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BIOLOGICAL SURVEYS ON THE SAVANNAH RIVER IN THE VICINITY OF THE SAVANNAH RIVER PLANT (1951-1976)

ROBIN A. MATTHEWS

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E. I. du Pont de Nemours & Co.
Savannah River Laboratory
Aiken, SC 29808

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ACKNOWLEDGEMENTS

The Savannah River Laboratory Data Base was created by J. E. Suich and J. H. Hightower, of the Savannah River Laboratory Computer Systems Division, and A. S. Dicks, of the Ecology Group. I would like to acknowledge their participation in that extensive project, and their many contributions to this report. Mike Odner, of the Academy of Natural Sciences of Philadelphia, has assisted in editing the computer data set. J. C. Corey, H. E. Mackey, T. V. Crawford and R. Patrick have reviewed this manuscript and provided editorial comments.

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COMMENTS

by
Dr. Ruth Patrick
Academy of Natural Sciences of Philadelphia
December 28, 1981

In 1951, the Academy of Natural Sciences of Philadelphia was contracted to initiate a long-term monitoring program to evaluate the effects of the Savannah River Plant on the Savannah River aquatic system. The purpose of this study was to establish conditions in the aquatic ecosystem:

(1) in the Savannah River immediately above the Savannah River Plant,

(2) just below various streams entering the Savannah River from the Savannah River Plant site, and

(3) in the Savannah River as it leaves the area of the Savannah River Plant.

The program was designed to monitor at frequent intervals the easily assayed conditions of the Savannah River using diatometers and quarterly studies. The more subtle changes in the river were to be determined by thorough surveys of the associations of the major kinds of aquatic life and the chemical and physical conditions of the river. These surveys were made at approximately four year intervals. In designing the program of study, there was no attempt to place study areas so as to detect the effects from any particular effluent produced by the Plant, but rather to detect major effects that might appear after a reasonable degree of mixing in the river.

This monitoring program has been continued up to the present, and provides a comprehensive data base covering 25 years of sampling. One of the great advantages of this program is that it has been conducted in basically the same way so that gradual changes over time can be assayed. The Savannah River Laboratory has computerized the Savannah River data, and they are available as described in this report. The Academy of Natural Sciences played a major role in making sure the computerized taxonomy was as correct as possible and consistent throughout the data set. One of the greatest problems in placing a large data base such as this one in a computer where it may be used for a long period of time is to make sure that there is a reliable taxonomic classification and the sources or authorities for this classification are clearly set forth. In this work, the following publications and personal

communications are the basis on which the taxonomic classifications were made.

Algae: We have discussed the classification of the algae with Dr. Paul Silva, Dr. Francis Drouet, and Dr. Charles W. Reimer. The general taxonomy of all groups except diatoms followed Bourrelly (1970), Silva (1960), and Drouet (1973). For diatoms Patrick and Reimer (1966, 1975) was used.

Protozoa: For general organization we have used Kudo (1966), Jahn and Jahn (1949), Schaeffer (1926), Kahl (1930-34). Pascher (1927), Pascher and Lammermann (1912, 1914), and Page (1976). For general classification we have asked the advice of Dr. John Cairns, Jr.

Invertebrates: For general discussion, particularly concerning species of mollusca, Dr. Samuel L. H. Fuller was consulted. For developing the classification, the following authorities were used: Porifera and Platyhelminthes - Pennak (1978); Nemertea - Pennak (1964) and Hyman (1951); Aschelminthea - Hyman (1951) and Edmondson (1959); Tardigrada - Pennak (1978); Bryozoa - Rogick (1959); Annelida - Brinkhurst and Jamieson (1971), Sybil Parker (personal communication); Mollusca - Taylor and Sohl (1962), Newell (1965), Turner (personal communication); Mollusca - Taylor and Sohl (1962), Newell (1965), Turner (personal communication); Arthropoda - Pennak (1978).

Insects: The greatest responsibility has rested on Dr. Selwyn S. Roback, who has utilized many references in developing his opinions.

Fish: Our principal consultants have been Dr. James E. Bohlke and Dr. William Smith-Vaniz. This classification has largely depended on Dahlberger and Scott (1971). However, Bailey et al. (1979) has in some cases been used.

No attempt has been made by the Savannah River Laboratory to interpret the data. However, the Academy of Natural Sciences of Philadelphia has published several reports on these data and intends to publish several more papers utilizing these data now that they have been computerized. The publications to date are listed in the reference section of this report.

There have been 16 comprehensive river surveys from 1951-1976. In addition to the comprehensive river surveys, diatometers were installed in the river in 1953, and have been used continuously up to the present. The types of data collected from these diatometers have differed somewhat over time. In the beginning, four quarterly detailed readings, which involved the construction of truncated normal curves, were carried out four

times a year. Every two weeks, rough readings were made in which slides were scanned to see if there was any definite change in the species present; however, these taxonomic identifications were not very thorough, and are not included here. This report includes the data from the comprehensive river surveys and the quarterly detailed diatometer readings. The diatometer data represent a semi-continuous biomonitoring program that may be used to supplement the major survey data.

Representative specimens of all species collected on all the comprehensive surveys were placed in the permanent collections of the Academy of Natural Sciences of Philadelphia. This enables anyone in the future to bring together the species that were associated at any point in time during the studies. It also enables the Academy to revalidate identifications of the diatoms from the diatometer collection, which were also placed in the permanent collections in the Academy of Natural Sciences of Philadelphia diatom herbaria.

Some of the most important considerations in carrying out a baseline study are to make sure the locations of the sampling stations are correctly selected. In the Savannah River, several factors had to be carefully considered in the location of such stations. The first requirement is to place the stations so that they show the impacts of the operations of the Savannah River Plant on the Savannah River, and to separate these changes from upstream effects. For this reason, the upstream station had to be located in an area close to, but above, potential outfalls, but also in an area where mixing was fairly complete in the river.

It was essential to have similar current patterns in the areas of study, which in turn produce similar shoaling areas and cutting areas. There must also be areas in which sediments are eroding and sediments are being deposited. In the Savannah River, the bed is unconsolidated sand. The best habitats for aquatic organisms are in the shallow waters, on floating debris, or on solid substrates that are impinged in the river bed. In the shallow water, the river bed consisted mostly of sand or sands with mud and silt. For these reasons, one would like to have a point bar at each of the river stations. Unfortunately, this was not possible at the two upper stations (Stations 1 and 3). However, near these stations, revetments had been placed in the river by the U. S. Corps of Engineers prior to the time of the first surveys. These areas contained habitats similar to those of a point bar. Around each one of these revetments there were depositing and eroding areas, and areas of shallow water which would make seining of fish easy. We, therefore, located the two upper stations (Stations 1 and 3) in the vicinity of revetments and the two lower stations (Stations 5 and 6) to include point bars.

It is also important to have the original location of the stations in regards to East-West or North-South directions as similar as possible in order that the exposure of the banks to light will be similar. One also has to be sure that similar amounts of debris are present in each of the stations because the dead trees and branches provide an excellent habitat for aquatic life. The dredging of the river by the Corps of Engineers, which removed some debris, definitely affected the availability of habitats and the population of sizes and various species.

The river communities and populations were sampled qualitatively from a wide variety of habitats. Experience has shown that if one collects from one to two hours after one obtains the last new entity in insects, macro-invertebrates and fish, one has collected the species that were established in the area. For microorganisms such as protozoa and algae, all available habitats must be sampled. As a result, it takes at least one day, and often two days, to sample any area. Separate species lists were developed for algae, protozoa, macroinvertebrates, insects, and fish. Appendices A and B provide a summary of the biological and chemical data available for each of the major surveys. Appendix B.1 summarizes the survey data, averaged for each station by survey number. Appendix B.3 includes the diatometer data derived from the studies in which the truncated normal curve model of the community was constructed.

When one examines the numbers of species present, one must remember that there are many environmental factors that affect the presence of species. Also important is one's ability to collect the species, i.e. high water as opposed to low flow. Furthermore, species react in aquatic systems according to the total stress from various causes, as long as one stress is not acute, and causes death. We have found that, in any given area, a 33 percent change in species numbers from the average for that area is natural, and only when the change is greater than 50 percent is severe perturbation indicated. Stated another way, generally, the natural functions of the transfer of nutrients in the food web can be maintained so long as 66 percent of the natural pattern of diversity of the various major groups is maintained. This applies to those groups in which there are many species. For these reasons, we have considered as separate groups, the algae, the protozoa, the invertebrates other than insects, the insects, and the fish.

Many things have happened over time in the Savannah River and some of these changes seem to be correlated with shifts in numbers of species in some of the groups. The algal flora in the river is dominated by diatoms. Station 6 has had the most radical shifts in numbers of diatom species. At all stations since 1968, there has been a small but consistent reduction in numbers of species. This decrease in species numbers seems to be correlated with the increase in chlorides in the river as evidenced by the chemical

analyses. These changes were correlated with the start-up of certain industries known to have chlorides in their effluents. Because the diatom species found in the Savannah River are typically soft water (low conductivity) species, one might expect such correlations. In the other groups of algae, which have very few species, more detailed studies are needed to interpret changes.

In the protozoa there seems to have been an increase in flagellates since 1972 in most stations that seems to be correlated with an increase in ammonia concentrations in the river. Likewise, the increase in ciliates seems to be correlated with increases in bacteria in the river.

Of the invertebrates other than insects, the mollusca were the only ones represented by a fairly diverse fauna. They show an irregular pattern, but seem to be more numerous since the building of Clarks Hill Dam, which has resulted in less fluctuation of water levels. Much more study is needed of these invertebrates to understand their patterns.

The more sensitive insects, such as stoneflies, have tended to be fewer in the surveys since 1955-56, and these changes may be correlated with the increased pollution load in the river. More study is needed to support or refute this statement. There was evidence that dredging activities, which varied in intensity at the different stations in different years, influenced the numbers of caddisflies, which are filter-feeders. These correlations were noted in the reports of the Academy of Natural Sciences of Philadelphia.

Of the fish, the suckers, minnows, sunfish and perch were more numerous as to species numbers in the river. These seemed to have increased since the building of Clarks Hill Dam. However, it must be poirnted out that restricted use of rotenone was not used in the first few survery, and has been used since then. This method allows retrieval of some species not otherwise caught.

In conclusion, it should be stated that these observations can be refined by more careful study of the data. The Academy of Natural Sciences of Philadelphia plans to continue analyzing these data in order to reevaluate and continue developing their conclusions.

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ABSTRACT

In 1951, the Academy of Natural Sciences of Philadelphia was contracted by the Savannah River Plant to initiate a long-term monitoring program in the Savannah River. The purpose of this program was to determine the effect of the Savannah River Plant on the Savannah River aquatic ecosystem. The data from this monitoring program have been computerized by the Savannah River Laboratory, and are summarized in this report.

During the period from 1951 - 1976, 16 major surveys were conducted by the Academy in the Savannah River. Water chemistry analyses were made, and all major biological communities were sampled qualitatively during the spring and fall of each survey year. In addition, quantitative diatom data have been collected quarterly since 1953. Major changes in the Savannah River basin, in the Savannah River Plant's activities, and in the Academy sampling patterns are discussed to provide a historical overview of the biomonitoring program. Appendices to the data report include a complete taxonomic listing of species collected from the Savannah River, and summaries of the entire biological and physicochemical data base.

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CHAPTER I. INTRODUCTION

The Savannah River Plant is a U. S. Department of Energy facility operated by E. I. du Pont de Nemours and Company. It is designed to produce nuclear materials for national defense. The Savannah River Plant is located about 25 miles southeast of Augusta, Georgia, along the South Carolina side of the Savannah River. Construction of the Savannah River Plant began in February, 1951, and involved a peak construction force of 39,000 workers. The first production reactor began operations on December 28, 1953.

In 1951, the Academy of Natural Sciences of Philadelphia was contracted to initiate a long-term monitoring program to evaluate the effects of the Savannah River Plant on the Savannah River aquatic system. This monitoring program has been continued up to the present, and provides a comprehensive data base covering more than 25 years of sampling. The Savannah River data collected from 1951 through 1976 have been computerized by the Savannah River Laboratory, and are available as described in this report. No attempt has been made by the Savannah River Laboratory to interpret the data; however, the Academy of Natural Sciences of Philadelphia has published a number of data interpretations.[1-11]

This report can be divided into two sections. The abstract and Chapters I through IX describe the Savannah River Plant and the Academy's surveys in detail. These chapters also provide a historical review of the Savannah River Basin from 1951 - 1976, and outline some of the changes that have occurred in the Savannah River Plant area that may have influenced the survey. The second section consists of Appendices A, B and C, which list the Savannah River Taxonomy and summarize much of the physical, chemical, and biological data from the Savannah River. These Appendices are included to show some examples of computer formats available for analyzing the data.

CHAPTER II. PERSONNEL

During the course of this study, Dr. Patrick has been responsible for the design of the studies and for the integration of results as set forth in the various Academy reports.

