A Survey of Benthic Macroinvertebrates in Rivers in Placentia Bay, Newfoundland

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Abstract

O'Connell, M. F., and C. W. Andrews. 1996. A survey of benthic macroinvertebrates in rivers in Placentia Bay, Newfoundland. Can. MS Rep. Fish.Aquat. Sci. 2344: iv + 72 p, 6 appendices.

Benthic macroinvertebrates and their diversity were studied in six rivers in Placentia Bay, Newfoundland. The study was conducted in 1975 as part of an overall environmental assessment, which was prompted by industrialization in the bay. Sampling was conducted with a Surber sampler at two (Bottom Brook) or three (all other rivers) stations in each river; five or ten replicate samples were taken at each station, depending on the size of the station. Organisms were identified to the level of genus in most cases and some to species. Community diversity was examined using the Shannon-Wiener index (H'). The information from this study can be regarded as baseline for four watersheds (Northeast River, North Harbour River, Bay De L'Eau River, and Rushoon River) and as indicative of conditions prevailing at the time for the watersheds in the immediate vicinity of the Come By Chance oil refinery (Come By Chance River) and the Long Harbour phosphorous plant (Bottom Brook).

Résumé

O'Connell, M. F., and C. W. Andrews. 1996. A survey of benthic macroinvertebrates in rivers in Placentia Bay, Newfoundland. Can. MS Rep. Fish.Aquat. Sci. 2344: iv + 72 p, 6 appendices.

Les macro-invertébrés benthiques et leur diversité ont été étudiés dans six rivières de la baie de Placentia, à Terre-Neuve. L'étude a été menée en 1975 dans le cadre de l'évaluation environnementale globale commandée par l' industrialisation de la baie. Des échantillonnages ont été effectués, au moyen d'un filet Surber, à deux stations dan le ruisseau Bottom at à trois stations dans chacun des autres cours d'eau; cinq ou dix échantillons répétés, selon la taille de la station, ont été prélevés à chaque station. Les organismes ont été identifiés jusqu'au niveau du genre pour plupart des cas, et de l'espèce pour quelques-uns. La diversité des communautés a été examinée par l'utilisation de l'index Shannon-Wiener (H'). Les reseignements tirés cette étude peuvent être considérés comme les conditions be base pour quatre bassins hydrographiques (rivière Northeast, rivière North Harbour, rivière Bay de L'Eau et rivière Rushoon), et comme indicateurs des conditions de l'époque dans les bassins hydrographiques arrosant le voisinage immédiat de la raffinerie de pétrole de Come By Chance (rivière Come By Chance) et de l'usine de phosphore de Long Harbour (ruisseau Bottom).

INTRODUCTION

This report presents the results of a study of benthic macroinvertebrates conducted in six rivers in Placentia Bay, Newfoundland, in 1975. The study formed part of an overall environmental assessment that was initiated in response to existing and proposed industrialization in the bay. The freshwater component of the study was conducted under the general direction of Dr. C. W. Andrews (deceased). At the time of the study, an electric reduction phosphorus plant was in operation at Long Harbour and an oil refinery at Come By Chance. The phosphorus plant started operation in 1968, closed permanently in 1989, and is presently being decommissioned. The oil refinery, which began operation in 1973, was slated for considerable expansion, but instead closed in 1976; it was reactivated in 1987 and is still in operation.

There is a paucity of information on benthic macroinvertebrates in Newfoundland river systems, in both the lotic and lentic environments. The present study examines the taxa and diversity of benthic macroinvertebrates occurring in the lotic environment, specifically those occupying riffle habitat. The information presented can be used to address statistical concerns for planning more detailed studies and to examine ecological relationships in the rivers studied. The results of studies of physical and chemical conditions and plankton ecology (O'Connell and Andrews 1987) and the biology and life history of salmonids (Dalley 1978; O'Connell 1982; Dalley et al. 1983), arising from the Placentia Bay freshwater assessment, are available in published and unpublished documents.

MATERIALS AND METHODS

The location of each study river is shown in Fig. 1. Northeast River (47° 16' 15" N; 53° 50' 52" W) and Bottom Brook (47° 26' 55" N; 53° 47' 23" W) are located on the eastern side of Placentia Bay. Bottom Brook flows into the bay at Long Harbour, approximately 3 km northeast of the vacant phosphorous plant. Come By Chance River (47° 50' 40" N; 53° 59' 25" W) and North Harbour River (47° 50' 52" N; 54° 04' 45" W) flow into the north end of the bay. The mouth of Come By Chance River is approximately 4 km north of the oil refinery. Bay De L'Eau River (47° 26' 20" N; 54° 47' 00" W) and Rushoon River (47° 21' 15" N; 54° 55' 03" W) are located on the western side of the bay. A water sample was taken for chemical analyses at each of the stations sampled for macroinvertebrates in North Harbour River, Bay De L'Eau River, and Rushoon River. The results of these analyses are presented in Table 1 and the analytical methods used are described in O'Connell and Andrews (1987). Water chemistry for ponds in close proximity to some of the stations sampled in Northeast River, Bottom Brook, and Come By Chance River in 1975 is available in O'Connell and Andrews (1987).

Station locations for each river are presented in Figs. 2-7. Samples were collected from riffle habitat with a Surber sampler (quadrat size of 22 x 30 cm) which was equipped with a nylon mesh net with openings of 571 microns. A riffle is defined as an area where the current exceeds 38 cm/second, usually with a broken flow, and mean depth is less than 23 cm (Allen 1951). Substrate type was mainly cobble with varying proportions of gravel and sand. Five or ten replicate samples

were collected at random at each station. Randomization was achieved simply by walking into the station, and with eyes closed and turning several complete revolutions, tossing the Suber sampler back over the shoulder. This was repeated for every replicate, using the current location from which to toss the sampler. The duration of sampling or manipulation of substrate inside the sampler quadrat lasted a minimum of 1.0 minute. The size of the station and number of replicates depended on the width of the river. Five replicates were taken within a station measuring approximately 50 m^2 in size and 10 replicates within approximately 100 m^2. Sampling date, station size, and number of replicates for each station in each river are shown in Table 2. Sample contents were removed from the Surber sampler and placed in 10% formalin in water-tight Lab Tek (Miles Laboratories) plastic hospital specimen containers. In the laboratory, specimens were sorted and placed in glass vials in 70-80% ethanol. All chironomid larvae were dehydrated, cleared, and mounted on glass microscope slides in Canada balsam in xylene. The head capsule of each chironomid larva was removed from the body and mounted ventral side up next to the body. Identifications were made with the aid of dissecting and compound microscopes and selected taxonomic literature (Boving and Craighead 1930; Claassen 1931; Frison 1942; Robertson 1948; Pennak 1953; Sanderson 1953, 1954; Usinger 1956; Edmondson 1959; Herrington 1962; Sinclair 1964; Beck 1965; Beck and Beck 1966; Brinkhurst and Jamieson 1971; Harman and Berg 1971; Mason 1973; Edmunds *et al.* 1976; Wiggins 1977; Merritt and Cummins 1978).

Community diversity was determined by the Shannon-Wiener index (Washington 1984),

$$H' = -\sum_{i=1}^{s} p_i \log_2 p_i$$

where p_i is the proportion of individuals belonging to the ith taxon and s is the number of taxa. Relative diversity (Pielou 1966) was calculated as

$$J = H'/H'_{max}$$

where $H'_{max} = \log_2 s$. Computational formulae presented in Zar (1974) were used for the calculation of H' and J. Diversity was determined for each station by pooling information for all sampling units (replicates) and for each river by pooling data for all stations. The taxonomic levels presented in Appendices 1-6, which were consistent across all rivers and stations, were used to calculate diversity.

RESULTS

Major Taxonomic Groups

Percent occurrence (based on number of organisms) of the major taxonomic groups is presented by station for each river in Figs. 8-10. Except for Northeast River and Bottom Brook, where Diptera predominated at all stations, there was variation among stations with respect to the dominance of a particular taxonomic group for the remaining rivers. When data for individual stations were pooled and presented by river (Figs. 11-13), in addition to Northeast River and Bottom

Brook, Diptera was also the dominant group in Come By Chance River and Rushoon River while in North Harbour River and Bay De L'Eau River, Pelecypoda and Trichoptera respectively, predominated.

Taxa Encountered in Each Major Group

The various taxa found in each major group by station for each river are listed in Appendices 1-6. Shown for each taxon are the total number of individuals captured in all sampling units for a given station, the mean number of individuals per sampling unit, variance, minimum and maximum, and frequency of occurrence.

TURBELLARIA AND NEMATODA

Turbellaria (all belonging to the family Planariidae) were encountered in all rivers though not necessarily at all stations in a given river. These organisms were most abundant in Northeast River (Appendix 1a-c) while lowest numbers and occurrences overall were found in Come By Chance (Appendix 3b) and Bay De L'Eau (Appendix 4a) rivers. Nematodes were encountered in low numbers and infrequently at some stations in Northeast, Come By Chance, Bay De L'Eau, and Rushoon rivers.

OLIGOCHAETA

Four families were encountered, the most common being Lumbriculidae, which except for Station 1 in North Harbour River, was found at all stations in all rivers. This family was represented by two species, *Lumbriculus variegatus* and *L. heringianus*, with the latter being most important. Unidentified species of Enchytraeidae were encountered at certain stations in all rivers except Rushoon River; they were most important at Station 3 in each of Come By Chance (Appendix 3c) and North Harbour (Appendix 4c) rivers. Unidentified Tubificidae were found in low numbers and frequencies in Come By Chance (Appendix 3a-c), North Harbour (Appendix 4b), and Bay De L'Eau (Appendix 5a and 5c) rivers. The family Naididae was found in North Harbour (represented by *Slavina appendiculata*, Appendix 4a), Bay De L'Eau (*Nais communis*, Appendix 5a), and Rushoon (*S. appendiculata* and *N. communis*, Appendix 6a-c) rivers, being most important in the latter river.

HIRUDINEA

The leeches were represented by the families Glossiphoniidae and Erpobdellidae. With respect to the former family, the species *Helobdella stagnalis* was found at some stations in Northeast River (Appendix 1b), Bottom Brook (Appendix 2a-b), Come By Chance River (Appendix 3c), and North Harbour River (Appendix 4a) while *Glossiphonia complanata* was limited to Station 1 in Come By Chance River (Appendix 3a). Two species of Erpobdellidae were encountered; *Erpobdella punctata* was found in Northeast River (Appendix 1b), Bottom Brook (Appendix 2b), and Rushoon River (Appendix 6b) while *Nephelopsis obscura* was found only in Northeast River (Appendix 1c).

AMPHIPODA

A single species (*Hyalella azteca*) was encountered. It occurred in varying numbers and frequencies in all rivers, being least important in Rushoon River. The most notable occurrences were in Northeast River (Appendix 1b), Come By Chance River (Appendix 3a), and North Harbour River (Appendix 4a).

EPHEMEROPTERA

Families encountered included Ephemerellidae, Heptageniidae, Leptophlebiidae, Baetidae, and Siphlonuridae. The Siphlonuridae was represented by a single genus (*Ameletus*) on one occasion at Station 1 in Come By Chance River (Appendix 3a), while genera of the remaining families were encountered at nearly all stations in all rivers. *Ephemerella* was the only genus of the family Ephemerellidae encountered and was least important numerically and in frequency in Come By Chance River (Appendix 3a-c). For the Heptageniidae, *Stenonema* dominated, being found in more or less similar numbers and frequencies everywhere except all stations in Come By Chance River and Station 3 in Bay De L'Eau River; *Heptagenia* was next in importance although it did not appear at every station in a given river. A single specimen of *Epeorus* was encountered at Station 3, Northeast River (Appendix 1a). Three genera of Leptophlebiidae (*Habrophlebia*, *Leptophlebia*, and *Paraleptophlebia*) were found at Stations 1 and 2 in North Harbour River (Appendix 4a-b) and Station 3 in Bay De L'Eau River (Appendix 5c). For the remaining rivers, only two of these taxa (and in some cases only one) occurred at any one time, with the co-occurrence of *Habrophlebia* and *Paraleptophlebia* being most frequent. The genus *Baetis* (Baetidae) was encountered everywhere except Station 1, Bay De L'Eau River and was most prevalent at Station 1 in each of Northeast River (Appendix 1a), Bottom Brook (Appendix 2a), and North Harbour River (Appendix 4a), Station 3 in Bay De L'Eau River (Appendix 5c), and Station 2 in Rushoon River (Appendix 6b).

ODONATA

This group was found on one occasion only and this was at Station 2 in Bay De L'Eau River (Appendix 5b). A single specimen of the genus *Octogomphus* (Gomphidae) was encountered.

PLECOPTERA

The families Nemouridae and Perlodidae were found at most stations in all rivers. Two genera of Nemouridae were encountered, *Leuctra* and *Paracapnia*, with the former genus being most widespread. The genus *Isogenus* was the sole representative of the family Perlodidae; it tended to dominate numerically but was similar to *Leuctra* in frequency. The family Chloroperlidae (genus *Hastaperla*) was encountered on one occasion only and this was at Station 3 in Come By Chance River (Appendix 3c).

TRICHOPTERA

This was one of the most diverse groups encountered; collectively, across all rivers, it contained 11 families and 25 genera. The families Hydropsychidae, Polycentropodidae, and Rhyacophilidae were found in all six rivers although not necessarily at all stations in a given river. Overall, the Hydropsychidae was the most important family encountered, both numerically and in terms of frequency; dominance within this family was by either *Hydropsyche* or *Cheumatopsyche*, depending on the river and station. The highest numbers of *Hydropsyche* and *Cheumatopsyche* were encountered at Stations 1 and 2 in Northeast River (Appendix 1a,b); *Cheumatopsyche* was absent from Come By Chance River and Rushoon River. The genus *Arctopsyche* was found only at Station 1 in Rushoon River (Appendix 6a). The most important representatives of the family Polycentropodidae were the genera *Neureclipsis* and *Polycentropus*. The former genus was dominant in most cases being most important at station 2 in Northeast River (Appendix 1b). The genus *Nyctiophylax* was found only at Station 2 in Bottom Brook (Appendix 2b) and *Polyplectropus* was found only at Station 1 in Come By Chance River (Appendix 3a). The family Rhyacophilidae was represented by a single genus, *Rhyacophila*, and highest numbers were found at Station 1 in Northeast River (Appendix 1a) and Station 2 in Bottom Brook (Appendix 2b).

The family Lepidostomatidae, represented by a single genus, *Lepidostoma*, was found in all rivers except Come By Chance. Highest number and frequency was found at Station 2, Northeast River (Appendix 1b). The Glossosomatidae was also represented by one genus, *Glossosoma*, in all rivers except Bay De L'Eau and North Harbour; the highest number and frequency occurred at Station 1, Bottom Brook (Appendix 2a). The family Philopotamidae occurred in all rivers except Bottom Brook and North Harbour River. The genus *Chimarra* was the most important numerically and in terms of frequency, followed by *Dolophilodes*. The genus *Wormaldia* was encountered only at Station 3 in Northeast River and it was also the only member of the family Philopotamidae found at this station (Appendix 1c). The family Hydroptilidae ocurred sporadically in Northeast River, Bottom Brook, Bay De L'Eau River, and Rushoon River. The genus *Hydroptila* appeared in very low numbers in Northeast River and Bottom Brook; *Oxyethira* occurred in Bay De L'Eau River (where it was most abundant - Appendix 5b) and Rushoon River. The Brachycentridae, represented by the genera *Micrasema* (Northeast River - Appendix 1c and Bottom Brook Appendix 2a and 2b) and *Brachycentrus* (North Harbour River - Appendix 4a and Bay De L'Eau River - Appendix 5a,b), was present infrequently and in low numbers. The family Limnephilidae occurred in Northeast River (*Pycnopsyche*), Bottom Brook (*Neophylax, Psychoglypha,* and *Pycnopsyche*), and Come By Chance River (*Neophylax* and *Pycnopsyche*) in low numbers. Three genera of the family Leptoceridae were also encountered in low numbers, in Come By Chance (*Mystacides*), North Harbour (*Nectopsyche* and *Mystacides*), and Rushoon (*Ceraclea*) rivers. The family Odontoceridae (*Marilia*) made only one appearance and this was at Station 1 in North Harbour River (Appendix 4a).

COLEOPTERA

Two families were encountered; the Elmidae occurred in all rivers while the Dytiscidae was found only in Bottom Brook. With respect to the Elmidae, the genus *Optioservus* was found in all rivers except Bottom Brook and Come By Chance River, being most important at Stations 1 and 2 in Rushoon River (Appendix 6a,b) followed by Station 1 in Northeast River (Appendix 1a). There were occurrences of *Limnius* in all rivers except Northeast and Rushoon; the highest number encountered was at Station 2 in Bottom Brook (Appendix 2b). The genus *Promoresia* was found in Northeast River, North Harbour River, and Bottom Brook; it was most important in the latter (Appendix 2b). Low numbers of *Stenelmis* were encountered in Come By Chance River (Appendix 3b) and Rushoon River (Appendix 6b,c). The Dytiscidae was represented by *Agabus* at both stations in Bottom Brook (Appendix 2a,b).

DIPTERA

Five families were present, of which the most important by far was the Chironomidae. Collectively, across all rivers, this family was comprised of 25 identified genera in addition to a group of unidentified genera referred to collectively as the *Tanytarsus* group. Highest numbers occurred at Station 2 in Bottom Brook (Appendix 2b) where the genus *Trichocladius* predominated followed by *Micropsectra* and *Conchapelopia*. The genus *Conchapelopia* was the most important both numerically and in terms of frequency for the remaining rivers. Other noteworthy genera included *Polypedilum* (Appendix 1a, 2b), *Constempellina* (Appendix 2b), *Eukiefferiella* (Appendix 2a), and *Cricotopus* (Appendix 1b, 2a).

The Simuliidae was found in all rivers except North Harbour. The most important taxon was the *Simulium venustum/verecundum* complex, which was most important at Station 1 in Come By Chance River (Appendix 3a), followed by Station 1 in Northeast River (Appendix 1a) and Station 2 in Bottom Brook (Appendix 2b). Other species included *S. tuberosum* (Appendix 1a,c and Appendix 5a), *S. corbis* (Appendix 1c, 3b), and *S. vernum* (Appendix 3a); also, there were unidentified species of *Simulium*.

The family Tipulidae was found in low numbers and frequencies in all rivers (collectively represented by the genera *Antocha, Tipula, Hexatoma, Pilaria,* and *Pedicia*). The same applied to the families Ceratopogonidae and Empididae.

PARASITENGONA

Three families were encountered in low numbers and frequencies. The Sperchonidae occurred in all rivers and was represented by two genera, *Sperchon* (Appendix 1b, 2a, 5b, 6b,c) and *Sperchonopsis* (Appendix 3a, 4a). The genus *Atractides* (Hygrobatidae) was found in all rivers except North Harbour, while *Hygrobates* occurred on one occasion only in Come By Chance River (Appendix 3a). The genus *Lebertia* (Lebertiidae) was confined to Bottom Brook (Appendix 2a,b) and Bay De L'Eau River (Appendix 5b,c).

GASTROPODA

Three families and 3 genera appeared in low numbers and frequencies. The Hydrobiidae (*Amnicola*) occurred in Northeast River (Appendix 1b), Bottom Brook (Appendix 2b) and Come By Chance River (appendix 3a,c). The families Planorbidae (*Gyraulus*) and Ancylidae (*Ferrissia*) were found only in Bottom Brook (Appendix 2a,b).

PELECYPODA

The most important family encountered was the Sphaeriidae which was represented by two genera, *Pisidium* (all rivers except Rushoon) and *Sphaerium* (found only in Northeast, Come By Chance, and North Harbour rivers). The highest number of *Pisidium* was found in North Harbour River (Appendix 4a) followed by Northeast River (Appendix 1a,b) with the reverse order true with respect to river for *Sphaerium*. The family Margaritiferidae was represented by a single species (*Margaritana margaritifera*) in Northeast River (Appendix 1a) and Come By Chance River (Appendix 3b,c).

Diversity and Relative Diversity

Diversity values for stations separately and combined for each river are shown in Fig. 14. On an individual station basis, the lowest diversity value obtained was at Station 3 in North Harbour River while the highest was at Station 3 in Northeast River. For stations combined, the lowest value obtained was for Come By Chance River; Rushoon River had the highest value followed closely by Bay De L'Eau and Northeast rivers. The pattern for relative diversity (Fig. 15) was essentially the same as for diversity.

