A QUANTITATIVE STUDY OF BENTHIC MACROINVERTEBRATES OF THE DELAWARE RIVER IN THE VICINITY OF ARTIFICIAL ISLAND IN 1971

By

Ronald W. Smith, Ph.D.

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INTRODUCTION

This report discusses preliminary studies of the benthic fauna of the Delaware River estuary in the vicinity of Artificial Island. The investigations were conducted as a part of the 1971 phase of the pre-operational monitoring program for the Salem Nuclear Generating Station (S.N.G.S.). Estimates of the diversity, distribution, abundance, and biomass were made on the basis of quantitative samples collected from June to December 1971. At that time the bottom had not been disturbed by offshore dredging and construction of the intake and outlet structures for the S.N.G.S. cooling system. The data from stations in those areas should, therefore, reflect true base line conditions. These studies will be continued and expanded in the future.

The distribution and abundance of benthic animals, like those of nektonic and planktonic organisms, are affected by such environmental parameters as water chemistry, temperature, and currents. In addition they are strongly influenced by the nature of the substrate. In general, hard substrates such as wood and stone are colonized by attached forms and the animals associated with them. These organisms are collectively termed the epifauna. Soft substrates such as mud, sand, and organic detritus are mainly colonized by the burrowing forms of the infauna. With moderate current velocities some epifaunal animals may also be found on soft substrates.

Estuarine environments are characterized by large, short-term fluctuations in salinity, dissolved oxygen, and temperature which are associated with the tides. There are also seasonal fluctuations associated with ice melt, flooding, and periods of low river flow.

Although there is a general downstream gradient of increasing salinity, both daily and seasonal changes of several ppt occur throughout the study area.

The type of substrate within an area depends primarily upon the pattern of currents. Coarse sand and gravel, and sometimes hard clay, occur where the currents are swift. As currents slacken, the substrate grades through fine sand to soft mud in quiet areas. Thick deposits of plant detritus, mainly Phragmites, may occur near marshes.

The character of the substrate at a given point in the estuary is relatively constant, but depth and water quality fluctuate. Thus, there is a constantly shifting mosaic of environmental conditions within the study area. It is not surprising that many estuarine animals are quite eurytopic with regard to such environmental parameters as salinity and temperature (Nicol, 1967). The rigor of this environment is often reflected in a scarcity of benthic fauna compared with many freshwater and shallow marine ecosystems (Gosner, 1971; Bassindale, 1943; Hunter, 1964). However, in some special brackish water habitats such as eelgrass, Zostera, communities and oysterbeds the fauna is often diverse.

The benthic community is more sensitive to environmental alteration than are other groups. Many benthic animals are severely limited in mobility and are, therefore, unable to actively seek favorable environments or to avoid unfavorable ones on a short-term basis. For example, the adult stages of barnacles, mussels, oysters, colonial coelenterates, ectoprocts, and some other taxa are permanently attached to the substrate. Dispersal and colonization in such forms are

typically accomplished by the early developmental stages. Small burrowing and crawling forms are also limited in horizontal mobility. Thus, benthic organisms cannot occupy a habitat that is only periodically suitable during a part of the tidal or seasonal cycle. Exceptions may include such relatively large and active animals as crabs and burrowing clams. The ecological impact of environmental modifications may be more immediately detectable and more marked in the benthic community than in other groups such as zooplankton and fish.

STUDY AREA

The area encompassed includes the Delaware River from Oakwood Beach, 6.6 miles upstream from the Salem Nuclear Generating Station site, to Arnold Point, 7.6 miles downstream from the site (Fig. 1). Eleven stations (Transects 3, 4), including two in Appoquinimink Creek, were sampled on an approximate monthly schedule; nine stations (Transects 1, 2, 5, and 6) were sampled less frequently. A total of 220 samples were collected and analyzed.

The approximate depth at mean low water, the type of substrate, and the number of samples at each station are summarized in Table 1.

METHODS

Collection of Samples

Quantitative samples were taken during daylight with a Ponar grab sampler (Wildlife Supply Co., Saginaw, Michigan) which samples an area 0.05 m^2 (0.0598 yd^2) to a depth of approximately 15 cm (6 inches). Three grabs were taken at each station. Each sample was placed in a

large plastic bag with a plastic identification tag and preserved with 200 ml (6.8 oz) of 40% formalin. Additional qualitative samples were collected at irregular intervals with the Ponar grab and by removing organisms from hard substrates by hand.

Processing of Quantitative Samples

In the laboratory each sample was carefully washed in a U. S. Standard Sieve No. 35 with 0.5 mm (0.0197 inch) openings. Benthic organisms were sorted from the remaining material (sand, gravel, and organic detritus) in enamel pans. The recovery of organisms was facilitated by the addition of Rose Bengal stain prior to sorting. Organisms were stored in 40% isopropyl alcohol. Each sample was sorted by taxa and the organisms were counted. The organisms of each taxon were then soaked in distilled water for several hours. Molluscs (Macoma, Modiolus, Crassostrea, Rangia) were dissected from their shells, and cirripedes (Balanus) were removed from their casts. The terga and scuta were kept intact because attempts to remove these resulted in loss of tissue, especially in small barnacles. After the organisms were soaked, they were dried in tared crucibles at 105 C to constant weight, cooled in a dessicator and weighed to the nearest 0.1 mg with a Mettler H10 balance.

Data Conversion

Density (number of individuals per grab) and biomass (mg dry weight per grab) were multiplied by 20 to convert these data to a per square meter (per 1.2 yd^2) basis.

Physicochemical Measurements

Three environmental parameters were routinely measured during the collection of samples. Temperature and dissolved oxygen were measured with a Yellow Springs Instruments Model 51A dissolved oxygen meter. Salinity was determined in the laboratory with an American Optical Corporation Hand Refractometer on water samples collected in the field. Although most of the measurements were recorded at the bottom, surface readings have been incorporated in some cases when no bottom measurements were available. This was justified on the grounds that the surface and bottom conditions were usually similar due to the thorough mixing of river water in the study area.

Taxonomic Considerations

Specimens were identified with the aid of a reference collection of local species and of standard taxonomic works.

Certain species are morphologically very similar and require careful microscopic examination of relatively mature specimens for specific identification. This is not practical when hundreds or thousands of specimens, many of them immature, must be sorted. Thus, some similar species have been analyzed quantitatively by genus. All specimens of Gammarus have been treated as G. daiberi although a small percentage were undoubtedly G. fasciatus and G. tigrinus which were reported by Bousefield, 1969, and were identified in some 1971 samples. The three species of Corophium reported from the area (Ferrante, 1971) have also been treated as a group.

Some specimens were difficult to identify, e.g. most of the polychaetes were badly damaged, but the few intact individuals were identified as Nereis succinea, and all damaged specimens were assigned to that species. Leeches, large oligochaetes, two hydroids (identified by small fragments), a small nematode, a mite, Chironomid larvae, and a gammaridean amphipod were not identified to species.

RESULTS AND DISCUSSION

Environmental Conditions

Measurements of temperature, salinity, and dissolved oxygen are reported in the appendix. Within the study area salinity is often extremely variable even within the short span of a single tidal cycle. Changes as great as 10 ppt have been recorded within 12 hours. There is a gradient of increasing salinity downstream within the study area. Low salinities in September 1971 were associated with heavy rainfall. Dissolved oxygen had the usual inverse relationship to water temperature.

Spatial Distribution

Thirty-two taxa were identified (Table 2). Of these, Nemopsis bachei (medusae) and Blackfordia virginica (medusae) are planktonic and were probably caught by the grab as it descended or while they were momentarily on the bottom. The hydroids of these species were not found. The mysid shrimp, Neomysis americana, functions as a member of of both the planktonic and benthic communities, and often occurs in greatest densities on or near the bottom (Hulburt, 1957; Wigley and Burns, 1971). The remaining taxa are primarily benthic in the life

history stages collected, but many also have planktonic stages (e.g. medusae, larvae).

Nine of the taxa collected were represented by a single specimen or colonial fragment, or were taken at only one station (Table 2). The widespread species included Nereis succinea (which was taken at all 20 stations), Cyathura polita (19 stations), N. americana and Gammarus daiberi (17 stations), and Paranais litoralis (16 stations). It is likely that continued systematic collecting will increase the number of taxa known in the study area and will extend the known distribution of some taxa within it.

Diversity

Simple diversity or the number of taxa occurring at each station varied from five at Station T6S2 (Transect 6, Station 2) to 18 at Station T4S2 (Table 2). This variability can be attributed to differences in habitat suitability or in the number of samples collected. When sampling effort was equal, observed differences between stations probably reflect actual differences in species diversity. For example stations T4S2 and T4S3 are adjacent and were sampled with equal frequency (18 grabs), yet the former had 18 taxa, the latter 8. This reflects habitat differences in depth and substrate (Table 1) and perhaps other characteristics.

A better measure of diversity is provided if the proportion of total individuals represented by each taxon is taken into account as well as the total number of taxa present. A variety of "diversity indices" have been proposed to accomplish this. One straightforward

index, derived from information theory, was proposed by MacArthur and MacArthur (1961). If p_i is the proportion of all individuals that belongs to the ith taxon then the diversity (D) is given by:

$$D = -\sum_i P_i \log_e P_i$$

D has been calculated for benthic organisms at all of the stations (Table 3). This index did not correlate well with the simple diversity at each station ($r = 0.033$). By this measure Station T3S1 was the most diverse ($D = 1.876$) and Station T1S2 the least ($D = 0.278$). Station T4S2 had the most benthic species (16), but a low index of diversity ($D = 0.854$). This is a reflection of the numerical dominance of a single species, Balanus improvisus, which represented over 73% of the total specimens at that station. The diversity index will serve as one very useful basis for comparison with future data.

Abundance

The estimated density of each species in numbers/m^2 (numbers/yd^2) is reported in Appendix 1 and summarized in Table 4. Mean total values ranged from 74/m^2 (62/yd^2) at Station T6S2 to 13,947/m^2 (11,660/yd^2) at Station T3S5. The two creek stations (T3S5, T3S6) had much higher densities than any of the river stations, together accounting for more than 70% of the benthic organisms collected at all stations combined. This was due to the large numbers of Corophium found at these two stations.