Members of the Academy of Natural Sciences, Philadelphia, who participated in the Savannah River surveys include the following individuals:

Survey 1 (June 25 - July 14, 1951)

John Cairns, Jr.	Protozoologist
Thomas Dolan, IV.	Entomologist
Harold W. Harry	Invertebrate Zoologist
John Lattin	Entomologist
Ruth Patrick	Director of Survey
Wilbur E. Wade	Algologist
John H. Wallace	Algologist
John M. Ward	Chemist and Bacteriologist
Charles B. Wurtz	Invertebrate Zoologist

Survey 2 (Oct. 15 - Nov. 31, 1951)

Fairie Lyn Carter	Chemist and Bacteriologist
Thomas Dolan	Entomologist
Sidney Kantor	Protozoologist
George W. McCammon	Ichthyologist
Ruth Patrick	Director of Survey and Algologist
Selwyn S. Roback	Entomologist
John H. Wallace	Algologist
Charles B. Wurtz	Invertebrate Zoologist

Survey 3 (Jan. 9 - 31, 1952)

Fairie Lyn Carter	Chemist and Bacteriologist
Thomas Dolan, IV.	Entomologist
George W. McCammon	Ichthyologist
Ruth Patrick	Director of Survey and Algologist
Selwyn S. Roback	Entomologist
John H. Wallace	Algologist
Ralph Wichterman	Protozoologist
Charles B. Wurtz	Invertebrate Zoologist

Survey 4 (May 5 - 22, 1952)

Fairie Lyn Carter	Chemist and Bacteriologist
Thomas Dolan, IV	Entomologist
George W. McCammon	Ichthyologist
Ruth Patrick	Director of Survey and Algologist
Selwyn S. Roback	Entomologist
John H. Wallace	Algologist
Ralph Wichterman	Protozoologist
Charles B. Wurtz	Invertebrate Zoologist

Survey 5 (Aug. 15 - 30, 1954)

Frederick A. Aldrich	Invertebrate Zoologist
John Cairns, Jr.	Protozoologist
Harold de Ropp	Field Assistant
Ruth Patrick	Director of Survey
Selwyn S. Roback	Entomologist
John H. Wallace	Algologist

Survey 6 (Aug. 24 - Sept. 7, 1955)

Frederick A. Aldrich	Invertebrate Zoologist
John Cairns, Jr.	Protozoologist, Field Director
Robert W. Haywood, III	Field Assistant
James Jacobs	Field Assistant
Ruth Patrick	Director of Survey
Charles W. Reimer	Algologist
Selwyn S. Roback	Entomologist
Yvonne H. Swabey	Chemist and Bacteriologist

Survey 7 (May 6 - 22, 1956)

Frederick A. Aldrich	Invertebrate Zoologist
John Cairns, Jr.	Protozoologist, Field Director
Robert R. Grant, Jr.	Field Assistant
Ruth Patrick	Director of Survey
Charles W. Reimer	Algologist
Selwyn S. Roback	Entomologist
Yvonne H. Swabey	Chemist and Bacteriologist

Survey 8 (May 23 - June 4, 1960)

John M. Bates	Invertebrate Zoologist
John Cairns, Jr.	Protozoologist, Project Supervisor
Phillip J. Halicki	Algologist
Nancy E. Hess	Chemist and Bacteriologist
Ruth Patrick	Director of Survey
Selwyn S. Roback	Entomologist

Survey 9 (Aug. 31 - Sept. 15, 1960)

John M. Bates	Invertebrate Zoologist
John Cairns, Jr.	Project Supervisor
Nancy E. Hess	Chemist and Bacteriologist
Thomas Lloyd	Field Assistant
Samson McDowell	Protozoologist
Ruth Patrick	Director of Survey
Charles Reimer	Algologist
Selwyn S. Roback	Entomologist

Survey 10 (May 30 - June 8, 1965)

John M. Bates	Invertebrate Zoologist
John Cairns, Jr.	Protozoologist
Neal Foster	Ichthyologist
Robert R. Grant, Jr.	Algologist and Field Supervisor
Jules J. Loos	Field Assistant
Ruth Patrick	Director of Survey
Selwyn S. Roback	Entomologist

Survey 11 (Sept. 21 - 30, 1965)

John M. Bates	Invertebrate Zoologist
John Cairns, Jr.	Protozoologist
Neal Foster	Ichthyologist
C. W. Hart, Jr.	Invertebrate Zoologist and Field Supervisor
Jules J. Loos	Field Assistant
Samson McDowell	Protozoologist
Nicholas Nitti	Chemist and Bacteriologist
Ruth Patrick	Director of Survey
Charles Reimer	Algologist
Selwyn S. Roback	Entomologist

Survey 12 (May 27 - June 5, 1968)

Robert R. Grant, Jr.	Algologist and Field Supervisor
Robert W. Haug	Chemist
Irwin R. Isquith	Protozoologist
Edward Jankowski	Field Assistant
Gerald J. Lauer	Ichthyologist
Ruth Patrick	Director of Survey
Jay W. Richardson	Invertebrate Zoologist
Selwyn S. Roback	Entomologist

Survey 13 (Aug. 24 - Sept. 2, 1968)

Robert R. Grant, Jr.	Algologist and Field Supervisor
Robert W. Haug	Chemist
Irwin R. Isquith	Protozoologist
Edward Jankowski	Field Assistant
Gerald J. Lauer	Ichthyologist
Ruth Patrick	Director of Survey
Jay W. Richardson	Invertebrate Zoologist and Entomologist

Survey 14 (May 22 - June 2, 1972)

Martin DeGraw	Field Assistant
Neal Foster	Ichthyologist
Samuel Fuller	Invertebrate Zoologist
Robert R. Grant, Jr.	Phycologist and Field Supervisor
Edward Jankowski	Field Assistant
Ruth Patrick	Director of Survey
Jay W. Richardson	Entomologist
Jesse Steelman	Chemist
William Yongue	Protozoologist

Survey 15 (Sept. 13 - Oct. 1, 1972)

Neal Foster	Ichthyologist
Samuel Fuller	Invertebrate Zoologist
Robert R. Grant, Jr.	Field Supervisor
Edward Jankowski	Field Assistant
Joy Morrill	Phycologist
Ruth Patrick	Director of Survey
Jay W. Richardson	Entomologist
Selwyn Roback	Entomologist
Jesse Steelman	Chemist
William Yongue	Protozoologist

Survey 16 (Aug. 10-16, 1976)

Jules Loos	Ichthyologist
Samuel Fuller	Invertebrate Zoologist
Clyde Goulden	Director of Survey
Robert R. Grant, Jr.	Phycologist and Field Supervisor
Edward Jankowski	Field Assistant
Jay W. Richardson	Entomologist
Larry Lyons	Chemist
Irwin Isquith	Protozoologist
Kenneth Johnson	Field Assistant
James Strickland	Field Assistant

The following authorities assisted in identification of a portion of the specimens collected:

Entomologists

Leonora K. Gloyd
Illinois Natural History Survey
Urbana, Illinois
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John Hanson
Department of Entomology
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(Surveys 14-16)

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(Surveys 1-9)

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Charles M. Palmer
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Academy of Natural Sciences
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Christine Smith
Department of Limnology
Academy of Natural Sciences
Philadelphia, Pennsylvania
(Surveys 14-15)

Lewis H. Tiffany
Department of Botany
Northwestern University
Evanston, Illinois
(Surveys 1-4)

Wilbur E. Wade
Michigan State University
East Lansing, Michigan
(Surveys 1-7)

Employees of E. I. du Pont de Nemours and Company, Inc. who have been directly involved in the Savannah River surveys include Raymond S. Harvey, John H. Horton, C. M. Patterson, Everett W. Rabon, William C. Reinig, and Daniel I. Ross.

CHAPTER III. SAVANNAH RIVER BASIN HISTORY*

The Savannah River drainage basin has a total area of 10,579 square miles (27,388 km^2), and encompases all or part of 41 counties in Georgia, South Carolina and North Carolina (Figure 1). The Savannah River Basin is located in three physiographic regions: the Mountain Province, the Piedmont, and the Coastal Plain (Figure 2). The Mountain Province contains most of the major tributaries of the Savannah River, including the Seneca,

* Much of the information provided in this chapter was obtained from references 12-19.

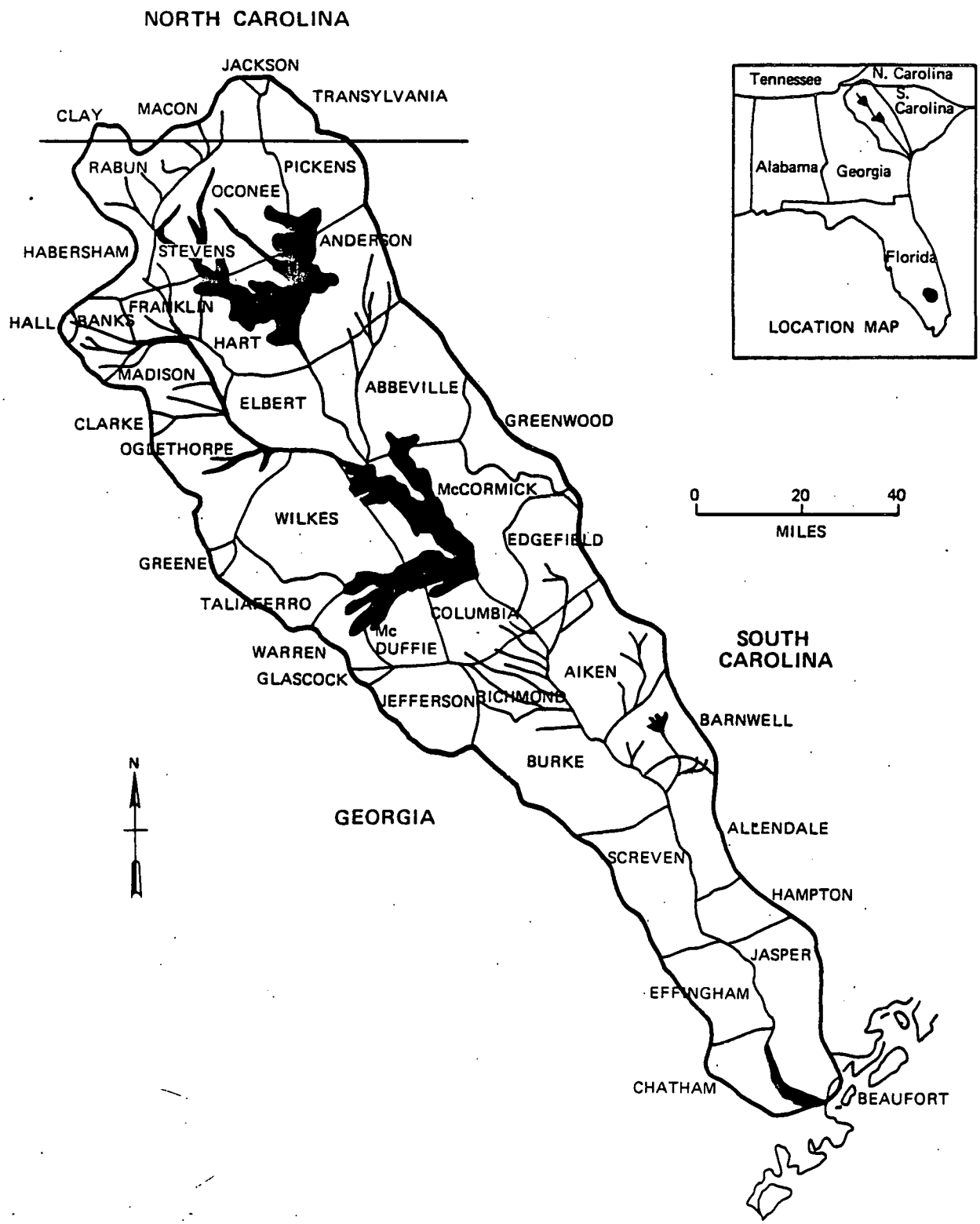

Figure 1. Counties Included Within the Savannah River Drainage Basin.

Reference 12.

