

ROCHESTER GAS and ELECTRIC CORPORATION
1982 CORBICULA sp. MONITORING PROGRAM
BENTHIC SURVEY

Data Collected and
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January 25, 1983

TABLE OF CONTENTS

	<u>Page</u>
List of Figures	ii
List of Tables	ii
A. SUMMARY	1
B. INTRODUCTION	2
C. RESULTS	5
REFERENCES	9

LIST OF FIGURES

- FIGURE 1 Site Vicinity Map.
- FIGURE 2 Schematic Diagram of Sampling Locations in Slater Creek and Around the Russell Station Discharge.

LIST OF TABLES

- TABLE 1 Macroinvertebrate Fauna Collected at Each Sampling Location.
- TABLE 2 Physical Characteristics and Macroinvertebrates Present at Site Location #1
- TABLE 3 Physical Characteristics and Macroinvertebrates Present at Site Location #2
- TABLE 4 Physical Characteristics and Macroinvertebrates Present at Site Location #3
- TABLE 5 Physical Characteristics and Macroinvertebrates Present at Site Location #4
- TABLE 6 Physical Characteristics and Macroinvertebrates Present at Site Location #5
- TABLE 7 Physical Characteristics and Macroinvertebrates Present at Site Location #6
- TABLE 8 Physical Characteristics and Macroinvertebrates Present at Site Location #7
- TABLE 9 Physical Characteristics and Macroinvertebrates Present at Site Location #8

1982 CORBICULA sp. MONITORING PROGRAM

BENTHIC SURVEY

A. SUMMARY

On September 21, 1982 Beak/Eco Research Incorporated conducted a benthic monitoring program to determine whether the Asiatic clam (Corbicula sp.) had established itself in the cooling water discharge of Rochester Gas and Electric's Russell Power Station. A total of eight samples were taken from a variety of substrates and locations. Although a few indigenous gastropods and pelecypods were collected, no members of the genus Corbicula were identified.

B. INTRODUCTION

In 1981, the Nuclear Regulatory Commission determined that under certain conditions Corbicula sp. could clog condenser cooling water systems (NRC, 1981). Metamorphosing Corbicula larvae that have been entrained in a water system can affix themselves to the inside surface of the conduit piping and grow to impede and eventually block the flow of water through the system (Hillman, 1980). This situation has caused a number of power plants to shutdown in order to remove the buildup of Corbicula from their condenser cooling water systems (Goss and Cain, 1977). Although this problem was formerly restricted to the southern states, these clams have recently been found as far north as the western basin of Lake Erie (Scott-Wasilk et. al., unpublished).

A benthic monitoring program was conducted on September 21, 1981 at the Russell Power Station to check for the presence of the Asiatic clam Corbicula sp. in the substrates of Slater Creek and in the discharge from the Russell Power Station into Lake Ontario (Figure 1). In conjunction with this monitoring program, a benthic macroinvertebrate species survey was carried out.

The Russell Power Station owned and operated by Rochester Gas and Electric (RG&E), is located approximately 2.4 km west of the Genesee River. Cooling water is discharged into an enlarged

portion of Slater Creek just upstream from the creek's entrance into Lake Ontario. The benthic sampling locations were confined to Slater Creek and the adjoining portions of Lake Ontario, as Corbicula sp. is intolerant of prolonged temperatures below 2°C and in the Great Lakes can survive the winter only in the thermal discharge plumes of baseload power plants (Scott-Wasilk et. al., unpublished).

Benthic samples were collected with the diver assisted diaphragm pump system utilized in the Ginna benthic sampling program (RG&E, 1979). The SCUBA diver positioned the collection end of the system at the desired sampling points. Scrapings were taken from hard rock and metal surfaces.

Samples were obtained from a variety of areas and substrates. Sampling locations are as follows (site numbers given correspond to those shown in Figure 2):

<u>SITE #</u>	<u>SITE LOCATION</u>	<u>SUBSTRATE</u>
1	Discharge plume/Lake Ontario	Boulder and flat rock
2	Discharge culvert	Steel and blocky rocks
3	Slater Creek - midstream	Fine sand
4	Shore area opposite discharge	Mud, muck
5	Slater Creek - pool	Fine sand
6	Mouth of discharge canal	Gravel
7	Inside wall of discharge canal	Concrete
8	Shore area opposite discharge canal (scraping)	Log and concrete

Samples were processed in the same manner as those in previous benthic surveys (RG&E, 1981). Each sample was processed in its entirety, with all mollusks and gastropods being separated for later identification. The levels of identification of all organisms were in accordance with those used in previous entrainment and benthic surveys.