DISCUSSION

While the primary aim of the study was to identify the benthic macroinvertebrates occurring in riffle habitat in river systems in Placentia Bay and to examine diversity, the data were also meant to serve other purposes. The information presented for each taxon in the Appendices can be used as a pilot survey (Cassie 1971; Prepas 1984), to aid in addressing statistical concerns for planning future, more detailed studies. The objective was to determine the number of sampling units required to to ensure that the 95% confidence interval would not exceed a set percentage of the mean. Methods are available in Elliott (1977) that use the same information to determine the form of the spatial distribution of each taxon (Poisson, binomial, or negative binomial), which can influence the calculation of the number of sampling units required to achieve a particular level of precision for a confidence interval. The information presented in the Appendices can also be used to examine ecological relationships by organizing taxa according to feeding adaptations or functional groups (Merritt and Cummins 1984).

There are many indices available to measure diversity and these have been the subject of extensive reviews (for example, Washington 1984). Still, there is little consensus as to which index is the best (Death and Winterbourn 1995). In spite of its drawbacks (Washington 1984; Norris and Georges 1993), the Shannon-Wiener index (H'), which is based on information theory, was chosen for this study mainly because it remains the most widely used index (Norris and Georges 1993). Hughes (1978) found six factors other than pollution which could affect values of diversity indices such as H'. These include sampling method, sample size, depth of sampling, duration of sampling, time of year, and taxonomic level. Differences in these factors among sampling sites and studies could compromise the comparability of index values. In the present study, of the six factors, only sample size (number of replicates) and time of year differed to any degree among stations. With respect to number of replicates, Hughes (1978) found that H' levelled off after four Surber samples. In the present study, index values were generally asymptotic after 4 or 5 sampling units (Figs. 16-18). As for time of year, Northeast River, Bottom Brook, and Come By Chance River were sampled in late spring-early summer while North Harbour River, Bay De L'Eau River, and Rushoon River were sampled in Autumn. Hughes (1978) reported that depth of sampling (penetration of substrate) had little influence on H'and a sampling duration of 30 seconds was sufficient. In the present study, sampling duration (rarely mentioned in most studies) always exceeded 30 seconds.

Hughes (1978) concluded that while diversity index values are useful indices of community structure, they cannot stand alone as indices of environmental quality. This is offset to a degree in the present study with the inclusion of water chemistry information.

Two anomalous sampling situations occurred that warrant mention. One of the sampling units for Station 2 in Bottom Brook contained a relatively large amount of a species of the freshwater moss *Fontinalis*, associated with which was considerably more organisms (mainly Chironomidae) than contained in the other samples. This accounts for the exceptionally high variance recorded for Station 2. At Station 3 in North Harbour River, high water levels and fast current, resulting from a heavy rainfall, confined sampling to an area close to the river bank, which could account for the low species diversity observed.

In recent years, the Come By Chance oil refinery has resumed operation and there have been various proposals for industrial development at the abandoned phosphorus plant site at Long Harbour. In addition, there is a possibility that spinoff industries associated with the Hibernia offshore gravity-based oil production platform, could locate in Placentia Bay. In the light of existing and potential development, the information presented above can be regarded as baseline for four watersheds (Northeast River, North Harbour River, Bay De L'Eau River, and Rushoon River) and as indicative of conditions at the time of the study in the immediate vicinity of the Come By Chance oil refinery (Come By Chance River) and the Long Harbour phosphorus plant (Bottom Brook). An original aim of the study, namely to serve as an aid in planning future studies, should still be valid.

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REFERENCES

Allen, K. R. 1951. The Horokiwi stream. A study of a trout population. Fish. Bull. Wellington, N.Z. 10: 1-231.

Beck, W. M. 1965. The streams of Florida. Bull. Florida State Mus. 10: 91-126.

Beck, W. M., and E. C. Beck. 1966. Chironomidae (Diptera) of Florida: I. Pentaneurini (Tanypodinae). Bull. Florida State Mus. 10: 305-379.

Boving, A. G., and F. C. Craighead. 1930. An illustrated synopsis of the principal larval forms of the order Coleoptera. Entomol. Am. 11 (1).

Brinkhurst, R. O., and B.G.M. Jamieson. 1971. Aquatic Oligochaeta of the world. University of Toronto Press, Toronto and Buffalo.

Cassie, R. M. 1971. Sampling and statistics, p. 174-209. *In* W. T. Edmondson and G. G. Winberg [eds.] A manual on methods for the assessment of secondary productivity in fresh waters. IBP Handbook No. 17. Blackwell Scientific Publications, Oxford and Edinburgh.

Claassen, P. W. 1931. Plecoptera nymphs of America (North of Mexico). The Thomas Say Foundation. Charles C. Thomas, Publisher, Springfield, Illinois and Baltimore, Maryland.

Dalley, E. L. 1978. Studies on the biology of sexually mature male salmon parr, *Salmo salar* Linnaeus 1758, in insular Newfoundland. M.Sc. Thesis, Department of Biology, Memorial University of Newfoundland, St. John's, Newfoundland.

Dalley, E. L., C. W. Andrews, and J. M. Green. 1983. Precocious male Atlantic salmon parr, *Salmo salar* in insular Newfoundland. Can. J. Fish. Aquat. Sci. 40: 647-652.

Death, R. G., and M. J. Winterbourn. 1995. Diversity patterns in stream benthic invertebrate communities: the influence of habitat stability. Ecology 76: 1446-1460.

Edmondson, W. T. 1959. Fresh-water biology. John Wiley and Sons, Inc., New York.

Edmunds, G. F., S. L. Jensen, and L. Berner. 1976. The mayflies of North and Central America. University of Minnesota Press, Minneapolis.

Elliott, J. M. 1977. Some methods for the statistical analysis of samples of benthic invertebrates. Scientific Publication No. 25 (2nd ed.). Freshwater Biological Association.

Frison, T. H. 1942. Studies of North American Plecoptera with special reference to the fauna of Illinnois. Ill. Nat. Hist. Surv. Bull. 22.

Harman, W. N., and C. O. Berg. 1971. The freshwater snails of Central New York with illustrated keys to the genera and species. Cornell University Agricultural Experiment Station. Cornell University, Ithaca, New York.

Herrington, H. B. 1962. A revision of the Sphaeriidae of North America (Mullosca: Pelecypoda). Miscellanaous Publications, Museum of Zoology, University of Michigan, No. 118.

Hughes, B. D. 1978. The influence of factors other than pollution on the value of Shannon's diversity index for benthic macroinvertebrates in streams. Water Res. 12: 359-364.

Mason, W. T. 1973. An introduction to the identification of Chironomid larvae. Analytical Quality Control Laboratory, National Environmental Research Center. U.S. Environmental Protection Probation Agency, Cincinnati, Ohio.

Merritt, R. W., and K. W. Cummins. 1978. An introduction to the aquatic insects of North America. Kendall/Hunt, Publishing Co., Dubuque, Iowa.

Merritt, R. W., and K. W. Cummins. 1984. An introduction to the aquatic insects of North America. 2nd. ed. Kendall/Hunt Publishing Co., Dubuque, Iowa.

Norris, H. N., and A. Georges. 1993. Analysis and interpretation of benthic macroinvertebrate surveys, p. 234-286. *In* D. M. Rosenberg and V. H. Resh [eds.] Freshwater monitoring and benthic macroinvertebrates. Chapman and Hall, New York and London

O'Connell, M. F. 1982. The biology of anadromous *Salvelinus fontinalis* (Mitchill, 1815) and *Salmo trutta* Linnaeus, 1758 in river systems flowing into Placentia Bay and St. Mary's Bay, Newfoundland. Ph.D. Thesis, Department of Biology, Memorial University of Newfoundland, St. John's, Newfoundland.

O'Connell, M. F., and C. W. Andrews. 1987. Plankton ecology in relation to flushing rate in four Newfoundland ponds. Int. Revue ges. Hydrobiol. 72: 487-515.

Pennak, R. W. 1953. Fresh-water invertebrates of the United States. The Ronald Press Company, New York.

Pielou, E. C. 1966. The measurement of diversity in different types of biological collections. J. Theoret. Biol. 13: 131-144.

Prepas, E. E. 1984. Some statistical methods for the design of experiments and analysis of samples, p. 266-335. *In* J. A. Downing and F. H. Rigler [eds.] A manual on methods for the assessment of secondary productivity in fresh waters. IBP Handbook No. 17 (2nd ed.). Blackwell Scientific Publications, Oxford, London, Edinburgh, Boston, Melbourne.

Robertson, I.M.C. 1948. The Mollusca of the Niagara frontier region and adjacent territory. Bull. Buffalo Soc. Nat. Sci. 19(3).

Sanderson, M. W. 1953. A revision of the Nearctic genra of Elmidae (Coleoptera). J. Kansas Entomol. Soc.26: 148-163.

Sanderson, M. W. 1954. A revision of the Nearctic genra of Elmidae (Coleoptera). J. Kansas Entomol. Soc.27: 1-13.

Sinclair, R. M. 1964. Water quality requirements for Elmid beetles with larval and adult keys to the eastern genera. Tennessee Stream Pollution Control Board. Tennessee Department of Public Health, Nashville, Tennesee.

Usinger, R. L. 1956. Aquatic insects of California with keys to North American genera and California species. University of California Press, Berkley, Los Angeles, London.

Washington, H. G. 1984. Diversity, biotic and similarity indices a review with special relevance to aquatic ecosystems. Water Res. 18: 653-694.

Wiggins, G. B. 1977. Larvae of the North American caddisfly genera (Trichoptera). University of Toronto Press, Toronto and Buffalo.

Zar, J. H. 1974. Biostatistical analysis. Prentice-Hall, Inc., Englewood Cliffs, N.J.

Table 1. Water chemistry for each station in North Harbour River, Bay De L'Eau River, and Rushoon River for the same dates that macroinvertebrates were sampled. Methods followed for the various analyses are described in O'Connell and Andrews (1987). N.D. = not detectable.

Parameter	North Harbour River			Bay De L'Eau River			Rushoon River		
	Station			Station			Station		
	1	2	3	1	2	3	1	2	3
pH	6.0	5.8	5.5	6.1	5.7	5.4		5.5	5.9
Specific conductance (µmhos/cm @ 25 °C)	61.9	76.0	53.9	30.6	31.3	34.0		31.8	32.8
Total alkalinity (as mg/l $CaCO_3$)	0.40	1.80	0.80	2.80	1.00	0.20		1.40	0.60
Total hardness (as mg/l $CaCO_3$)	7.83	7.43	7.41	4.55	3.98	6.39		5.32	5.85
Ammonium nitrogen (mg/l N)	0.003	0.002	0.004	0.003	0.003	0.002		0.003	0.003
Nitrate + nitrite (mg/l N)	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.		N.D.	N.D.
Total phosphorus (mg/l PO_4)	0.033	0.033	0.032	0.033	0.024	0.034		0.033	0.045
Silica (mg/l SiO_2)	0.194	0.157	0.176	0.089	0.118	0.203		0.096	0.158
Sulfate (mg/l SO_4)	1.50	0.60	0.20	0.20	0.70	0.50		0.10	0.10
Calcium (mg/l)	2.100	1.956	1.884	1.186	0.953	1.673		1.301	1.487
Magnesium (mg/l)	0.550	0.561	0.564	0.387	0.376	0.483		0.443	0.474
Apparent colour	60	60	55	25	35	60		65	65

Table 2. Sampling date, size of station, and number of replicates for each of the stations sampled in each river.

River	Station No.	Sampling date	Station size (m^2)	Replicates (No.)
Northeast River	1	June 9, 1975	50	5
	2	June 25, 1975	100	10
	3	June 9, 1975	100	10
Bottom Brook	1	June 25, 1975	50	5
	2	June 25, 1975	50	5
Come By Chance River	1	June 4, 1975	100	10
	2	June 3, 1975	100	10
	3	June 5, 1975	100	10
North Harbour River	1	Oct. 21, 1975	100	10
	2	Oct. 21, 1975	100	10
	3	Oct. 23, 1975	Undefined	5
Bay De L'Eau River	1	Oct. 1, 1975	50	5
	2	Oct. 1, 1975	100	10
	3	Sept. 30, 1975	100	10
Rushoon River	1	Sept. 24, 1975	50	5
	2	Sept. 24, 1975	100	10
	3	Sept. 23, 1975	100	10

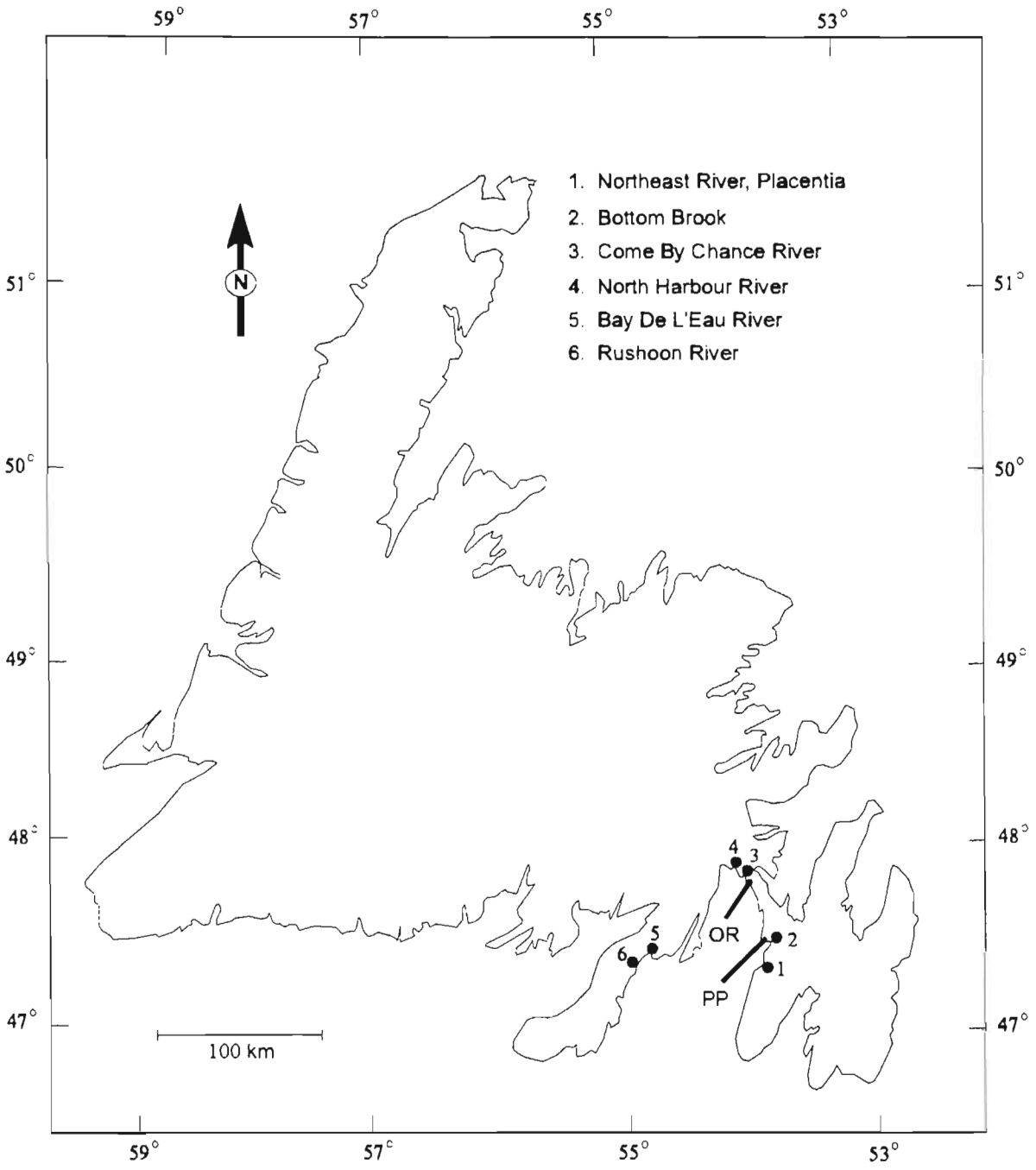


Fig. 1. Map showing the location of each of the rivers studied. OR = oil refinery; PP = phosphorus plant.

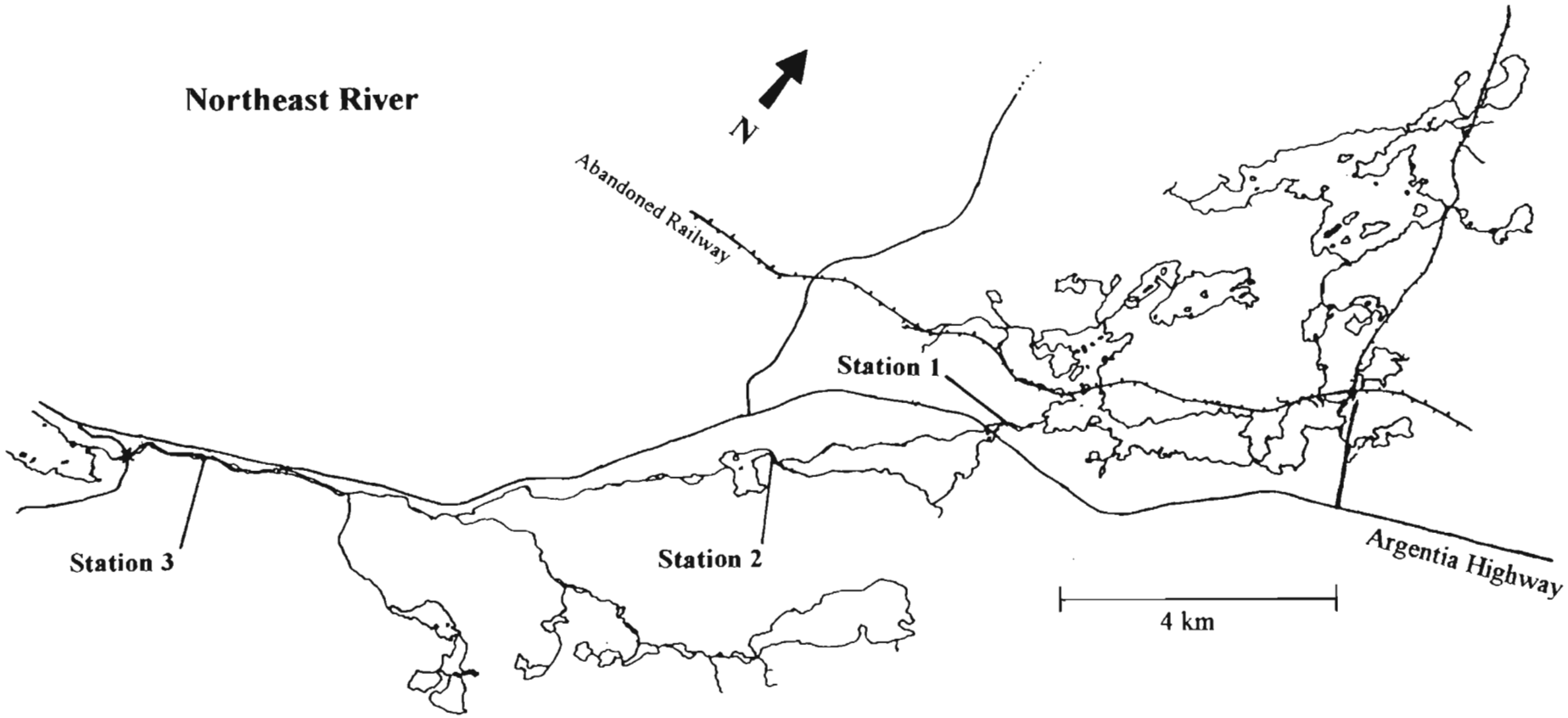


Fig. 2. Map showing the location of sampling stations in Northeast River, Placentia Bay.