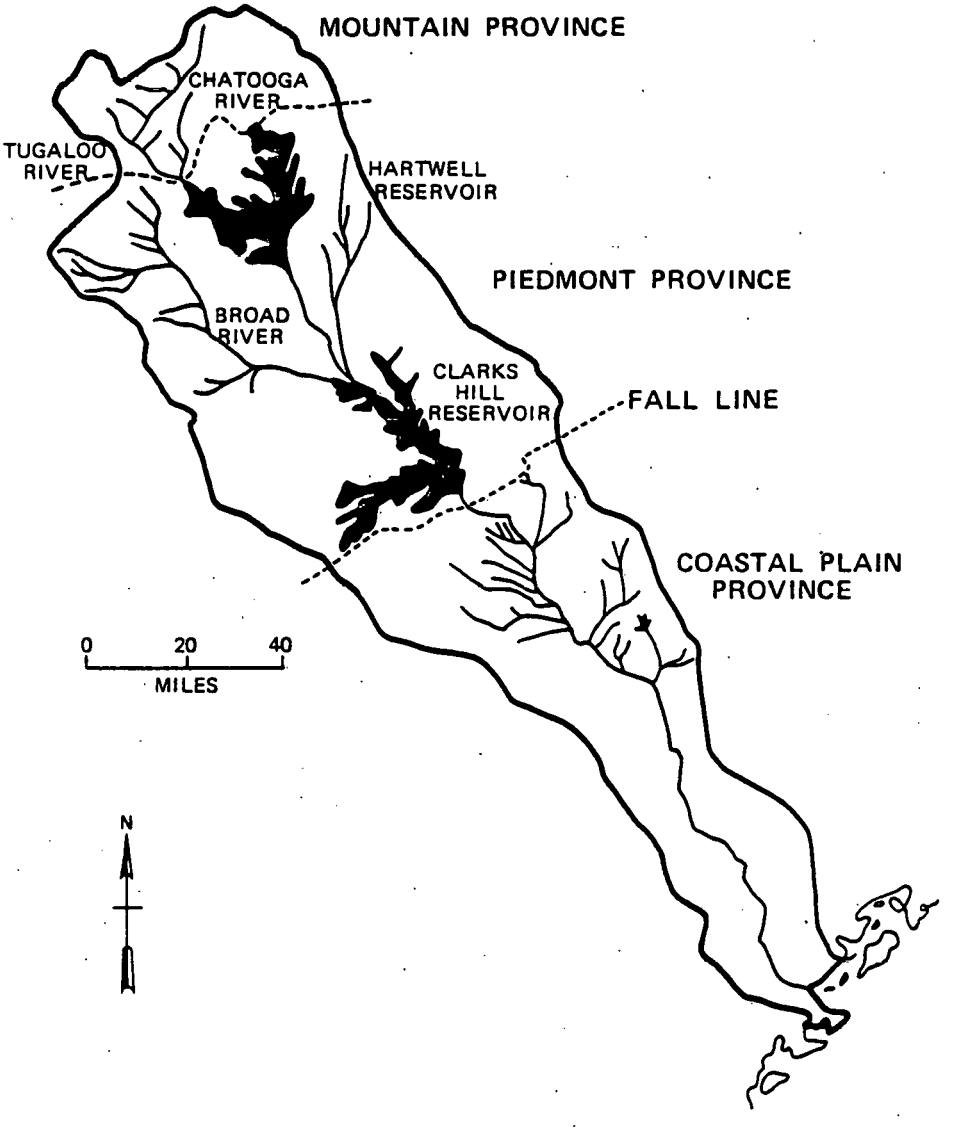

Figure 2. Major Tributaries and Physiographic Regions Included in the Savannah River Drainage Basin.

Reference 12.

Tugaloo and Chattooga Rivers. The region is characterized by a relatively steep gradient, ranging from about 5,500 to 1,000 ft (1676 to 305 m), and includes 2,022 sq mi (5235 km^2) of the total drainage basin. The Mountain Province lies in the Blue Ridge, and has a bedrock composed of gneisses, granites, schists and quartzites; the subsoil is composed of brown and red sandy clays. In this region the Savannah River and its tributaries have the character of mountain streams, with shallow riffles, clear creeks, and a fairly steep gradient. The stream bed is mainly sand and rubble, and the banks are sloping and grass-covered.

The Piedmont Region has an intermediate gradient, with elevations ranging from 1,000 to 200 ft (305 to 61 m). This region includes 5,233 sq mi (13,548 km^2) of the total drainage basin. Soils in the Piedmont are primarily red, sandy or silty clays, with weathered bedrock consisting of ancient sediments containing granitic intrusions. The Piedmont is bordered by the Fall-Line, an area where the sandy soils of the Coastal Plain meet the rocky terrain of the Piedmont foothills. The city of Augusta, Georgia, is located near this line.

The Savannah River becomes more turbid in the Piedmont Region, picking up the majority of its silt load. The river often meanders, and, despite the stabilizing effect of Clarks Hill Dam, the outer banks on curves are relatively unstable. Sand bars are deposited downstream from many inside banks along the curves.

The Coastal Plain has a negligible gradient ranging from an elevation of 200 ft (61 m) to sea level. The soils of this region are primarily stratified silts, clays, and sands. The Coastal Plain contains 3,334 sq mi (8631 km^2) of the total Savannah River drainage area, and includes the city of Savannah, Georgia (Figure 2). In the Coastal Plain, the Savannah River is quite slow moving. Tidal effects may be observed near the mouth of the river, and a salt water tongue extends upstream along the bottom of the river bed. The river bed is often muddy, and the river proper merges with the surrounding swamps.

Flow data for the Savannah River at Augusta (measured at Butler Creek) are given in Table 1. Typically, low flow occurs during the fall while high water occurs in late winter or early spring. The average discharge at Augusta calculated from 72 years of data, is 10,300 cfs (292 m^3/sec). More detailed flow and temperature data are given in Appendix C.

The water quality of the Savannah River and its tributaries varies considerably, ranging from clean to heavily contaminated with industrial and domestic effluents. The 1974 stream use

TABLE 1

Minimum, Maximum, and Average Flows of the Savannah River (Measured at Augusta)*

Water Year (Oct-Sept)	Minimum (cfs)	Maximum (cfs)	Average (cfs)
1950-51	1,710	41,400	6,766
1951-52	1,770	38,600	8,596
1952-53	3,260	34,800	6,561
1953-54	5,460	22,300	7,293
1954-55	4,180	22,400	5,487
1955-56	3,580	14,600	5,398
1956-57	5,170	15,200	6,572
1957-58	5,000	57,100	11,360
1958-59	5,260	28,200	7,125
1959-60	5,350	33,200	12,450
1960-61	4,930	30,300	8,873
1961-62	4,760	28,200	9,276
1962-63	5,130	30,600	9,554
1963-64	6,120	84,500	16,580
1964-65	6,300	33,000	12,940
1965-66	6,160	34,500	9,509
1966-67	5,740	20,900	8,372
1967-68	5,890	32,200	9,043
1968-69	5,800	44,100	9,812
1969-70	5,870	23,200	7,032
1970-71	4,460	59,700	8,668
1971-72	6,220	32,700	10,240
1972-73	5,460	38,100	13,200
1973-74	5,450	29,300	9,822
1974-75	5,520	43,900	11,690
1975-76	6,750	31,900	12,110
1976-77	6,000	32,200	11,030

* Reference 19.

classifications for the Savannah River Basin are given in Table 2. These classifications indicate the water quality at the time of the last Academy survey.

Historically, the Augusta, North Augusta, and Aiken County areas have provided the major sources of pollution to the Savannah River in the area around the Savannah River Plant. The city of Augusta did not have a secondary sewage treatment facility until 1975. Prior to that time most domestic and industrial wastes were discharged untreated or inadequately treated into the Savannah River, or into Hawks Gully, Butler Creek, and Spirit Creek, which flow into the Savannah River (Table 3). In the North Augusta and Aiken County area, domestic and industrial effluents entered the Savannah River directly and via Horse Creek and Lower Three Runs Creek (Table 4). Treatment facilities for the North Augusta and Aiken County area was not in operation until 1979. The Savannah River Plant also discharged waste water into the Savannah River. These discharges include thermal effluents as well as domestic and industrial wastes. The Savannah River Plant effluents are discussed in more detail in the next chapter.

Other pollution sources may be identified, particularly in the Savannah River Estuary near Savannah, Georgia. However, these sources did not have as great a potential for influencing the Academy of Natural Sciences of Philadelphia surveys as did those pollution sources from the Augusta area.

During the survey period there were a number of dams and impoundments built or in operation on the Savannah River. The largest of these were the Clarks Hill and the Hartwell Dams, located upstream from Augusta (Figure 2). The Clarks Hill Dam was completed in March, 1953 and is located 27 miles (43 km) above Augusta. Since the construction of Clarks Hill Dam, the Academy of Natural Sciences of Philadelphia survey teams have noted several changes in the Savannah River at their sampling station. River flow regulation increased the stability of the river banks by allowing vegetation, which previously had been torn loose from the banks by periodic floods, to build up along the river. In addition, there seemed to be an increase in water clarity as sediments settled out behind the dam. This increased clarity may have been partially responsible for the growth of dense algal mats in shallow river areas. The Academy hypothesized that because light was now able to penetrate farther into the water, the productivity of the river increased. The Academy also attributed part of the increased production to increasing industrial and domestic nutrient input into the river as cities and communities grew in the Savannah River Basin. Finally, the Academy noted a reduction in the number of snags and trash piles along the river.

TABLE 2

Stream Use Classification of the Savannah River (1974)*

Stream	Reach	Classification**
Chattooga	Georgia-North Carolina State Line to Tugalo Reservoir	Wild & Scenic
West Fork - Chatooga River	Confluence of Overflow Creek and Clear Creek to Chatooga River	Wild & Scenic
Savannah River	Headwaters of Tugalo Reservoir to Clarks Hill Dam	Recreation
Savannah River	Clarks Hill Dam to Augusta, 13th Street Bridge	Drinking Water
Butler Creek (and its tributaries)	Headwaters in Augusta to confluence with Savannah River	Urban
Cason's Dead River (and its tributaries)	Headwaters in Augusta to confluence with Savannah River	Urban
Savannah River	Augusta, 13th Street Bridge to U. S. Highway 301 Bridge	Fishing
Savannah River	U. S. Highway 301 Bridge to U. S. Highway 17 Bridge	Drinking Water
Savannah River	U. S. Highway 17 Bridge to Field's Cut	Industrial Navigation
Savannah River	Field's Cut to Fort Pulaski	Fishing
Savannah River	Fort Pulaski to open sea and all littoral waters of Tybee Island	Recreation

* Reference 14.

** Water quality classifications are defined in the Georgia Department of Natural Resources, Rules of the Environmental Protection Division.[13]

TABLE 3

Partial List of the Savannah River Pollution Sources from the Augusta Area*

Name of Industry	Const. Date	Type of Wastewater	Est. Vol. of Wastewater (mgd) Prior to 1970	Treatment Prior to 1970**	Receiving Stream
Augusta Chemical Co.	?	Organic, acidic, with sodium salts	0.13	Some Neutralization	Camille St. Ditch to
Augusta Plating Co.	1966	Cd, Cr, Cu, Zn, cyanide plating wastes	0.10	None	Oates Creek
Augusta Waste Water Treatment Facility	1969	Domestic sewage, textile finishing wastes, chemical manufacturers wastes, slaughter-house wastes	8.0 (23.0 max. cap.)	Primary and chlorination	Butler Creek
Babcock & Wilcox	1928	Oil, kaolin, sawdust	0.15	Settling tank	Unnamed tributary to Rocky Creek
Buckeye Cotton Oil Div. of Buckeye Cellulose Corp.	1902	Suspended & floating organics, oils	0.30	None	Camille St. Ditch to Beaverdam Ditch
Burris Chemical, Inc.	1969	Cooling water & chloride solutions	0.12	Retention area	Savannah River
Castleberry's Food Co.	1926	Organic	?	None	City sewer to Oates Creek
Columbia Nitrogen Corp. (Nitrogen Plant)	1963	Contaminated cooling water (Ammonia), domestic wastes	?	Containment and reuse, pH neutralization	Butler Creek

* Reference 15.

** Most Augusta industries currently direct their wastewaters to the Augusta Waste Water Treatment Facility, which was improved in 1975 to provide secondary treatment. Columbia Nitrogen Corp. and Continental Forest Industries currently have their own secondary treatment facility.

TABLE 3 (Contd)

Name of Industry	Const. Date	Type of Wastewater	Estimated Vol. of Wastewater (mgd)	Treatment Prior to 1970	Receiving Stream
Columbia Nitrogen Corp. (Caprolactam Plant)	1963	Cooling water domestic wastes oil stripper bottoms	0.40	None (Activated sludge in approx. 1975)	Savannah River
Continental Forest Industries	1960	Kraft Pulp Mill Effluent	0.50	Settling ponds, aeration	Spirit Creek
E. I. du Pont Nemours & Co.	1962	Inorganic caustics	?	Settling ponds	Butler Creek
Graniteville Mills, Sibley Division	1870	Dye, slasher, and domestic	.28	None	Water wheel tailrace to Savannah River
IMC (International Minerals & Chemicals	1908	Cooling water and scrubber wastewater	.002	None	Oates Creek
J. P. King Mfg. Co.	1881	Dye, slasher, and domestic	.03	None	Water wheel tailrace to Savannah River
Monsanto Company	1962	Cooling water, boiler blowdown,	.20	Cooling ditch	Ditch to Butler Creek
Olin Corp.	1964	Hg, chloride	2.5	Hg recovery and pH neutralization	Savannah River
Philadelphia Quartz Co.	?	Inorganic caustics	.008	Two holding ponds	Savannah River
Riverside Mills	?	Organic acidic	.30	None	City sewer to Third Level Canal
Scott Meat Packers, Inc.	1939	Blood, washwater	.12	None	Rocky Creek

TABLE 3 (Contd)

Name of Industry	Const. Date	Type of Wastewater	Estimated Vol. of Wastewater (mgd)	Treatment Prior to 1970	Receiving Stream
Shapiro Packing Co., Inc.	1940	Organic	?	Grease trap	Most of waste to sanitary sewers, small amount to Camille Street Ditch
Swift Fresh Meats Co.	1897	Organic	?	Floor grates	Second Level Canal
Taylor-Piedmont Co.	?	Creosote, oils	.90	None	Rocky Creek

TABLE 4

Partial List of the Savannah River Pollution Sources from the North Augusta and Aiken County Areas*

Name of Industry	Const. Date	Type of Wastewater	Estimated Vol. of Wastewater (mgd)	Treatment Prior to 1970**	Receiving Stream
Aiken STP	1951 (improved 1963)	Domestic & industrial wastes	0.93	Secondary (Trickling filter)	Kelly Creek
N. Augusta Sewer Outfall	?	Domestic & industrial wastes	0.95	None	Savannah River
Bath Mill	1929	Domestic & industrial wastes	0.303	none	Horse Creek
Clearwater Finishing	1929	Finishing plant and domestic wastes	4.52	none	Little Horse
Graniteville Mill	1890	Finishing plant wastes, chromium	4.65	none	Horse Creek
Kimberly Clark	1968	Domestic & industrial wastes	6.89	Retention Lagoon	Savannah River
Seminole Mills	1924	Boiler blowdown air conditioning, wastewater, domestic wastes	0.04	none	Little Horse Creek
J. P. Stevens Co.	1966	Domestic & industrial wastes wool scouring wastes	0.38	none	Lower Three Runs Creek
Valchem Chemical Co.	1947	Domestic & industrial wastes chromium, ammonia-N	1.61	none (?)	Horse Creek
Warrenville STP	1946	Domestic & industrial wastes	0.33	Secondary (Activated sludge)	Kelly Creek

* Reference 18.