C. RESULTS

The results of the benthic survey are presented below in two sections 1) Corbicula sp. survey results, including all hard shelled organisms (gastropods and pelecypods) found in the study area, and 2) Macroinvertebrate survey results from study area sampling locations.

1. Corbicula Survey

Samples were taken from a broad range of substrate types and locations within the study location, however, corbiculids were not identified in any of the samples. Three genera of gastropods and two families of pelecypods were identified in the samples, however. The gastropods identified were Physa sp., Gyraulus sp. and Valvata sp. The pelecypods were determined to be from the families Unionidae and Sphaeriidae. All of these organisms are indigenous to the lower Great Lakes and have not presented any major problems to operational power plants in the region.

2. Macroinvertebrate Survey

Twenty-three macroinvertebrate taxa were identified from the eight samples collected during the benthic survey (Table 1). Only chironomid larvae were present in every sample taken.

Nematodes and oligochaetes were found at seven and six of the sampling stations, respectively. The physical characteristics and the faunal assemblages of each sampling location are presented in Tables 2-9.

The Slater Creek sampling area consists of four discrete areas, each with generally similar ecological characteristics. These areas are: 1) the creek mouth, 2) the midstream, 3) the shore opposite the discharge and 4) the discharge.

Sampling stations #1 and #2 are located at the mouth of Slater Creek and the area just above the culvert (Figure 2). The constriction of the water by the culvert causes an increased current, and the subsequent turbulence causes a relatively high dissolved oxygen content (11.5 ppm). The substrate consisted of boulders, flat rocks and concrete blocks. The culvert itself was constructed of corrugated steel. The most abundant organism present at the creek mouth was the nematode. Oligochaetes, polychaetes and chironomids were also abundant. The bryozoan Fredericella sp. was common in the scrapings from the inside of the conduit.

Sampling stations #3 and #5 are located midstream in Slater Creek (Figure 2). This area is typified by a sandy bottom, a moderate current and an intermediate dissolved oxygen content (10.8 ppm at station #3). No vegetation was observed in this area.

Sample #5 was collected at a depth of 10 feet in a pool probably scoured out by the Russell Station discharge. Sample #3 was taken at a shallower depth (7 feet). Very few organisms were found in this portion of the study area. Gammarus sp. and chironomid larvae were the dominant organisms. Pelecypods present in the substrate of this area were from the families Sphaeriidae and Unionidae.

Sampling stations #4 and #8 are located in the shore area opposite the Russell Plant discharge. The area was typified by shallow water with a soft mud and muck substrate. Arrowroot was the chief vegetation type in the area. Dissolved oxygen concentration was 9.0 ppm, the lowest level observed within the study area. Organisms observed in this area are typical of environments with still water, soft substrate and low dissolved oxygen concentration. The oligochaetes present were tentatively identified as the tubificid worm, Branchiura sp. A damselfly nymph (Lestes sp.) and many Turbellaria were also found. This area had the highest species diversity with 14 taxa observed.

Sampling stations #6 and #7 were located near the Russell Plant discharge canal. Sample #6 was obtained from a gravel substrate, and Sample #7 was scraped from the northern concrete wall of the discharge canal. Dissolved oxygen levels in this area were 9.0 ppm. Water temperature (28.1°C) was approximately the same as the remainder of Slater Creek. Twelve taxa were identified

from samples #6 and #7, the most abundant were nematodes and the amphipod Gammarus sp. Three gastropod genera and two pelecypod families were identified from these samples. No corbiculids were identified.