In addition to Corophium, which made up half (50.72%) of the total density, numerically important species included Nereis succinea, Paranais litoralis, Balanus improvisus, Cyathura polita, Gammarus daiberi, and Neomysis americana.

The estimates of biomass in terms of mg/m^2 (x 0.00893 = lb/acre) dry weight for all 1971 collections are reported in Appendix Table 2 and summarized in Table 5. The total mean biomass varied from 138.6 mg/m^2 (1.24 lb/acre) at Station T6S2 to 7150 mg/m^2 (63.85 lb/acre) at Station T5S2. The estimates of total mean biomass were not well correlated with those of total mean density (r = 0.388).

The mean estimated biomass varied from 0.8 mg/m^2 (0.007 lb/acre) for Hartlaubella gelatinosa to 13,740.8 mg/m^2 (112.71 lb/acre) for Macoma balthica. The latter species contributed about 32.5% of the total, and the eight next most important taxa combined made up about 59%. Thus, nine dominant taxa represented 91% of the estimated biomass. Corophium, although numerically very important, contributed only 7% of total biomass.

SUMMARY

1. A quantitative sampling program for benthic organisms was carried out in the Delaware River near Artificial Island from June to December 1971.

2. Two hundred twenty Ponar grab samples were collected at 20 stations on the Delaware River and Appoquinimink Creek.

3. Estimates were made of the diversity, distribution, density, and biomass of the benthic fauna.

4. Because the estuarine environment is characterized by frequent and rapid changes in salinity and in the direction and velocity of currents, adapted forms are usually eurytopic with regard to these environmental conditions.

5. Benthic animals are relatively immobile and generally occupy only consistently tolerable habitats.

6. Thirty-two taxa, 29 of them primarily benthic in the life history stages collected, were found in the quantitative samples.

7. Nine of these were represented by a single individual or colonial fragment, or were taken at one station, but five species occurred at more than 75% of the stations.

8. The total number of taxa varied from five to 18 per station.

9. An index of diversity calculated for each station ranged from 0.278 to 1.876 and was not well correlated with the total number of taxa present at each station.

10. The mean density at each station varied from 74 to 13,947/m^2 (62 to 11,660/yd^2).

11. Biomass (dry weight) ranged from 138.6 to 7,150 mg/m^2 (1.24 to 63.85 lb/acre) and was not well correlated with density.

Table 1. - Location, depth, substrate, and number of grabs taken at benthic stations in the Delaware River 1971.

Station	Fish survey trawl zone	Approximate depth (mean low water) Meters	Feet	Substrate	Number of grabs
Transect 1					
Station 1	NE 1	2.5	8.0	Sand and gravel overlaid by organic mud	6
Station 2	NE 1	4.0	13.0	Sand and gravel overlaid by this layer of organic mud and detritus	6
Transect 2					
Station 1	E 5	1.0	3.5	Clay intercalated with sand and detritus	6
Station 2	E 5	5.0	16.5	Clay intercalated with sand and detritus	3
Transect 3					
Station 1	E 2	4.0	13.0	Fine black sand, little mud and detritus	18
Station 2	E 2	10.0	33.0	Fine black sand, very little mud and detritus	15
Station 3	W 1	2.0	6.5	Clay and organic mud, little sand, moderate detritus	18
Station 4	W 1	1.0	3.5	Organic mud and detritus, some sand	18
Station 5	Appoquinimink Creek	5.0	16.5	Organic mud and detritus	16
Station 6	Appoquinimink Creek	3.5	11.5	Sand and detritus, little mud	9
Transect 4					
Station 1	E 1	1.5	5.0	Clay, organic mud, detritus	18
Station 2	E 1	5.0	16.5	Sand, gravel, shell, little mud and detritus	18
Station 3	E 1	9.0	30.0	Clay and detritus	18
Station 4	SW 2	8.0	27.0	Clay, little detritus	18
Station 5	SW 2	1.5	5.0	Sand, little clay and detritus	18
Transect 5					
Station 1	SE 3	1.5	5.0	Hard sandy clay, moderate detritus	3
Station 2	SE 3	5.0	16.5	Sand, gravel and shell, little mud or detritus	3
Station 3	SW 2	5.5	18.0	Hard clay and detritus, little sand	3
Transect 6					
Station 1	SE 1	2.5	8.0	Sand, gravel and shell, moderate clay and detritus	3
Station 2	SE 1	2.0	6.5	Sand and gravel, little detritus	3

Table 2. - Occurrence of taxa at benthic stations in the Delaware River in 1971. Asterisk indicates organisms not identified to species.

Transect	1		2		3						4					5			6		No. of Stations at Which Species Were Taken
Station	1	2	1	2	1	2	3	4	5	6	1	2	3	4	5	1	2	3	1	2	
PHYLUM CNIDARIA																					
Hemoplo bakeri	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	1
Blackfordia virginica	-	-	X	-	X	X	-	-	-	X	X	X	-	X	X	X	X	-	X	X	12
Garveia franciscana	X	X	-	X	X	X	X	-	X	X	-	X	-	-	-	-	X	X	-	-	11
Hartlaubella gelatinosa	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Sertularia argentea	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Unidentified hydroid 1*	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	1
Unidentified hydroid 2*	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	1
PHYLUM ECTOPROCTA																					
Amathia vidovici	-	-	X	-	X	-	-	-	X	-	X	X	-	X	X	-	X	X	-	-	9
PHYLUM ASCHELMINTHES																					
Nematode*	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	1
PHYLUM MOLLUSCA																					
Crassostrea virginica	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	X	-	-	-	2
Modiolus demissus	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	X	-	-	-	2
Macoma balthica	-	-	X	-	X	X	X	X	-	-	X	X	X	X	X	-	X	X	X	-	13
Rangia cuneata	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
PHYLUM ANNELIDA																					
Nereis succinea	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	20
Paranais litoralis	X	X	X	X	X	-	X	X	X	X	X	X	X	X	X	-	-	X	X	-	16
Large oligochaete*	-	-	-	-	X	-	-	-	-	-	X	X	-	-	X	X	-	-	-	X	6
Leech*	-	-	-	-	-	-	-	-	-	X	-	-	-	X	-	-	-	-	-	-	2
PHYLUM ARTHROPODA																					
Mite*	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Balanus improvisus	-	-	-	X	-	-	-	-	-	-	-	X	-	-	-	-	X	-	-	-	3
Cyathura polita	X	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	19
Chiridotea almyra	-	X	X	X	X	X	X	-	X	X	-	-	X	X	X	-	-	-	-	-	11
Edotea triloba	-	-	-	-	-	-	-	-	X	X	X	X	-	-	-	-	-	X	-	X	6
Corophium spp.	-	-	-	-	X	X	X	X	X	X	X	X	-	X	-	-	-	-	-	-	9
Gammarus daiberi	X	X	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	-	17
Gammaridean amphiped	X	X	X	-	-	-	-	X	-	-	X	-	-	-	-	-	-	-	-	-	5
Neomysis americana	X	X	-	X	X	X	X	X	X	X	X	X	X	X	X	-	X	X	X	-	17
Palaemonetes pugio	-	-	-	-	-	-	-	-	-	X	-	X	-	-	X	-	-	-	-	-	3
Crangon septemspinosus	-	-	-	X	X	X	X	X	-	X	-	X	X	X	-	X	X	-	-	-	11
Panopeus herbstii	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	1
Rhithropanopeus harrisii	-	-	-	-	X	X	-	X	X	X	X	X	-	-	-	-	-	-	-	-	7
Chironomid larvae	X	X	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	3
Total Taxa	9	8	8	9	16	12	10	11	12	16	14	18	8	13	11	6	12	9	6	5	

Table 3. - Information theory index of diversity for 1971 benthic stations based on benthic organisms only.[1]

Station	Index of diversity
Transect 1	
Station 1	1.575
Station 2	0.278
Transect 2	
Station 1	0.983
Station 2	1.001
Transect 3	
Station 1	1.876
Station 2	1.020
Station 3	1.599
Station 4	1.610
Station 5	0.613
Station 6	0.828
Transect 4	
Station 1	1.258
Station 2	0.854
Station 3	1.483
Station 4	1.545
Station 5	1.705
Transect 5	
Station 1	0.732
Station 2	1.462
Station 3	1.518
Transect 6	
Station 1	1.286
Station 2	1.332

[1] The number of individuals for Nereis was calculated from biomass data with the smallest dry weight taken arbitrarily as indicating one individual. Colonial fragments were considered to represent one individual per occurrence.

. - Estimated mean population density (number/m^2) at all benthic stations in the Delaware River 1971.