** Most North Augusta and Aiken County industries currently direct their wastes to the Horse Creek Pollution Control Facility (constructed in 1979) for secondary treatment.

The second major dam is Hartwell Dam, which was completed in June, 1962. Hartwell Dam is located in the headwater region of the Savannah River about 65 miles (105 km) upstream from the Clarks Hill Dam. A third large dam, the Richard B. Russell Dam, is being built between the Clarks Hill and Hartwell Dams, but it will not be completed until 1984 or 1985. Several other small dams are located along the river, including three near Augusta: New Savannah Bluff Lock and Dam (completed in 1937), Stevens Creek Dam (completed in 1914), and Augusta City Dam (rebuilt in 1863).

A program that may have had considerable short-term implications on the surveys, was the dredging operations conducted by the U. S. Corps of Engineers. This program, initiated in October, 1958, was designed to dredge and maintain a 9 ft navigation channel in the Savannah River from the city of Savannah to Augusta.* A total of 61 sets of pile dikes were placed to constrict the river flow, thereby increasing flow rates, and a total of 37,645 linear ft of wood and stone revetment was laid to reduce erosion on banks opposite from the dikes. In addition, the channel was dredged, and 31 cutoffs were made, reducing the total river distance from Augusta to Savannah by about 15 miles (24.1 km). The project was completed in July, 1965; however, periodic dredging was continued to maintain the channel. A table of dredging dates and locations is included in Table 5.

The Savannah River Plant, which began construction in 1951, was another source of potential impact on the Savannah River. The major purpose of the Academy's surveys in the Savannah River was to monitor the effects of the Savannah River Plant. The next chapter will discuss the Savannah River Plant activities from a historical aspect to evaluate some of the possible sources of impact by the Savannah River Plant on the Savannah River.

CHAPTER IV. SAVANNAH RIVER PLANT ACTIVITIES

The Savannah River Plant (Figures 3-4) consists of a total of five nuclear production reactors and supporting facilities.[20,21] Three of the reactors are currently operational (P, K, and C), and two are on stand-by (R and L). In addition, a small test reactor (U) is on stand-by. Nuclear fuel and targets are manufactured on the site in the fuel and target fabrication facility (M). The irradiated reactor products are processed and packaged for shipment in the chemical separations areas (F and H). Deuterium,

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* Some dikes and revetments had been laid earlier, and were in place at the start of the Savannah River surveys in 1951.

TABLE 5

Savannah River Dredging Activities, 1964 through 1974 (Partial Listing)*

Dates		River Miles Dredged
1964	Dec. 7-10	176.0 - 175.4
	Dec. 10-12	175.2 - 174.8
	Dec. 13	165.5
	Dec. 14-17	158.4 - 159.0
	Dec. 18-22	158.1 - 157.2
	Dec. 23-30	141.3 - 140.8
	Dec. 31	137.3 - 136.8
1965	Jan. 2-5	135.6 - 135.3
	Jan. 5	129.2
	Jan. 6	118.7 (Rt 301 Bridge)
1966	April 22-25	173.8**
	April 26 - May 2	162.0**
	May 3-4	151.0**
	May 4-9	149.0**
	May 9-10	144.0**
	May 11-12	126.0**
	May 12-13	124.5**
1967	June 3-5	197.9 - 179.8
	June 6-16	179.8 - 175.0
	June 17-22	175.0 - 174.3
	June 22 - July 9	174.3 - 169.0
	July 10 - Aug. 4	169.0 - 135.0
	Aug. 4 - Aug. 10	135.0 - 134.4
	Aug. 10	128.4
	Aug. 11	59.4
1968	Sept. 8	above 167.1
	Sept. 9	167.1
	Sept. 24-25	151.3 - 151.1
	Sept. 26	144.2 - 144.1
	Sept. 27	136.5 - 136.3
	Sept. 26 - Oct. 4	129.3 - 128.9
	Oct. 5-6	124.6 - 124.0
	Oct. 6-7	114.5 - 114.2

* Reference 16.

** Only average river mile values were available.

TABLE 5 (Contd)

Dates		River Miles Dredged
1970 -	Aug. 21-27	179.7
	Aug. 28 - Sept. 9	151.3
	Sept. 10-23	150.8
	Sept. 24-29	149.6 - 149.4
	Sept. 30 - Oct. 8	149.3 - 149.0
	Oct. 9-14	148.5 - 148.3
	Oct. 15-22	146.6 - 146.2
	Oct. 23 - 29	145.7 - 145.4
	Oct. 30 - Nov. 12	128.4 - 128.2
	Nov. 13-19	124.4 - 124.2
	Nov. 20	78.6 - 78.4
1973	Oct 22 - 30	187**
	Oct. 31 - Nov. 2	183.1**
	Nov. 3-6	151.3**
	Nov. 7-24	149.4**
	Nov. 25	148**
	Nov. 26 - Dec. 1	146**
	Dec. 2-4	144**
	Dec. 5-7	136**
	Dec. 8	117**

** Only average river mile values were available.

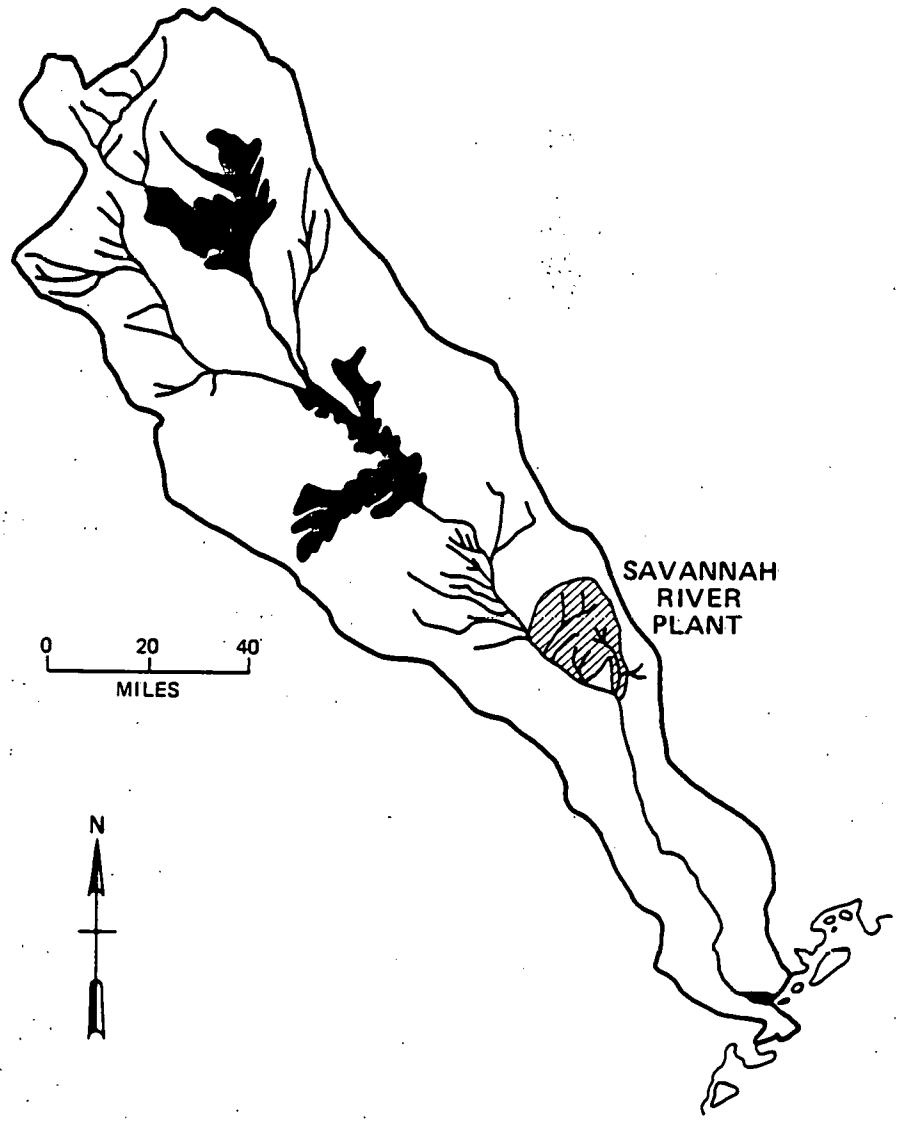

Figure 3. Location of the Savannah River Plant in the Savannah River Drainage Basin.

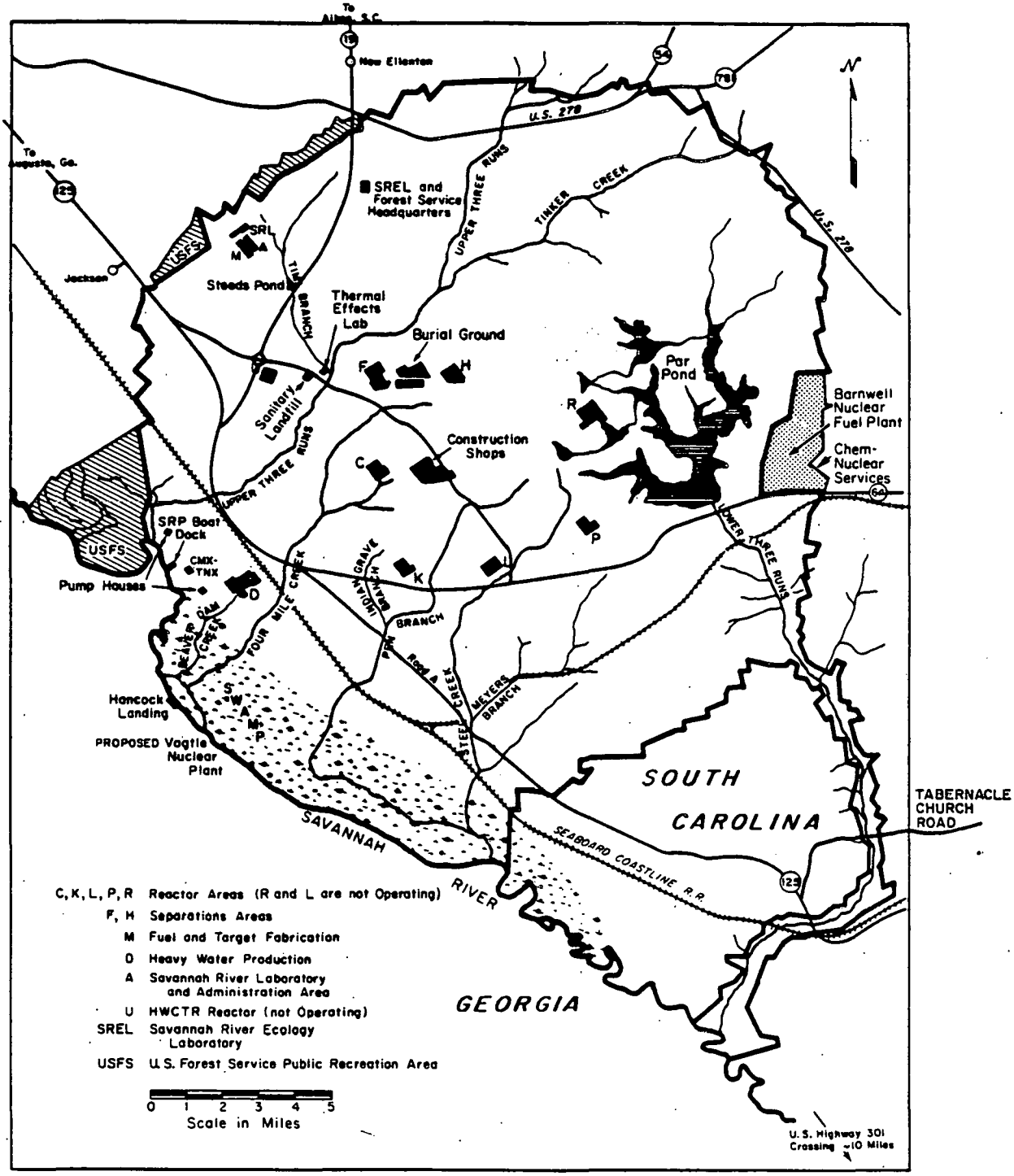

Figure 4. The Savannah River Plant Site.

which is used to moderate the neutron activity inside the reactor, is separated from Savannah River water in the heavy water extraction and recovery area (D). Other facilities include the Savannah River Laboratory, a process development laboratory, and administrative areas (A).