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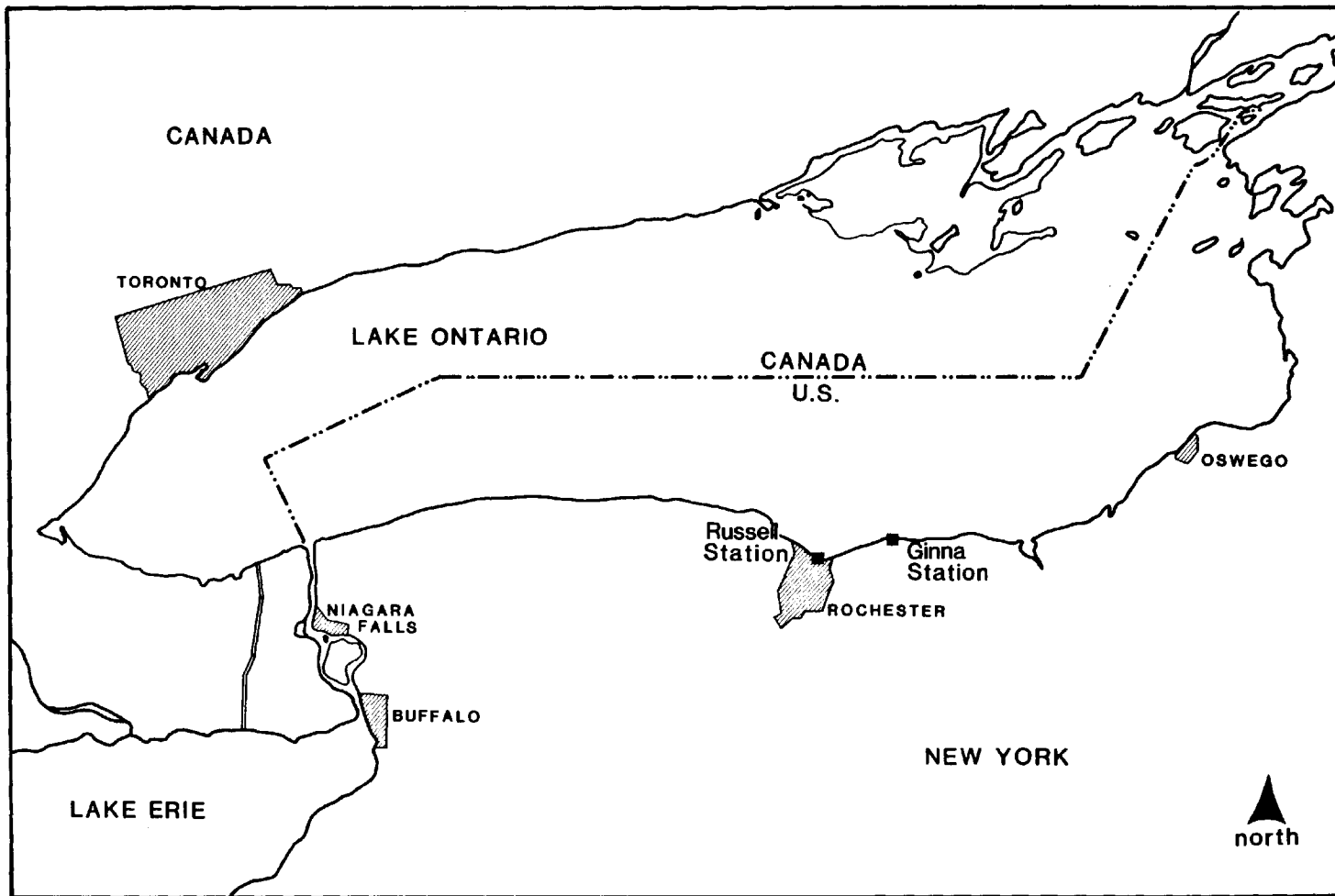