	1		2		3						4					5			6		Total	Proportion
	1	2	1	2	1	2	3	4	5	6	1	2	3	4	5	1	2	3	1	2		
bachei	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	1	.001
dia virginica	–	–	3	–	30	29	–	–	–	2	22	66	–	48	2	113	30	–	160	40	545	.015
franciscana	3	3	–	13	3	4	1	–	4	2	–	1	–	–	–	–	10	7	–	–	51	.001
ella gelatinosa	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	.001
ia argentea	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	.001
fied hydroid 1	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	1	.001
ified hydroid 2	–	–	–	–	–	–	–	–	–	2	–	–	–	–	–	–	–	–	–	–	2	.001
vidovici	–	–	3	–	1	–	–	–	1	–	4	1	–	2	1	–	10	7	–	–	30	.001
	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	1	.001
trea virginica	–	–	–	–	–	–	–	–	–	–	–	2	–	–	–	–	20	–	–	–	22	.001
s demissus	–	–	–	–	–	–	–	–	–	–	–	57	–	–	–	–	10	–	–	–	67	.002
balthica	–	–	3	–	10	1	3	6	–	–	43	11	19	11	16	–	270	87	20	–	500	.014
cuneata	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	3	.001
succinea	33	40	10	120	24	39	33	37	83	156	81	291	32	94	63	247	190	27	7	7	1614	.044
s litoralis	130	1250	543	47	21	–	39	259	23	22	318	86	9	139	66	–	–	120	27	–	3099	.084
ligochaete	–	–	–	–	3	–	–	–	–	–	7	19	–	–	3	7	–	–	–	13	52	.001
ified leech	–	–	–	–	–	–	–	–	–	2	–	–	–	1	–	–	–	–	–	–	3	.001
	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	.001
improvisus	–	–	–	13	–	–	–	–	–	–	–	2246	–	–	–	–	760	–	–	–	3019	.082
a polita	30	–	67	7	48	13	2	42	691	1204	54	48	50	82	28	27	140	7	27	7	2574	.070
tea almyra	–	3	3	13	104	469	8	–	5	9	–	–	1	1	8	–	–	–	–	–	624	.017
triloba	–	–	–	–	–	–	–	–	8	20	3	1	–	–	–	–	–	7	–	7	46	.001
ium	–	–	–	–	9	37	2	49	11924	6402	1	16	–	2	–	–	–	–	–	–	18442	.502
us daiberi	37	7	–	540	49	103	40	127	1159	671	2	41	83	33	28	20	60	27	–	–	3027	.082
tified Gammaridean	97	7	353	–	–	–	–	61	–	–	3	–	–	–	–	–	–	–	–	–	521	.014
is americana	10	3	–	340	36	125	396	42	24	73	56	163	249	288	152	–	50	287	80	–	2374	.065
onetes pugio	–	–	–	–	–	–	–	–	–	2	–	2	–	–	2	–	–	–	–	–	6	.001
n septemspinosus	–	–	–	7	4	1	3	4	–	4	–	4	4	6	–	7	10	–	–	–	54	.001
us herbstii	–	–	–	–	–	–	–	–	–	2	–	–	–	–	–	–	–	–	–	–	2	.001
opanopeus harrisii	–	–	–	–	1	1	–	1	24	16	1	3	–	–	–	–	–	–	–	–	47	.001
omid larvae	7	10	–	–	–	–	–	2	–	–	–	–	–	–	–	–	–	–	–	–	19	.001
	350	1323	985	1100	345	823	527	630	13947	8589	596	3058	447	708	369	421	1560	576	321	74	36746	0.999
tion	.010	.036	.027	.030	.009	.022	.014	.017	.380	.234	.016	.083	.012	.019	.010	.012	.042	.016	.009	.002	1.000	

e number of individuals for Nereis was calculated from biomass data with the smallest dry weight taken arbitrarily as indicating one individual. Colonial fragments
re considered to represent one individual per occurrence.

. - Estimated mean biomass (mg/m^2 dry weight) at all benthic stations in the Delaware River 1971. An asterisk indicated organisms retained for taxonomic purposes.

t	1		2		3						4					5			6		Total	Proportion
	1	2	1	2	1	2	3	4	5	6	1	2	3	4	5	1	2	3	1	2		
s bachei	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0	-	-	-	-	-	-	-	-
rdia virginica	-	-	0.0	-	15.7	25.6	-	-	-	0.0	10.0	13.3	-	15.4	0.0	18.7	0.0	-	40.0	21.3	160.0	.004
franciscana	5.3	0.0	-	4826.0	6.2	67.7	9.7	-	284.4	29.6	-	54.9	-	-	-	-	23.0	8.7	-	-	5315.5	.126
bella gelatinosa	-	-	-	-	0.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.8	.001
ria argentea	-	-	-	-	-	9.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9.2	.001
ified hydroid 1	-	-	-	-	-	-	-	-	*	-	-	-	-	-	-	-	-	-	-	-	*	-
ified hydroid 2	-	-	-	-	-	-	-	-	-	*	-	-	-	-	-	-	-	-	-	-	*	-
vidovici	-	-	0.0	-	6.8	-	-	-	9.0	-	9.2	1.9	-	5.4	4.1	-	0.0	24.0	-	-	60.4	.001
	-	-	-	-	-	-	-	-	-	-	*	-	-	-	-	-	-	-	-	-	*	-
trea virginica	-	-	-	-	-	-	-	-	-	-	-	269.8	-	-	-	-	2514.0	-	-	-	2783.8	.066
demissus	-	-	-	-	-	-	-	-	-	-	-	695.0	-	-	-	-	92.0	-	-	-	787.0	.019
ailthica	-	-	27.7	-	367.7	16.1	9.3	11.7	-	-	2297.9	120.9	967.0	580.4	354.8	-	3214.0	5501.3	272.0	-	13740.8	.326
cuneata	28.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	28.7	.001
uccinea	71.0	78.3	22.3	239.3	49.9	76.3	65.8	72.3	166.0	309.8	163.0	581.2	70.1	189.0	127.4	488.7	378.0	50.0	0.0	15.3	3213.7	.076
litoralis	7.0	70.3	25.0	0.0	1.2	-	5.2	12.0	0.0	0.0	13.8	4.2	0.0	9.6	4.1	-	-	12.7	0.0	-	165.1	.004
igochaete	-	-	-	-	33.2	-	-	-	-	-	11.0	83.0	-	-	4.6	40.0	-	-	-	71.3	243.1	.006
fied leech	-	-	-	-	-	-	-	-	-	*	-	-	-	*	-	-	-	-	-	-	*	-
	-	-	-	-	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*	-
improvisus	-	-	-	40.0	-	-	-	-	-	-	-	2304.9	-	-	-	-	319.0	-	-	-	2663.9	.063
polita	37.0	-	50.3	16.0	119.7	46.0	7.0	55.2	1227.0	1617.3	156.7	138.4	97.3	99.2	109.6	88.7	422.0	11.3	17.3	2.0	4318.0	.102
ea almyra	-	4.0	2.7	8.0	31.8	176.8	11.7	-	8.9	47.6	-	-	0.0	0.0	14.0	-	-	-	-	-	305.5	.007
rilobe	-	-	-	-	-	-	-	-	15.1	34.2	8.3	6.4	-	-	-	-	-	0.0	-	28.7	92.7	.002
	-	-	-	-	2.0	8.7	3.7	15.2	1479.1	1415.8	0.0	10.3	-	1.0	-	-	-	-	-	-	2935.8	.070
daiberi	22.3	9.7	-	676.7	64.2	155.6	30.0	43.2	415.1	349.6	1.9	62.3	62.4	35.4	41.2	14.7	90.0	40.0	-	-	2114.3	.050
ean amphipod	40.0	5.3	107.3	-	-	-	-	21.6	-	-	18.4	-	-	-	-	-	-	-	-	-	192.6	.005
americana	1.3	2.0	-	107.3	14.3	52.5	205.7	16.2	25.4	42.4	14.3	64.3	76.4	108.1	57.3	-	12.0	80.7	14.0	-	894.2	.021
etes pugio	-	-	-	-	-	-	-	-	-	49.3	-	11.1	-	-	0.7	-	-	-	-	-	61.1	.001
septemspinosus	-	-	-	32.7	29.1	72.3	18.3	35.6	-	28.9	-	46.6	32.6	181.3	-	26.0	86.0	-	-	-	589.4	.014
herbstii	-	-	-	-	-	-	-	-	-	81.6	-	-	-	-	-	-	-	-	-	-	81.6	.002
anopeus harrisii	-	-	-	-	152.4	0.0	-	0.2	161.5	921.8	3.0	191.2	-	-	-	-	-	-	-	-	1430.1	.034
id larvae	*	*	-	-	-	-	-	*	-	-	-	-	-	-	-	-	-	-	-	-	*	-
	212.6	169.6	235.3	5946.0	895.0	706.8	366.4	283.2	3791.5	4927.9	2707.5	4659.7	1305.8	1224.8	717.8	676.8	7150.0	5728.7	343.3	138.6	42187.3	1.000
on	.005	.004	.006	.141	.021	.017	.009	.007	.090	.117	.064	.110	.031	.029	.017	.016	.169	.136	.008	.003	1.000	-