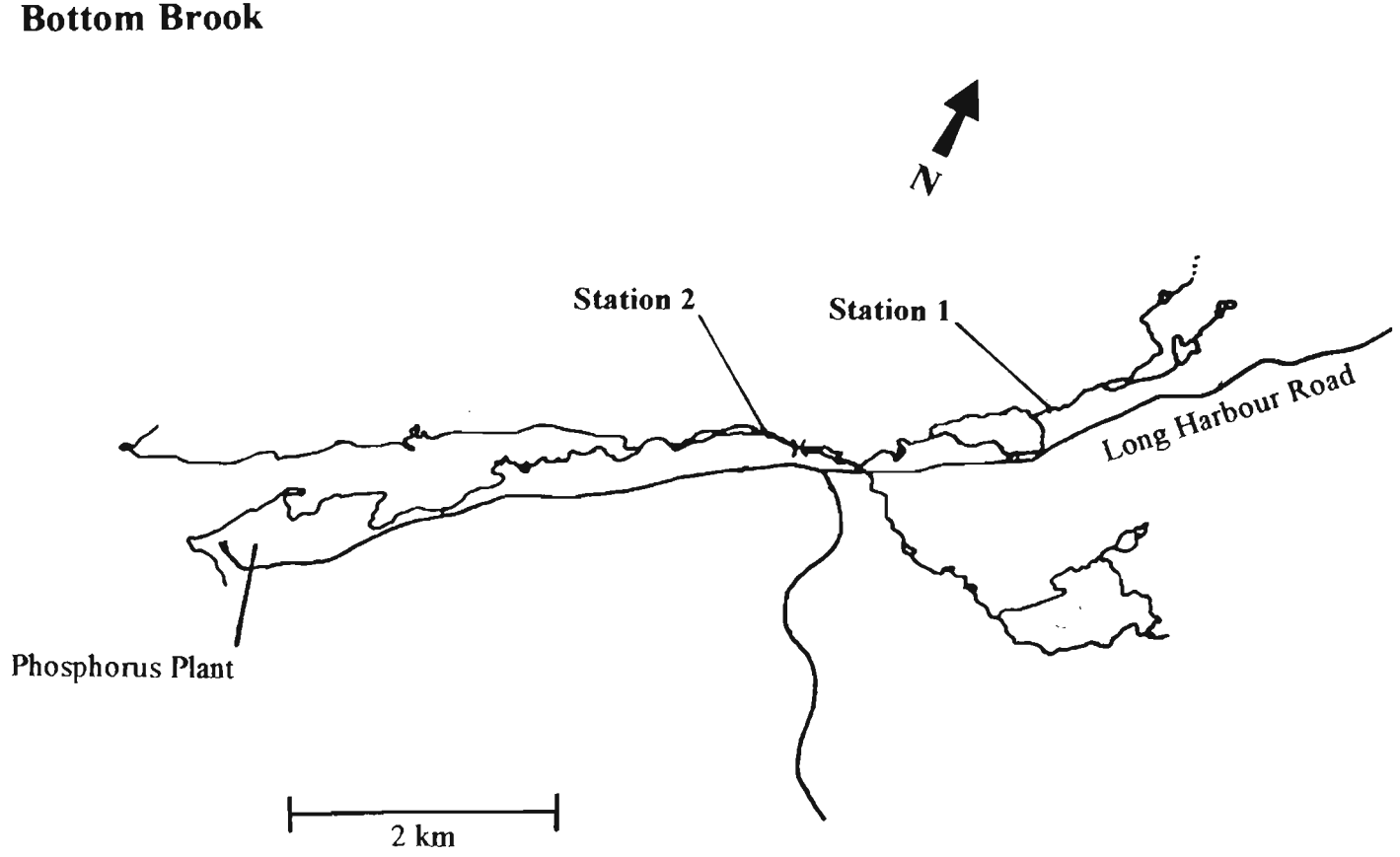


Fig. 3. Map showing the location of sampling stations in Bottom Brook, Long Harbour, Placentia Bay.

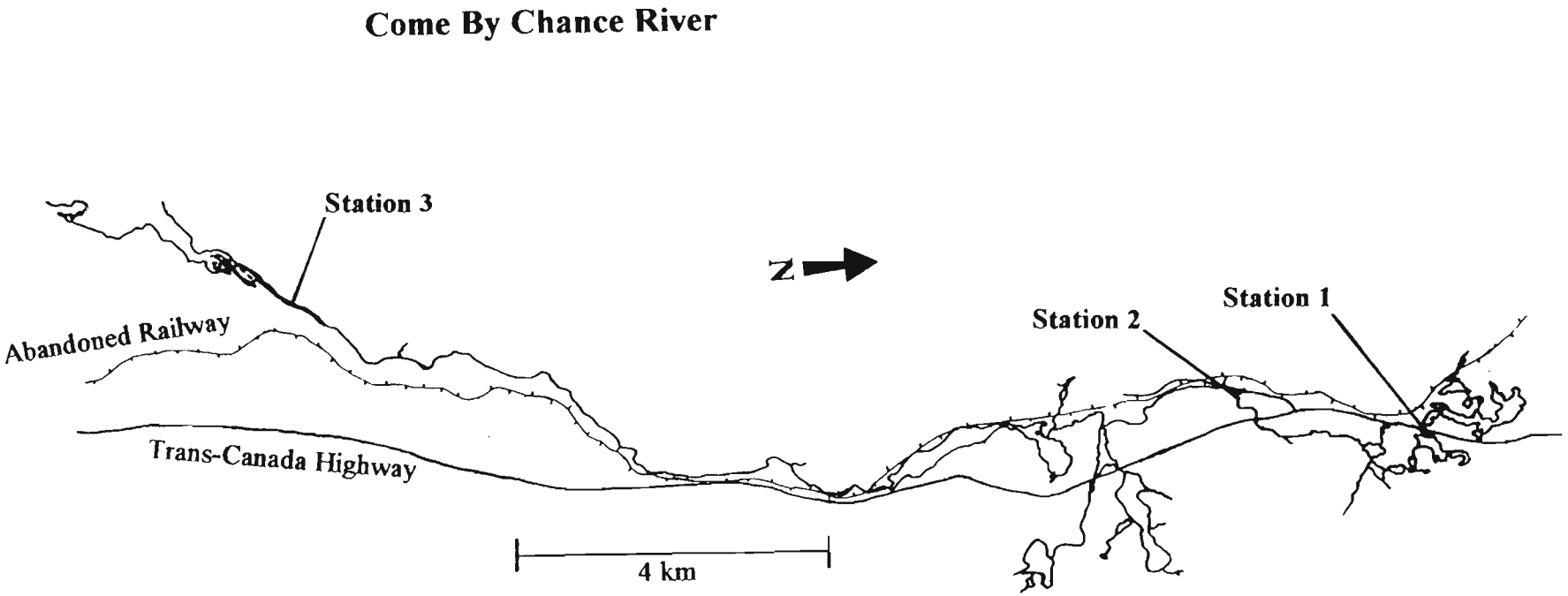


Fig. 4. Map showing the location of sampling stations in Come By Chance River, Placentia Bay.

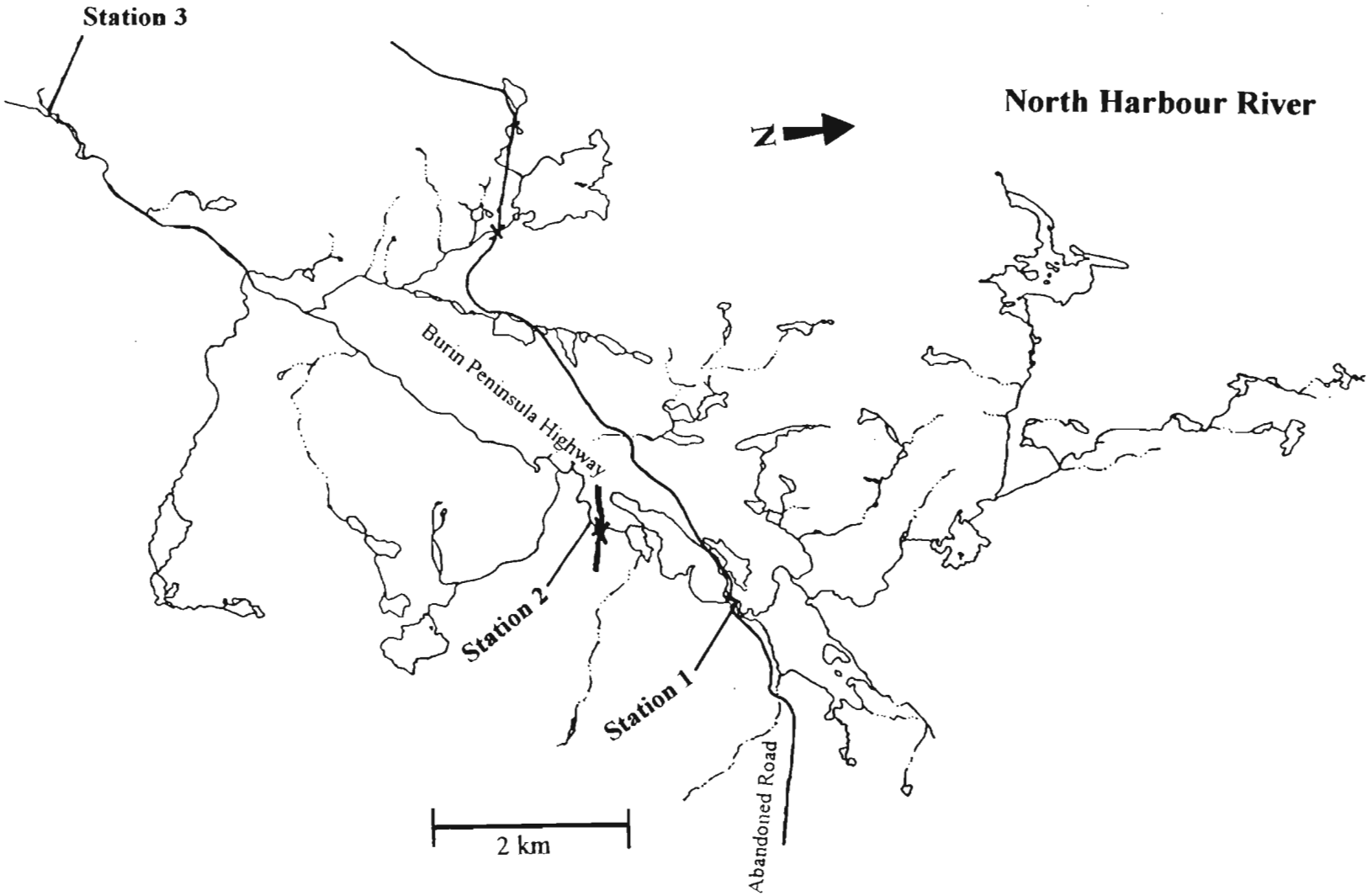


Fig. 5. Map showing the location of sampling stations in North Harbour River, Placentia Bay.

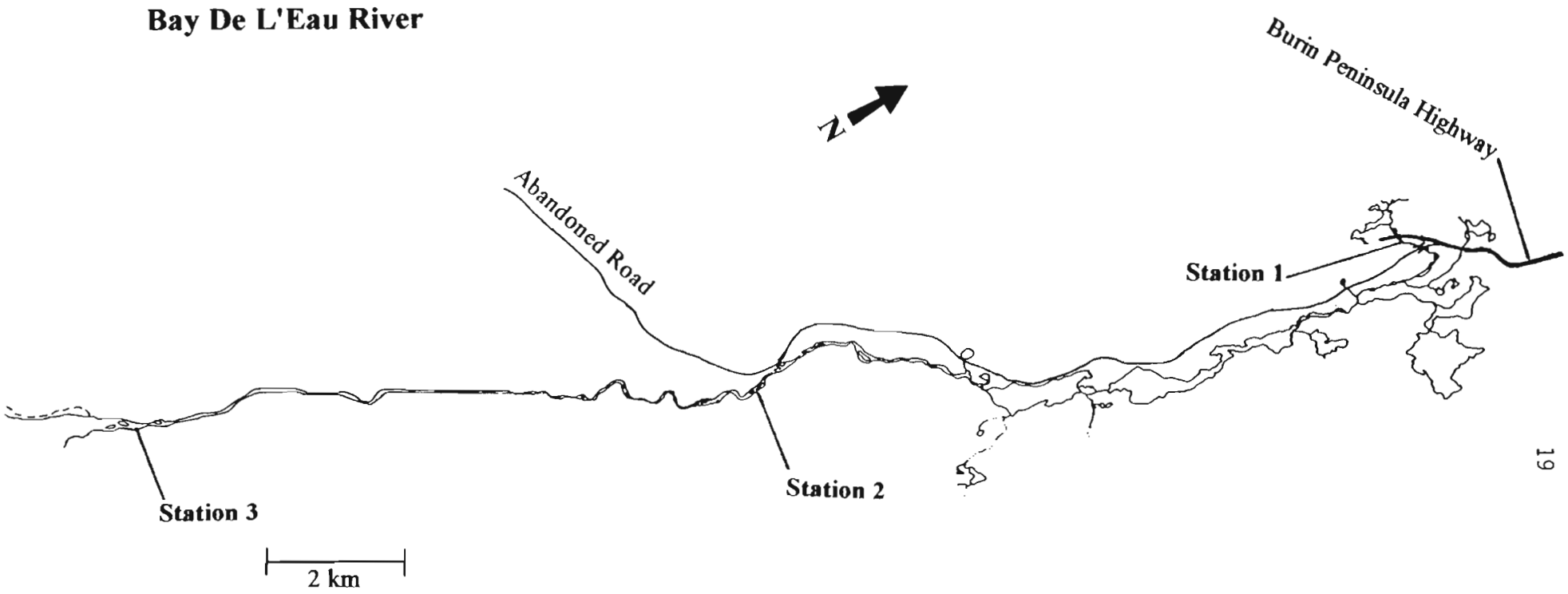


Fig. 6. Map showing the location of sampling stations in Bay De L'Eau River, Placentia Bay.

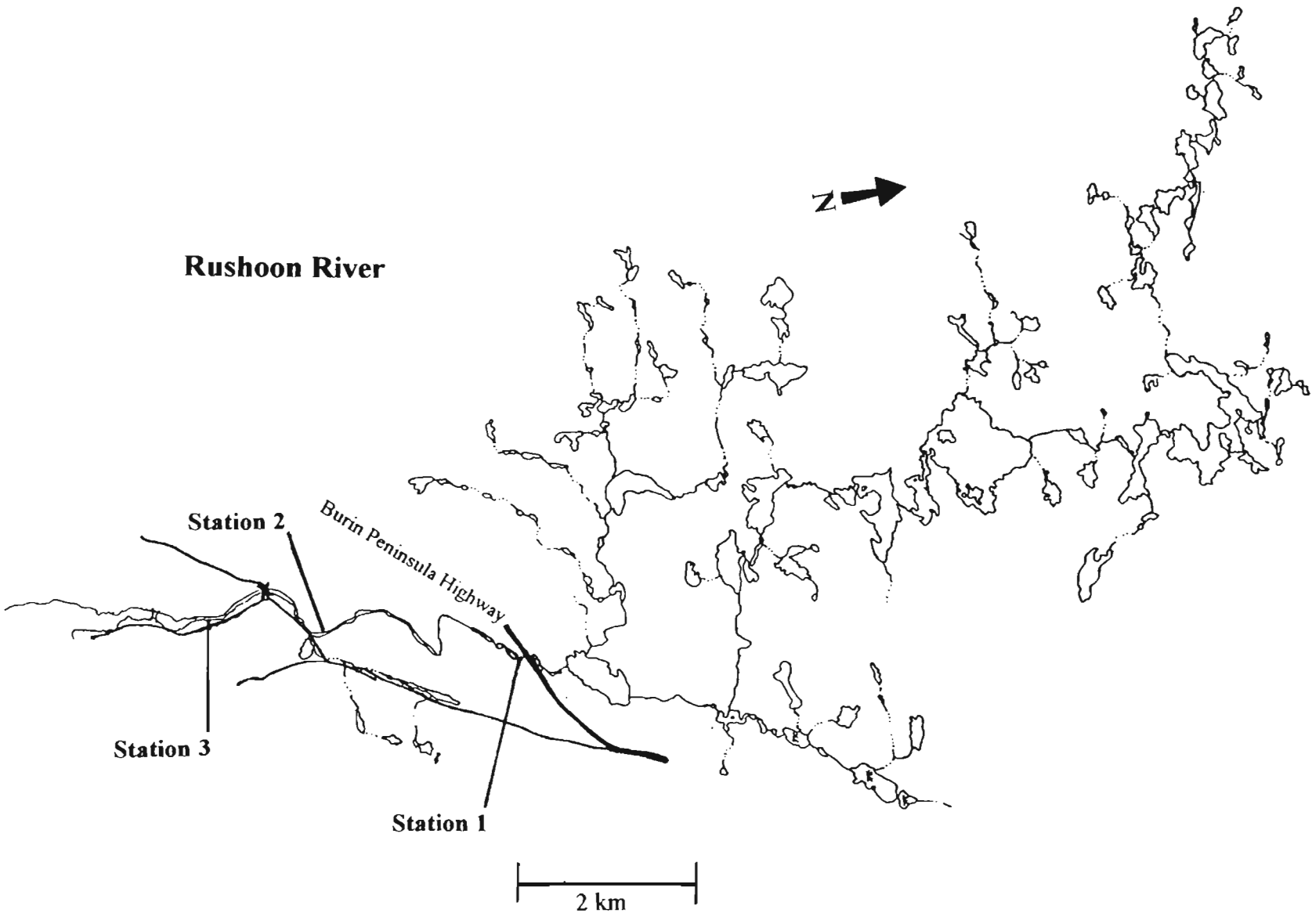


Fig. 7. Map showing the location of sampling stations in Rushoon River, Placentia Bay.

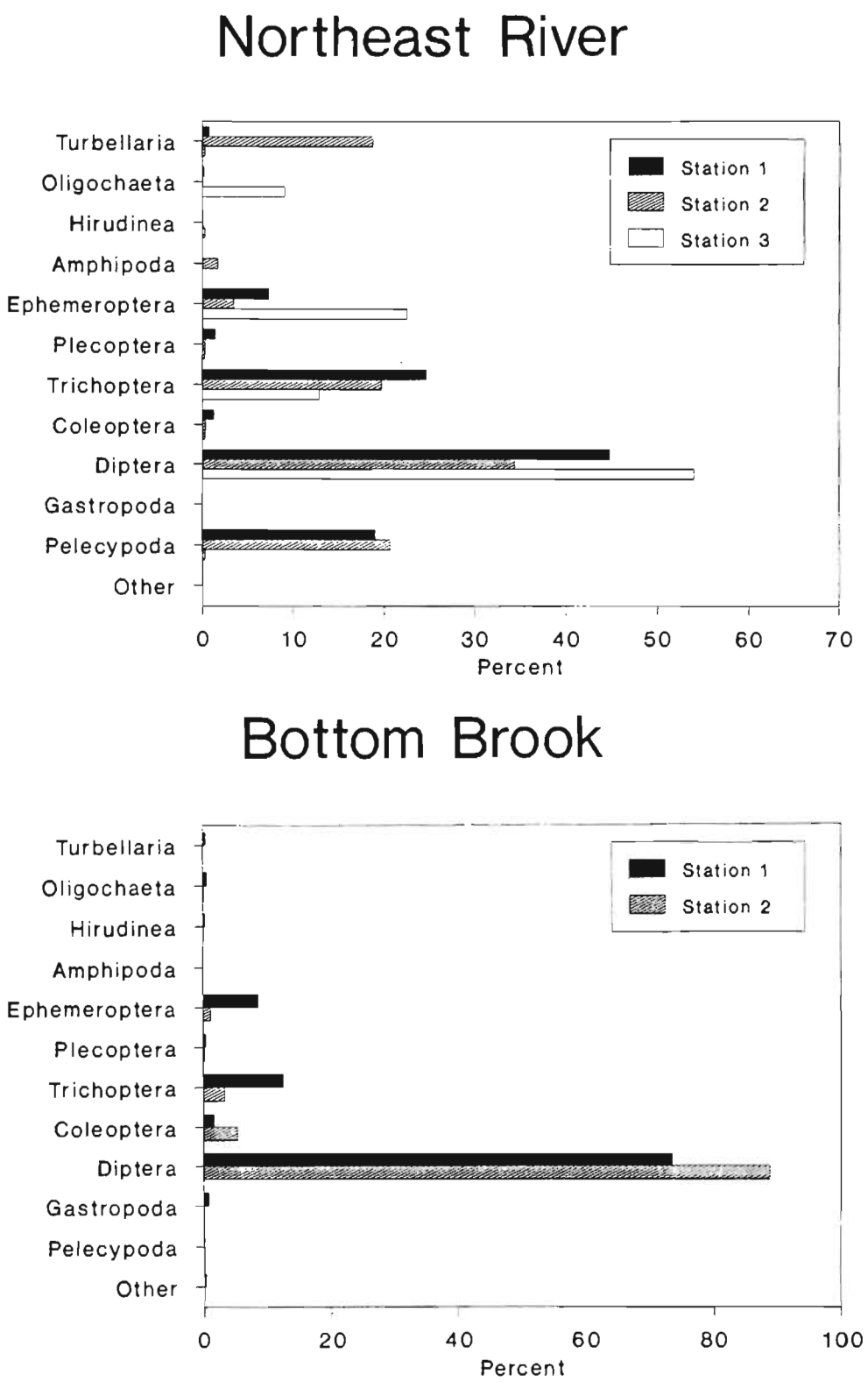


Fig. 8. Frequency of occurrence of the major taxonomic groups for each station in Northeast River and Bottom Brook, Placentia Bay, 1975.