The major products produced at the Savannah River Plant are ^{239}Pu and ^{3}H. Smaller quantities of other nuclear materials have been produced. Some of these products include:

1) ^{238}Pu, a self-contained energy source used as a power supply in pacemakers and for the space program

2) ^{252}Cf, an active neutron source useful in radiography, activation analysis, and possible cancer therapy

3) ^{60}Co, a gamma ray source used in cancer therapy and self-contained power sources

4) ^{244}Cm, a potential power source

5) ^{233}U, a research material loaned to Universities and other research facilities.

The Savannah River Plant operations produce nuclear wastes, as well as a variety of industrial and domestic wastes. Most nuclear wastes are processed and stored on the site. Industrial and domestic wastes, and some radionuclides are processed if necessary, and released to drainage ditches and seepage basins. As part of a comprehensive program to monitor the effects of these wastes on the environment, the Academy of Natural Sciences of Philadelphia was contracted to evaluate the impact of the Savannah River Plant on the health of the Savannah River.

Effluents released to the Savannah River, or to seepage basins that drain into tributaries of the Savannah River, contain exceedingly low levels of radionuclides and other materials. Tables 6 through 9 list the major compounds found in Savannah River Plant effluents,[20] and show the effect of these compounds on chemical concentrations and bacterial numbers in the Savannah River.

One of the most important potential impacts that the Savannah River Plant has is from thermal effluents. Large quantities of river water are pumped through heat exchangers in the reactor buildings, then are returned to the river by way of Four Mile Creek, Beaver Dam Creek, and Pen Branch Creek (Figure 4). Steel Creek and Lower Three Runs Creek have also been used during the 1951-1976 survey period to transport thermal effluents. A summary of the history of reactor operations is shown in Table 10.

TABLE 6

Radioactivity in Savannah River Water (1975)*

Sampling Point	Alpha Emitters** (10^{-9} µCi/cc)			Nonvolatile Beta Emitters** (10^{-9} µCi/cc)		
	Max	Min	Ave	Max	Min	Avg
Above SRP, 1 mile upstream from Upper Three Runs	1.0	ND†	ND	6	ND	ND
Below SRP, 8 miles downstream from Lower Three Runs at Highway 301	1.5	ND	ND	7	ND	ND

* Reference 20.

** Tritium and small amounts of ^{137}Cs and ^{90}Sr are the only radionuclides of SRP origin detectable by routine monitoring in river water at the downstream location.

† ND = not detectable (less than sensitivity of analysis). Alpha emitter minimum sensitivity = 0.2×10^{-9} µCi/cc Nonvolatile beta emitter minimum sensitivity = 4.0×10^{-9} µCi/cc.

TABLE 7

Comparison of Changes in Savannah River Water Quality with Drinking Water Standards (1975)[a]

(Assumes all materials discharged to streams reach the Savannah River)

Material	Changes in Savannah River Concentrations Resulting From SRP Release (mg/L)[b]	Drinking Water Standard, (mg/L)
Sulfate	0.2	250
Chloride	0.05	250
Nitrate	0.01	10
Phosphate	3×10^{-3}	d
Barium	1.7×10^{-3}	1.0
Iron	4.9×10^{-4}	0.3
Boron	1.8×10^{-4}	1.0
Zinc	1.5×10^{-4}	5
Chromium	4×10^{-5}	0.05
Manganese	9×10^{-5}	0.05
Arsenic	1×10^{-5}	0.05
Mercury	9×10^{-8}	0.002
Copper	1.3×10^{-6}	1
Phenols	1.7×10^{-7}	0.001
Cyanide	c	0.2
Cadmium	c	0.01
Lead	c	0.05
Selenium	c	0.01
Silver	c	0.05

a. References 20, 22.

b. Assumes minimum flow of 6000 cfs. Concentrations downstream of SRP are all below the standards.

c. Not normally discharged to streams at SRP.

d. No drinking water standard in 1975.

TABLE 8

Pesticides Analyzed by USGS[a] in Savannah River Sediment and Water Samples (1975).

	River Sediment, µg/kg	
	Above Plant	Below Plant
Aldrin[b]	d	d
Chlordane[b]	d	d
DDD[b]	1.0	3.2
DDE[b]	1.2	3.4
DDT[b]	1.3	4.1
Diazinon[b]	d	d
Dieldrin[b]	0.5	1.4
Endrin[b]	d	d
Ethion[b]	d	d
Ethyl-Parathion[b]	d	d
Ethyl-Trithion[b]	d	d
Heptachlor[b]	d	d
Heptachlor-Epox[b]	d	d
Lindane[b]	d	d
Malathion[b]	d	d
Methoxychlor[c]	d	d
Methyl-Parathion[b]	d	d
Methyl-Trithion[b]	d	d
PCB[b]	d	9.0
PCN[b]	d	d
Silvex[b]	d	d
Toxaphene[b]	d	d
2, 4-D[b]	d	d
2, 4-DP[b]	d	d
2, 4, 5-T[b]	d	d

a. Limit of sensitivity of each analysis is 0.1 µg/L of water and 1.0 µg/kg of sediment. Reference 20.

b. Water and sediment analyses.

c. Water analyses only.

d. Below limit of sensitivity.

TABLE 9

Fecal Coliform Bacteria Measurements (1975)*

	Weekly Samples, Colonies/100 mL		
	Maximum	Mean (Geom.)	Minimum
Savannah River			
Upstream from SRP	26,000	2,300	110
Highway 301 Bridges	1,200	440	<10
Upper Three Runs			
SRP Road F	530	90	0
SRP Road A	1,400	120	20
400-D Area Effluent	8,600	830	0
Four Mile Creek - Road A	4,600	450	0
Pen Branch - Road A	6,600	80	0
Steel Creek - Road A	1,800	130	0
Lower Three Runs			
Tabernacle Church Road	4,400	100	10
Road A	3,400	350	10

* Reference 20. Data from the Academy of Natural Sciences of Philadelphia are included in Table B.4.23 (Appendix B) for comparison.

TABLE 10

Startup and Stand-by Dates of the Savannah River Plant Reactors

Reactor	Startup	Stand-by
R*	12/28/53	6/15/64
P**	2/20/54	
L†	7/02/54	2/18/68
K††	10/14/54	
C¶	3/28/55	

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* Discharge to Lower Three Runs until 1958, then discharge to Par Pond.

** Discharge to Steel Creek until 1963, then discharge to Par Pond.

† Discharge to Steel Creek.

†† Discharge to Pen Branch Creek.

¶ Discharge to Four Mile Creek.

Typically, the thermal effluents from the Savannah River Plant area create plumes in the river which mix slowly with the rest of the river. Thermal profiles for the Savannah River below Four Mile Creek and Steel Creek (Pen Branch effluent) are shown in Tables 11 and 12. The maximum river temperature recorded below the Savannah River Plant after mixing was 29.4°C on August 25, 1959 (Table 13).

The Academy of Natural Sciences of Philadelphia has conducted 16 major surveys on the Savannah River to monitor the effluence of the Savannah River Plant. These surveys, and the Academy's monitoring program, are described in more detail in the next chapters.

CHAPTER V. CHRONOLOGY OF SURVEYS AND STUDIES

There have been a total of 16 major surveys conducted by the Academy of Natural Sciences of Philadelphia on the Savannah River from 1951 to 1976 (Table 14). These surveys have produced a comprehensive, taxonomic data base covering the entire span of the Savannah River Plant's operations. The biological and chemical data from these surveys have been used to evaluate the impact of thermal effluents from the Savannah River Plant reactors, particularly L reactor, on the Savannah River.[10] Other comparisons between biological data and reactor activity may be made using one or more of the data formats discussed in Chapter VIII (Scope of the Savannah River Plant Data Base).

In addition to the comprehensive river surveys, diatometer data have been collected quarterly from 1953 to 1976 at Stations 1, 6, and AB. These data represent a semi-continuous biomonitoring program that may be used to supplement the major survey data. Chapter IX and Appendices A and B provide a summary of the biological and chemical data available for each survey.

The Savannah River has been influenced by many changes that have occurred during the 25 year sampling period. The most notable impacts resulted from dredging of the river, industrialization along the river banks, and construction of upstream dams. The impacts resulting from these operations are detailed in Chapters III, IV, and VI.

CHAPTER VI. SAMPLING STATIONS

A number of criteria were used to select the location of sampling stations on the Savannah River.[1-9] The Academy survey team wanted stations with comparable ecological habitats. The total area to be sampled was of less importance than the inclusion of a similar variety of habitats. In addition, the stations should have similar physical and chemical characteristics

TABLE 11

River Temperatures Near Four Mile Creek (Measured 4/10/72)*

Location**	Depth, ft	Temperatures Above Ambient at Various Distances† from Right Bank, °C 75%	50%	37%	25%	12%	Air Temperature, °C
I	1	0.1	0.0		0.2		18.4
	5	0.0	0.0		0.2		
	10	0.0	0.0 (at 9.5')		0.2 (at 10.5')		
II	1	0.1	0.2	0.7	7.8	13.8	
	2	0.1	0.2	0.6	5.8	13.9	
	3	0.1	0.2	0.6	3.4	14.0	
	5	0.0	0.2	0.6	1.0	14.0	
	8	0.0	0.2	0.6	0.9	(at 3.5')	
	10	0.0		0.5 (at 9.5')	0.8 (at 9.5')		
III	1	0.0	0.2	0.3	2.9	3.9	
	2	0.1	0.1	0.5	2.4	2.8	
	3	0.1	0.1	0.5	2.0	2.3	
	5	0.0	0.1	0.5	0.9	1.8	
		0.0 (at 11')	0.1 (at 9')	1.0 (at 8')	0.9 (at 7.5')	1.6 (at 8.5')	
IV	1	0.6		0.9	1.4	1.4	
	3	0.5		0.8	0.9	1.4	
	5	0.4		0.9	(at 2.5')		

* River flow measured at SRP boat docks: 7750 cfs
River stage measured at SRP boat docks: 85.9 ft
River ambient temperature measured at Location I: 14.6°C.
Reference 20.

** Locations:
I - Control, on Savannah River, 200 yards above Four Mile Creek mouth.
II - On Savannah River, at downstream side of Four Mile Creek mouth.
III - On Savannah River, 100 yards below Location II.
IV - On Savannah River, 0.5 mile below Location III.

† Percent of distance across stream from right bank, facing upstream.

TABLE 12

River Temperatures Near Steel Creek (Measured 4/13/72)*

Location**	Depth, ft	Temperatures Above Ambient at Various Distances† from Right Bank, °C 75%	50%	37%	25%	12%	Temperature, °C
I	1	0.0	0.0		0.0		27.8
	5	0.0	0.0		0.0		
	10	0.0	0.0		0.0		
		0.0			0.0		
		(at 11.5')			(at 11')	28.6	
II	1	0.2	0.0	0.0	0.0	2.4	
	2	0.2	0.0	0.0	1.2	3.0	
	3	0.1	0.0	0.0	1.1	3.0	
	5	0.1	0.0	0.0	1.1	1.4	
	10	0.1	0.0	0.0	0.3	1.1	
		(at 7')	(at 10.5')	0.0	0.1	0.4	
				(at 14')	(at 15.5')	(at 14')	
III	1	0.1	0.0	0.0	0.1	0.9	30.0
	2	0.1	0.0	0.0	0.0	1.2	
	3	0.1	0.0	0.0	1.1	1.2	
	5	0.0	0.0	0.0	0.1	1.1	
	10	0.0	0.0	0.0	0.1	0.8	
			(at 9.5')	0.0	0.1	0.8	
				(at 11.5')	(at 13')	(at 14.5')	
IV	1	0.4	0.1	0.2	0.5	0.9	
	5	0.2	0.1	0.2	0.5	0.8	
		0.2	0.1	0.2	0.5	0.9	
		(at 7')	(at 8')	(at 8.5')	(at 10.5')	(at 12.6')	
V	1	0.5	0.6		0.7	28.9	
	5	0.4	0.6		0.7		
	10	0.3	0.5		0.7		
		0.3	0.3		0.7		
		(at 23')	(at 20')		(at 13')		
VI	1	0.6	0.5		0.5		29.0
	5	0.5	0.4		0.5		
	10	0.5	0.4		0.5		
		0.5	0.4		0.5		
		(at 11')	(at 14')		(at 15.5')		

* River flow measured at SRP boat docks: 7450 cfs
River stage measured at SRP boat docks: 85.5 ft
River ambient temperature measured at Location I: 16.9°C. Reference 20.

** Locations:
I - Control, on Savannah River, above Steel Creek mouth.
II - On Savannah River, 20 ft below Steel Creek.
III - On Savannah River, 100 yards below Steel Creek.
IV - On Savannah River, 0.6 mile below Steel Creek.
V - On Savannah River, one mile below Location IV.
VI - On Savannah River, one mile below Location V.