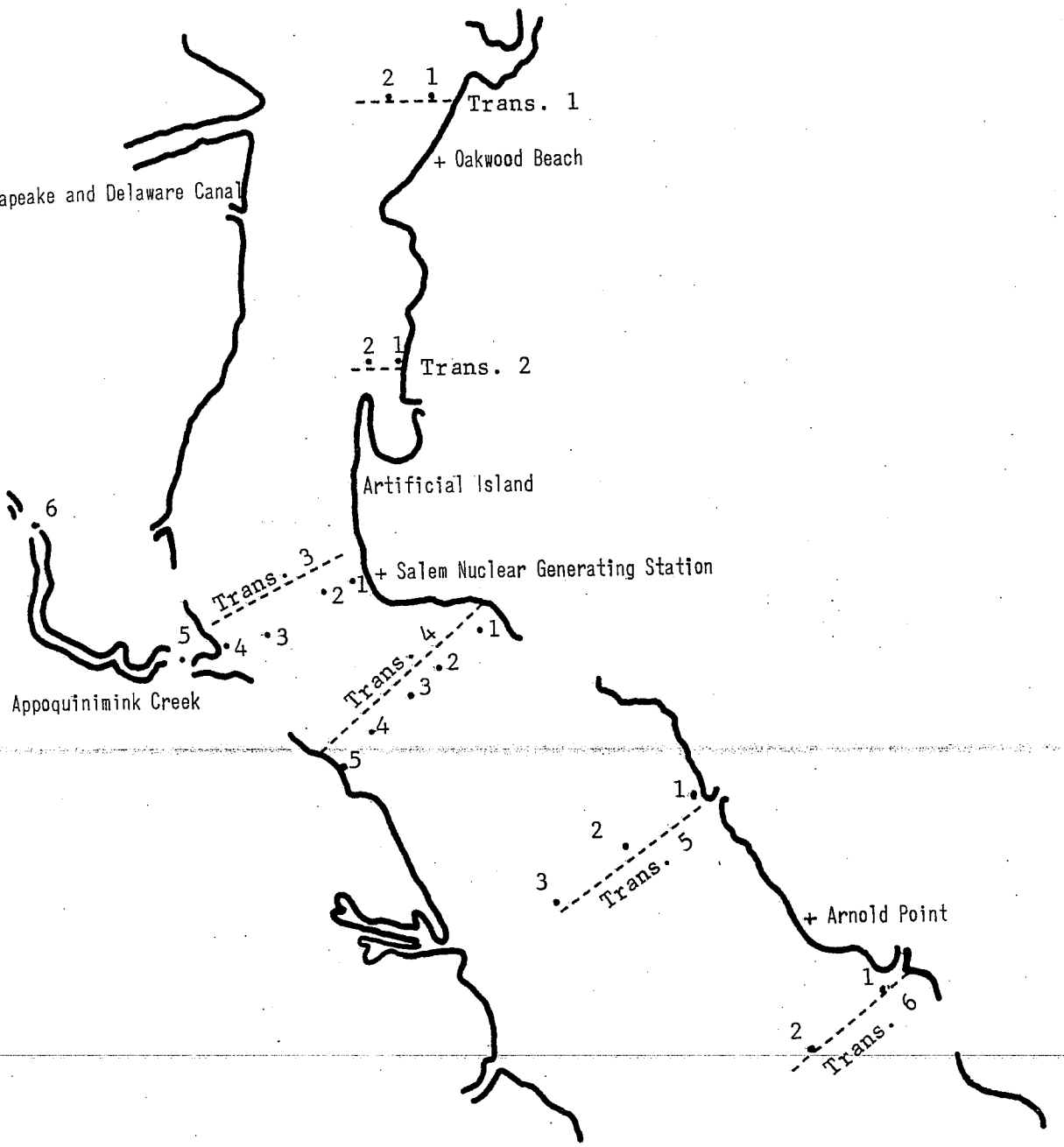

Figure 1. - Map of the Delaware River in the vicinity of Artificial Island showing benthic stations sampled in 1971.

Appendix Table 1. - Physicochemical parameters and estimated density of organisms taken (number/m^2) in ponar grab samples in 1971. Symbols: + indicates present as fragments, X indicates no sample, - indicates not present.

Station	T1S1		T1S2		T2S1		T2S2	T3S1		
Coll. No.	WFG-71-39	RWS-71-20	WFG-71-40	RWS-71-21	WFG-71-37	RWS-71-22	WFG-71-38	WFG-71-1	WFG-71-17	WFG-71-28
Month	August	December	August	December	August	December	August	June	July	August
Day	20	1	20	1	19	1	20	23	16	17
Temp. (C), bottom	26.5	5.0	27.5	5.0	27.0	5.0	27.0	21.9	26.0	26.9
Oxygen (ppm), bottom	5.0	9.0	4.8	8.5	6.2	8.5	4.5	5.9	4.7	5.3
Salinity (ppt), bottom	3.9	1.5	3.5	2.0	4.8	1.5	4.8	6.0	-	5.5
Garveia franciscana	-	-	-	-	-	-	+	+	-	+
	+	-	-	-	-	-	-	-	-	+
	-	-	-	+	-	-	+	-	-	-
Hartlaubella gelatinosa	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	+	-	-
	-	-	-	-	-	-	-	-	-	-
Blackfordia virginica	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	300
	-	-	-	-	20	-	-	-	-	240
Nereis succinea	+	+	+	+	-	+	+	+	-	+
	-	-	-	+	+	+	-	-	+	-
	-	+	-	+	-	-	+	+	-	-
Paranais litoralis	-	220	480	5,000	900	80	-	-	-	-
	-	-	360	300	400	920	140	-	-	-
	20	540	220	1,140	-	960	-	-	-	-
Large oligochaete	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
Rangia cuneata	-	-	-	-	-	-	-	-	-	+
	20	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
Macoma balthica	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	+	-	-	+	-	-
Balanus improvisus	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
Cyathura polita	40	20	-	-	-	40	20	20	60	-
	20	20	-	-	80	80	-	-	-	-
	80	-	-	-	60	140	-	-	-	20
Chiridotea almyra	-	-	-	20	-	-	-	140	400	-
	-	-	-	-	-	-	-	20	620	-
	-	-	-	-	20	-	40	60	60	-
Corophium spp.	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	80	-	40
Gammarus daiberi	80	-	20	-	-	-	1,520	-	20	140
	40	-	-	-	-	-	60	20	-	320
	100	-	20	-	-	-	40	-	20	80
Unidentified gammaridean	-	320	-	-	300	20	-	-	-	-
	-	40	40	-	620	620	-	-	-	-
	40	180	-	-	360	200	-	-	-	-
Neomysis americana	-	-	20	-	-	-	140	260	40	40
	20	-	-	-	-	-	660	40	-	-
	40	-	-	-	-	-	220	100	-	-
Crangon septemspinosus	-	-	-	-	-	-	20	-	-	-
	-	-	-	-	-	-	-	-	-	20
	-	-	-	-	-	-	-	20	40	-
Rhithropanopeus harrisii	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	20
Amathia vidovici	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	+	-	-	-	-
Chironomid larvae	-	-	20	-	-	-	-	-	-	-
	-	-	20	-	-	-	-	-	-	-
	-	40	20	-	-	-	-	-	-	-
Mite	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	20	-	-	-
	-	-	-	-	-	-	-	-	-	-

Appendix Table 1. - (continued).

Station	T3S1			T3S2					T3S3	
Coll. No.	WFG-71-51	RWS-71-6	RWS-71-16	WFG-71-2	WFG-71-18	WFG-71-27	WFG-71-52	RWS-71-7	WFG-71-3	WFG-71-19
Month	September	November	November	June	July	August	September	November	June	July
Day	15	10	30	23	16	17	15	10	23	16
Temp. (C), bottom	26.0	12.3	6.0	22.2	26.0	26.5	5.2	13.0	22.6	26.1
Oxygen (ppm), bottom	4.0	8.6	9.0	6.2	5.1	4.8	5.2	7.4	5.4	5.4
Salinity (ppt), bottom	1.8	2.2	6.5	6.0	-	6.4	0.6	-	7.0	-
Garveia franciscana	-	-	-	-	-	-	+	-	-	-
	-	-	-	+	-	-	-	-	-	+
	-	-	-	+	-	-	-	-	-	-
Hartlaubella gelatinosa	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
Blackfordia virginica	-	-	-	-	60	-	-	-	-	-
	-	-	-	-	-	220	-	-	-	-
	-	-	-	-	-	160	-	-	-	-
Sertularia argentea	-	-	-	+	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
Nereis succinea	+	-	+	+	+	-	-	-	-	-
	+	-	-	+	-	+	-	-	-	-
	-	-	+	+	+	+	+	+	-	-
Paranais litoralis	-	-	40	-	-	-	-	-	100	-
	-	-	340	-	-	-	-	-	20	-
	-	-	-	-	-	-	-	-	320	-
Large Oligochaete	-	-	-	-	-	-	-	-	-	-
	-	+	-	-	-	-	-	-	-	-
	-	+	-	-	-	-	-	-	-	-
Macoma balthica	-	-	-	-	-	-	-	-	-	-
	-	-	160	-	-	-	-	-	-	-
	-	-	-	+	-	-	-	-	+	-
Cyathura polita	-	-	300	40	-	-	-	-	20	-
	-	-	280	-	-	-	-	-	-	-
	-	-	180	140	-	20	-	-	-	-
Chiridotea almyra	60	60	-	3,120	100	700	40	20	20	20
	400	-	-	400	60	860	40	360	-	-
	60	-	-	20	360	760	20	180	-	-
Corophium spp.	-	-	-	20	-	-	-	20	-	-
	-	-	40	-	-	-	-	-	40	-
	-	-	-	500	-	20	-	-	-	-
Gammarus daiberi	20	-	-	20	-	-	740	20	60	60
	220	-	-	580	-	-	100	-	-	-
	20	-	20	20	-	-	60	-	100	20
Neomysis americana	-	20	20	460	160	-	80	200	1,000	80
	-	40	-	320	20	20	-	40	1,060	-
	-	80	-	380	-	40	80	80	1,380	80
Crangon septemspinosus	-	-	-	-	-	-	-	20	-	20
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	40	-
Rhithropanopeus harrisii	-	-	-	+	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
Amathia vidovici	-	-	-	-	-	-	-	-	-	-
	-	-	+	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
Mite	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-

Appendix Table 1. - (continued).

Station	T3S3				T3S4					
Coll. No.	WFG-71-26	WFG-71-53	RWS-71-8	RWS-71-17	WFG-71-4	WFG-71-20	WFG-71-25	WFG-71-54	RWS-71-9	RWS-71-18
Month	August	September	November	Nobemver	June	July	August	September	November	November
Day	17	15	16	30	23	19	17	15	10	30
Temp. (C), bottom	26.1	25.2	13.9	6.0	23.0	26.1	25.8	25.0	11.8	6.0
Oxygen (ppm), bottom	-	2.7	-	8.5	6.7	6.2	5.5	4.5	8.8	9.5
Salinity (ppt), bottom	8.5	0.8	-	3.5	3.8	-	4.3	0.8	-	4.0
Garveia franciscana	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
Nereis succinea	+	-	+	+	+	+	+	-	+	+
	-	+	+	+	+	+	+	-	-	+
	-	-	+	+	+	+	-	+	+	+
Paranais litoralis	-	20	-	-	140	-	20	60	-	1,440
	-	20	-	100	20	-	60	20	-	100
	-	80	-	40	40	-	-	-	120	2,640
Macoma balthica	-	-	-	-	+	-	-	-	-	-
	20	-	-	-	+	-	+	-	-	-
	20	-	-	-	+	-	-	-	20	-
Cyathura polita	-	-	-	-	20	20	-	180	40	-
	-	-	-	-	60	100	140	-	40	-
	-	-	-	20	-	80	20	20	40	-
Chiridotea almyra	20	-	40	-	-	-	-	-	-	-
	-	-	40	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
Corophium spp.	-	-	-	-	840	-	-	-	20	-
	-	-	-	-	-	-	20	-	-	-
	-	-	-	-	-	-	-	-	-	-
Gammarus daiberi	80	60	-	-	60	440	160	280	-	-
	120	-	-	-	-	580	240	20	-	-
	160	40	20	-	-	260	240	-	-	-
Unidentified Gammaridean	-	-	-	-	-	-	-	-	20	-
	-	-	-	-	320	-	-	300	-	-
	-	-	-	-	260	-	-	40	160	-
Neomysis americana	2,160	-	100	20	100	140	-	20	-	20
	160	-	280	40	60	360	20	-	-	-
	600	-	160	-	-	-	20	-	-	20
Crangon septemspinosus	-	-	-	-	20	-	-	-	40	-
	-	-	-	-	-	-	20	-	-	-
	-	-	-	-	-	-	-	-	-	-
Rhithropanopeus harrisii	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	20	-	-	-
	-	-	-	-	-	-	-	-	-	-
Chironomid larvae	-	-	-	-	20	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	20

Appendix Table 1. - (continued).