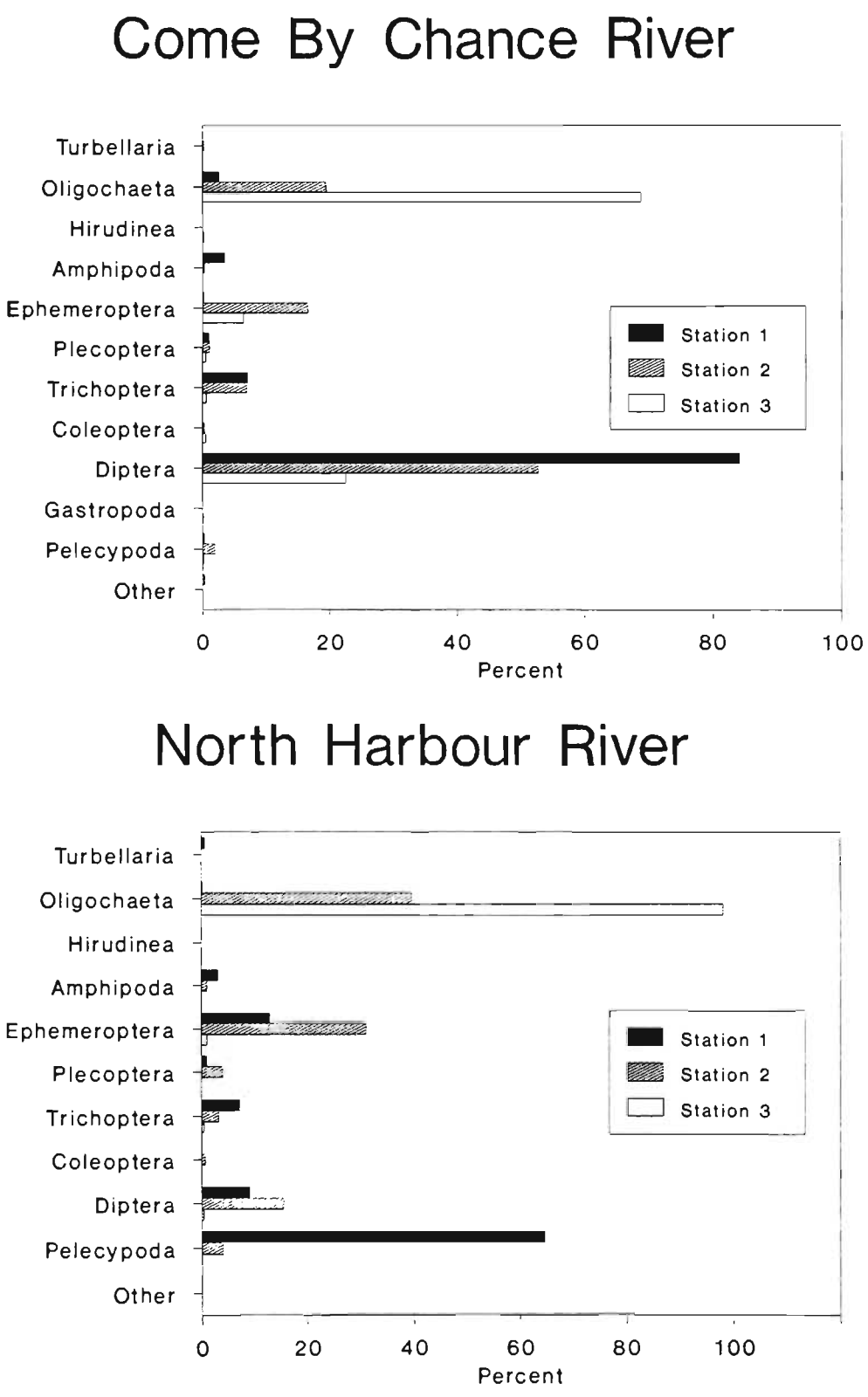


Fig. 9. Frequency of occurrence of the major taxonomic groups for each station in Come By Chance River and North Harbour River, Placentia Bay, 1975.

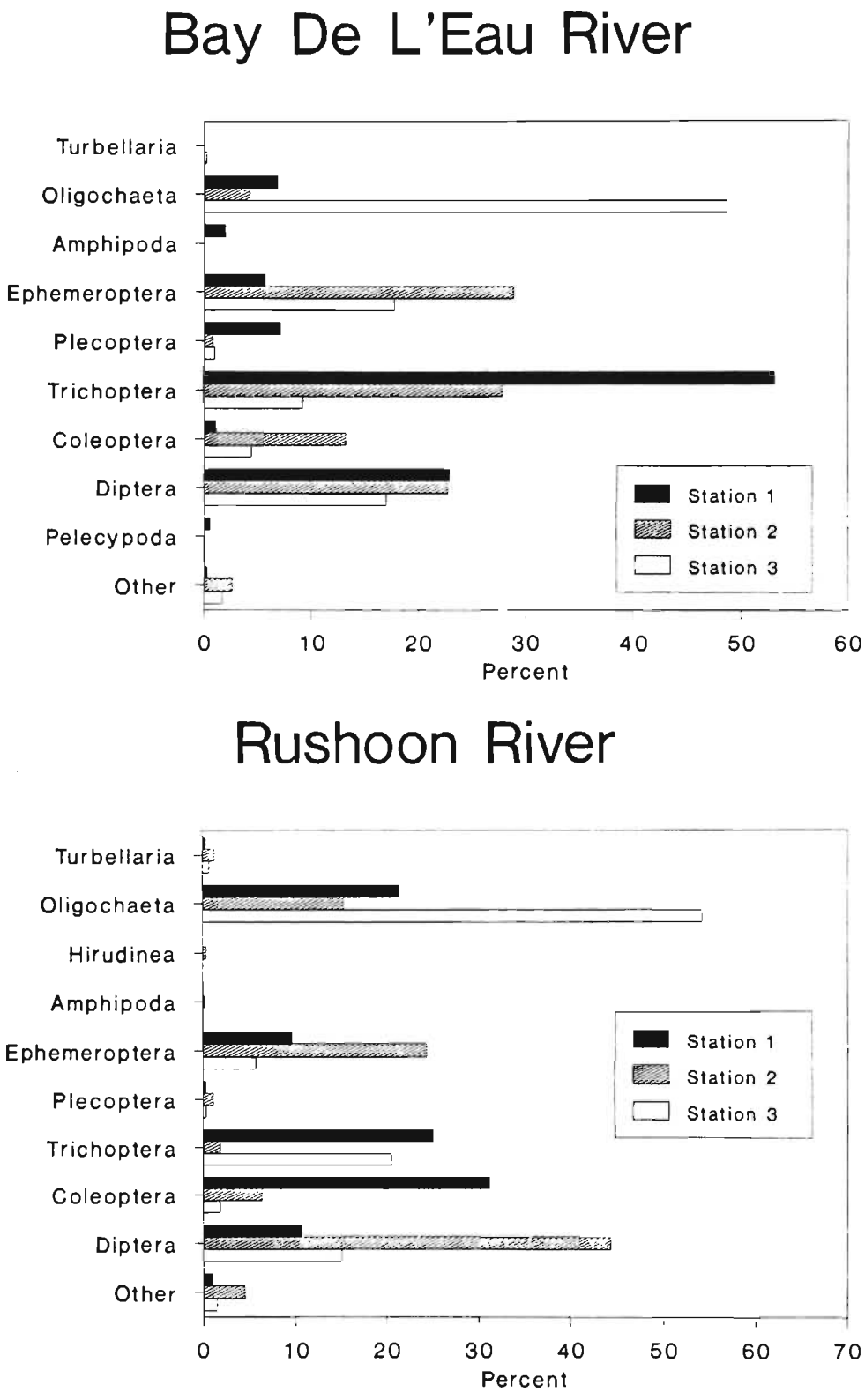


Fig. 10. Frequency of occurrence of the major taxonomic groups for each station in Bay De L'Eau River and Rushoon River, Placentia Bay, 1975.

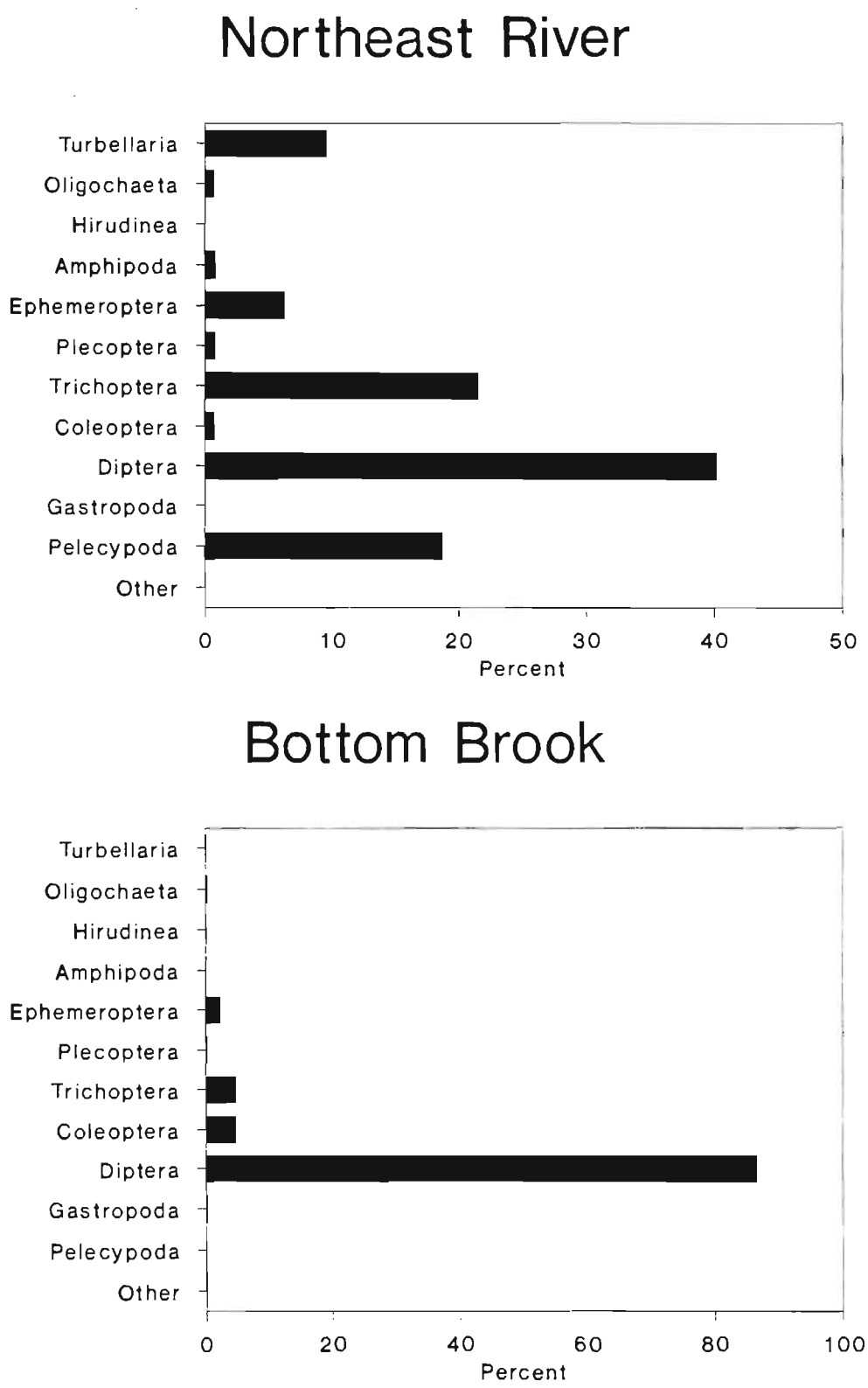


Fig. 11. Frequency of occurrence of the major taxonomic groups for stations combined in Northeast River and Bottom Brook, Placentia Bay, 1975.

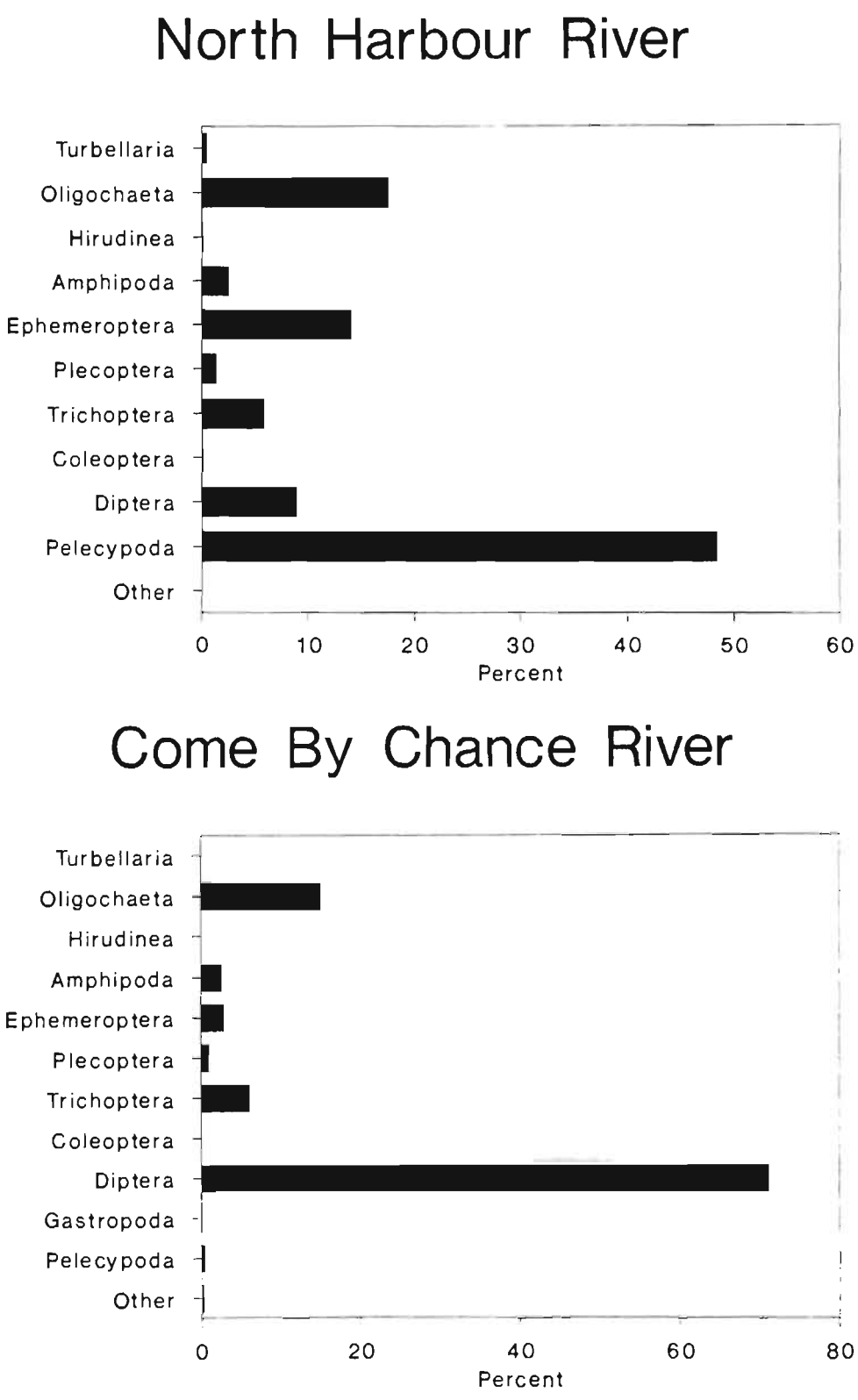


Fig. 12. Frequency of occurrence of the major taxonomic groups for stations combined in Come By Chance River and North Harbour River, Placentia Bay, 1975.

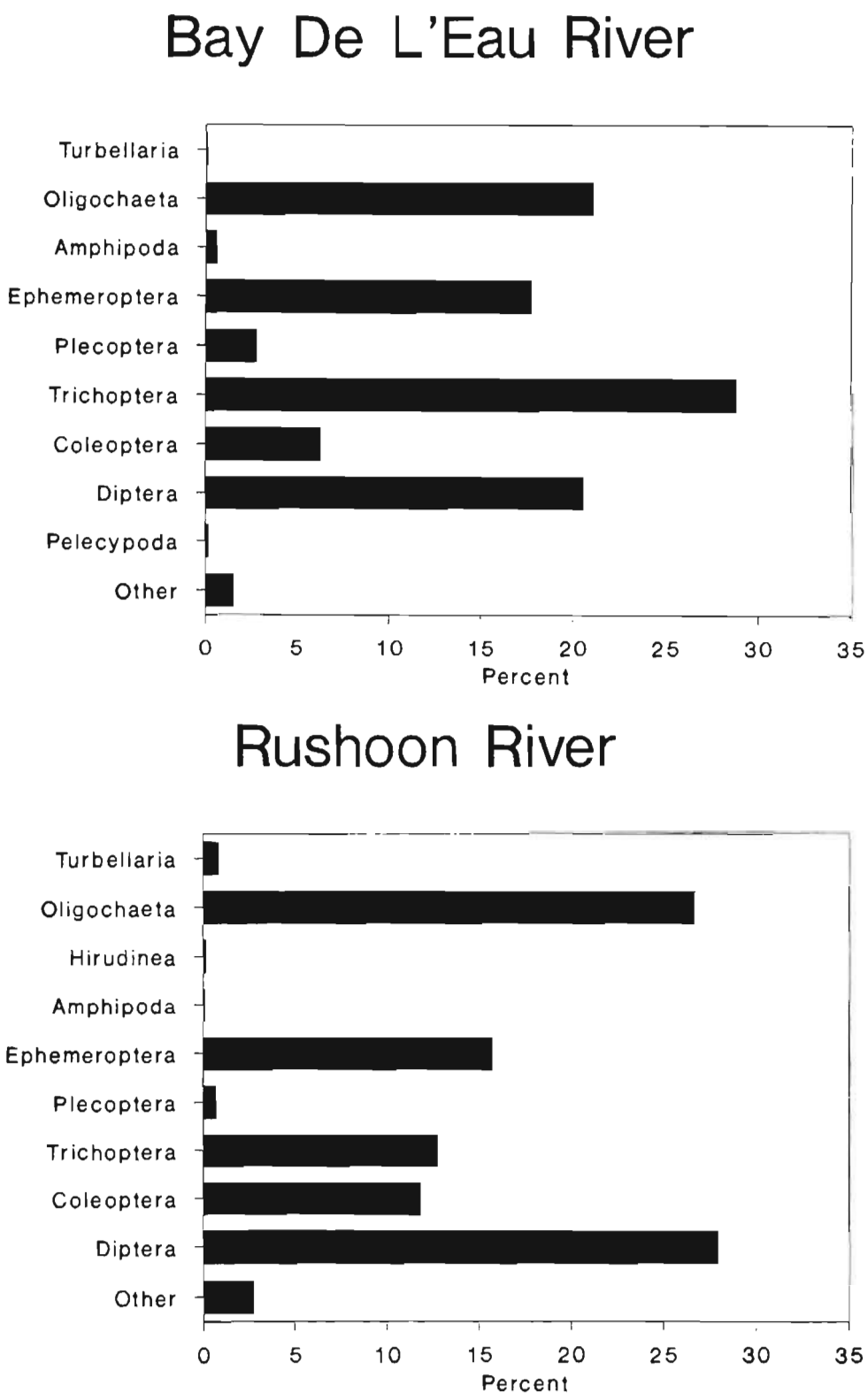


Fig. 13. Frequency of occurrence of the major taxonomic groups for stations combined in Bay De L'Eau River and Rushoon River, Placentia Bay, 1975.