FIGURE 1. SITE VICINITY MAP

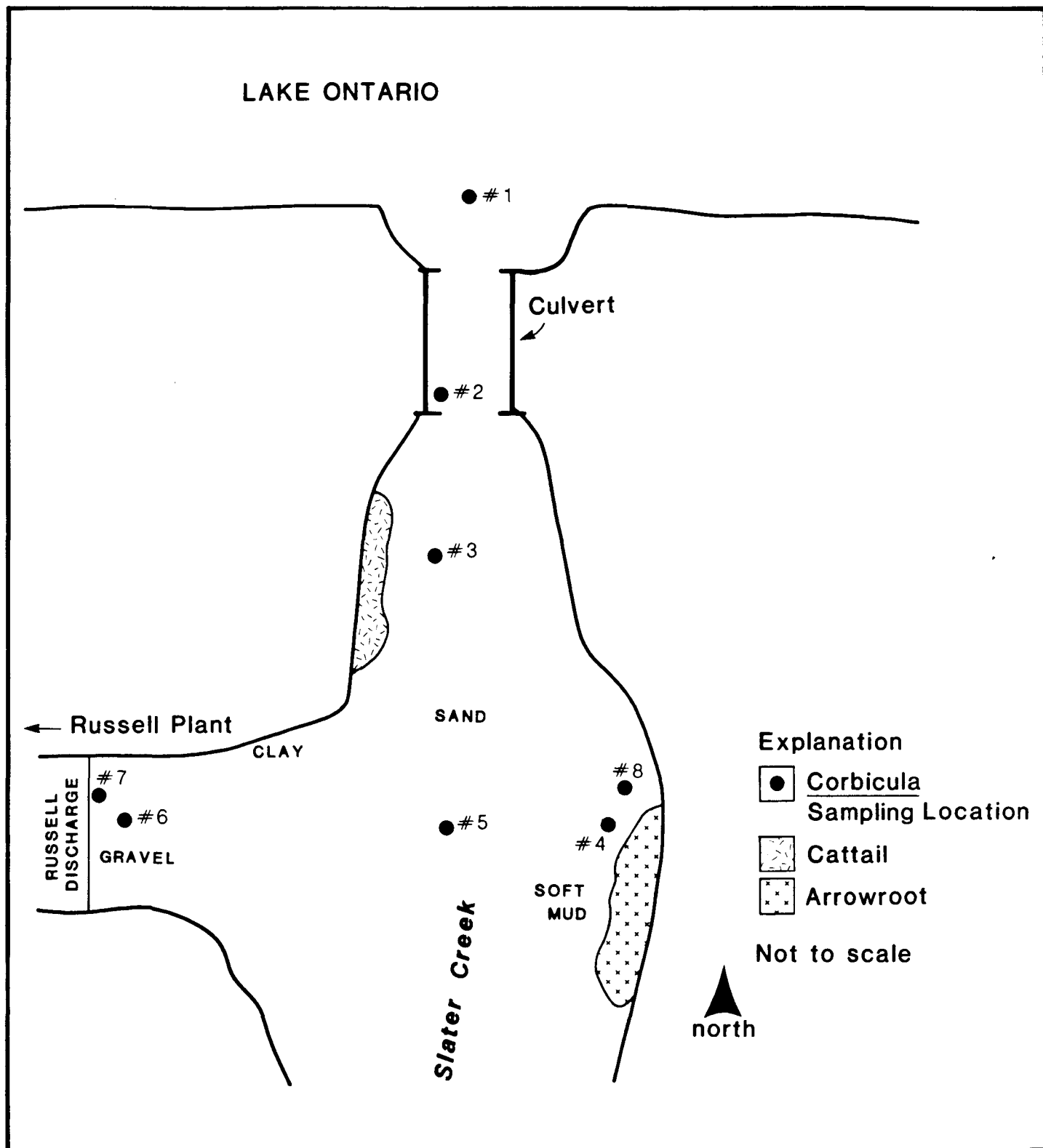


FIGURE 2. SCHEMATIC DIAGRAM OF SAMPLING LOCATIONS IN SLATER CREEK AND LAKE ONTARIO NEAR THE RUSSELL STATION DISCHARGE. 1982 CORBICULA MONITORING PROGRAM

TABLE 1
 Macroinvertebrate Fauna Collected at Each Sampling Location
 Russell Power Station, 1982

ORGANISM	TOTAL	LOCATION							
		#1	#2	#3	#4	#5	#6	#7	#8
Hydra	1								X
Turbellaria	4		X		X		X		X
Nematoda	7	X	X		X	X	X	X	X
<u>Cordylophora</u>	1						X		
<u>Paludicella</u>	1				X				
<u>Fredericella</u>	3		X				X	X	
Oligochaeta	6	X	X	X	X			X	X
Polychaeta	1		X						
Hirudinea	1		X						
Ostracoda	3				X	X			X
<u>Crangonyx</u>	1				X				
<u>Gammarus</u>	5	X		X	X	X	X		
Hydracarina	1		X						
Collembola	1								X
Baetidae	1				X				
<u>Lestes</u>	1				X				
Heleidae	1				X				
Chironomid larvae	8	X	X	X	X	X	X	X	X
Chironomid pupae	2	X				X			
<u>Physa</u>	2				X		X		
<u>Valvata</u>	1						X		
<u>Gyraulus</u>	1						X		
Sphaeriidae	2					X	X		
Unionidae	2					X	X		

TABLE 2
 Physical Characteristics and Macroinvertebrates Present at
 Site Location #1
 Russell Power Station, 1982

Site description: Discharge plume into Lake Ontario
 Depth of sample: 2 ft
 Substrate type: Boulder and flat rock
 Water temp: Not sampled
 Dissolved oxygen: Not sampled

<u>Organisms Present</u>	<u>Number</u>	<u>Percent Composition</u>
Nematoda	18	23.0
Oligochaeta	28	36.0
<u>Gammarus</u>	2	3.0
Chironomid larvae	29	37.0
Chironomid pupae	1	1.0

TABLE 3
 Physical Characteristics and Macroinvertebrates Present at
 Site Location #2
 Russell Power Station, 1982

Site description: Discharge culvert under road
 Depth of sample: 1 ft - 3 ft
 Substrate type: Steel and blocky rock
 Water temp: 28.1°C
 Dissolved oxygen: 11.5 ppm