Station	T3S5						T3S6			T4S1
Coll. No.	WFG-71-5	WFG-71-21	WFG-71-24	WFG-71-55	RWS-71-10	RWS-71-19	WFG-71-6	WFG-71-22	WFG-71-23	WFG-71-7
Month	June	July	August	September	November	November	June	July	August	June
Day	23	19	11	15	10	30	22	19	11	22
Temp. (C), bottom	-	26.0	27.9	25.0	10.2	5.0	22.0	26.1	28.5	-
Oxygen (ppm), bottom	-	5.4	5.4	3.5	8.6	8.5	5.2	5.7	4.5	-
Salinity (ppt), bottom	-	-	-	2.0	2.0	-	4.0	-	4.8	-
Garveia franciscana	-	+	-	-	-	-	-	-	-	-
	-	-	-	-	+	-	-	--	+	-
	X	-	-	X	+	-	-	-	-	-
Blackfordia virginica	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	20	-	-
Nereis succinea	+	-	-	+	+	-	-	+	+	+
	+	-	-	+	+	-	+	+	+	+
	X	-	+	X	+	+	-	+	+	+
Paranais litoralis	-	-	-	-	40	-	-	-	-	-
	-	-	-	-	60	60	160	-	40	1,200
	X	-	40	X	120	40	-	-	-	900
Large oligochaete	-	-	-	-	-	-	-	-	-	20
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	20
Unidentified hydroid 1	-	-	-	-	20	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	X	-	-	X	-	-	-	-	-	-
Unidentified hydroid 2	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	+	-	-	-
	-	-	-	-	-	-	-	-	-	-
Leech	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	20	-	-	-
Macoma balthica	-	-	-	-	-	-	-	-	-	+
	-	-	-	-	-	-	-	-	-	+
	-	-	-	-	-	-	-	-	-	60
Cyathura polita	660	20	1,940	700	440	-	1,040	2,700	2,400	130
	1,300	1,240	420	640	320	520	1,680	420	-	100
	X	1,660	500	X	420	60	1,220	40	1,340	60
Chiridotea almyra	-	80	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	60	20	-	-
	X	-	-	X	-	-	-	-	-	-
Edotea triloba	40	-	-	-	-	-	-	60	100	-
	-	-	-	-	20	-	20	-	-	-
	X	20	-	X	40	-	-	-	-	-
Corophium spp.	1,440	20	33,060	19,740	60	60	10,740	1,260	1,340	-
	2,860	67,440	9,340	2,820	500	980	22,300	60	-	-
	X	43,640	5,540	X	3,180	100	21,020	800	100	-
Gammarus daiberi	560	-	2,640	400	260	-	20	740	500	-
	760	9,260	280	820	160	20	1,580	180	2,260	-
	X	2,660	240	X	480	-	160	480	120	-
Unidentified Gammaridean	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	20
	-	-	-	-	-	-	-	-	-	-
Neomysis americana	180	80	40	-	-	-	20	-	20	60
	60	-	20	-	-	-	540	-	20	160
	X	-	-	X	-	-	40	20	-	60
Palaemonetes pugio	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	20	-
	-	-	-	-	-	-	-	-	-	-
Crangon septemspinosus	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	40	-
	-	-	-	-	-	-	-	-	-	-
Panopeus herbstii	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	20	-	-	-
	-	-	-	-	-	-	-	-	-	-
Rhithropanopeus harrisii	-	-	-	180	60	-	-	-	-	-
	-	-	-	20	-	20	-	20	-	-
	X	20	-	X	80	-	-	100	20	-
Nematode	-	-	-	-	-	-	-	-	-	20
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-

Appendix Table 1. - (continued).

Station	T4S1					T4S2				
Coll. No.	WFG-71-12	WFG-71-29	WFG-71-46	RWS-71-1	RWS-71-11	WFG-71-8	WFG-71-13	WFG-71-33	WFG-71-47	RWS-71-2
Month	July	August	September	October	November	June	July	August	September	October
Day	15	17	15	26	30	22	15	19	14	25
Temp. (C), bottom	25.2	27.8	24.9	17.1	6.5	-	26.1	27.0	24.6	17.2
Oxygen (ppm), bottom	5.8	6.2	5.7	1.0	8.5	-	4.3	4.7	4.6	6.5
Salinity (ppt), bottom	-	7.8	2.7	6.0	10.5	-	-	10.0	2.2	4.9
Garveia franciscana	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	+	-	-	-
	-	-	-	-	-	-	-	-	-	-
Blackfordia viriginica	-	100	-	-	-	-	-	1,000	-	-
	-	-	-	-	-	-	20	80	-	-
	80	220	-	-	-	-	-	80	-	-
Nereis succinea	+	+	-	+	+	+	+	+	+	+
	+	+	+	+	+	+	+	+	+	+
	+	+	-	+	-	+	+	+	+	+
Paranais litoralis	-	580	320	520	440	1,180	-	-	-	-
	-	40	-	740	40	100	-	-	-	-
	500	20	280	140	-	-	40	40	-	-
Large oligochaete	20	-	-	-	-	-	-	-	+	-
	-	-	-	-	-	40	20	140	+	-
	-	-	60	-	-	-	-	+	+	+
Modiolus demissus	-	-	-	-	-	-	80	-	40	300
	-	-	-	-	-	-	-	20	20	320
	-	-	-	-	-	-	-	-	160	80
Crassostrea virginica	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	20	-	-	20
	-	-	-	-	-	-	-	-	-	-
Macoma balthica	60	80	+	20	40	+	+	+	-	-
	80	60	40	+	40	-	+	+	-	-
	+	140	-	20	40	-	+	-	20	-
Balanus improvisus	-	-	-	-	-	20	10,000	180	560	5,840
	-	-	-	-	-	-	2,000	6,440	1,520	6,080
	-	-	-	-	-	-	620	4,800	1,260	1,100
Cyathura polita	100	20	20	20	80	120	40	20	20	-
	80	-	60	-	-	80	40	80	60	-
	80	60	80	-	40	120	100	120	-	20
Edotea triloba	40	-	-	-	-	-	20	-	-	-
	20	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
Corophium spp.	20	-	-	-	-	60	20	-	-	-
	-	-	-	-	-	60	-	-	-	-
	-	-	-	-	-	140	-	-	-	-
Gammarus daiberi	-	-	-	40	-	-	160	20	-	20
	-	-	-	-	-	100	60	-	-	140
	-	-	-	-	-	20	140	20	-	60
Unidentified Gammaridean	-	-	-	-	20	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
Neomysis americana	20	-	-	460	-	900	40	60	-	40
	-	-	-	-	-	1,000	60	-	-	-
	240	-	-	-	-	740	60	-	-	-
Palaemonetes pugio	-	-	-	-	-	-	20	-	-	-
	-	-	-	-	-	-	-	-	-	20
	-	-	-	-	-	-	-	-	-	-
Crangon septemspinosus	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	20
	-	-	-	-	-	-	60	-	-	-
Rhithropanopeus harrissi	-	-	-	-	-	40	20	-	-	-
	-	-	-	-	-	-	-	-	-	-
	-	-	20	-	-	-	-	-	-	-
Amathia vidovici	-	-	-	+	-	-	-	-	-	-
	-	-	-	+	+	-	-	-	-	-
	-	-	+	-	-	-	-	-	-	-

Appendix Table 1. - (continued).

Station	T4S2	T4S3						T4S4		
Coll. No.	RWS-71-12	WFG-71-9	WFG-71-14	WFG-71-32	WFG-71-48	RWS-71-3	RWS-71-13	WFG-71-10	WFG-71-15	WFG-71-31
Month	November	June	July	August	September	October	November	June	July	August
Day	30	22	15	19	14	26	30	22	15	19
Temp. (C), bottom	6.0	-	26.5	26.0	25.2	17.1	7.5	-	26.0	26.0
Oxygen (ppm), bottom	9.5	-	4.2	4.0	4.5	7.4	8.5	-	5.2	4.8
Salinity (ppt), bottom	6.5	-	-	10.0	6.2	4.2	6.5	-	-	10.4
Nemopsis bachei	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	20
Blackfordia virginica	-	-	-	-	-	-	-	-	-	440
	-	-	-	-	-	-	-	-	-	320
	-	-	-	-	-	-	-	-	-	100
Nereis succinea	-	+	-	-	-	-	-	+	+	-
	-	+	+	-	+	-	+	+	+	-
	-	+	-	-	+	-	-	+	+	-
Paranais litoralis	20	-	-	-	40	-	40	-	-	-
	60	-	-	-	-	-	40	-	-	-
	-	-	40	-	-	-	-	-	-	-
Leech	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	20
	-	-	-	-	-	-	-	-	-	-
Macoma balthica	+	20	60	-	-	+	20	-	-	-
	20	-	50	60	40	-	-	-	-	20
	+	-	60	-	-	-	-	-	-	-
Cyathura polita	-	220	40	-	-	-	-	320	20	-
	-	160	140	60	20	-	20	100	20	-
	40	180	-	60	-	-	-	480	200	-
Chiridotes almyra	-	-	-	-	-	-	-	-	-	-
	-	-	-	20	-	-	-	20	-	-
	-	-	-	-	-	-	-	-	-	-
Corophium spp.	-	-	-	-	-	-	-	-	20	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
Gammarus daiberi	-	-	-	-	480	20	-	60	-	60
	-	40	40	40	540	40	40	60	20	60
	-	-	-	20	220	20	-	-	20	-
Neomysis americana	-	20	40	540	100	160	20	100	100	2,380
	-	200	500	1,100	-	340	-	20	60	1,480
	40	80	140	800	20	340	-	40	80	740
Crangon septemspinosus	-	-	-	-	-	20	-	20	-	-
	-	20	40	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	20	40	-
Amathia vidovici	+	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
Large oligochaete	-	-	-	-	-	-	-	-	-	-
	+	-	-	-	-	-	-	-	-	-
	+	-	-	-	-	-	-	-	-	-

Appendix Table 1. - (continued).

