin shiner	-	2	-	1	-	1	-	4
Channel catfish	1	1	-	7	1	3	2	11
Rock bass	-	-	-	-	-	1	-	1
Bluegill	-	1	-	-	-	-	-	1
Black crappie	-	-	-	-	-	1	-	1
Tessellated darter	-	1	-	-	-	2	-	3
Total	1	7	-	8	1	8	2	23

Table 13

Summary of lengths, weights, breeding condition, and numbers of fishes impinged at the Unit 2 Intake on 30 November - 1 December 1979.

Species	Fork Length Range (5 mm groups)	Reproductive Status	Total Weight (g)	Total Number
Common shiner	51-55	1 Juvenile	1.9	1
Swallowtail	26-30	1 Young	0.2	1
Spotfin shiner	21-30, 36-45	3 Young, 1 Juvenile	1.8	4
Channel catfish	41-60, 66-75	13 Young	25.2	13
Rock bass	31-35	1 Young	1.0	1
Bluegill	36-40	1 Young	1.0	1
Black crappie	81-85	1 Young	8.4	1
Tessellated darter	31-35, 46-55	1 Young, 1 Juvenile, 1 Adult	2.7	3
Total			42.2	25

Table 14

Numbers of fishes captured by AC electrofisher near TMINS in November 1979.

Zone	15B2	16B8	4A1	16A2	15A2	15A1	11B1	10B3	10B1	13A1	10A3	9B5
Date	5 Nov	5 Nov	5 Nov	5 Nov	5 Nov	5 Nov	6 Nov	6 Nov	6 Nov	6 Nov	6 Nov	6 Nov
Time	1809	1841	1910	1935	2000	2025	1753	1822	1853	1927	1950	2015
Duration (min)	13	14	15	15	16	15	15	14	16	14	13	14
Air Temp. (C)	4.0	6.5	5.5	5.5	5.0	4.5	9.5	9.0	8.5	10.5	9.5	9.5
Water Temp. (C)	8.0	8.5	8.0	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5
Dissolved Oxygen (mg/l)	13.2	10.0	9.7	9.8	9.9	10.1	14.4	11.6	11.0	10.9	10.6	11.1
pH	7.9	8.1	7.6	7.9	7.9	7.6	7.9	7.6	7.5	7.3	7.7	7.5
Conductivity (micromhos/cm)	190	164	198	230	170	166	240	154	153	173	175	170
Secchi Disc (cm)	46	38	23	18	31	36	81	46	46	31	28	33
Volts	190	195	180	180	190	200	190	200	200	200	195	200
Amps	3.0	2.5	3.5	3.5	2.5	2.5	4.0	2.0	2.5	3.5	4.0	3.5
Gizzard shad	-	8	-	-	-	2	-	2	-	1	2	1
Carp	-	6	2	3	1	3	4	3	-	1	-	1
Golden shiner	-	-	-	-	-	-	-	-	-	-	-	-
Fallfish	-	-	-	-	-	1	-	-	-	-	-	-
Quillback	-	-	-	1	1	-	4	3	16	-	1	-
White sucker	-	1	1	-	1	-	-	-	1	1	5	5
Northern hog sucker	-	-	-	-	-	-	-	-	-	-	-	-
Shorthead redhorse	-	1	-	2	2	-	-	1	-	-	-	-
Channel catfish	-	-	-	-	-	9	-	1	-	-	1	-
Rock bass	4	3	-	-	-	-	-	4	2	2	1	-
Redbreast sunfish	-	1	-	-	-	-	2	-	1	-	-	-
Pumpkinseed	1	-	1	-	-	-	4	-	2	-	-	1
Bluegill	-	-	-	-	-	-	-	-	-	-	-	-
Smallmouth bass	5	5	-	3	1	-	1	6	-	7	3	3
Largemouth bass	-	-	-	-	-	-	-	-	-	-	-	-
White crappie	-	-	-	-	-	-	-	-	-	-	-	-
Black crappie	-	-	-	-	-	-	1	-	-	-	-	-
Yellow perch	-	-	-	-	-	-	-	-	-	1	-	-
Walleye	4	2	1	2	-	-	10	36	8	4	6	28
No. of Specimens	14	27	5	11	6	15	26	56	30	17	19	39
No. of Species	4	8	4	5	5	4	7	8	6	7	7	6

Table 14 continued.