† Percent of distance across stream from right bank, facing upstream.

TABLE 13

Maximum Temperature Increases Caused by the Savannah River Plant in the Savannah River*

Criterion	South Carolina Standard	Maximum SRP Value
Maximum temperature below SRP after mixing	32.2°C (90°F)	29.4°C
Maximum temperature increase	2.8°C (5°F)	1.4°C
Maximum mixing zone (% of cross-sectional area)	25%	<20%
% of surface area	33-1/3%	<25%

* Reference 20. Calculated using classified information for two reactors discharging to the river, at minimum river flow.

TABLE 14

Chronology of Surveys Conducted by the Academy of Natural Sciences of Philadelphia on the Savannah River (1951-1976)

Survey No.	Survey Dates	Reactors in Operation*
1	1951: June 25 - July 14	None
2	Oct. 15 - Nov. 31	None
3	1952: Jan. 9-31	None
4	May 5-22	None
5	1954: Aug. 15-30	R P L
6	1955: Aug. 24 - Sept. 7	R** P L K C**
7	1956: May 6-22	R P L K C
8	1960: May 23 - June 4	R P L K C
9	Aug. 31 - Sept. 15	R** P L K C
10	1965: May 30 - June 8	P K C
11	Sept. 21-30	P L K C
12	1968: May 27 - June 5	K C
13	Aug. 24 - Sept. 2	P K C
14	1972: May 22 - June	P K C
15	Sept. 13-22	P K C
16	1976: Aug. 10-16	P K C

* R reactor discharged into Lower Three Runs Creek until 1958 then discharged into Par Pond until it was shutdown in 1964;

P reactor discharged into Steel Creek until 1963, then discharged into Par Pond;

L reactor discharged into Steel Creek until it was placed on stand-by in 1968;

K reactor discharges into Pen Branch Creek;

C reactor discharges into Four Mile Creek

** Reactor up for part of survey.

including similar substrates, current velocities and river contours. There should be shallow water and beaches for collecting (particularly for seining fish) and the area should be workable during high and low water conditions.

The Savannah River stations were all located in slow-moving, meandering sections of the river. The river bed consisted mostly of sand, with mud and silt in the pools and backwater areas. There were no large rocks in the river bed, although there were some limestone outcroppings in the area. The largest of these was Blue Bluff, located about 1/4 mile (0.4 km) downstream from Four Mile Creek (Figure 5). A considerable amount of floating and partially submerged debris was present at all stations, which provided increased surface area in the shallow, photosynthetic region of the river. After the completion of Clarks Hill Dam in 1953 there were noticeable changes in the productivity of the Savannah River stations. These changes included increased algal, invertebrate and fish diversities, as discussed in Chapter III.

The major Savannah River stations were numbered 1, 3, 5 and 6, as shown in Figure 5. These stations were used for all comprehensive surveys since 1951. A descriptive summary of the Savannah River stations is given in Table 15.

Station 1 (Figure 6) was located on a straight portion of the river at Mile 160.7 (formerly Mile 175.1), and was above any possible discharge from the Savannah River Plant. Station 1 included all of the dikes on the left bank* and the opposite area on the right bank. The right bank was a gentle slope with overhanging willows. A stone revetment had been built along part of the right bank, and a small stream entering at the downstream boundary. There were sandy beaches between the left bank dikes. At this point the river flowed almost due south.

Station 3 was ecologically very similar to Station 1. It was located on a straight section of the river at Mile 143.9 (formerly 157.5), about 6 miles (9.6 km) downstream from Four Mile Creek (Figure 7). There were dikes with sandy beaches along the left bank, and the right bank was moderately steep and overhung with willows. There was a stone revetment near the right downstream boundary, and a small stream entered along the right bank.

Station 5 was originally located on a bend in the river at Mile 149.5 (Figure 8). Despite superficial differences from Stations 1 and 3, the ecological habitats were quite similar at Station 5. Sandy beaches and a considerable amount of fallen debris at Station 5 provided habitats similar to the sandy, shallow areas between dikes at Stations 1 and 3.

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* Bank sides were determined by facing downstream.

TABLE 15

Descriptive Summary of Stations Used by the Academy of Natural Sciences of Philadelphia for Surveys on the Savannah River

Station	Location	Survey Numbers	Description
1	Mile 160.7 (old 175.1)	1-16	Dikes and sandy beaches on L. bank. Gentle slope with stone revetment and small stream on R. bank. Overhanging willows, straight section of river.
3	Mile 143.9 (old 157.5)	1-16	Dikes and sandy beaches or L. bank. Fairly steep R. bank with stone revetment and small stream. Overhanging willows, straight section of river.
5 (old)	Old Mile 149.5	1-7	Sandy beaches on both banks with small stream on L. bank. Much debris. Curved section of river, with steep outer banks.
5 (new)	Mile 135.8 (old 149.5)	8-16	Similar to Old Station 5 Sandy beaches with small stream on L. bank. Much debris. Curved section of river with steep outer banks.
6	Mile 123.1 (old 134.5)	1-16	Sandy beaches on curve of river. Slough on R. bank designated Station 6B as opposed to river proper at 6A. Much debris.

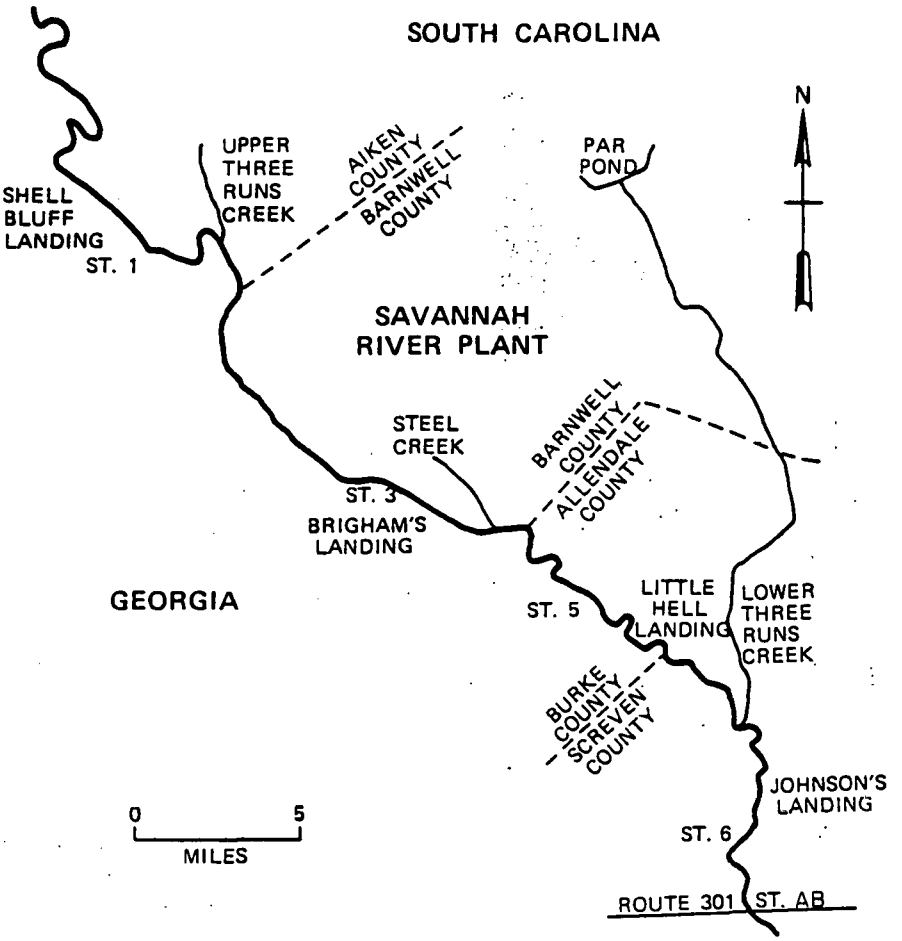

Figure 5. Survey Stations Used By the Academy of Natural Sciences of Philadelphia on the Savannah River (1951-1976).

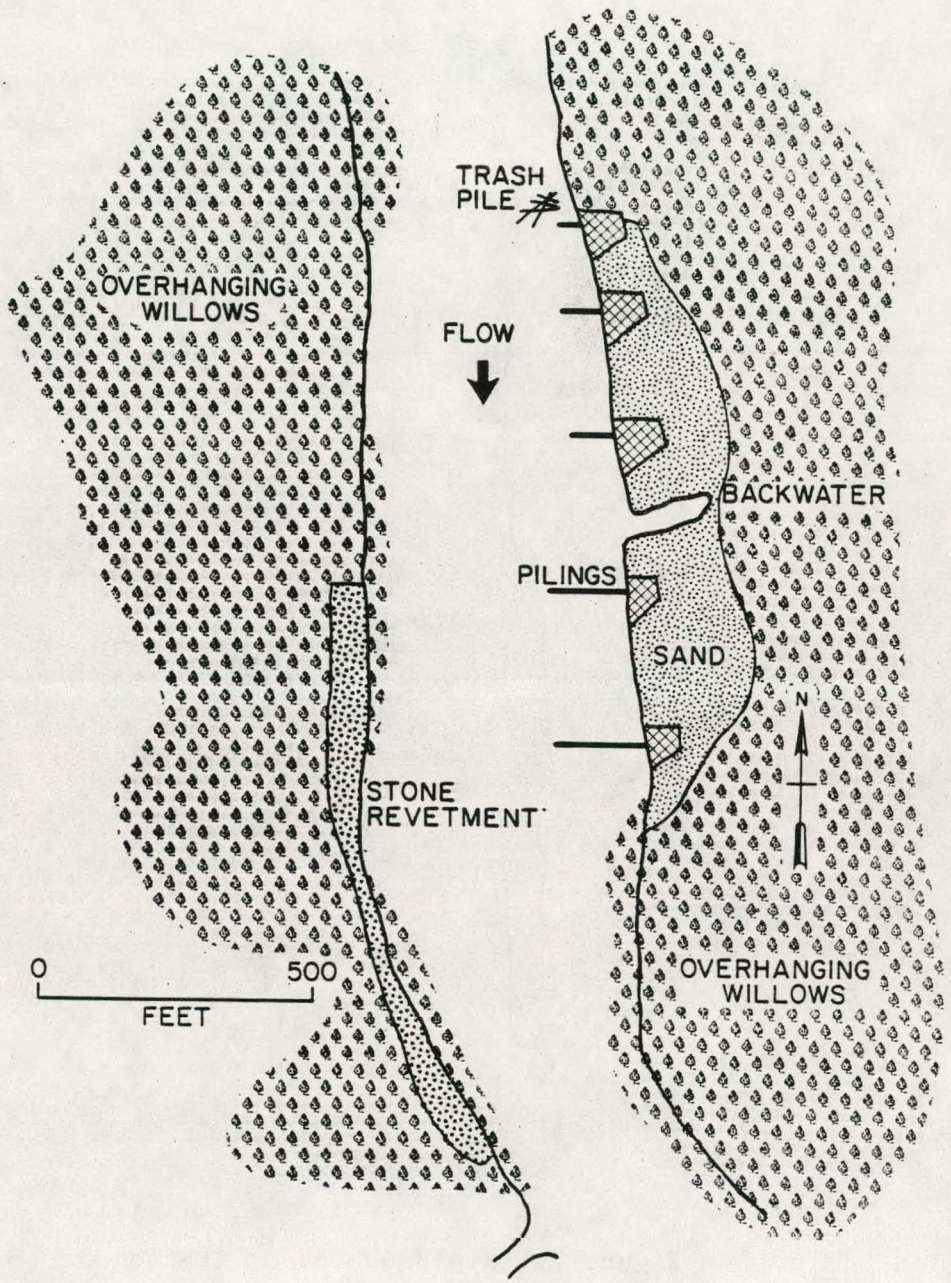

Figure 6. Field Sketch of Station 1.

References 1-9.