Station	T4S4			T4S5							T5S1
Coll. No.	WFG-71-50	RWS-71-4	RWS-71-14	WFG-71-11	WFG-71-16	WFG-71-30	WFG-71-49	RWS-71-5	RWS-71-15	WFG-71-36
Coll. No.	September	October	November	June	July	August	September	October	November	August
Day	14	26	30	22	15	19	14	26	30	19
Temp. (C), bottom	25.2	17.2	7.0	-	25.2	26.0	25.0	16.5	7.0	26.0
Oxygen (ppm), bottom	4.0	6.5	8.5	-	4.9	4.5	4.4	6.2	9.0	5.5
Salinity (ppt), bottom	3.5	3.9	4.0	-	-	6.0	3.1	4.5	5.0	10.0
Blackfordia virginica	-	-	-	-	-	-	-	20	-	160
	-	-	-	-	-	-	-	20	-	-
	-	-	-	-	-	-	-	-	-	180
Nereis succinea	-	+	-	+	+	+	+	+	-	+
	-	-	+	+	-	+	+	+	-	+
	+	-	-	+	+	+	+	-	-	+
Paranais litoralis	-	-	100	-	-	-	-	-	60	-
	-	-	2,280	-	-	-	-	-	80	-
	-	-	120	-	-	-	-	20	1,020	-
Large oligochaete	-	-	-	-	-	-	-	+	-	+
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	+	+	-	-
Macoma balthica	20	-	20	20	+	-	-	-	60	-
	60	20	20	-	+	-	-	-	100	-
	20	-	+	+	+	-	-	-	20	-
Cyathura polita	20	20	80	100	20	20	60	-	20	20
	-	-	140	40	20	20	-	-	20	40
	20	-	60	60	-	80	-	40	-	20
Chiridotea almyra	-	-	-	20	-	-	-	20	-	-
	-	-	-	-	-	-	-	60	-	-
	-	-	-	-	-	-	-	40	-	-
Corophium spp.	-	-	20	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
Gammarus daiberi	-	-	40	20	120	40	60	20	-	20
	-	20	-	60	-	-	60	-	-	20
	100	220	-	40	-	40	40	-	-	20
Neomysis americana	-	-	60	80	160	160	-	-	-	-
	-	20	40	100	-	-	-	-	-	-
	40	20	-	340	-	100	20	1,780	-	-
Palaemonetes pugio	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	40	-	-
Crangon septemspinosus	-	-	-	-	-	-	-	-	-	-
	-	-	20	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
Amathia vidovici	-	-	+	-	-	-	-	-	-	20
	-	-	-	-	-	-	-	-	-	-
	-	-	+	-	-	-	-	+	-	-
								-	-	-

Appendix Table 1. - (continued).

Station	T5S2	T5S3	T6S1	T6S2
Coll. No.	WFG-71-41	WFG-71-42	WFG-71-35	WFG-71-34
Month	August	August	August	August
Day	20	20	19	19
Temp. (C), bottom	26.5	26.8	26.0	26.5
Oxygen (ppm), bottom	5.5	5.6	5.7	5.3
Salinity (ppt), bottom	11.0	12.4	12.7	13.8
Garveia franciscana	-	-	-	-
	+	+	-	-
	X	-	-	-
Blackfordia virginica	60	-	240	40
	-	-	80	20
	X	-	160	60
Nereis succinea	+	+	+	-
	+	-	-	+
	X	-	-	-
Paranais litoralis	-	40	80	-
	-	320	-	-
	-	-	-	-
Large Oligochaete	-	-	-	-
	-	-	-	20
	-	-	-	+
Modiolus demissus	-	-	-	-
	20	-	-	-
	X	-	-	-
Crassostrea virginica	-	-	-	-
	40	-	-	-
	X	-	-	-
Macoma balthica	320	60	20	-
	220	160	+	-
	X	40	+	-
Balanus improvisus	-	-	-	-
	1,520	-	-	-
	X	-	-	-
Cyathura polita	120	-	80	20
	160	20	-	-
	X	-	-	-
Edotea triloba	-	20	-	-
	-	-	-	-
	-	-	-	20
Gammarus daiberi	40	60	-	-
	80	-	-	-
	X	20	-	-
Neomysis americana	80	-	180	-
	20	660	20	-
	X	200	40	-
Crangon septemspinosus	-	-	-	-
	20	-	-	-
	X	-	-	-
Amathia vidovici	-	-	-	-
	+	-	-	-
	X	-	-	-

Appendix Table 2. - Physicochemical parameters and estimated biomass (mg/m^2 dry weight) of organisms taken in ponar grab samples in 1971. Symbols: X indicates no sample, - indicates not present, 0 indicates insufficient mass to measure, * indicates organisms retained for taxonomic purposes.

Station	T1S1		T1S2		T2S1		T2S2	T3S1		
Coll. No.	WFG-71-39	RWS-71-20	WFG-71-40	RWS-71-21	WFG-71-37	RWS-71-22	WFG-71-38	WFG-71-1	WFG-71-17	WFG-71-28
Month	August	December	August	December	August	December	August	June	July	August
Day	20	1	20	1	19	1	20	23	16	17
Temp. (C), bottom	26.5	5.0	27.5	5.0	27.0	5.0	27.0	21.9	26.0	26.9
Oxygen (ppm), bottom	5.0	9.0	4.8	8.5	6.2	8.5	4.5	5.9	4.7	5.3
Salinity (ppt), bottom	3.9	1.5	3.5	2.0	4.8	1.5	4.8	6.0	-	5.5
Garveia franciscana	-	-	-	-	-	-	14,364	-	-	*
	32	-	-	-	-	-	-	-	-	112
	-	-	-	-	-	-	114	-	-	-
Hartlaubella gelatinosa	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	14	-	-
	-	-	-	-	-	-	-	-	-	-
Blackfordia virginica	-	-	-	-	-	-	-	-	-	208
	-	-	-	-	-	-	-	-	-	74
	-	-	-	-	0	-	-	-	-	-
Nereis succinea	338	30	44	304	-	40	200	64	-	166
	-	-	-	70	48	46	-	-	262	-
	-	58	-	52	-	-	518	58	-	-
Paranais litoralis	-	12	36	256	38	0	0	-	-	-
	-	-	12	4	28	48	0	-	-	-
	0	30	10	104	-	36	-	-	-	-
Large oligochaete	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	478
Macoma balthica	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	166	-	-	138	-	-
	-	-	-	-	-	-	-	-	-	-
Balanus improvisus	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	120	-	-	-
Cyathura polita	66	34	-	-	-	24	48	30	376	-
	62	8	-	-	56	84	-	-	-	-
	52	-	-	-	76	62	-	-	-	40
Rangia cuneata	-	-	-	-	-	-	-	-	-	-
	172	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
Chiridotea almyra	-	-	-	24	-	-	-	0	124	-
	-	-	-	-	-	-	-	0	204	-
	-	-	-	-	16	-	24	0	8	-
Gammarus daiberi	76	-	18	-	-	-	1,926	-	26	182
	42	-	-	-	-	-	56	62	-	426
	16	-	40	-	-	-	48	-	40	106
Unidentified gammaridean	-	132	-	-	120	36	-	-	-	-
	-	28	32	-	106	180	-	-	-	-
	20	60	-	-	126	76	-	-	-	-
Corophium spp.	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	36	-	0
Neomysis americana	-	-	12	-	-	-	26	10	40	0
	0	-	-	-	-	-	204	116	-	-
	8	-	-	-	-	-	92	0	-	-
Crangon septemspinosus	-	-	-	-	-	-	98	-	-	-
	-	-	-	-	-	-	-	-	-	336
	-	-	-	-	-	-	-	58	130	-
Rhithropanopeus harrisii	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	2,744
Amathia vidovici	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	0	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
Chironomid larvae	-	-	*	*	-	-	-	-	-	-
	-	-	*	*	-	-	-	-	-	-
	-	-	*	*	-	-	-	-	-	-

Appendix Table 2. - (continued).