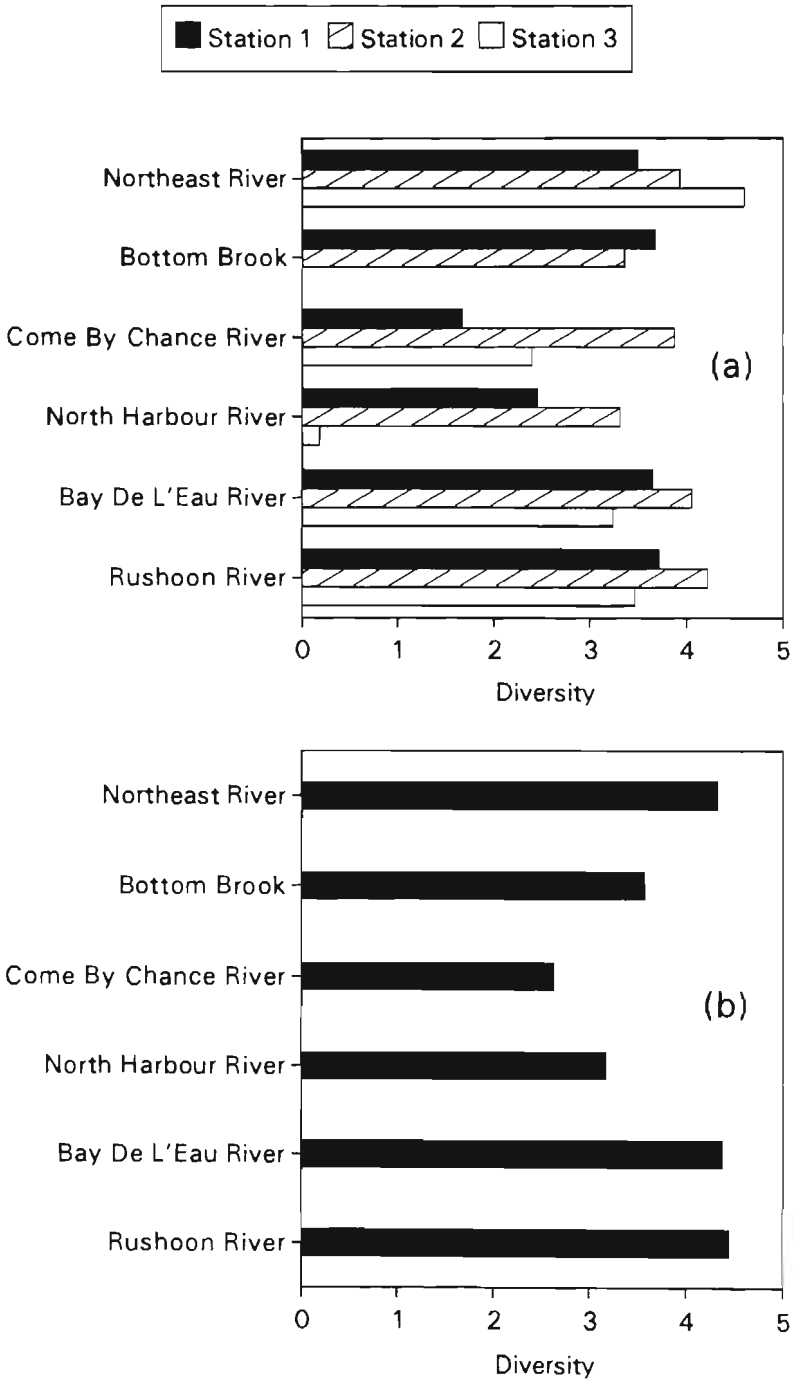


Fig. 14. Diversity (H') by station (a) and for stations combined (b) for each river.

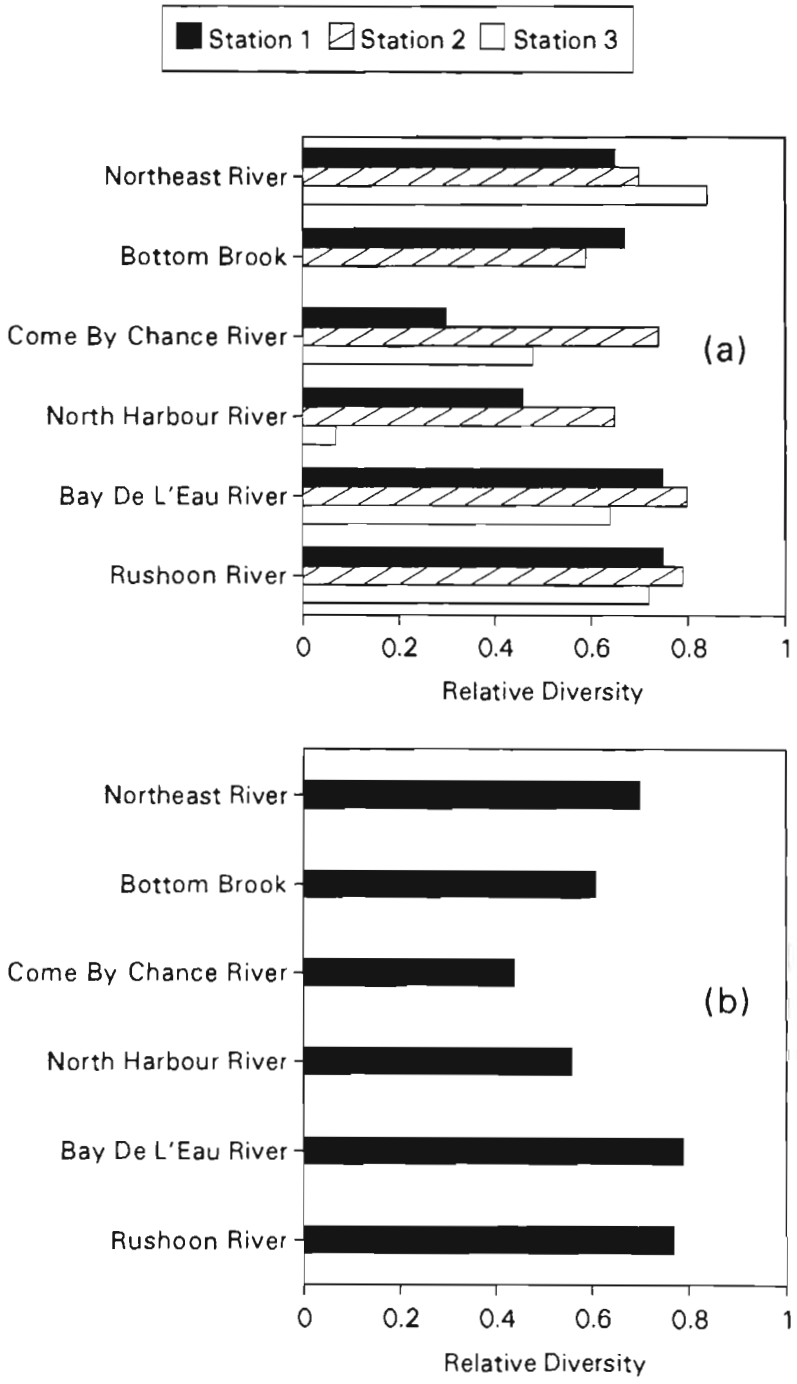
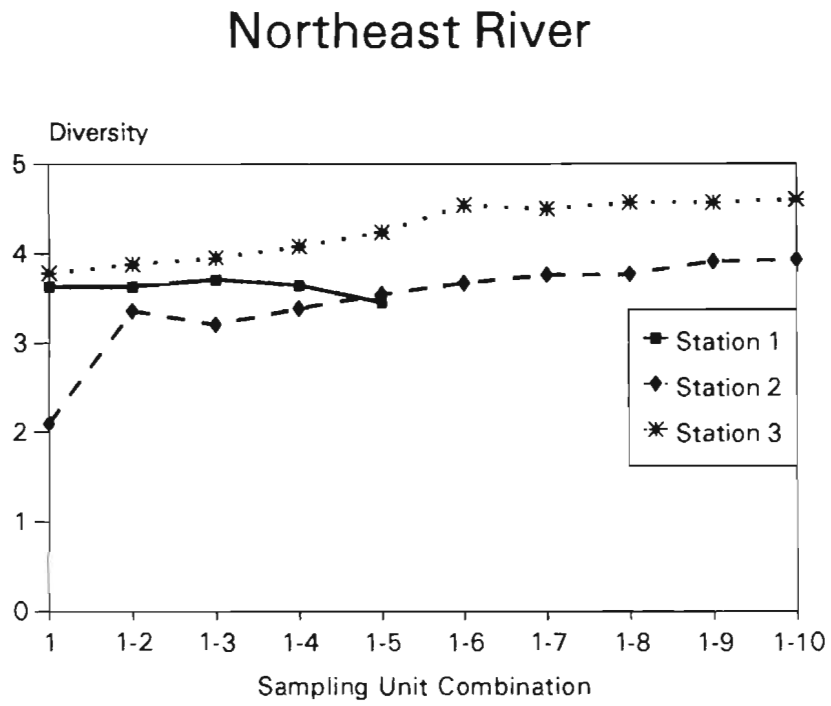


Fig. 15. Relative diversity (J) by station (a) and for stations combined (b) for each river.



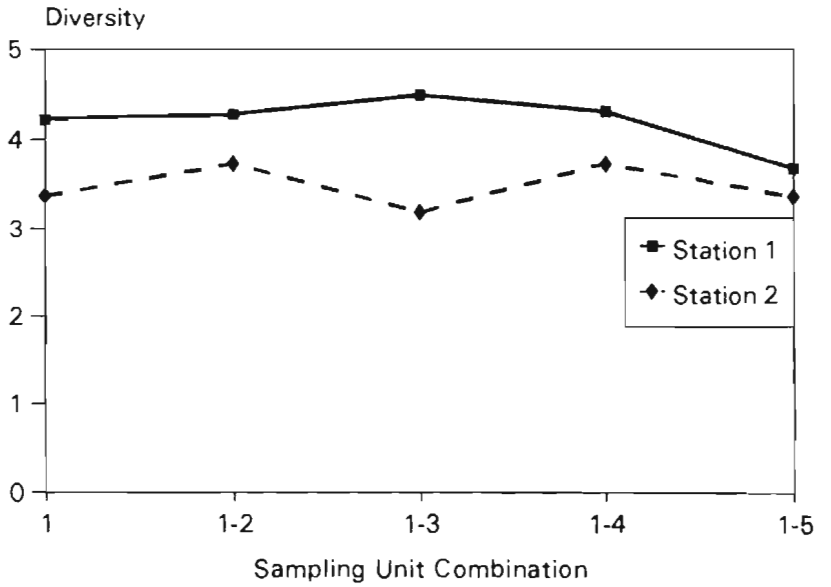


Fig. 16. Comparison of diversity with increasing number of sampling units for Northeast River and Bottom Brook.

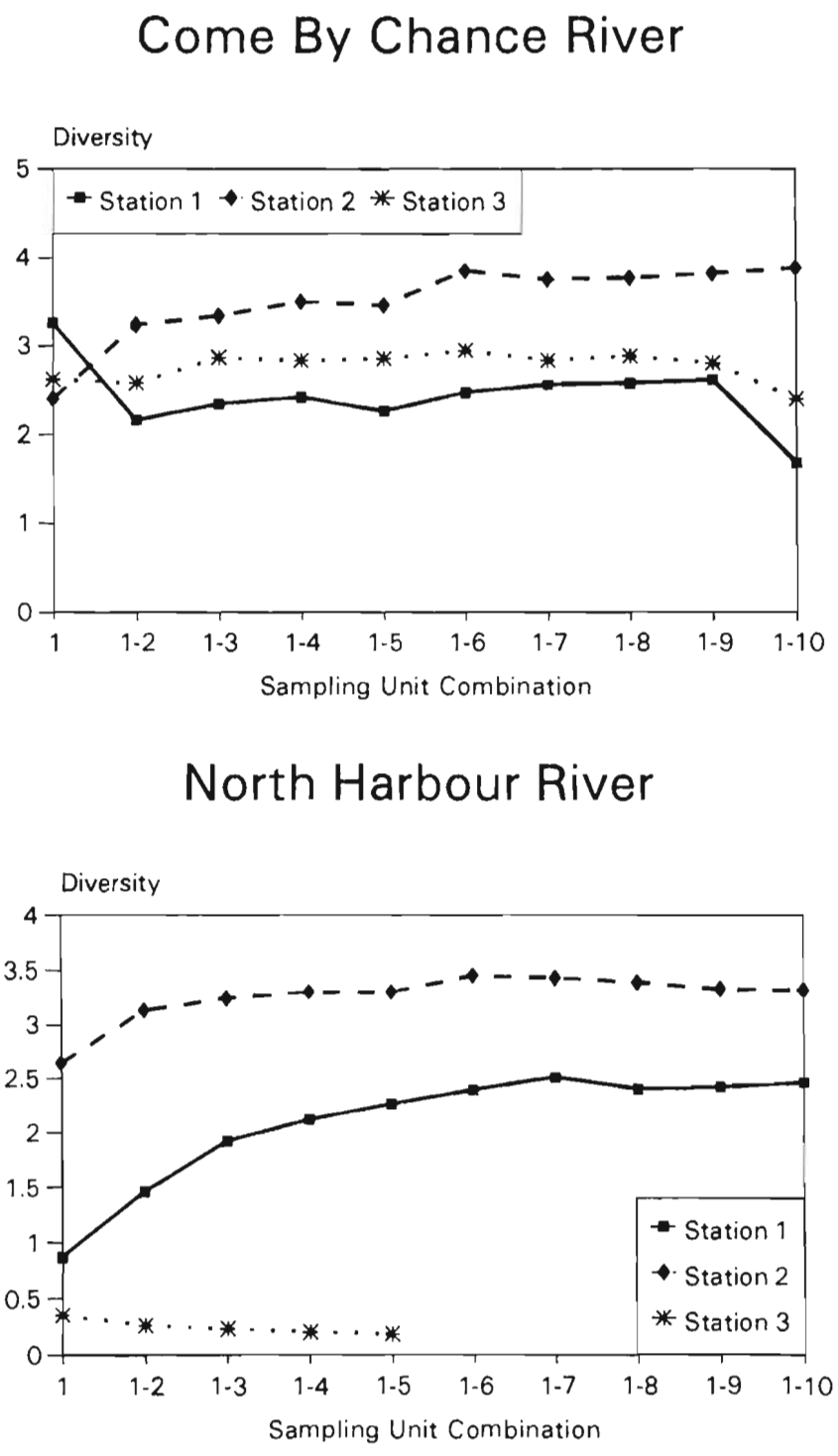
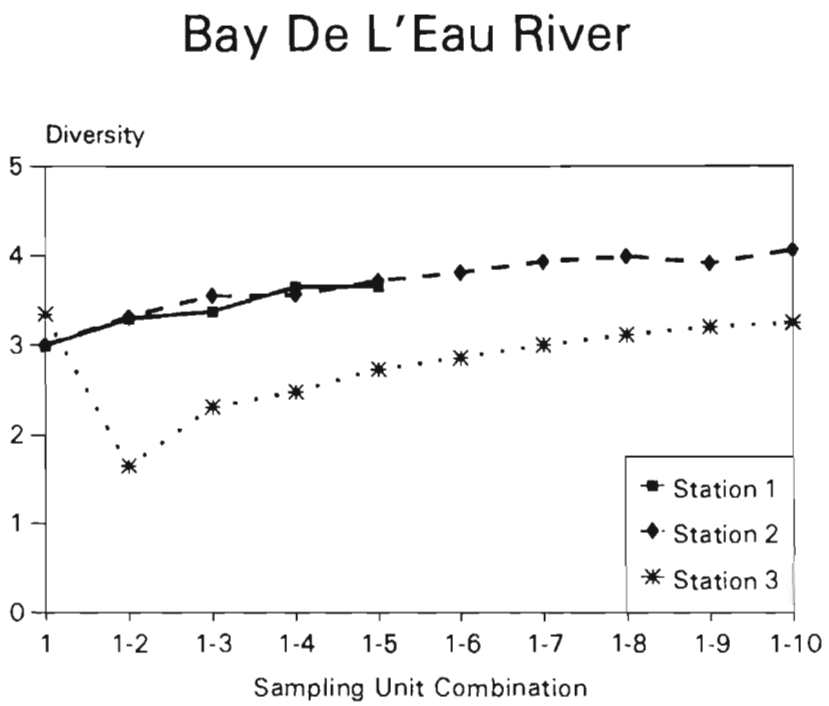


Fig. 17. Comparison of diversity with increasing number of sampling units for Come By Chance River and North Harbour River.



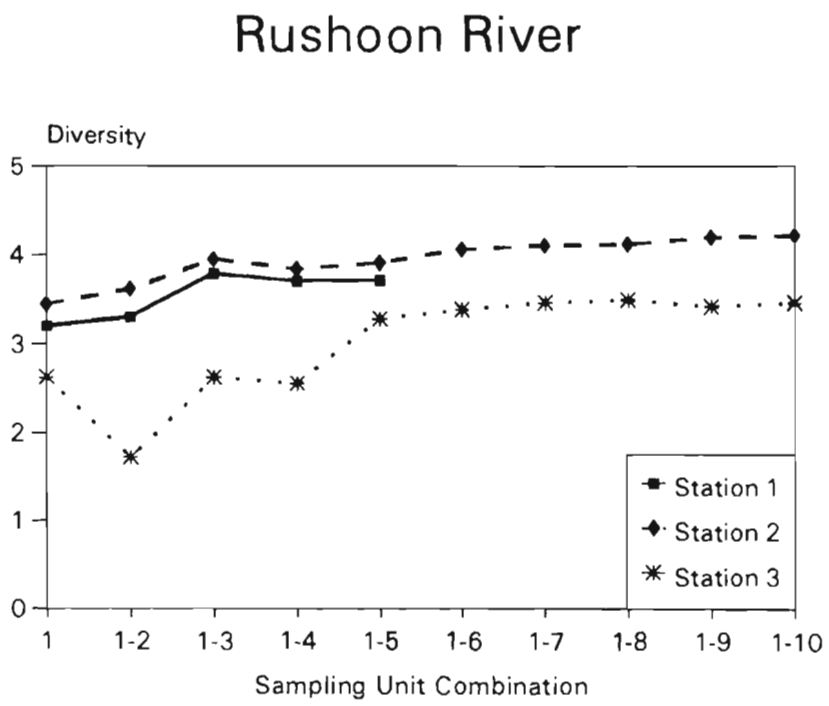


Fig. 18. Comparison of diversity with increasing number of sampling units for Bay De L'Eau River and Rushoon River.

Appendix 1a. The total number of individuals in each taxon captured in 5 sampling units, mean number of individuals per sampling unit, variance, minimum - maximum, and frequency of occurrence for Station 1, Northeast River, June 9, 1975.