Zone	15B2	16B8	4A1	16A2	15A2	15A1	13A1	10A3	9B5	10B1	10B3	11B1	Total
Date	19 Nov	19 Nov	19 Nov	19 Nov	19 Nov	19 Nov	20 Nov	20 Nov	20 Nov	20 Nov	20 Nov	20 Nov	
Time	1756	1830	1900	1928	1959	2022	1747	1816	1845	1920	1945	2022	
Duration (min)	16	14	15	15	14	15	18	14	17	14	16	21	
Air Temp. (C)	7.0	7.5	7.5	7.0	7.0	7.0	9.0	9.0	7.5	6.0	7.5	6.0	
Water Temp. (C)	8.0	8.0	8.5	7.0	7.5	7.5	7.5	8.0	8.5	8.0	8.0	8.5	
Dissolved Oxygen (mg/l)	15.4	11.9	11.0	10.8	11.6	11.7	11.1	10.8	11.1	11.9	11.8	12.2	
pH	7.9	8.3	8.2	7.7	7.8	7.8	7.7	7.9	7.8	7.8	7.8	8.4	
Conductivity (micromhos/cm)	300	178	300	300	192	186	300	300	300	194	185	300	
Secchi Disc (cm)	137	122	102	99	152	137	125	119	125	163	183	127	
Volts	190	200	195	190	195	195	190	195	185	200	200	190	
Amps	5.0	2.5	5.0	5.5	3.5	3.5	5.0	5.5	5.5	4.0	4.5	5.5	
Gizzard shad	-	-	-	1	-	-	5	1	-	-	-	-	23
Carp	-	2	1	-	1	3	3	-	2	1	1	3	41
Golden shiner	-	-	-	-	-	-	-	-	-	-	-	42	42
Fallfish	-	-	-	-	-	-	-	-	-	-	-	-	1
Quillback	-	1	-	-	-	-	6	4	26	16	2	-	81
White sucker	-	-	2	1	1	-	-	1	-	-	-	-	20
Northern hog sucker	-	-	-	4	2	1	1	-	-	-	-	-	8
Shorthead redhorse	-	-	-	-	-	-	-	-	1	-	-	-	7
Channel catfish	-	-	-	2	-	2	-	-	-	-	-	-	15
Rock bass	13	10	1	15	3	8	3	10	4	6	13	3	105
Redbreast sunfish	4	4	1	1	-	1	1	-	-	1	-	3	20
Pumpkinseed	4	-	6	1	2	-	-	-	1	-	-	38	61
Bluegill	-	-	-	-	-	-	-	-	-	-	-	9	9
Smallmouth bass	2	7	-	5	1	2	5	1	-	-	1	-	58
Largemouth bass	-	-	-	-	-	-	-	-	-	-	-	6	6
White crappie	-	-	-	-	-	-	-	-	-	-	-	1	1
Black crappie	-	-	-	-	-	-	-	-	-	1	-	27	29
Yellow perch	-	-	-	-	-	-	1	1	1	1	1	-	6
Walleye	3	2	2	7	1	-	21	15	22	-	3	1	178
No. of Specimens	26	26	13	37	11	17	46	33	57	26	21	133	711
No. of Species	5	6	6	9	7	6	9	7	7	6	6	10	19

Table 15

Creel survey data from the GR for each survey day in November 1979.

Day	2 Fri			10 Sat			18 Sun			27 Tue			
Weather	Overcast, Heavy Rain			Light Rain, Overcast			Clear, Partly Cloudy			Clear, Partly Cloudy			
River Stage (m)	1.26			1.55			1.37			1.63			
Air Temperature (C)	16.5	13.0	NA	14.5	13.0	NA	15.0	19.5	NA	11.0	12.5	NA	
Water Temperature (C)	11.5	11.5	NA	10.0	10.5	NA	6.5	8.0	NA	12.5	13.0	NA	
Times:													
a) morning (0900-1300)	a			a			a			a			
b) afternoon (1300-1700)		b			b			b			b		
c) evening (1700-2100)			c			c			c			c	TOTAL
Total Per Time Period:													
Anglers	3	4	NO SURVEY	4	1	NO SURVEY	9	12	NO SURVEY	-	-	NO SURVEY	33
Fish Caught	2	6		12	-		13	11		-	-		44
Fish Kept	1	3		3	-		11	11		-	-		29
Hours Fished	3.75	1.40		8.50	1.00		16.25	29.50		-	-		60.40
Catch/Effort (h)	0.53	4.29		1.41	-		0.80	0.37		-	-		0.73
Day Totals:													
Anglers		7			5			21			-		
Fish Caught		8			12			24			-		
Fish Kept		4			3			22			-		
Hours Fished		5.15			9.50			45.75			-		
Catch/Effort (h)		1.55			1.26			0.52			-		
Species	a	b	c	a	b	c	a	b	c	a	b	c	Total
Carp	-	-	NO	1R	-	NO	-	-	NO	-	-	NO	- 1R 1
Fallfish	-	-		1R	-		-	-		-	-		- 1R 1
Smallmouth bass	1K 1R	3K 3R	SURVEY	3K 7R	-	SURVEY	11K 2R	11K	SURVEY	-	-	SURVEY	29K 13R 42

R Released.
K Kept.
NA Not available.