Station	T3S1			T3S2					T3S3	
Coll. No.	WFG-71-51	RWS-71-6	RWS-71-16	WFG-71-2	WFG-71-18	WFG-71-2	WFG-71-52	RWS-71-7	WFG-71-3	WFG-71-19
Month	September	November	Nobember	June	July	August	September	November	June	July
Day	15	10	30	23	16	17	15	10	23	16
Temp. (C), bottom	26.0	12.3	6.0	22.2	26.0	26.5	25.7	13.0	22.6	26.1
Oxygen (ppm), bottom	4.0	8.6	9.0	6.2	5.1	4.8	4.2	7.4	5.4	5.4
Salinity (ppt), bottom	1.8	2.2	6.5	6.0	-	6.4	0.6	-	7.0	-
Garveia franciscana	-	-	-	-	-	-	86	-	-	-
	-	-	-	838	-	-	-	-	-	174
	-	-	-	92	-	-	-	-	-	-
Blackfordia virginica	-	-	-	-	4	-	-	-	-	-
	-	-	-	-	-	270	-	-	-	-
	-	-	-	-	-	110	-	-	-	-
Sertularia argentea	-	-	-	138	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
Nereis succinea	52	-	204	168	156	-	-	-	-	-
	60	-	-	80	-	262	-	-	-	-
	-	-	32	218	12	130	32	86	-	-
Paranais litoralis	-	-	0	-	-	-	-	-	42	-
	-	-	22	-	-	-	-	-	0	-
	-	-	-	-	-	-	-	-	52	-
Large oligochaete	-	-	-	-	-	-	-	-	-	-
	-	50	-	-	-	-	-	-	-	-
	-	70	-	-	-	-	-	-	-	-
Macoma balthica	-	-	-	-	-	-	-	-	-	-
	-	-	6,480	-	-	-	-	-	-	-
	-	-	-	242	-	-	-	-	110	-
Cyathura polita	-	-	378	408	-	-	-	-	86	-
	-	-	1,068	-	-	-	-	-	-	-
	-	-	262	282	-	0	-	-	-	-
Chiridotea almyra	38	54	-	638	60	444	36	40	30	22
	94	-	-	10	22	376	12	348	-	-
	50	-	-	0	98	502	26	40	-	-
Corophium spp.	-	-	-	46	-	-	-	0	-	-
	-	-	0	-	-	-	-	-	66	-
	-	-	-	84	-	0	-	-	-	-
Gammarus daiberi	36	-	-	212	-	-	946	10	32	0
	162	-	-	1,034	-	-	120	-	-	-
	32	-	84	0	-	-	12	-	204	0
Neomysis americana	-	0	0	302	10	-	52	88	514	6
	-	32	-	158	0	0	-	52	846	-
	-	60	-	80	-	0	20	26	1,036	10
Crangon septemspinosus	-	-	-	-	-	-	-	1,084	-	132
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	198	-
Rhithropanopeus harrisii	-	-	-	0	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
Amathia vidovici	-	-	-	-	-	-	-	-	-	-
	-	-	122	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-

Appendix Table 2. - (continued).

Station	T3S3				T3S4					
Coll. No.	WFG-71-26	WFG-71-53	RWS-71-8	RWS-71-17	WFG-71-4	WFG-71-20	WFG-71-25	WFG-71-54	RWS-71-9	RWS-71-18
Month	August	September	November	November	June	July	August	September	November	November
Day	17	15	10	30	23	19	17	15	10	30
Temp. (C), bottom	26.1	25.2	13.9	6.0	23.0	26.1	25.8	25.0	11.8	6.0
Oxygen (ppm), bottom	-	2.7	-	8.5	6.7	6.2	5.5	4.5	8.8	9.5
Salinity (ppt), bottom	8.5	0.8	-	3.5	3.8	-	4.3	0.8	-	4.0
Nereis succinea	110	-	232	4	62	52	0	-	156	78
	-	238	76	62	344	30	14	-	-	36
	-	-	386	76	102	46	-	58	250	74
Paranais litoralis	-	0	-	-	68	-	0	0	-	84
	-	0	-	0	0	-	0	0	-	0
	-	0	-	0	0	-	-	-	0	64
Macoma balthica	-	-	-	-	120	-	-	-	-	-
	32	-	-	-	0	-	0	-	-	-
	26	-	-	-	18	-	-	-	72	-
Cyathura polita	-	-	-	-	84	6	-	106	104	-
	-	-	-	-	46	166	174	-	38	-
	-	-	-	40	-	82	60	28	100	-
Chiridotea almyra	76	-	24	-	-	-	-	-	-	-
	-	-	58	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
Corophium spp.	-	-	-	-	188	-	-	-	-	32
	-	-	-	-	-	-	54	-	-	-
	-	-	-	-	-	-	-	-	-	-
Gammarus daiberi	44	8	-	-	120	150	72	68	-	-
	158	-	-	-	-	126	76	0	-	-
	52	20	22	-	-	104	62	-	-	-
Unidentified gammaridean	-	-	-	-	-	-	-	-	6	-
	-	-	-	-	128	-	-	-	90	-
	-	-	-	-	130	-	-	0	34	-
Neomysis americana	598	-	100	48	72	2	-	0	-	20
	224	-	46	34	50	148	0	-	-	-
	172	-	68	-	-	-	0	-	-	0
Crangon septemspinosus	-	-	-	-	124	-	-	-	240	-
	-	-	-	-	-	-	276	-	-	-
	-	-	-	-	-	-	-	-	-	-
Rhithropanopeus harrisii	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	4	-	-	-
	-	-	-	-	-	-	-	-	-	-
Chironomid larvae	-	-	-	-	8	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	*

Appendix Table 2. - (continued).

Station	T3S5						T3S6		
Coll. No.	WFG-71-5	WFG-71-21	WFG-71-24	WFG-71-55	RWS-71-10	RWS-71-19	WFG-71-6	WFG-71-22	WFG-71-23
Month	June	July	August	September	November	November	June	July	August
Day	23	19	11	15	10	30	22	19	11
Temp. (C), bottom	-	26.0	27.9	25.0	10.2	5.0	22.0	26.1	28.5
Oxygen (ppm), bottom	-	5.4	5.4	3.5	8.6	8.5	5.2	5.7	4.5
Salinity (ppt), bottom	-	-	-	2.0	2.0	-	4.0	-	4.8
Garveia franciscana	-	486	-	-	1,472	-	-	-	-
	-	-	-	-	192	-	-	-	266
	X	-	-	X	2,400	-	-	-	-
Blackfordia virginica	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	0	-
Nereis succinea	450	-	-	8	154	-	-	246	626
	1,560	-	-	0	194	-	1,286	0	236
	X	-	82	X	0	208	-	196	198
Paranais litoralis	-	-	-	-	0	-	-	-	-
	-	-	-	-	0	0	0	-	0
	X	-	0	X	0	0	-	-	-
Leech	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	*	-	-
Cyathura polita	1,666	404	2,228	1,372	774	-	2,528	2,106	1,428
	2,990	1,860	1,026	1,442	476	1,284	3,500	1,060	-
	X	1,832	1,358	X	710	210	2,564	94	1,276
Chiridotea almyra	-	142	-	-	-	-	-	-	-
	-	-	-	-	-	-	104	324	-
	X	-	-	X	-	-	-	-	-
Edotea triloba	230	-	-	-	-	-	-	94	32
	-	-	-	-	10	-	182	-	-
	X	2	-	X	0	-	-	-	-
Corophium spp.	512	114	598	3,204	14	30	1,826	448	68
	752	5,970	2,410	454	44	126	4,924	22	-
	X	7,386	1,478	S	516	58	5,170	152	132
Gammarus daiberi	194	-	538	130	230	-	56	100	234
	198	3,096	36	162	112	14	368	238	1,408
	X	1,520	90	X	322	-	278	382	14
Neomysis americana	166	108	2	-	-	-	0	-	0
	130	-	0	-	-	-	382	-	0
	X	-	-	X	-	-	0	0	-
Palaemonetes pugio	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	444
	-	-	-	-	-	-	-	-	-
Crangon septemspinosus	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	260
	-	-	-	-	-	-	-	-	-
Panopeus herbstii	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	734	-	-
	-	-	-	-	-	-	-	-	-
Rhithropanopeus harrisii	-	-	-	892	698	-	-	-	-
	-	-	-	30	-	194	-	52	-
	X	2	-	X	768	-	-	7,942	302
Unidentified hydroid 1	-	-	-	-	*	-	-	-	-
	-	-	-	-	-	-	-	-	-
	X	-	-	X	-	-	-	-	-
Unidentified hydroid 2	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	*	-	-
	-	-	-	-	-	-	-	-	-
Amathia vidovici	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-
	X	-	144	X	-	-	-	-	-

Appendix Table 2. - (continued).

Station	T4S2		T4S3						T4S4	
Coll. No.	RWS-71-2	RWS-71-12	WFG-71-9	WFG-71-14	WFG-71-32	WFG-71-48	RWS-71-3	RWS-71-13	WFG-71-10	WFG-71-15
Mo.:	October	November	June	July	August	September	October	November	June	July
Day	26	30	22	15	19	14	26	30	22	15
Tem p. (C), bottom	17.2	6.0	-	26.5	26.0	25.2	17.1	7.5	-	26.0
Oxygen (ppm), bottom	6.5	9.5	-	4.2	4.0	4.5	7.4	8.5	-	5.2
Salinity (ppt), bottom	4.9	6.5	-	-	10.0	6.2	4.2	6.5	-	-
Nereis succinea	1,834	-	274	-	-	-	-	-	1,284	0
	2,100	-	120	256	-	72	-	100	994	50
	422	-	348	-	-	92	-	-	816	102
Paranais litoralis	-	0	-	-	-	0	-	0	-	-
	-	10	-	-	-	-	-	0	-	-
	-	-	-	0	-	-	-	-	-	-
Large oligochaete	-	-	-	-	-	-	-	-	-	-
	-	54	-	-	-	-	-	-	-	-
	238	20	20	-	-	-	-	-	-	-
Modiolus demissus	1,388	-	-	-	-	-	-	-	-	-
	8,702	-	-	-	-	-	-	-	-	-
	204	-	-	-	-	-	-	-	-	-
Macoma balthica	-	82	230	1,542	-	-	0	82	-	-
	-	60	-	3,266	4,230	3,324	-	-	-	-
	-	48	-	4,732	-	-	-	-	-	-
Balanus improvisus	7,860	-								
	8,360	-	-	-	-	-	-	-	-	-
	3,064	-	-	-	-	-	-	-	-	-
Cyathura polita	-	-	490	40	-	-	-	-	424	28
	-	-	324	302	212	38	-	32	120	0
	120	184	240	-	74	-	-	-	514	410
Crassostrea virginica	-	-	-	-	-	-	-	-	-	-
	2,490	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
Chiridotea almyra	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	0	-	-	-	-	0
	-	-	-	-	-	-	-	-	-	-
Corophium spp.	-	-	-	-	-	-	-	-	-	18
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
Gammarus daiberi	22	-	-	-	-	318	50	98	88	-
	196	-	36	0	44	386	64	-	-	28
	112	-	-	-	14	60	54	-	-	52
Neomysis americana	80	-	0	46	100	18	72	48	84	0
	-	-	104	10	296	-	208	-	0	38
	-	34	74	0	230	18	152	-	114	44
Palaemonetes pugio	-	-	-	-	-	-	-	-	-	-
	180	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
Crangon septemspinosus	-	-	-	-	-	-	326	-	138	-
	380	-	20	240	-	-	-	-	76	394
	-	-	-	-	-	-	-	-	-	-
Amathia vidovici	-	34	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-

Appendix Table 2. - (continued).