Organism	Total	$\bar{X}$	S^2	Min. - Max.	Frequency
TURBELLARIA					
Planariidae	20	4.00	8.50	0-8	4
NEMATODA	1	0.20	0.20	0-1	1
OLIGOCHAETA					
Enchytraeidae	1	0.20	0.20	0-1	1
Lumbriculidae					
Lumbriculus variegatus (Müller)	2	0.40	0.30	0-1	2
Stylodrilus heringianus Claparède	3	0.60	1.80	0-3	1
EPHEMEROPTERA					
Ephemerellidae					
Ephemerella Walsh	102	20.40	185.30	8-40	5
Heptageniidae					
Stenonema Traver	2	0.40	0.30	0-1	2
Leptophlebiidae					
Habrophlebia Eaton	6	1.20	3.20	0-4	2
Paraleptophlebia Lestage	1	0.20	0.20	0-1	1
Baetidae					
Baetis Leach	77	15.40	54.80	9-27	5
PLECOPTERA					
Nemouridae					
Leuctra Stephens	5	1.00	0.50	0-2	4
Perlodidae					
Isogenus Newman	32	6.40	11.30	2-10	5
TRICHOPTERA (larvae)					
Philopotamidae					
Chimarra Stephens	122	24.40	39.80	19-35	5
Polycentropodidae					
Neureclepsis McLachlan	8	1.60	6.80	0-6	2
Hydropsychidae					
Hydropsyche Pictet	450	90.00	645.50	62-126	5
Cheumatopsyche Wallengren	23	4.60	11.30	1-10	5

Appendix 1a (cont'd)

Organism	Total	$\bar{X}$	S^2	Min. - Max.	Frequency
Rhyacophilidae					
Rhyacophila Pictet	19	3.80	10.70	0-7	4
Glossosomatidae					
Glossosoma Curtis	2	0.40	0.80	0-2	1
Lepidostomatidae					
Lepidostoma Rambur	3	0.60	0.80	0-2	2
COLEOPTERA (larvae)					
Elmidae					
Promoresia Sanderson	13	2.60	9.30	1-8	5
Optioservus Sanderson	20	4.00	6.50	0-7	4
DIPTERA					
Tipulidae (larvae)					
Antocha Osten Sacken	19	3.80	22.70	0-9	3
Simuliidae (larvae)					
Simulium tuberosum Lundstrom	5	1.00	3.00	0-4	2
Simulium venustum/verecundum complex	630	126.00	39996.50	10-480	5
Simuliidae (pupae)					
Simulium venustum/verecundum complex	2	0.40	0.80	0-2	1
Chironomidae (larvae)					
Conchapelopia Fittkau	179	35.80	99.20	27-51	5
Pseudochironomus Malloch	4	0.80	0.70	0-2	3
Glyptotendipes Kieffer	1	0.20	0.20	0-1	1
Polypedilum Kieffer	217	43.40	324.30	25-68	5
Paralauterborniella Lenz	1	0.20	0.20	0-1	1
Microtendipes Kieffer	4	0.80	0.20	0-1	4
Micropsectra Kieffer	2	0.40	0.80	0-2	1
Pseudodiamesa Goetghebuer	9	1.80	1.70	0-3	4
Eukiefferiella Thienemann	17	3.40	8.80	0-8	4
Psectrocladius Kieffer	5	1.00	0.50	0-2	4
Cricotopus Van der Wulp	13	2.60	6.80	0-6	3
Chironomidae (pupae)	4	0.80	0.70	0-2	3
Empididae (larvae)	24	4.80	25.70	0-12	3
PELECYPODA					
Margaritiferidae					
Margaritana margaritifera Linné	1	0.20	0.20	0-1	1

Appendix 1a (cont'd)

Organism	Total	$\bar{X}$	S^2	Min. - Max.	Frequency
Sphaeridae					
Sphaerium Scopoli	85	17.00	585.00	2-60	5
Pisidium Pfeiffer	397	79.40	12912.30	1-275	5

Appendix 1b. The total number of individuals in each taxon captured in 10 sampling units, mean number of individuals per sampling unit, variance, minimum - maximum, and frequency of occurrence for Station 2, Northeast River, June 25, 1975.

Organism	Total	$\bar{X}$	S^2	Min. - Max.	Frequency
TURBELLARIA					
Planariidae	530	53.00	4832.11	1-211	10
OLIGOCHAETA					
Lumbriculidae					
Stylodrilus heringianus Claparède	3	0.30	0.90	0-3	1
HIRUDINEA					
Glossiphoniidae					
Helobdella stagnalis (Linnaeus)	1	0.10	0.10	0-1	1
Erpobdellidae					
Erpobdella punctata (Leidy)	1	0.10	0.10	0-1	1
AMPHIPODA					
Talitridae					
Hyalella azteca (Saussure)	49	4.90	33.88	0-19	9
EPHEMEROPTERA					
Ephemerellidae					
Ephemerella Walsh	4	0.40	0.27	0-1	4
Heptageniidae					
Stenonema Traver	2	0.20	0.18	0-1	2
Leptophlebiidae					
Habrophlebia Eaton	25	2.50	12.05	0-9	5
Leptophlebia Westwood	8	0.80	2.18	0-4	3
Baetidae					
Baetis Leach	59	5.90	75.43	0-29	8
PLECOPTERA					
Nemouridae					
Leuctra Stephens	1	0.10	0.10	0-1	1
Perlodidae					
Isogenus Newman	8	0.80	2.40	0-5	4
TRICHOPTERA (larvae)					
Polycentropodidae					
Neureclepsis McLachlan	93	9.30	293.78	0-55	8
Polycentropus Curtis	1	0.10	0.10	0-1	1

Appendix 1b (cont'd)

Organism	Total	$\bar{X}$	S^2	Min. - Max.	Frequency
Hydropsychidae					
Hydropsyche Pictet	107	10.70	172.68	0-40	8
Cheumatopsyche Wallengren	311	31.10	1554.54	0-125	9
Rhyacophilidae					
Rhyacophila Pictet	7	0.70	1.12	0-3	4
Hydroptilidae					
Hydroptila Dalman	1	0.10	0.10	0-1	1
Limnephilidae					
Pycnopsyche Rambur	1	0.10	0.10	0-1	1
Lepidostomatidae					
Lepidostoma Rambur	36	3.60	16.48	0-12	7
COLEOPTERA (larvae)					
Elmidae					
Promoresia Sanderson	2	0.20	0.40	0-2	1
Optioservus Sanderson	8	0.80	1.51	0-3	4
DIPTERA					
Tipulidae (larvae)					
Antocha Osten Sacken	78	7.80	59.51	0-19	8
Simuliidae (larvae)					
Simulium Latreille	12	1.20	11.95	0-11	2
Simulium venustum/verecundum complex	3	0.30	0.90	0-3	1
Chironomidae (larvae)					
Larsia Fittkau	1	0.10	0.10	0-1	1
Conchapelopia Fittkau	326	32.60	775.16	4-104	10
Endochironomus Kieffer	1	0.10	0.10	0-1	1
Glyptotendipes Kieffer	3	0.30	0.46	0-2	2
Polypedilum Kieffer	35	3.50	50.50	0-23	6
Paralauterborniella Lenz	1	0.10	0.10	0-1	1
Microtendipes Kieffer	14	1.40	4.93	0-7	5
Micropsectra Kieffer	68	6.80	165.96	0-39	5
Tanytarsus group	56	5.60	289.38	0-54	3
Pseudodiamesa Goetghebuer	82	8.20	137.73	0-31	8
Cardiocladius Kieffer	1	0.10	0.10	0-1	1
Eukiefferiella Thienemann	28	2.80	10.40	0-11	7
Psectrocladius Kieffer	37	3.70	8.90	0-9	8
Cricotopus Van der Wulp	184	18.40	2139.82	0-147	5
Orthocladius Van der Wulp	26	2.60	17.38	0-13	5
Chironomidae (pupae)	9	0.90	2.32	0-5	5

Appendix 1b (cont'd)

Organism	Total	$\bar{X}$	S^2	Min. - Max.	Frequency
Empididae (larvae)	4	0.40	0.27	0-1	4
PARASITENGONA					
Sperchonidae					
Sperchon Kramer	1	0.10	0.10	0-1	1
Hygrobatidae					
Atractides Koch	1	0.10	0.10	0-1	1
GASTROPODA					
Hydrobiidae					
Amnicola Gould and Haldeman	3	0.30	0.23	0-1	1
PELECYPODA					
Sphaeridae					
Sphaerium Scopoli	313	31.30	7910.01	0-284	6
Pisidium Pfeiffer	271	27.10	2253.21	0-144	8

Appendix 1c. The total number of individuals in each taxon captured in 10 sampling units, mean number of individuals per sampling unit, variance, minimum - maximum, and frequency of occurrence for Station 3, Northeast River, June 9, 1975.

Organism	Total	$\bar{X}$	S^2	Min. - Max.	Frequency
TURBELLARIA					
Planariidae	1	0.10	0.10	0-1	1
OLIGOCHAETA					
Enchytraeidae	3	0.30	0.46	0-2	2
Lumbriculidae					
Lunbriculus variegatus (Müller)	4	0.40	0.49	0-2	3
Stylodrilus heringianus Claparède	24	2.40	2.71	0-6	9
HIRUDINEA					
Erpobdellidae					
Nephelopsis obscura Verril	1	0.10	0.10	0-1	1
EPHEMEROPTERA					
Ephemerellidae					
Ephemerella Walsh	27	2.70	7.12	0-9	8
Heptageniidae					
Epeorus Eaton	3	0.30	0.90	0-3	1
Heptagenia Walsh	1	0.10	0.10	0-1	1
Stenonema Traver	8	0.80	1.51	0-3	4
Leptophlebiidae					
Habrophlebia Eaton	16	1.60	3.38	0-5	6
Paraleptophlebia Lestage	15	1.50	2.72	0-5	6
Baetidae					
Baetis Leach	7	0.70	0.68	0-2	5
PLECOPTERA					
Perlodidae					
Isogenus Newman	1	0.10	0.10	0-1	1
TRICHOPTERA (larvae)					
Philopotamidae					
Wormaldia McLachlan	4	0.40	1.60	0-4	1
Polycentropodidae					
Neureclepsis McLachlan	2	0.20	0.18	0-1	2
Hydropsychidae					
Hydropsyche Pictet	13	1.30	9.79	0-10	3
Glossosomatidae					
Glossosoma Curtis	12	1.20	1.96	0-4	6

Appendix 1c (cont'd)

Organism	Total	$\bar{X}$	S^2	Min. - Max.	Frequency
Brachycentridae					
Micrasema McLachlan	1	0.10	0.10	0-1	1
Limnephilidae					
Limnephilus Leach	1	0.10	0.10	0-1	1
Lepidostomatidae					
Lepidostoma Rambur	11	1.10	1.43	0-3	5
COLEOPTERA (larvae)					
Elmidae					
Optioservus Sanderson	1	0.10	0.10	0-1	1
DIPTERA					
Tipulidae (larvae)					
Antocha Osten Sacken	4	0.40	0.49	0-2	3
Pilaria Sintenis	1	0.10	0.10	0-1	1
Hexatoma Latreille	3	0.30	0.46	0-2	2
Blephariceridae (larvae)					
Blepharicera Macquart	5	0.50	0.28	0-1	5
Simuliidae (larvae)					
Simulium Latreille	7	0.70	1.12	0-3	4
Simulium corbis Twinn	1	0.10	0.10	0-1	1
Simulium tuberosum Lundstrom	1	0.10	0.10	0-1	1
Simulium venustum/verecundum complex	5	0.50	1.61	0-4	2
Ceratopogonidae (larvae)	6	0.60	0.93	0-3	4
Chironomidae (larvae)					
Procladius Skuse	2	0.20	0.40	0-2	1
Conchapelopia Fittkau	65	6.50	18.28	1-13	10
Xenochironomus Kieffer	1	0.10	0.10	0-1	1
Polypedilum Kieffer	2	0.20	0.18	0-1	2
Microtendipes Kieffer	5	0.50	0.94	0-3	3
Constempellina Brudin	13	1.30	1.79	0-3	6
Tanytarsus group	8	0.80	1.73	0-4	4
Pseudodiamesa Goetghebuer	1	0.10	0.10	0-1	1
Eukiefferiella Thienemann	18	1.80	9.96	0-10	5
Psectrocladius Kieffer	4	0.40	0.49	0-2	3
Cricotopus Van der Wulp	4	0.40	0.93	0-3	2
Orthocladius Van der Wulp	13	1.30	3.34	0-6	6
Chironomidae (pupae)	9	0.90	2.32	0-5	5

Appendix 1c (cont'd)

Organism	Total	$\bar{X}$	S^2	Min. - Max.	Frequency
Empididae (larvae)	6	0.60	0.27	0-1	6
PELECYPODA					
Sphaeridae					
Pisidium Pfeiffer	1	0.10	0.10	0-1	1

Appendix 2a. The total number of individuals in each taxon captured in 5 sampling units, mean number of individuals per sampling unit, variance, minimum - maximum, and frequency of occurrence for Station 1, Bottom Brook, June 25, 1975.

Organism	Total	$\bar{X}$	S^2	Min. - Max.	Frequency
TURBELLARIA					
Planariidae	5	1.00	1.50	0-3	3
OLIGOCHAETA					
Lumbriculidae					
Lumbriculus variegatus (Müller)	3	0.60	0.80	0-2	2
Stylodrilus heringianus Claparède	4	0.80	1.20	0-2	2
HIRUDINEA					
Glossiphoniidae					
Helobdella stagnalis (Linnaeus)	3	0.60	0.80	0-2	2
AMPHIPODA					
Talitridae					
Hyalella azteca (Saussure)	2	0.40	0.80	0-2	1
EPHEMEROPTERA					
Ephemerellidae					
Ephemerella Walsh	16	3.20	3.70	1-6	5
Heptageniidae					
Stenonema Traver	6	1.20	1.20	0-3	4
Leptophlebiidae					
Habrophlebia Eaton	4	0.80	0.70	0-2	3
Paraleptophlebia Lestage	1	0.20	0.20	0-1	1
Baetidae					
Baetis Leach	57	11.40	214.30	2-37	5
PLECOPTERA					
Perlodidae					
Isogenus Newman	4	0.80	3.20	0-4	1
TRICHOPTERA (larvae)					
Polycentropodidae					
Polycentropus Curtis	4	0.80	1.20	0-2	2
Hydropsychidae					
Hydropsyche Pictet	41	8.20	35.20	2-18	5
Rhyacophilidae					
Rhyacophila Pictet	3	0.60	0.30	0-1	3
Glossosomatidae					
Glossosoma Curtis	25	5.00	23.00	0-12	4

Appendix 2a (cont'd)

Organism	Total	$\bar{X}$	S^2	Min. - Max.	Frequency
Hydroptilidae					
Hydroptila Dalman	1	0.20	0.20	0-1	1
Brachycentridae					
Micrasema McLachlan	35	7.00	113.00	0-24	2
Limnephilidae					
Neophylax McLachlan	3	0.60	0.80	0-2	2
Pycnopsyche Banks	1	0.20	0.20	0-1	1
Lepidostomatidae					
Lepidostoma Rambur	8	1.60	2.30	0-4	4
COLEOPTERA (larvae)					
Dytiscidae					
Agabus Leach	2	0.40	0.30	0-1	2
Elmidae					
Limnius Erichson	3	0.60	0.30	0-1	3
Promoresia Sanderson	12	2.40	15.30	0-9	2
DIPTERA					
Tipulidae (larvae)					
Antocha Osten Sacken	3	0.60	0.80	0-2	2
Simuliidae (larvae)					
Simulium Latreille	33	6.60	217.80	0-33	1
Chironomidae (larvae)					
Conchapelopia Fittkau	30	6.00	13.50	3-12	5
Polypedilum Kieffer	3	0.60	0.30	0-1	3
Microtendipes Kieffer	11	2.20	8.20	0-7	3
Constempellina Brudin	12	2.40	6.30	0-6	3
Micropsectra Kieffer	6	1.20	1.20	0-2	3
Tanytarsus group	3	0.60	0.80	0-2	2
Pseudodiamesa Goetghebuer	10	2.00	2.50	0-4	4
Thienemanniella Kieffer	1	0.20	0.20	0-1	1
Eukiefferiella Thienemann	237	47.40	8802.30	2-215	5
Psectrocladius Kieffer	7	1.40	1.80	0-3	3
Cricotopus Van der Wulp	175	35.00	2292.00	0-108	4
Orthocladius Van der Wulp	1	0.20	0.20	0-1	1
Trichocladius Kieffer	152	30.40	4620.80	0-152	1
Metriocnemus Van der Wulp	5	1.00	5.00	0-5	1
Chironomidae (pupae)	17	3.40	19.30	0-11	4

Appendix 2a (cont'd)

Organism	Total	$\bar{X}$	S^2	Min. - Max.	Frequency
PARASITENGONA					
Sperchonidae					
Sperchon Kramer	1	0.20	0.20	0-1	1
Lebertiidae					
Lebertia Neuman	1	0.20	0.20	0-1	1
Hygrobatidae					
Atractides Koch	1	0.20	0.20	0-1	1
GASTROPODA					
Planorbidae					
Gyraulus Charpentier	2	0.40	0.80	0-2	1
Ancylidae					
Ferrissia Walker	6	1.20	3.20	0-4	2

Appendix 2b. The total number of individuals in each taxon captured in 5 sampling units, mean number of individuals per sampling unit, variance, minimum - maximum, and frequency of occurrence for Station 2, Bottom Brook, June 25, 1975.

Organism	Total	$\bar{X}$	S^2	Min. - Max.	Frequency
TURBELLARIA					
Planariidae	6	1.20	4.70	0-5	2
OLIGOCHAETA					
Enchytraeidae	4	0.80	3.20	0-4	1
Lumbriculidae					
Lumbriculus variegatus (Müller)	1	0.20	0.20	0-1	1
Stylodrilus heringianus Claparède	8	1.60	2.80	0-4	3
HIRUDINEA					
Glossiphoniidae					
Helobdella stagnalis (Linnaeus)	6	1.20	1.70	0-3	3
Erpobdellidae					
Erpobdella punctata (Leidy)	1	0.20	0.20	0-1	1
AMPHIPODA					
Talitridae					
Hyalella azteca (Saussure)	4	0.80	0.70	0-2	3
EPHEMEROPTERA					
Ephemerellidae					
Ephemerella Walsh	21	4.20	17.20	0-10	4
Heptageniidae					
Stenonema Traver	1	0.20	0.20	0-1	1
Leptophlebiidae					
Habrophlebia Eaton	3	0.60	0.80	0-2	2
Baetidae					
Baetis Leach	41	8.20	62.20	1-20	5
PLECOPTERA					
Perlodidae					
Isogenus Newman	14	2.80	39.20	0-14	1
TRICHOPTERA (larvae)					
Polycentropodidae					
Nyctiophylax Braeur	1	0.20	0.20	0-1	1
Neureclipsis McLachlan	17	3.40	57.80	0-17	1
Hydropsychidae					
Hydropsyche Pictet	67	13.40	36.80	9-24	5
Cheumatopsyche Wallengren	3	0.60	1.80	0-3	1

Appendix 2b (cont'd)

Organism	Total	$\bar{X}$	S^2	Min. - Max.	Frequency
Rhyacophilidae					
Rhyacophila Pictet	17	3.40	18.80	1-11	5
Glossosomatidae					
Glossosoma Curtis	12	2.40	28.80	0-12	1
Hydroptilidae					
Hydroptila Dalman	1	0.20	0.20	0-1	1
Brachycentridae					
Micrasema McLachlan	66	13.20	838.70	0-65	2
Limnephilidae					
Psychoglypha Ross	1	0.20	0.20	0-1	1
Pycnopsyche Banks	1	0.20	0.20	0-1	1
Lepidostomatidae					
Lepidostoma Rambur	1	0.20	0.20	0-1	1
COLEOPTERA (larvae)					
Dytiscidae					
Agabus Leach	3	0.60	1.80	0-3	1
Elmidae					
Limnius Erichson	102	20.40	2080.80	0-102	1
Promoresia Sanderson	186	37.20	6643.70	0-183	3
DIPTERA					
Tipulidae (larvae)					
Antocha Osten Sacken	16	3.20	11.20	0-8	3
Pedicia Latreille	3	0.60	1.80	0-3	1
Simuliidae (larvae)					
Simulium Latreille	1	0.20	0.20	0-1	1
Simulium venustum/verecundum complex	167	33.40	5017.80	0-160	2
Simuliidae (Pupae)					
Simulium venustum/verecundum complex	1	0.20	0.20	0-1	1
Ceratopogonidae (larvae)	2	0.40	0.80	0-2	1
Chironomidae (larvae)					
Conchapelopia Fittkau	691	138.20	88382.20	3-670	5
Polypedilum Kieffer	477	95.40	45030.30	0-475	3
Microtendipes Kieffer	63	12.60	702.80	0-60	3
Constempellina Brudin	336	67.20	10233.70	0-230	4

Appendix 2b (cont'd)

Organism	Total	$\bar{X}$	S^2	Min. - Max.	Frequency
Micropsectra Kieffer	764	152.80	79467.20	0-650	4
Tanytarsus group	1	0.20	0.20	0-1	1
Pseudodiamesa Goetghebuer	18	3.60	12.80	0-8	3
Thienemanniella Kieffer	26	5.20	122.70	0-25	2
Eukiefferiella Thienemann	76	15.20	636.70	1-60	5
Corynoneura Winnertz	3	0.60	1.80	0-3	1
Trichocladius Kieffer	1956	391.20	616131.70	1-1790	5
Metriocnemus Van der Wulp	180	36.00	6480.00	0-180	1
Empididae (larvae)	24	4.80	103.70	0-23	2
PARASITENGONA					
Lebertiidae					
Lebertia Neuman	1	0.20	0.20	0-1	1
Hygrobatidae					
Atractides Koch	2	0.40	0.30	0-1	2
GASTROPODA					
Hydrobiidae					
Amnicola Gould and Haldeman	1	0.20	0.20	0-1	1
Ancylidae					
Ferrissia Walker	4	0.80	0.70	0-2	3
PELECYPODA					
Sphaeridae					
Pisidium Pfeiffer	4	0.80	3.20	0-4	1

Appendix 3a. The total number of individuals in each taxon captured in 10 sampling units, mean number of individuals per sampling unit, variance, minimum - maximum, and frequency of occurrence for Station 1, Come By Chance River, June 4, 1975.