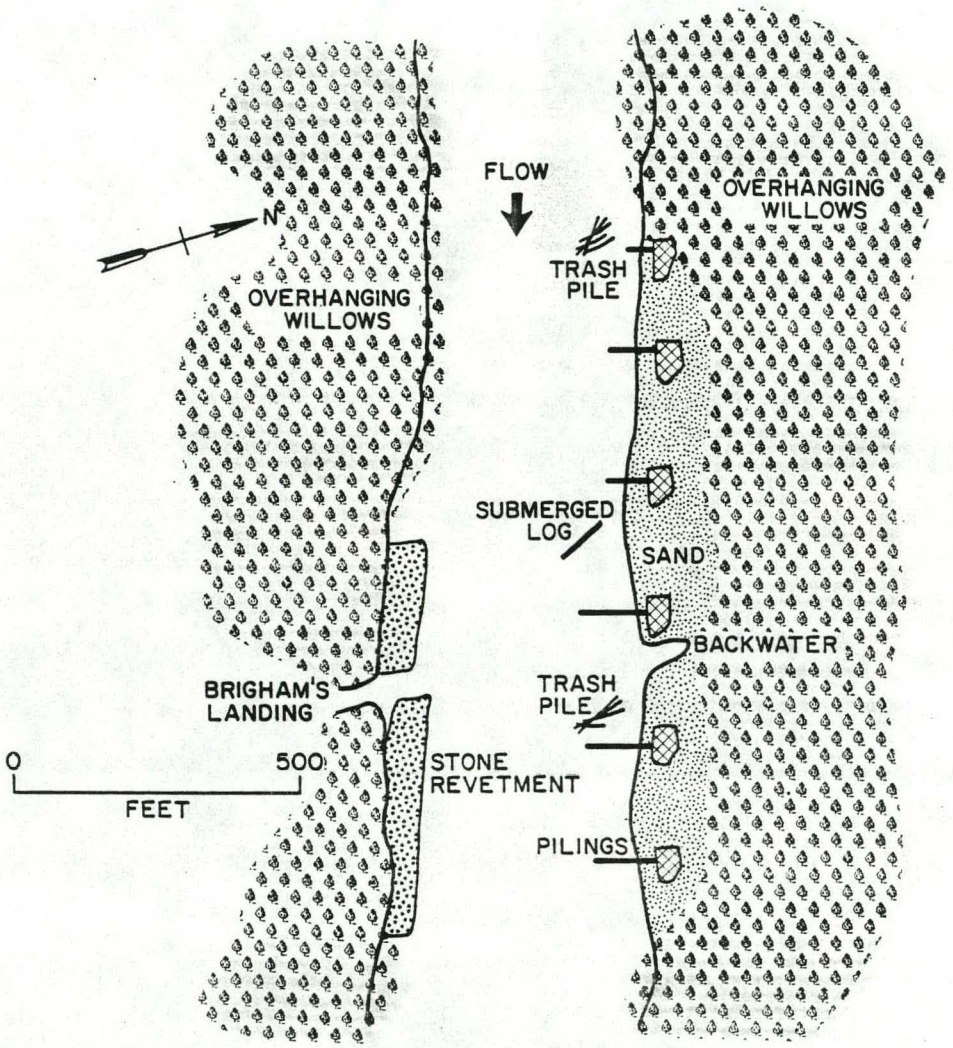

Figure 7. Field Sketch of Station 3.

References 1-9.

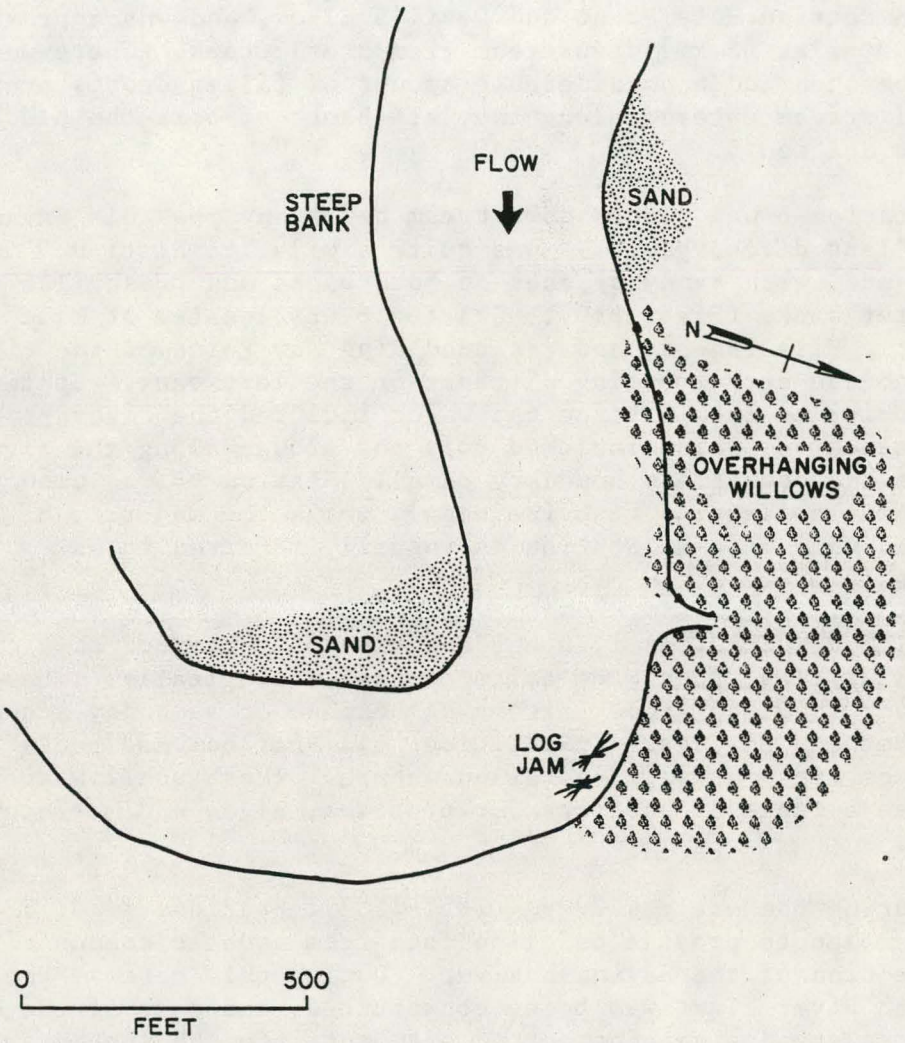

Figure 8. Field Sketch of Original Station 5.

References 1, 2.

In 1958 a dredging project was initiated by the U. S. Corps of Engineers. This project altered the river channel and caused Station 5 to become an oxbow. Station 5 was relocated to Mile 135.8 (formerly 149.5) for the 1960 surveys, and for the subsequent surveys. The new Station 5 was so similar in appearance to old Station 5 that the two were difficult to distinguish without a map. New Station 5 (Figure 9) was located on a bend in the river between Catfish Hole Point and Devil's Elbow, and was approximately 5 miles (8 km) downstream from Steel Creek. There were sandy beaches and a considerable amount of fallen debris present. A small stream entered along the left banks of both the old and the new Station 5.

Station 6 was placed downstream below any possible Savannah River Plant discharges. It was quite similar to Station 5 in appearance, with sandy beaches on both banks and trashpiles along the outer banks (Figure 10). Station 6 was located at Mile 123.1 (formerly Mile 134.5), and included Ring Jaw Point on the right bank and the corresponding distance on the left bank. Station 6 was subdivided into Station 6A, which included the river proper, and Station 6B, which included only the slough along the right bank at the downstream boundary of 6A. Station 6B was used primarily for collecting fish (seining), while the majority of collections were made at Station 6A (usually referred to as Station 6).

Although Stations 1, 3, 5, and 6 had a number of physical dissimilarities, they were quite similar ecologically. They all had sandy, shallow areas, either as beaches or as sandy accumulations between pilings. In addition, all stations had pools and backwater areas as well as fallen debris. These shallow areas provided a range of habitats for protozoa, algae and macroinvertebrates.

During the early surveys (1951-1952), Stations 1, 3, 5, and 6 were sampled to provide baseline data from aquatic communities in this section of the Savannah River. During this period, the Savannah River Plant was being constructed, and none of the reactors were discharging heated effluent into the survey area. After 1954, Station 5 received heated effluent from P and L reactors by way of Steel Creek, and indirectly from K reactor which discharged into Pen Branch, a tributary of Steel Creek. Station 3 received effluent from C reactor by way of Four Mile Creek. The effluent from P reactor was redirected into Par Pond in 1963, and L reactor was placed on stand-by in 1968. Reactors C and K are still in operation.

During the period that K, L, and C reactors were all operational, the temperature increase observed in the Savannah River caused by Savannah River Plant operations was usually no

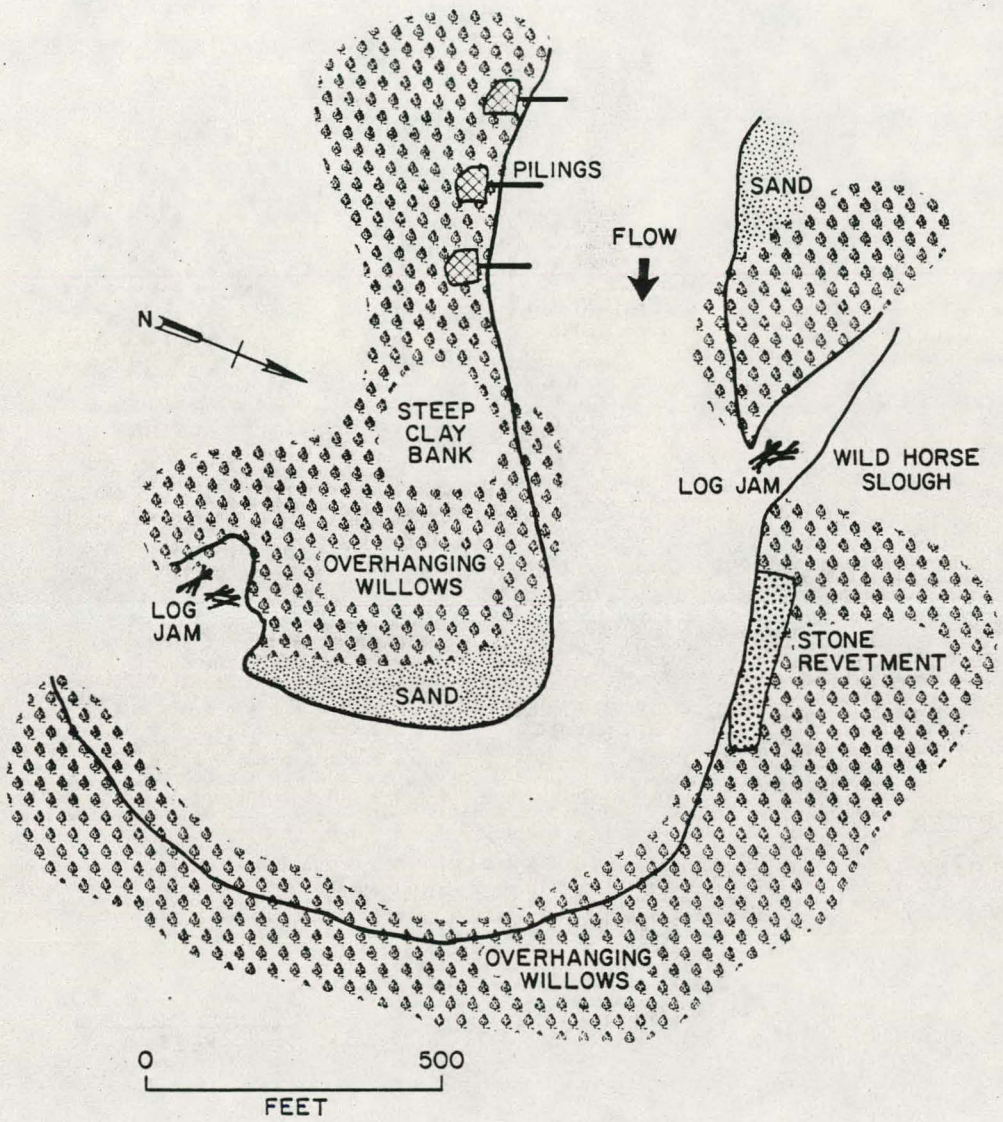

Figure 9. Field Sketch of Relocated Station 5.

References 3 through 9.

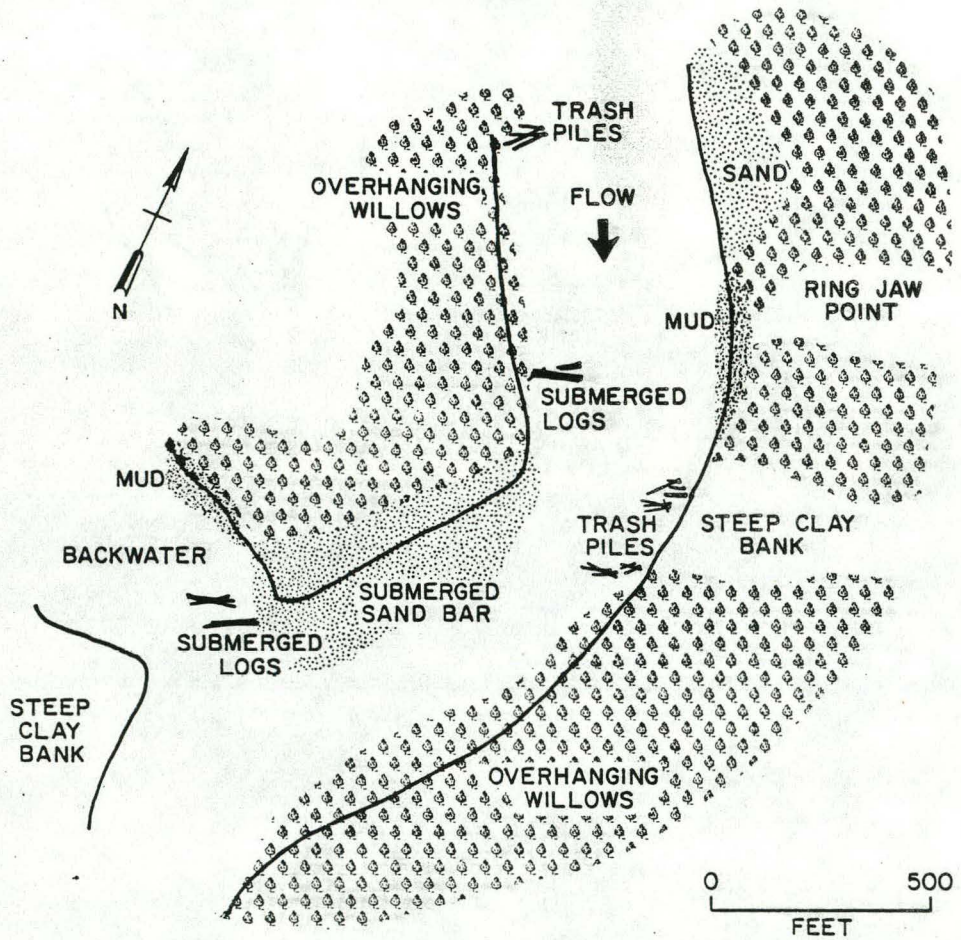

Figure 10. Field Sketch of Station 6.