Station	T4S4				T4S5					
Coll. No.	WFG-71-31	WFG-71-50	RWS-71-4	RWS-71-14	WFG-71-11	WFG-71-16	WFG-71-30	RWG-71-49	RWS-71-5	RWS-71-15
Month	August	September	October	November	June	July	August	September	October	November
Day	19	14	26	30	22	15	19	14	26	30
Temp. (C), bottom	26.0	25.2	17.2	7.0	-	25.2	26.0	25.0	16.5	7.0
Oxygen (ppm), bottom	4.8	4.0	6.5	8.5	-	4.9	4.5	4.4	6.2	9.0
Salinity (ppt), bottom	10.4	3.5	3.9	4.0	-	-	6.0	3.1	4.5	5.0
Nemopsis bachei	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	7	-	-	-	-	-	-	-	-	-
Blackfordia virginica	142	-	-	-	-	-	-	-	0	-
	98	-	-	-	-	-	-	-	0	-
	37	-	-	-	-	-	-	-	-	-
Nereis succinea	-	-	66	-	170	88	136	222	204	-
	-	-	-	56	248	-	154	124	108	-
	-	34	-	-	216	236	184	204	-	-
Paranais litoralis	-	-	-	0	-	-	-	-	-	0
	-	-	-	128	-	-	-	-	-	74
	-	-	-	44	-	-	-	-	0	0
Large oligochaete	-	-	-	-	-	-	-	-	46	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	0	36	-
Leech	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
Macoma balthica	-	3,612	-	830	610	194	-	-	-	1,538
	2,382	1,422	368	1,750	-	72	-	-	-	2,654
	-	84	-	0	0	418	-	-	-	900
Cyathura polita	-	-	26	58	670	64	146	278	-	46
	-	34	-	122	124	18	154	-	-	58
	-	22	-	28	238	-	26	-	150	-
Chiridotea almyra	-	-	-	-	0	-	-	-	82	-
	-	-	-	-	-	-	-	-	132	-
	-	-	-	-	-	-	-	-	38	-
Corophium spp.	-	-	-	0	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
Gammarus daiberi	104	-	-	98	80	166	66	96	28	-
	64	-	22	-	52	-	-	50	-	-
	-	72	110	-	72	-	76	56	-	-
Neomysis americana	630	-	-	46	110	18	90	-	-	-
	654	-	42	60	138	-	-	-	-	-
	206	28	0	-	150	-	90	0	436	-
Palaemonetes pugio	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	12	-
Amathia vidovici	-	-	-	20	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	74	-
	-	-	-	78	-	-	-	-	-	-
Crangon septemspinosus	-	-	-	-	-	-	-	-	-	-
	-	-	-	2,656	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-

Appendix Table 2. – (continued).

Station	T4S1						T4S2			
Coll. No.	WFG-71-7	WFG-71-12	WFG-71-29	WFG-71-46	RWS-71-1	RWS-71-11	WFG-71-8	WFG-71-13	WFG-71-33	WFG-71-47
Month	June	July	August	September	October	November	June	July	August	September
Day	22	15	17	14	26	30	22	15	19	14
Temp. (C), bottom	–	[illegible]	27.6	24.9	17.1	6.5	–	26.1	27.0	24.6
Oxygen (ppm), bottom	–	[illegible]	6.2	5.7	6.0	8.5	–	4.3	4.7	4.6
Salinity (ppt), bottom	–	–	7.8	[illegible]	6.0	10.5	–	–	10.0	2.2
Garveia franciscana	–	–	–	–	–	–	–	–	–	–
	–	–	–	–	–	–	–	988	–	–
	–	–	–	–	–	–	–	–	–	–
Blackfordia virginica	–	–	30	–	–	–	–	–	220	–
	–	–	–	–	–	–	–	0	0	–
	–	60	90	–	–	–	–	–	20	–
Nereis succinea	424	140	886	–	76	72	52	1,136	92	178
	298	200	[illegible]	262	–	198	18	612	1,370	1,286
	76	4[illegible]	52	–	200	–	12	90	666	594
Paranais litoralis	–	–	0	0	0	32	32	–	–	–
	–	–	0	–	0	0	0	–	–	–
	42	92	0	28	0	–	–	34	0	–
Large oligochaete	58	50	–	–	–	–	–	–	–	72
	–	–	–	–	–	–	40	76	296	284
	42	–	–	48	–	–	–	–	216	196
Modiolus denissus	–	–	–	–	–	–	–	242	–	28
	–	–	–	–	–	–	–	–	72	524
	–	–	–	–	–	–	–	–	–	1,350
Crassostrea virginica	–	–	–	–	–	–	–	–	–	–
	–	–	–	–	–	–	–	2,366	–	–
	–	–	–	–	–	–	–	–	–	–
Macoma balthica	136	1,934	3,922	86	0	1,078	586	106	230	–
	614	11,774	2,798	694	40	2,294	–	274	88	–
	4,298	532	8,194	–	1,060	1,908	–	300	–	402
Balanus improvisus	–	–	–	–	–	–	122	10,692	0	948
	–	–	–	–	–	–	–	722	2,766	1,488
	–	–	–	–	–	–	–	506	3,178	1,782
Cyathura polita	160	3[illegible]	42	40	164	320	148	54	216	106
	368	–	–	58	–	–	74	134	338	142
	174			76	–	138	186	434	356	–
Edotea triloba	–		–	–	–	–	–	116	–	–
	–	10	–	–	–	–	–	–	–	–
	–	–	–	–	–	–	–	–	–	–
Corophium spp.	–	0	–	–	–	–	42	42	–	–
	–	–	–	–	–	–	54	–	–	–
	–	–	–	–	–	–	48	–	–	–
Gammarus daiberi	–	–	–	–	34	–	–	338	18	–
	–	–	–	–	–	–	108	134	–	–
	–	–	–	–	–	–	64	106	24	–
Unidentified Gammaridean	–	–	–	–	–	86	–	–	–	–
	72	173	–	–	–	–	–	–	–	–
	–	–	–	–	–	–	–	–	–	–
Neomysis americana	72	14	–	–	94	–	282	0	26	–
	10	–	–	–	–	–	376	34	–	–
	42	26	–	–	–	–	290	36	–	–
Palaemonetes pugio	–	–	–	–	–	–	–	20	–	–
	–	–	–	–	–	–	–	–	–	–
	–	–	–	–	–	–	–	–	–	–
Crangon septemspinosus	–	–	–	–	–	–	–	–	–	–
	–	–	–	–	–	–	–	–	–	–
	–	–	–	–	–	–	–	488	–	–
Rhithropanopeus harrisii	–	–	–	–	–	–	1,230	2,212	–	–
	–	–	–	–	–	–	–	–	–	–
	–	–	–	54	–	–	–	–	–	–
Amathia vidovici	–	–	–	–	0	–	–	–	–	–
	–	–	–	–	52	100	–	–	–	–
	–	–	–	14	–	–	–	–	–	–
Nematode	*	–	–	–	–	–	–	–	–	–
	–	–	–	–	–	–	–	–	–	–
	–	–	–	–	–	–	–	–	–	–

Appendix Table 2. - (continued).

Station	T5S1	T5S2	T5S3	T6S1	T6S2
Coll. No.	WFG-71-36	WFG-71-41	WFG-71-42	WFG-71-35	WFG-71-34
Month	August	August	August	August	August
Day	19	20	20	19	19
Temp. (C), bottom	26.0	26.5	26.8	26.0	26.5
Oxygen (ppm), bottom	5.5	5.5	5.6	5.7	5.3
Salinity (ppt), bottom	10.0	11.0	12.4	12.7	13.8
Garveia franciscana	-	-	-	-	-
	-	X	26	-	-
	-	46	-	-	-
Blackfordia virginica	0	0	-	36	64
	-	X	-	68	0
	56	-	-	16	0
Nereis succinea	196	136	150	0	-
	326	X	-	-	46
	944	620	-	-	-
Paranais litoralis	-	-	0	0	-
	-	-	38	-	-
	-	-	-	-	-
Large oligochaete	120	-	-	-	-
	-	-	-	-	192
	-	-	-	-	112
Modiolus demissus	-	-	-	-	-
	-	X	-	-	-
	-	184	-	-	-
Crassostrea virginica	-	-	-	-	-
	-	X	-	-	-
	-	5,028	-	-	-
Macoma balthica	-	570	3,762	462	-
	-	X	11,804	154	-
	-	5,858	938	200	-
Balanus improvisus	-	-	-	-	-
	-	X	-	-	-
	-	638	-	-	-
Cyathura polita	78	180	-	52	6
	108	X	34	-	-
	80	664	-	-	-
Edotea triloba	-	-	0	-	-
	-	-	-	-	-
	-	-	-	-	86
Gammarus daiberi	12	100	62	-	-
	0	X	-	-	-
	32	80	58	-	-
Neomysis americana	-	0	-	10	-
	-	X	198	0	-
	-	24	44	32	-
Crangon septemspinosus	-	-	-	-	-
	-	X	-	-	-
	78	172	-	-	-
Amathia vidovici	-	-	-	-	-
	-	X	72	-	-
	-		-	-	-
		0			