Organism	Total	$\bar{X}$	S^2	Min. - Max.	Frequency
NEMATODA	5	0.50	1.17	0-3	2
OLIGOCHAETA					
Lumbriculidae					
Lumbriculus variegatus (Müller)	5	0.50	0.94	0-3	3
Stylodrilus heringianus Claparède	69	6.90	108.99	0-35	8
Tubificidae	1	0.10	0.10	0-1	1
HIRUDINEA					
Glossiphoniidae					
Glossiphonia complanata (Linnaeus)	2	0.20	0.40	0-2	1
AMPHIPODA					
Talitridae					
Hyalella azteca (Saussure)	101	10.10	83.21	2-31	10
EPHEMEROPTERA					
Ephemerellidae					
Ephemerella Walsh	1	0.10	0.10	0-1	1
Leptophlebiidae					
Habrophlebia Eaton	5	0.50	0.50	0-2	4
Paraleptophlebia Lestage	3	0.30	0.23	0-1	3
Baetidae					
Baetis Leach	2	0.20	0.18	0-1	2
Siphlonuridae					
Ameletus Eaton	1	0.10	0.10	0-1	1
PLECOPTERA					
Nemouridae					
Leuctra Stephens	20	0.20	7.33	0-8	5
Perlodidae					
Isogenus Newman	11	1.10	1.43	0-3	6
TRICHOPTERA (larvae)					
Philopotamidae					
Chimarra Stephens	82	8.20	67.29	0-21	7
Polycentropodidae					
Polyplectropus Ulmer	1	0.10	0.10	0-1	1
Neureclipsis McLachlan	19	1.90	2.32	0-5	9
Polycentropus Curtis	1	0.10	0.10	0-1	1

Appendix 3a (cont'd)

Organism	Total	$\bar{X}$	S^2	Min. - Max.	Frequency
Hydropsychidae					
Hydropsyche Pictet	96	9.60	153.82	0-39	8
Rhyacophilidae					
Rhyacophila Pictet	1	0.10	0.10	0-1	1
Glossosomatidae					
Glossosoma Curtis	3	0.30	0.46	0-2	2
Limnephilidae					
Neophylax McLachlan	1	0.10	0.10	0-1	1
Pycnopsyche Banks	1	0.10	0.10	0-1	1
DIPTERA					
Simuliidae (larvae)					
Simulium vernum Macquart	7	0.70	1.12	0-3	4
Simulium venestum/verecundum complex	2189	218.90	179736.55	1-1400	10
Simuliidae (pupae)					
Simulium venustum/verecundum complex	1	0.10	0.10	0-1	1
Ceratopogonidae (larvae)	1	0.10	0.10	0-1	1
Chironomidae (larvae)					
Procladius Skuse	1	0.10	0.10	0-1	1
Larsia Fittkau	4	0.40	0.49	0-2	3
Conchapelopia Fittkau	68	6.80	10.84	2-11	10
Cryptochironomus Kieffer	2	0.20	0.18	0-1	2
Glyptotendipes Kieffer	3	0.30	0.46	0-2	2
Microtendipes Kieffer	11	1.10	3.43	0-6	5
Constempellina Brudin	2	0.20	0.18	0-1	2
Micropsectra Kieffer	18	1.80	14.40	0-12	3
Tanytarsus group	2	0.20	0.18	0-1	2
Pseudodiamesa Goetghebuer	1	0.10	0.10	0-1	1
Cardiocladius Kieffer	7	0.70	1.79	0-4	3
Eukiefferiella Thienemann	3	0.30	0.46	0-2	2
Psectrocladius Kieffer	1	0.10	0.10	0-1	1
Cricotopus Van der Wulp	17	1.70	6.01	0-8	6
Orthocladius Van der Wulp	12	1.20	3.96	0-6	4
Heterotrissocladius Spärck	15	1.50	4.94	0-5	4
Chironomidae (pupae)	2	0.20	0.18	0-1	2
Empididae (larvae)	10	1.00	2.22	0-4	4

Appendix 3a (cont'd)

Organism	Total	$\bar{X}$	S^2	Min. - Max.	Frequency
PARASITENGONA					
Sperchonidae					
Sperchonopsis Piersig	2	0.20	0.40	0-2	1
Hygrobatidae					
Hygrobates Koch	1	0.10	0.10	0-1	1
Atractides Koch	1	0.10	0.10	0-1	1
GASTROPODA					
Hydrobiidae					
Amnicola Gould and Haldeman	1	0.10	0.10	0-1	1
PELECYPODA					
Sphaeridae					
Sphaerium Scopoli	1	0.10	0.10	0-1	1
Pisidium Pfeiffer	8	0.80	1.51	0-4	5

Appendix 3b. The total number of individuals in each taxon captured in 10 sampling units, mean number of individuals per sampling unit, variance, minimum - maximum, and frequency of occurrence for Station 2, Come By Chance River, June 3, 1975.

Organism	Total	$\bar{X}$	S^2	Min. - Max.	Frequency
TURBELLARIA					
Planariidae	1	0.10	0.10	0-1	1
OLIGOCHAETA					
Lumbriculidae					
Stylodrilus heringianus Claparède	61	6.10	66.99	0-27	9
Tubificidae	8	0.80	2.18	0-4	3
AMPHIPODA					
Talitridae					
Hyalella azteca (Saussure)	1	0.10	0.10	0-1	1
EPHEMEROPTERA					
Heptageniidae					
Heptagenia Walsh	5	0.50	2.50	0-5	1
Leptophlebiidae					
Habrophlebia Eaton	12	1.20	2.84	0-5	5
Paraleptophlebia Lestage	25	2.50	4.06	0-7	9
Baetidae					
Baetis Leach	17	1.70	2.68	0-4	7
PLECOPTERA					
Nemouridae					
Leuctra Stephens	1	0.10	0.10	0-1	1
Perlodidae					
Isogenus Newman	3	0.30	0.23	0-1	3
TRICHOPTERA (larvae)					
Philopotamidae					
Chimarra Stephens	1	0.10	0.10	0-1	1
Dolophilodes Ulmer	2	0.20	0.18	0-1	2
Polycentropodidae					
Neureclipsis McLachlan	1	0.10	0.10	0-1	1
Polycentropus Curtis	1	0.10	0.10	0-1	1
Hydropsychidae					
Hydropsyche Pictet	13	1.30	4.46	0-7	6
Rhyacophilidae					
Rhyacophila Pictet	1	0.10	0.10	0-1	1

Appendix 3b (cont'd)

Organism	Total	$\bar{X}$	S^2	Min. - Max.	Frequency
Glossosomatidae					
Glossosoma Curtis	6	0.60	0.49	0-2	5
COLEOPTERA (larvae)					
Elmidae					
Stenelmis Dufour	1	0.10	0.10	0-1	1
DIPTERA					
Tipulidae (larvae)					
Pilaria Sintenis	4	0.40	0.93	0-3	2
Hexatoma Latreille	9	0.90	0.54	0-2	7
Simuliidae (larvae)					
Simulium Latreille	1	0.10	0.10	0-1	1
Simulium corbis Twinn	1	0.10	0.10	0-1	1
Simulium venestum/verecundum complex	24	2.40	28.04	0-17	4
Ceratopogonidae (larvae)	4	0.40	0.49	0-2	3
Chironomidae (larvae)					
Procladius Skuse	1	0.10	0.10	0-1	1
Conchapelopia Fittkau	80	8.00	47.78	2-24	10
Cryptochironomus Kieffer	3	0.30	0.46	0-2	2
Glyptotendipes Kieffer	1	0.10	0.10	0-1	1
Constempellina Brudin	34	3.40	16.27	0-12	6
Micropsectra Kieffer	7	0.70	0.46	0-2	6
Tanytarsus group	4	0.40	0.93	0-3	2
Cricotopus Van der Wulp	1	0.10	0.10	0-1	1
Orthocladius Van der Wulp	1	0.10	0.10	0-1	1
Heterotrissocladius Spärck	2	0.20	0.40	0-2	1
Empididae (larvae)	10	1.00	1.56	0-3	5
PELECYPODA					
Margaritiferidae					
Margaritana margaritifera Linné	3	0.30	0.23	0-1	3
Sphaeridae					
Pisidium Pfeiffer	4	0.40	0.93	0-3	2

Appendix 3c. The total number of individuals in each taxon captured in 10 sampling units, mean number of individuals per sampling unit, variance, minimum - maximum, and frequency of occurrence for Station 3, Come By Chance River, June 5, 1975.

Organism	Total	$\bar{X}$	S^2	Min. - Max.	Frequency
NEMATODA	1	0.10	0.10	0-1	1
OLIGOCHAETA					
Enchytraeidae	82	8.20	148.62	0-32	7
Lumbriculidae					
Lumbriculus variegatus (Müller)	1	0.10	0.10	0-1	1
Stylodrilus heringianus Claparède	349	34.90	1690.10	6-148	10
Tubificidae	1	0.10	0.10	0-1	1
HIRUDINEA					
Glossiphoniidae					
Helobdalla stagnalis (Linnaeus)	1	0.10	0.10	0-1	1
EPHEMEROPTERA					
Empemerelliidae					
Ephemerella Walsh	4	0.40	0.71	0-2	2
Heptageniidae					
Heptagenia Walsh	4	0.40	1.60	0-4	1
Leptophlebiidae					
Habrophlebia Eaton	1	0.10	0.10	0-1	1
Paraleptophlebia Lestage	31	3.10	3.88	0-6	9
Baetidae					
Baetis Leach	1	0.10	0.10	0-1	1
PLECOPTERA					
Nemouridae					
Leuctra Stephens	1	0.10	0.10	0-1	1
Perlodidae					
Isogenus Newman	1	0.10	0.10	0-1	1
Chloroperlidae					
Hastaperla Ricker	1	0.10	0.10	0-1	1
TRICHOPTERA (larvae)					
Philopotamidae					
Chimarra Stephens	1	0.10	0.10	0-1	1
Glossosomatidae					
Glossosoma Curtis	1	0.10	0.10	0-1	1

Appendix 3c (cont'd)

Organism	Total	$\bar{X}$	S^2	Min. - Max.	Frequency
Leptoceridae					
Mystacides Berthold	2	0.20	0.40	0-2	1
COLEOPTERA (larvae)					
Elmidae					
Limnius Erichson	3	0.30	0.46	0-2	2
DIPTERA					
Tipulidae (larvae)					
Hexatoma Latreille	4	0.40	0.49	0-2	3
Simuliidae (larvae)					
Simulium venestum/verecundum complex	8	0.80	6.40	0-8	1
Ceratopogonidae (larvae)	14	1.40	2.49	0-5	7
Chironomidae (larvae)					
Procladius Skuse	2	0.20	0.18	0-1	2
Conchapelopia Fittkau	79	7.90	18.10	2-15	10
Cryptochironomus Kieffer	1	0.10	0.10	0-1	1
Glyptotendipes Kieffer	3	0.30	0.23	0-1	3
Polypedilum Kieffer	5	0.50	0.94	0-3	3
Microtendipes Kieffer	3	0.30	0.46	0-2	2
Constempellina Brudin	20	2.00	12.44	0-11	5
Micropsectra Kieffer	1	0.10	0.10	0-1	1
Cardiocladius Kieffer	1	0.10	0.10	0-1	1
Heterotrissocladius Spärck	1	0.10	0.10	0-1	1
GASTROPODA					
Hydrobiidae					
Amnicola Gould and Haldeman	1	0.10	0.10	0-1	1
PELECYPODA					
Margaritiferidae					
Margaritana margaritifera Linné	1	0.10	0.10	0-1	1

Appendix 4a. The total number of individuals in each taxon captured in 10 sampling units, mean number of individuals per sampling unit, variance, minimum - maximum, and frequency of occurrence for Station 1, North Harbour River, October 21, 1975.

Organism	Total	$\bar{X}$	S^2	Min. - Max.	Frequency
TURBELLARIA					
Planariidae	21	2.10	4.99	0-5	6
OLIGOCHAETA					
Naididae					
Slavina appendiculata D'Udeken	1	0.10	0.10	0-1	1
Lumbriculidae					
Lumbriculus variegatus (Müller)	5	0.50	0.94	0-3	3
Stylodrilus heringianus Claparède	1	0.10	0.10	0-1	1
HIRUDINEA					
Glossiphoniidae					
Helobdalla stagnalis (Linnaeus)	4	0.40	0.49	0-2	3
AMPHIPODA					
Talitridae					
Hyalella azteca (Saussure)	93	9.30	72.01	1-29	10
EPHEMEROPTERA					
Empemerelliidae					
Ephemerella Walsh	35	3.50	13.39	0-10	6
Heptageniidae					
Stenonema Traver	4	0.40	0.49	0-2	3
Leptophlebiidae					
Habrophlebia Eaton	48	4.80	191.29	0-44	2
Leptophlebia Westwood	182	18.20	227.29	0-34	8
Paraleptophlebia Lestage	23	2.30	7.34	0-7	6
Baetidae					
Baetis Leach	83	8.30	86.01	0-32	8
PLECOPTERA					
Nemouridae					
Paracapnia Hanson	10	1.00	1.56	0-3	5
Leuctra Stephens	5	0.50	0.94	0-3	3
Perlodidae					
Isogenus Newman	16	1.60	3.60	0-5	5
TRICHOPTERA (larvae)					
Polycentropodidae					
Neureclipsis McLachlan	19	1.90	1.43	0-3	8

Appendix 4a (cont'd)

Organism	Total	$\bar{X}$	S^2	Min. - Max.	Frequency
Hydropsychidae					
Hydropsyche Pictet	13	1.30	2.68	0-5	5
Cheumatopsyche Wallengren	161	16.10	138.77	2-40	10
Rhyacophilidae					
Rhyacophila Pictet	11	1.10	1.88	0-4	6
Brachycentridae					
Brachycentrus Curtis	1	0.10	0.10	0-1	1
Lepidostomatidae					
Lepidostoma Rambur	1	0.10	0.10	0-1	1
Odontoceridae					
Marilia Müller	1	0.10	0.10	0-1	1
Leptoceridae					
Nectopsyche Müller	2	0.20	0.18	0-1	2
Mystacides Berthold	2	0.20	0.18	0-1	2
DIPTERA					
Tipulidae (larvae)					
Tipula Linnaeus	5	0.50	0.28	0-1	5
Antocha Osten Sacken	7	0.70	2.68	0-5	2
Chironomidae (larvae)					
Conchapelopia Fittkau	193	19.30	55.34	7-31	10
Xenochironomus Kieffer	3	0.30	0.46	0-2	2
Cryptochironomus Kieffer	1	0.10	0.10	0-1	1
Pseudochironomus Malloch	1	0.10	0.10	0-1	1
Polypedilum Kieffer	1	0.10	0.10	0-1	1
Microtendipes Kieffer	6	0.60	0.49	0-2	5
Micropsectra Kieffer	11	1.10	0.54	0-2	8
Pseudodiamesa Goetghebuer	6	0.60	0.49	0-2	5
Eukiefferiella Thienemann	2	0.20	0.40	0-2	1
Cricotopus Van der Wulp	25	2.50	7.83	0-8	8
Empididae (larvae)	2	0.20	0.18	0-1	2
PARASITENGONA					
Sperchonidae					
Sperchonopsis Piersig	1	0.10	0.10	0-1	1

Appendix 4a (cont'd)

Organism	Total	$\bar{X}$	S^2	Min. - Max.	Frequency
PELECYPODA					
Spaheridae					
Sphaerium Scopoli	120	12.00	221.33	1-48	10
Pisidium Pfeiffer	1734	173.40	76245.60	1-899	10

Appendix 4b. The total number of individuals in each taxon captured in 10 sampling units, mean number of individuals per sampling unit, variance, minimum - maximum, and frequency of occurrence for Station 2, North Harbour River, October 21, 1975.

Organism	Total	$\bar{X}$	S^2	Min. - Max.	Frequency
OLIGOCHAETA					
Enchytraeidae	12	1.20	1.73	0-3	5
Naididae					
Nais communis Piquet	1	0.10	0.10	0-1	1
Lumbriculidae					
Lumbriculus variegatus (Müller)	24	2.40	9.60	0-10	7
Stylodrilus heringianus Claparède	178	17.80	76.18	6-32	10
Tubificidae	1	0.10	0.10	0-1	1
AMPHIPODA					
Talitridae					
Hyalella azteca (Saussure)	6	0.60	0.93	0-3	4
EPHEMEROPTERA					
Empemerelliidae					
Ephemerella Walsh	16	1.60	2.49	0-5	8
Heptageniidae					
Stenonema Traver	1	0.10	0.10	0-1	1
Leptophlebiidae					
Habrophlebia Eaton	5	0.50	0.28	0-1	5
Leptophlebia Westwood	1	0.10	0.10	0-1	1
Paraleptophlebia Lestage	138	13.80	364.40	1-58	10
Baetidae					
Baetis Leach	8	0.80	1.51	0-3	4
PLECOPTERA					
Nemouridae					
Paracapnia Hanson	4	0.40	0.71	0-2	2
Leuctra Stephens	11	1.10	1.66	0-4	6
Perlodidae					
Isogenus Newman	7	0.70	1.12	0-3	4
TRICHOPTERA (larvae)					
Polycentropodidae					
Neureclipsis McLachlan	3	0.30	0.46	0-2	2
Polycentropus Curtis	1	0.10	0.10	0-1	1

Appendix 4b (cont'd)

Organism	Total	$\bar{X}$	S^2	Min. - Max.	Frequency
Hydropsychidae					
Hydropsyche Pictet	10	1.00	1.56	0-3	5
Cheumatopsyche Wallengren	2	0.20	0.40	0-2	1
Lepidostomatidae					
Lepidostoma Rambur	1	0.10	0.10	0-1	1
Leptoceridae					
Mystacides Berthold	1	0.10	0.10	0-1	1
COLEOPTERA (larvae)					
Elmidae					
Limnius Erichson	1	0.10	0.10	0-1	1
Optioservus Sanderson	3	0.30	0.23	0-1	3
DIPTERA					
Tipulidae (larvae)					
Antocha Osten Sacken	2	0.20	0.40	0-2	1
Hexatoma Latreille	11	1.10	2.32	0-5	6
Ceratopogonidae (larvae)	25	2.50	10.28	0-10	7
Chironomidae (larvae)					
Conchapelopia Fittkau	26	2.60	2.27	0-5	9
Microtendipes Kieffer	4	0.40	0.27	0-1	4
Micropsectra Kieffer	1	0.10	0.10	0-1	1
Eukiefferiella Thienemann	1	0.10	0.10	0-1	1
Cricotopus Van der Wulp	1	0.10	0.10	0-1	1
Trichocladius Kieffer	1	0.10	0.10	0-1	1
Empididae (larvae)	13	1.30	2.01	0-4	6
PELECYPODA					
Sphaeridae					
Pisidium Pfeiffer	22	2.20	18.18	0-12	3

Appendix 4c. The total number of individuals in each taxon captured in 5 sampling units, mean number of individuals per sampling unit, variance, minimum - maximum, and frequency of occurrence for Station 3, North Harbour River, October 23, 1975.