<u>Organisms Present</u>	<u>Number</u>	<u>Percent Composition</u>
Turbellaria	2	0.1
Nematoda	4104	99.0
Oligochaeta	10	0.2
Polychaeta	10	0.2
Hirudinea	1	<0.1
Hydracarina	2	0.1
Chironomid larvae	10	0.2
<u>Fredericella</u>	Present	

TABLE 4
Physical Characteristics and Macroinvertebrates Present at
Site Location #3
Russell Power Station, 1982

Site description: Midstream
Depth of Sample: 7 ft
Substrate type: Sandy bottom
Water temp: 28.0°C
Dissolved oxygen: 10.8 ppm

<u>Organisms Present</u>	<u>Number</u>	<u>Percent Composition</u>
Oligochaeta	5	29.4
<u>Gammarus</u>	7	41.2
Chironomid larvae	5	29.4

TABLE 5
 Physical Characteristics and Macroinvertebrates Present at
 Site Location #4
 Russell Power Station, 1982

Site description: Shore opposite discharge-arrowroot
 Depth of sample: 3 ft
 Substrate type: Muddy, soft bottom
 Water temp: Not sampled
 Dissolved oxygen: Not sampled

<u>Organisms Present</u>	<u>Number</u>	<u>Percent Composition</u>
Nematoda	35	25.0
Oligochaeta	11	7.9
Crangonyx	5	3.6
<u>Gammarus</u>	3	2.1
Baetidae	1	0.7
Chironomid larvae	9	6.4
Heleidae larvae	3	2.1
<u>Physa</u> sp.	12	8.6
Ostracoda	9	6.4
Turbellaria	45	32.1
<u>Lestes</u> sp. (damselfly)	7	5.0
<u>Paludicella</u> sp.	Present	

TABLE 6
 Physical Characteristics and Macroinvertebrates Present at
 Site Location #5
 Russell Power Station, 1982

Site description: Creek pool
 Depth of sample: 10 ft
 Substrate type: Sandy bottom-current
 Water temp: 28.0°C
 Dissolved oxygen: 9.0 ppm

<u>Organisms Present</u>	<u>Number</u>	<u>Percent Composition</u>
Nematoda	1	5.0
<u>Gammarus</u>	9	45.0
Chironomid larvae	3	15.0
Chironomid pupae	1	5.0
Unionidae	1	5.0
Sphaeriidae	4	20.0
Ostracoda	1	5.0

TABLE 7
 Physical Characteristics and Macroinvertebrates Present at
 Site Location #6
 Russell Power Station, 1982

Site description: Mouth of discharge canal
 Depth of sample: 7 ft
 Substrate type: Gravel bottom
 Water temp: 28.1°C
 Dissolved oxygen: 9.0 ppm

<u>Organisms Present</u>	<u>Number</u>	<u>Percent Composition</u>
Turbellaria	11	11.2
Nematoda	27	26.7
<u>Gammarus</u>	25	25.5
Chironomid larvae	3	3.1
<u>Physa</u> sp.	21	21.4
<u>Gyraulus</u> sp.	1	1.0
<u>Valvata</u> sp.	5	5.1
Sphaeriidae	3	3.1
Unionidae	2	2.0
<u>Fredericella</u> sp.	Present	
<u>Cordylophora</u> sp.	Present	

TABLE 8
 Physical Characteristics and Macroinvertebrates Present at
 Site Location #7
 Russell Power Station, 1982

Site description: Wall of canal
 Depth of sample: 2 ft
 Substrate type: Off concrete wall
 Water temp: Not sampled
 Dissolved oxygen: Not sampled

<u>Organisms Present</u>	<u>Number</u>	<u>Percent Composition</u>
Nematoda	408	80.6
Oligochaeta	96	19.0
Chironomid larvae	2	0.4
<u>Fredericella</u> sp.	Present	

TABLE 9
 Physical Characteristics and Macroinvertebrates Present at
 Site Location #8
 Russell Power Station, 1982

Site description: Shore opposite discharge (scraping)
 Depth of sample: 1 ft
 Substrate type: Concrete and log in mud
 Water temp: Not sampled
 Dissolved oxygen: Not sampled

<u>Organisms Present</u>	<u>Number</u>	<u>Percent Composition</u>
<u>Hydra</u> sp.	57	40.7
Turbellaria	8	5.7
Nematoda	4	2.9
Oligochaeta	58	41.4
Chironomid larvae	7	5.0
Ostracoda	4	2.9
Collembola	2	1.4