Table 16

Creel survey data from the East Dam for each survey day in November 1979.

Day	2 Fri			10 Sat			18 Sun			27 Tue			
Weather	Overcast, Heavy Rain			Overcast			Clear			Clear, Partly Cloudy			
River Stage (m)	1.26			1.55			1.37			1.63			
Air Temperature (C)	15.5	12.5		14.5	13.5	NA	11.5	18.0	NA	10.0	13.0	NA	
Water Temperature (C)	12.0	12.0	NA	10.0	10.5	NA	6.5	8.0	NA	12.5	12.5	NA	
Times:													
a) morning (0900-1300)	a			a			a			a			
b) afternoon (1300-1700)		b			b			b			b		
c) evening (1700-2100)			c			c			c			c	TOTAL
Total Per Time Period:													
Anglers	-	-	NO SURVEY	3	2	NO SURVEY	2	2	NO SURVEY	-	-	NO SURVEY	9
Fish Caught	-	-		39	47		1	-		-	-		87
Fish Kept	-	-		1	4		-	-		-	-		5
Hours Fished	-	-		10.00	8.00		0.50	4.00		-	-		22.50
Catch/Effort (h)	-	-		3.90	5.88		2.00	-		-	-		3.87
Day Totals:													
Anglers		-			5			4			-		
Fish Caught		-			86			1			-		
Fish Kept		-			5			-			-		
Hours Fished		-			18.00			4.50			-		
Catch/Effort (h)		-			4.78			0.22			-		

Species	a	b	c	a	b	c	a	b	c	a	b	c	Total	
Suckers (Catostomidae)[1]	-	-		-	1R		-	-		-	-		- 1R	1
Smallmouth bass	-	-	NO	1R	2K 2R	NO	1R	-	NO	-	-	NO	2K 4R	6
Yellow perch	-	-		-	1K		-	-		-	-		1K -	1
Walleye	-	-	SURVEY	1K 37R	1K 40R	SURVEY	-	-	SURVEY	-	-	SURVEY	2K 77R	79

1 General identification.
R Released.
K Kept.
NA Not Available.

Table 17

Creel survey data from the West Dam for each survey day in November 1979..

Day	2 Fri			10 Sat			18 Sun			27 Tue			
Weather	Overcast, Heavy Rain			Light Rain, Overcast			Clear			Clear, Partly Cloudy			
River Stage (m)	1.26			1.55			1.37			1.63			
Air Temperature (C)	14.5	13.5	NA	14.5	13.0	NA	15.0	18.0	NA	11.0	12.5	NA	
Water Temperature (C)	11.5	11.5	NA	10.0	10.5	NA	6.5	8.0	NA	12.5	13.0	NA	
Times:													
a) morning (0900-1300)	a			a			a			a			
b) afternoon (1300-1700)		b			b			b			b		
c) evening (1700-2100)			c			c			c			c	TOTAL
Total Per Time Period:													
Anglers	-	-	NO SURVEY	-	-	NO SURVEY	2	-	NO SURVEY	-	-	NO SURVEY	2
Fish Caught	-	-		-	-		-	-		-	-		-
Fish Kept	-	-		-	-		-	-		-	-		-
Hours Fished	-	-		-	-		2.00	-		-	-		2.00
Catch/Effort (h)	-	-		-	-		-	-		-	-		-
Day Totals:													
Anglers		-			-			-			-		
Fish Caught		-			-			-			-		
Fish Kept		-			-			-			-		
Hours Fished		-			-			-			-		
Catch/Effort (h)		-			-			-			-		
Species	a	b	c	a	b	c	a	b	c	a	b	c	Total

NA Not Available.

Table 18

Creel survey data from the YHGS for each survey day in November 1979.