Organism	Total	$\bar{X}$	S^2	Min. - Max.	Frequency
OLIGOCHAETA					
Enchytraeidae	461	92.20	2327.20	14-147	5
EPHEMEROPTERA					
Leptophlebiidae					
Paraleptophlebia Lestage	2	0.40	0.80	0-2	1
Baetidae					
Baetis Leach	3	0.60	0.30	0-1	3
TRICHOPTERA (larvae)					
Rhyacophilidae					
Rhyacophila Pictet	1	0.20	0.20	0-1	1
Lepidostomatidae					
Lepidostoma Rambur	1	0.20	0.20	0-1	1
DIPTERA					
Tipulidae (larvae)					
Hexatoma Latreille	1	0.20	0.20	0-1	1
Chironomidae (larvae)					
Microtendipes Kieffer	1	0.20	0.20	0-1	1

Appendix 5a. The total number of individuals in each taxon captured in 5 sampling units, mean number of individuals per sampling unit, variance, minimum - maximum, and frequency of occurrence for Station 1, Bay De L'Eau River, October 1, 1975.

Organism	Total	$\bar{X}$	S^2	Min. - Max.	Frequency
NEMATODA	1	0.20	0.20	0-1	1
OLIGOCHAETA					
Enchytraeidae	1	0.20	0.20	0-1	1
Naididae					
Nais communis Piquet	8	1.60	3.80	0-5	4
Lumbriculidae					
Lumbriculus variegatus (Müller)	2	0.40	0.80	0-2	1
Stylodrilus heringianus Claparède	11	2.20	24.20	0-11	1
Tubificidae	2	0.40	0.30	0-1	2
AMPHIPODA					
Talitridae					
Hyalella azteca (Saussure)	7	1.40	0.30	1-2	5
EPHEMEROPTERA					
Empemerelliidae					
Ephemerella Walsh	7	1.40	6.80	0-6	2
Heptageniidae					
Stenonema Traver	8	1.60	1.30	0-3	4
Leptophlebiidae					
Leptophlebia Westwood	3	0.60	0.30	0-1	3
Paraleptophlebia Lestage	2	0.40	0.80	0-2	1
PLECOPTERA					
Nemouridae					
Paracapnia Hanson	2	0.40	0.80	0-2	1
Leuctra Stephens	2	0.40	0.80	0-2	1
Perlodidae					
Isogenus Newman	21	4.20	21.70	0-11	4
TRICHOPTERA (larvae)					
Polycentropodidae					
Neureclipsis McLachlan	11	2.20	8.70	0-7	3
Polycentropus Curtis	7	1.40	2.80	0-4	3
Hydropsychidae					
Hydropsyche Pictet	41	8.20	24.70	3-14	5
Cheumatopsyche Wallengren	110	22.00	197.50	2-38	5

Appendix 5a (cont'd)

Organism	Total	$\bar{X}$	S^2	Min. - Max.	Frequency
Rhyacophilidae					
Rhyacophila Pictet	15	3.00	12.00	0-8	3
Brachycentridae					
Brachycentrus Curtis	1	0.20	0.20	0-1	1
COLEOPTERA (larvae)					
Elmidae					
Optioservus Sanderson	4	0.80	0.20	0-1	4
DIPTERA					
Tipulidae (larvae)					
Antocha Osten Sacken	5	1.00	1.50	0-3	3
Simuliidae (larvae)					
Simulium tuberosum Lundstrom	2	0.40	0.30	0-1	2
Chironomidae (larvae)					
Conchapelopia Fittkau	37	7.40	13.30	5-13	5
Cryptochironomus Kieffer	1	0.20	0.20	0-1	1
Microtendipes Kieffer	3	0.60	0.80	0-2	2
Pseudodiamesa Goetghebuer	7	1.40	9.80	0-7	1
Eukiefferiella Thienemann	1	0.20	0.20	0-1	1
Cricotopus Van der Wulp	22	4.40	3.30	2-7	5
Chironomidae (pupae)	2	0.40	0.30	0-1	2
PELECYPODA					
Sphaeridae					
Pisidium Pfeiffer	2	0.40	0.80	0-2	1

Appendix 5b. The total number of individuals in each taxon captured in 10 sampling units, mean number of individuals per sampling unit, variance, minimum - maximum, and frequency of occurrence for Station 2, Bay De L'Eau River, October 1, 1975.

Organism	Total	$\bar{X}$	S^2	Min. - Max.	Frequency
NEMATODA	1	0.10	0.10	0-1	1
OLIGOCHAETA					
Lumbriculidae					
Lumbriculus variegatus (Müller)	7	0.70	1.12	0-3	4
Stylodrilus heringianus Claparède	9	0.90	3.66	0-6	3
EPHEMEROPTERA					
Empemerelliidae					
Ephemerella Walsh	16	1.60	1.16	0-3	8
Heptageniidae					
Heptagenia Walsh	3	0.30	0.90	0-3	1
Stenonema Traver	13	1.30	2.01	0-4	6
Leptophlebiidae					
Leptophlebia Westwood	1	0.10	0.10	0-1	1
Paraleptophlebia Lestage	63	6.30	29.12	0-20	9
Baetidae					
Baetis Leach	13	1.30	1.57	0-4	7
ODONATA					
Gomphidae					
Octogomphus Selys	1	0.10	0.10	0-1	1
PLECOPTERA					
Nemouridae					
Paracapnia Hanson	1	0.10	0.10	0-1	1
Perlodidae					
Isogenus Newman	2	0.20	0.18	0-1	1
TRICHOPTERA (larvae)					
Philopotamidae					
Dolophilodes Ulmer	5	0.50	0.72	0-2	3
Polycentropodidae					
Neureclipsis McLachlan	8	0.80	2.40	0-5	4
Polycentropus Curtis	3	0.30	0.23	0-1	3
Hydropsychidae					
Hydropsyche Pictet	49	4.90	40.77	0-21	9
Rhyacophilidae					
Rhyacophila Pictet	4	0.40	0.27	0-1	4

Appendix 5b (cont'd)

Organism	Total	$\bar{X}$	S^2	Min. - Max.	Frequency
Brachycentridae					
Brachycentrus Curtis	2	0.20	0.18	0-1	2
Hydroptilidae					
Oxyethira Eaton	29	2.90	39.66	0-20	4
Lepidostomatidae					
Lepidostoma Rambur	5	0.50	0.50	0-2	4
COLEOPTERA (larvae)					
Elmidae					
Limnius Erichson	1	0.10	0.10	0-1	1
Optioservus Sanderson	49	4.90	12.32	1-13	10
DIPTERA					
Tipulidae (larvae)					
Antocha Osten Sacken	4	0.40	0.93	0-3	2
Hexatoma Latreille	3	0.30	0.46	0-2	2
Ceratopogonidae (larvae)	8	0.80	1.07	0-3	5
Chironomidae (larvae)					
Conchapelopia Fittkau	23	2.30	4.23	0-7	9
Microtendipes Kieffer	1	0.10	0.10	0-1	1
Tanytarsus group	28	2.80	7.96	0-9	9
Eukiefferiella Thienemann	2	0.20	0.40	0-2	1
Cricotopus Van der Wulp	13	1.30	2.23	0-4	6
Chironomidae (pupae)	1	0.10	0.10	0-1	1
Empididae (larvae)	1	0.10	0.10	0-1	1
PARASITENGONA					
Sperchonidae					
Sperchon Kramer	1	0.10	0.10	0-1	1
Lebertiidae					
Lebertia Neuman	3	0.30	0.23	0-1	3
Hygrobatidae					
Atractides Koch	4	0.40	0.49	0-2	3

Appendix 5c. The total number of individuals in each taxon captured in 10 sampling units, mean number of individuals per sampling unit, variance, minimum - maximum, and frequency of occurrence for Station 3, Bay De L'Eau River, September 30, 1975.

Organism	Total	$\bar{X}$	S^2	Min. - Max.	Frequency
TURBELLARIA					
Planariidae	1	0.10	0.10	0-1	1
OLIGOCHAETA					
Lumbriculidae					
Lumbriculus variegatus (Müller)	10	1.00	1.56	0-4	6
Stylodrilus heringianus Claparède	189	18.90	1518.10	0-129	9
Tubificidae	1	0.10	0.10	0-1	1
EPHEMEROPTERA					
Empemerelliidae					
Ephemerella Walsh	4	0.40	0.27	0-1	4
Heptageniidae					
Heptagenia Walsh	5	0.50	0.50	0-2	4
Leptophlebiidae					
Habrophlebia Eaton	1	0.10	0.10	0-1	1
Leptophlebia Westwood	22	2.20	5.73	0-6	6
Paraleptophlebia Lestage	14	1.40	4.49	0-7	6
Baetidae					
Baetis Leach	27	2.70	8.46	0-9	8
PLECOPTERA					
Nemouridae					
Paracapnia Hanson	1	0.10	0.10	0-1	1
Leuctra Stephens	1	0.10	0.10	0-1	1
Perlodidae					
Isogenus Newman	2	0.20	0.40	0-2	1
TRICHOPTERA (larvae)					
Philopotamidae					
Dolophilodes Ulmer	6	0.60	2.49	0-5	2
Polycentropodidae					
Neureclipsis McLachlan	1	0.10	0.10	0-1	1
Polycentropus Curtis	1	0.10	0.10	0-1	1
Hydropsychidae					
Hydropsyche Pictet	21	2.10	19.88	0-14	4
Hydroptilidae					
Oxyethira Eaton	1	0.10	0.10	0-1	1

Appendix 5c (cont'd)

Organism	Total	$\bar{X}$	S^2	Min. - Max.	Frequency
Lepidostomatidae					
Lepidostoma Rambur	8	0.80	0.62	0-2	6
COLEOPTERA (larvae)					
Elmidae					
Optioservus Sanderson	18	1.80	5.07	0-7	6
DIPTERA					
Tipulidae (larvae)					
Hexatoma Latreille	2	0.20	0.18	0-1	2
Ceratopogonidae (larvae)	12	1.20	2.18	0-4	5
Chironomidae (larvae)					
Ablabesmyia Johannsen	1	0.10	0.10	0-1	1
Conchapelopia Fittkau	21	2.10	6.32	0-7	7
Cryptochironomus Kieffer	5	0.50	1.61	0-4	2
Polypedilum Kieffer	1	0.10	0.10	0-1	1
Microtendipes Kieffer	22	2.20	4.84	0-6	7
Micropsectra Kieffer	1	0.10	0.10	0-1	1
Tanytarsus group	2	0.20	0.18	0-1	2
Cricotopus Van der Wulp	2	0.20	0.40	0-2	1
Empididae (larvae)	1	0.10	0.10	0-1	1
PARASITENGONA					
Lebertiidae					
Lebertia Neuman	3	0.30	0.46	0-2	2
Hygrobatidae					
Atractides Koch	4	0.40	0.93	0-3	2

Appendix 6a. The total number of individuals in each taxon captured in 5 sampling units, mean number of individuals per sampling unit, variance, minimum - maximum, and frequency of occurrence for Station 1, Rushoon River, September 24, 1975.

Organism	Total	$\bar{X}$	S^2	Min. - Max.	Frequency
TURBELLARIA					
Planariidae	1	0.20	0.20	0-1	1
NEMATODA	2	0.40	0.30	0-1	2
OLIGOCHAETA					
Naididae					
Nais communis Piquet	5	1.00	3.00	0-4	2
Slavina appendiculata D'Udeken	14	2.80	17.70	0-10	3
Lumbriculidae					
Stylodrilus heringianus Claparède	45	9.00	123.50	0-28	4
EPHEMEROPTERA					
Empemerelliidae					
Ephemerella Walsh	8	1.60	2.30	0-4	4
Heptageniidae					
Stenonema Traver	4	0.80	1.70	0-3	2
Baetidae					
Baetis Leach	17	3.40	6.80	0-7	4
PLECOPTERA					
Nemouridae					
Leuctra Stephens	1	0.20	0.20	0-1	1
TRICHOPTERA (larvae)					
Philopotamidae					
Chimarra Stephens	15	3.00	32.00	0-13	2
Dolophilodes Ulmer	9	1.80	7.20	0-6	2
Polycentropodidae					
Neureclipsis McLachlan	2	0.40	0.30	0-1	2
Hydropsychidae					
Arctopsyche McLachlan	3	0.60	0.30	0-1	3
Hydropsyche Pictet	38	7.60	20.30	4-15	5
Rhyacophilidae					
Rhyacophila Pictet	3	0.60	0.30	0-1	3
Hydroptilidae					
Oxyethira Eaton	1	0.20	0.20	0-1	1

Appendix 6a (cont'd)

Organism	Total	$\bar{X}$	S^2	Min. - Max.	Frequency
Lepidostomatidae					
Lepidostoma Rambur	4	0.80	0.70	0-2	3
COLEOPTERA (larvae)					
Elmidae					
Promoresia Sanderson	13	2.60	17.80	0-10	3
Optioservus Sanderson	80	16.00	90.50	8-32	5
DIPTERA					
Tipulidae (larvae)					
Tipula Linnaeus	1	0.20	0.20	0-1	1
Antocha Osten Sacken	3	0.60	0.80	0-2	2
Simuliidae (larvae)					
Simulium venestum/verecundum complex	2	0.40	0.30	0-1	2
Chironomidae (larvae)					
Conchapelopia Fittkau	7	1.40	0.80	1-3	5
Cryptochironomus Kieffer	5	1.00	5.00	0-5	1
Thienemanniella Kieffer	1	0.20	0.20	0-1	1
Psectrocladius Kieffer	1	0.20	0.20	0-1	1
Cricotopus Van der Wulp	9	1.80	9.20	0-7	2
Chironomidae (pupae)	1	0.20	0.20	0-1	1
Empididae (larvae)	2	0.40	0.30	0-1	2
PARASITENGONA					
Hygrobatidae					
Atractides Koch	1	0.20	0.20	0-1	1

Appendix 6b. The total number of individuals in each taxon captured in 10 sampling units, mean number of individuals per sampling unit, variance, minimum - maximum, and frequency of occurrence for Station 2, Rushoon River, September 24, 1975.

Organism	Total	$\bar{X}$	S^2	Min. - Max.	Frequency
TURBELLARIA					
Planariidae	7	0.70	1.12	0-3	4
OLIGOCHAETA					
Naididae					
Nais communis Piquet	27	2.70	10.46	0-8	5
Slavina appendiculata D'Udeken	8	0.80	2.18	0-4	3
Lumbriculidae					
Lumbriculus variegatus (Müller)	11	1.10	3.43	0-6	5
Stylodrilus heringianus Claparède	36	3.60	16.93	0-11	6
HIRUDINEA					
Erpobdellidae					
Erpobdella punctata (Leidy)	2	0.20	0.18	0-1	2
AMPHIPODA					
Talitridae					
Hyalella azteca (Saussure)	1	0.10	0.10	0-1	1
EPHEMEROPTERA					
Empemerelliidae					
Ephemerella Walsh	8	0.80	0.84	0-2	5
Heptageniidae					
Heptagenia Walsh	40	4.00	25.33	0-16	8
Stenonema Traver	1	0.10	0.10	0-1	1
Leptophlebiidae					
Habrophlebia Eaton	20	2.00	4.00	0-5	7
Baetidae					
Baetis Leach	61	6.10	12.54	1-13	10
PLECOPTERA					
Nemouridae					
Paracapnia Hanson	2	0.20	0.18	0-1	2
Leuctra Stephens	1	0.10	0.10	0-1	1
Perlodidae					
Isogenus Newman	3	0.30	0.23	0-1	3
TRICHOPTERA (larvae)					
Philopotamidae					
Dolophilodes Ulmer	2	0.20	0.18	0-1	2

Appendix 6b (cont'd)

Organism	Total	$\bar{X}$	S^2	Min. - Max.	Frequency
Hydropsychidae					
Hydropsyche Pictet	7	0.70	0.90	0-2	4
Leptoceridae					
Ceraclea Stephens	1	0.10	0.10	0-1	1
COLEOPTERA (larvae)					
Elmidae					
Stenelmis Dufour	14	1.40	7.60	0-9	5
Optioservus Sanderson	20	2.00	5.33	0-8	8
DIPTERA					
Tipulidae (larvae)					
Antocha Osten Sacken	3	0.30	0.46	0-2	2
Chironomidae (larvae)					
Ablabesmyia Johannsen	1	0.10	0.10	0-1	1
Conchapelopia Fittkau	68	6.80	19.96	1-15	10
Cryptochironomus Kieffer	2	0.20	0.40	0-2	1
Polypedilum Kieffer	4	0.40	0.49	0-2	3
Microtendipes Kieffer	7	0.70	1.57	0-3	3
Constempellina Brudin	1	0.10	0.10	0-1	1
Micropsectra Kieffer	14	1.40	2.93	0-4	5
Tanytarsus group	94	9.40	139.60	0-35	8
Eukiefferiella Thienemann	2	0.20	0.18	0-1	2
Cricotopus Van der Wulp	6	0.60	1.82	0-4	2
Orthocladius Van der Wulp	1	0.10	0.10	0-1	1
Trichocladius Kieffer	1	0.10	0.10	0-1	1
Empididae (larvae)	32	3.20	5.96	0-7	9
PARASITENGONA					
Sperchonidae					
Sperchon Kramer	8	0.80	1.51	0-3	4
Hygrobatidae					
Atractides Koch	16	1.60	7.60	0-9	6

Appendix 6c. The total number of individuals in each taxon captured in 10 sampling units, mean number of individuals per sampling unit, variance, minimum - maximum, and frequency of occurrence for Station 3, Rushoon River, September 23, 1975.

Organism	Total	$\bar{X}$	S^2	Min. - Max.	Frequency
TURBELLARIA					
Planariidae	2	0.20	0.18	0-1	2
NEMATODA	1	0.10	0.10	0-1	1
OLIGOCHAETA					
Naididae					
Nais communis Piquet	25	2.50	9.83	0-9	5
Slavina appendiculata D'Udeken	5	0.50	1.17	0-3	2
Lumbriculidae					
Lumbriculus variegatus (Müller)	23	2.30	6.90	0-6	7
Stylodrilus heringianus Claparède	97	9.70	72.90	0-29	9
EPHEMEROPTERA					
Heptageniidae					
Heptagenia Walsh	3	0.30	0.46	0-2	2
Stenonema Traver	2	0.20	0.18	0-1	2
Leptophlebiidae					
Leptophlebia Westwood	1	0.10	0.10	0-1	1
Baetidae					
Baetis Leach	10	1.00	0.89	0-2	6
PLECOPTERA					
Perlodidae					
Isogenus Newman	1	0.10	0.10	0-1	1
TRICHOPTERA (larvae)					
Philopotamidae					
Dolophilodes Ulmer	6	0.60	2.49	0-5	2
Hydropsychidae					
Hydropsyche Pictet	36	3.60	36.04	0-19	5
Glossosomatidae					
Glossosoma Curtis	7	0.70	4.90	0-7	1
Lepidostomatidae					
Lepidostoma Rambur	8	0.80	1.29	0-3	4

Appendix 6c (cont'd)

Organism	Total	$\bar{X}$	S^2	Min. - Max.	Frequency
COLEOPTERA (larvae)					
Elmidae					
Stenelmis Dufour	1	0.10	0.10	0-1	1
Optioservus Sanderson	4	0.40	0.49	0-2	3
DIPTERA					
Tipulidae (larvae)					
Antocha Osten Sacken	1	0.10	0.10	0-1	1
Hexatoma Latreille	4	0.40	0.27	0-1	4
Chironomidae (larvae)					
Conchapelopia Fittkau	14	1.40	5.16	0-5	3
Polypedilum Kieffer	1	0.10	0.10	0-1	1
Microtendipes Kieffer	2	0.20	0.40	0-2	1
Micropsectra Kieffer	2	0.20	1.18	0-1	2
Tanytarsus group	9	0.90	1.66	0-3	4
Cricotopus Van der Wulp	5	0.50	0.94	0-3	3
Empididae (larvae)	4	0.40	0.27	0-1	4
PARASITENGONA					
Sperchonidae					
Sperchon Kramer	1	0.10	0.10	0-1	1
Hygrobatidae					
Atractides Koch	2	0.20	0.18	0-1	2