Day	2 Fri			10 Sat			18 Sun			27 Tue					
Weather	Overcast, Light Rain			Overcast			Clear			Clear, Partly Cloudy					
River Stage (m)	1.26			1.35			1.37			1.63					
Air Temperature (C)	18.5	15.5	13.5	14.0	15.0	13.5	12.5	22.0	15.0	11.0	14.0	12.5			
Water Temperature (C)	11.5	12.5	12.0	10.0	10.5	10.5	6.5	7.5	8.0	12.5	12.5	12.5			
Times:															
a) morning (0900-1300)	a			a			a			a					
b) afternoon (1300-1700)		b			b			b			b				
c) evening (1700-2100)			c			c			c			c	TOTAL		
Total Per Time Period:															
Anglers	2	2	-	3	4	3	1	10	2	2	2	4	35		
Fish Caught	1	5	-	24	10	7	-	45	-	3	4	5	104		
Fish Kept	1	3	-	24	5	1	-	42	-	3	3	4	86		
Hours Fished	2.40	1.50	-	9.00	5.75	11.00	1.00	41.75	0.50	5.00	4.50	2.00	84.40		
Catch/Effort (h)	0.42	3.33	-	2.67	1.74	0.64	-	1.08	-	0.60	0.89	2.50	1.23		
Day Totals:															
Anglers		4			10			13			8				
Fish Caught		6			41			45			12				
Fish Kept		4			30			42			10				
Hours Fished		3.90			25.75			43.25			11.50				
Catch/Effort (h)		1.54			1.59			1.04			1.04				
Species	a	b	c	a	b	c	a	b	c	a	b	c	Total		
Channel catfish	-	-	-	-	-	-	-	-	-	-	1K	1K	2K	-	2
Rock bass	-	-	-	1K	1K 3R	-	-	1R	-	-	1R	-	2K	5R	7
Redbreast sunfish	-	-	-	1K	-	-	-	-	-	-	-	-	1K	-	1
Pumpkinseed	1K	-	-	-	-	-	-	-	-	-	-	-	1K	-	1
Smallmouth bass	-	1R	-	-	-	2R	-	5K 2R	-	-	-	-	5K	5R	10
Largemouth bass	-	-	-	1K	-	-	-	-	-	-	-	-	1K	-	1
White crappie	-	3K	-	-	1K	-	-	-	-	3K	-	3K 1R	10K	1R	11
Black crappie	-	-	-	21K	3K	1K 4R	-	-	-	-	2K	-	27K	4R	31
Crappies (Pomoxis spp.)[1]	-	1R	-	-	2R	-	-	37K	-	-	-	-	37K	3R	40

1 General identification.
R Released.
K Kept.

Table 19

Summary of selected physicochemical parameters taken on 5 and 19 November 1979 near the TMINS. Values are expressed in mg/l except for water temperature (C), pH, and turbidity (NTU).

Location	Date	Water Temperature (C)	pH	Dissolved Oxygen	Turbidity (NTU)	Alkalinity as $CaCO_3$	Sulfate	Total Dissolved Solids	Total Copper	Dissolved Copper	Total Zinc	Dissolved Zinc
TM-AQI-1A1	5 Nov	9.0	7.6	9.6	12.0	20	37	95	0.007	0.001	0.054	0.006
TM-AQI-1A2		8.5	7.7	9.6	12.0	24	39	99	0.007	0.002	0.050	0.010
TM-AQI-11A1		8.5	7.5	10.4	13.0	23	38	70	0.007	0.002	0.076	0.008
TM-AQI-11A2		8.5	7.4	10.4	11.0	23	36	76	0.007	0.002	0.049	0.015
TM-AQI-9B1		9.5	7.4	9.7	10.0	24	39	87	0.006	0.004	0.045	0.032
TM-AQI-1A1	19 Nov	7.5	8.7	11.0	4.1	35	72	155	0.004	0.002	0.054	0.025
TM-AQI-1A2		7.5	8.5	10.2	3.9	38	72	155	0.003	0.003	0.044	0.055
TM-AQI-11A1		8.0	7.4	11.0	4.4	35	70	151	0.002	0.002	0.052	0.011
TM-AQI-11A2		8.0	7.5	11.1	4.4	38	70	145	0.004	0.003	0.062	0.013
TM-AQI-9B1		8.0	7.4	10.6	4.6	35	78	126	0.003	0.003	0.021	0.017
						MEAN VALUES FOR NOVEMBER 1979						
TM-AQI-1A1	Nov	8.2	-	10.3	8.0	28	54	125	0.006	0.002	0.054	0.016
TM-AQI-1A2		8.0	-	9.9	8.0	31	56	127	0.005	0.002	0.047	0.027
TM-AQI-11A1		8.2	-	10.7	8.7	29	54	110	0.004	0.002	0.064	0.038
TM-AQI-11A2		8.2	-	10.8	7.7	30	53	110	0.006	0.002	0.056	0.014
TM-AQI-9B1		8.8	-	10.2	7.3	30	58	106	0.004	0.004	0.033	0.024