References 1 through 9.

greater than 5°C (2.8°C; Table 13, Chapter IV). The thermal plume from Steel Creek was obliterated when the river passed a meander. The water temperatures at both Stations 3 and 5 were essentially homogeneous.

One additional station, Station AB, was located on the Savannah River, and was used for quarterly diatom surveys. This station was located at Mile 118.7, upstream from the Allendale Bridge on Rt. 301. Station AB was used as a reference station, and was situated well downstream from any Savannah River Plant thermal sources. The station was ecologically similar to Stations 1, 3, 5 and 6, with debris along the left bank, and overhanging vegetation along the right bank. Station AB was not used for any of the comprehensive river surveys, and field sketches of the station were not provided in any of the Academy survey publications.

CHAPTER VI. METHODS

The Academy of Natural Sciences of Philadelphia attempted to sample all river habitats qualitatively during the major river surveys to insure that most of the biota in the river were collected on each survey. Survey field teams usually consisted of a phycologist, an entomologist, an ichthyologist, a water chemist, a protozoologist, an invertebrate zoologist, and field assistants. Except where noted, the collecting, preservation and identification techniques were consistent for all major river surveys.

Much of the sampling was done by boats and, because of the size of the sampling area, took several weeks to complete. The first samples collected at each station were water samples for physical, chemical, and bacterial analyses. The methods for these analyses are summarized in Table 16. The station averages for each water chemistry measurement are given by survey number in Appendix B.4.

After the water samples were collected, several days were spent at each station sampling the major biological communities and populations in the river. Collecting was initiated at the downstream boundary of each station and proceeded upstream. All organisms, except protozoa, were sorted and preserved in the field, then transported to the Academy's laboratories for identification and incorporation into permanent collections. Protozoa were identified in the field laboratory because they cannot be preserved satisfactorily.

The river communities and populations were sampled qualitatively from a wide variety of habitats. Separate species lists were developed for algae and diatoms, insects, microinvertebrates,

TABLE 16

Summary of Methods used for Physical, Chemical, and Bacteriological Analyses of Savannah River Water Samples*

Measurement	Method
Alkalinity	
a) Methyl Orange	a) Methyl orange titration
b) Phenolphthalein	b) Phenolphthalein titration
c) Bicarbonate	c) Calculated from M.O. & P Alkalinities
d) Carbonate	d) Calculated from M.O. & P Alkalinities
Bacteriological	
a) Total bacteria	a) Membrane filtration + M-TGE broth incubation
c) Coliform	b) Membrane filtration + M-endo broth incubation
Bicarbonate	Calculated from Alkalinity
Carbon Dioxide	Calculated from pH and Alkalinity
Chlorides	Mohr titration, Silver Nitrate/Potassium Chromate titration
Conductivity	Specific conductivity meter (Cond. bridge)
Hardness	
a) Total	a) Complexiметric or EDTA titration, procedure and reagents from Betz & Co., Philadelphia, Pennsylvania, or calculated from Atomic Absorpton data
b) Calcium	b) C.4 Calcium hardness method, Betz & Co. reagents and procedure or calculated from A. A. data
c) Magnesium	c) Betz & Co. reagents and procedure or calculated from A. A. data
Metals	
a) Calcium	a) Measured on Perkin Elmer Model 303 Atomic Absorption Spectrophotometer or calculated from Hardness data.
b) Iron	b) Phenanthroline method or measured on A. A.
c) Magnesium	c) Calculated from Total and Calcium Hardness, or measured on A. A.
d) Manganese	d) Measured on A. A.
e) Potassium	e) Measured on A. A.
f) Sodium	f) Measured on A. A.

* All methods are from Standard Methods[23-26] unless indicated.

TABLE 16 (Contd)

Measurement	Method
Nitrogen	
a) Ammonia	a) Direct Nesslerization method, automated Phenate method[27] or measured with an Orion Ammonia electrode
b) Kjeldahl	b) Kjeldahl method or measured with a Technicon Auto Analyzer II
c) Nitrate	c) Phenoldesulphonic acid method, Cadmium Reduction Auto Analyzer[27] and Spectrophotometric Brucine method
d) Nitrite	d) Diazotization method, and Diazotization using Auto Analyzer[27]
Oxygen	
a) Biological Oxygen Demand	a) 5-day B.O.D. Test
b) Chemical Oxygen Demand	b) Microdichromate Reflux Method[28]
c) Dissolved Oxygen	c) Azide modification of the Winkler test
pH	La Motte Co., Baltimore, Maryland pH Kit or Orion 401 pH Meter
Phosphate	
a) Total	a) Persulfate digestion/Ascorbic acid method
b) Ortho	b) Colorimeteric Stannous Chloride method, Ascorbic Acid method, and Auto Analyzer (Ascorbic Acid) Method[27]
Silica	Colorimeters silicomolybdate method (intermediate range) and Auto Analyzer (Molybdate - Reactive Silica)
Solids (Residue)	
a) Total	a) Filtration/gravimetric method
b) Dissolved	b) Filtration/gravimetric method
c) Fixed	c) Filtration/gravimetric method
d) Suspended	d) Filtration/gravimetric method
e) Volatile	e) Filtration/gravimetric method
Sulfate	Turbidimetric method
Temperature	Field measurement using mercury-filled glass thermometer
Transparency	Black and white Secchi disc
Turbidity	Jackson Candle method, photometric measurement at 420 µm using standard suspendion from Harleco Co., Philadelphia Pennsylvania, or Hach 2100 Turbidimeter, Standardized with formazin suspension

protozoa, and fish. A summary of these data averaged for each station by survey number, are presented in Appendix B.1.

Algae were sampled from shallow and deep water, logs and twigs, stones, moss and rootlets, soft mud, and any other substrate present inside the station boundaries. All samples were placed in 17 ml vials or small jars and examined in the laboratory to separate nonliving material from the sample. The samples were preserved with formalin, ethanol or Transeau's Fixative (6 parts water: 3 parts 95% ethanol: 1 part formalin). Diatoms were cleared and washed prior to examination. All organisms were identified to species or taxa. Diatom taxa represented by fewer than six specimens were not considered to be established in the samples, and were excluded from the species lists.

Diatoms were also collected from glass slide substrates that had been suspended for two weeks at Stations 1, 6, and AB using Catherwood Diatometers.[29] The diatometers were placed near the right and left banks at each station, and collections were made biweekly by Savannah River Plant personnel. The colonized slides were mailed to the Academy for processing and quantitative species identifications. Complete quantitative counts were made quarterly on representative slides from the biweekly samples. The diatom data in the Savannah River Laboratory data base are segregated into Diatom data (from quarterly quantitatives counts) and Diatom Taxonomy Data (from qualitative major river surveys).

Protozoa were collected using an aspirator bottle or a plastic tube connected to a rubber bulb. Approximately 15 to 20 half-pint jars were collected at each station. Samples were kept in an insulated container or wet bag, and were transported to the laboratory within one hour to avoid loss of sensitive species. At the laboratory the samples were placed near a light source and allowed to settle. Subsamples were taken from the miniscus and surface of the sediments near and away from the light source. Species were identified with the aid of conventional stains or by using a Phase Contrast microscope, which eliminated the necessity of stains. Only species represented by 6 or more specimens per slide, or species identified in 3 out of 4 subsamples were considered to be established and were included in the species lists.

Macroinvertebrates were collected from a variety of habitats, including sand bars, clay banks, mud flats, stone revetments, tributary mouths, pilings, floating debris and snags. Slow moving and sedentary forms were collected by hand, while other forms were collected using dip nets, dredges, mesh screens and bottom scrapers (Needham Scraper). Some specimens were placed directly in vials with alcohol or formalin. Substrate and plant materials were taken to the laboratory for sorting under a dissecting microscope.

Insects were placed in vials containing 50 percent alcohol, then transferred to 70 percent alcohol for storage. Tendipedid larvae were mounted directly on microscope slides. Arthropods, annelids and poriferans were preserved in 70 percent alcohol. All other macroinvertebrates were collected alive, then narcotized to prevent excessive contraction in death, before being fixed and preserved in alcohol.

Fish were collected by a number of methods. Initially, seines were used in backwater areas, along with hoop nets, gill nets, wire traps and hook and line fishing techniques. After 1952, rotenone was also used for collecting fish. Potassium permanganate was applied after the collections were made to detoxify the rotenone and to restrict its effects to the desired area. Fish were preserved with 10 percent formalin and transferred to 40 percent isopropyl alcohol for storage.

CHAPTER VIII. SCOPE OF THE SAVANNAH RIVER LABORATORY DATA BASE

The Savannah River Laboratory version of the 25-year data base is stored on IBM 370/VS direct access devices, using local FORTRAN/VSAM interface routines. It is expected, therefore, that parties interested in analyzing these data will require the assistance of Savannah River Laboratory Computer Science personnel in retrieving and reformatting selected data items. This chapter will describe the content of the data base. Appendix A alphabetically lists the taxa for which data are available. Appendix B gives an overview of the Savannah River Survey results in conveniently available formats.

There are four major data sets in the data base:

1) A taxonomic nomenclature coding structure;
2) Presence/absence data, organized by
   - Each Station and Date for all Taxa
   - Each Taxon for all Stations and Dates;
3) Diatometer Taxa frequency counts, organized by
   - Each Station and Date for all Taxa
   - Each Taxon for all Stations and Dates;
4) Water Quality physical and chemical species concentrations, organized by
   - Each Station and Date for all species
   - Each species for all Stations and Dates.

Each of these data sets are described in the following subsections.

A. Savannah River Taxonomy

The Savannah River taxonomic coding structure uses three distinct labels for each item of nomenclature:

1) An Accession Number identifies each specific class of organism. This unique number is never changed, and is treated in all computer programs as a surrogate for the organism's taxonomic identity. The Accession Number is maintained as a non-reuseable JSS Key Access Number (KAN).

2) Each Accession Number (KAN) is correlated to appropriate biological taxonomic nomenclature from the Savannah River data. This is the data portion of the KAN record in the Taxonomic Data Set.

3) Taxonomic data are placed into a classification hierarchy from Phylum to Forma, comprised of 18 possible levels (Table 17).

The Key portion of the JSS taxonomic data set is comprised of the 18 hierarchical levels concatenated into a 72 byte Key. Unused levels, and levels below the one being defined, are zero filled. The Key field values may be changed to alter the natural presentation order of taxonomy, but such changes do not alter the assigned KAN. For example, the organism "Alasmidonta arcula (Lea)" with the following taxonomy:

Phylum	Mollusca
Class	Bivalvia
Subclass	Paleoheterodonta
Order	Unionoida
Superfamily	Unionacea
Family	Unionidae
Subfamily	Anodontinae

might be represented by a Key of:

```
phy. subp cls. subc ord. subo grp. ser. supf fam. subf
0140 0000 0200 0100 0100 0000 0000 0000 0100 0100 0100
trb. grp. gen. subg spc. subs frm. (not used)
0000 0000 0100 0000 0010 0000 0000 0000 0000
```

where numeric codes have been recorded in corresponding hierarchical positions.

In short, the Accession Number creates a computer identity for each organism in the Savannah River. As we alter the taxonomic

TABLE 17

Taxonomic Hierarchy used for the Classification of the Savannah River Biological Data

Taxonomic Level	Key Positions
Phylum/Division	1-4
Subphylum/Subdivision	5-8
Class	9-12
Subclass	13-16
Order	17-20
Ssborder	21-24
Group	25-28
Series	29-32
Superfamily	33-36
Family	37-40
Subfamily	41-44
Tribe	45-48
Group	49-52
Genus	53-56
Subgenus	57-60
Species	61-64
Subspecies/Variety	65-68
Forma	69-72

cross references for the computer's Accession Numbers, the printed names for organisms may change; however, their computer identity will not. This system allows the taxonomic nomenclature to be updated when future changes or revisions are necessary to maintain a current and accurate taxonomy. A listing of the taxonomic accession numbers is included in Appendix A. Whenever possible, the accession number should be used when requesting data for a particular organism or group of organisms.

The taxonomic data may be formatted in a variety of ways. A complete listing of the organisms identified from the Savannah River during the entire survey period is extensive. This lengthy list may be condensed into similar orders, classes or phyla, for easier interpretation. One example of such a condensation is presented in Appendix B.1. Here the data are grouped into major biological subsets, and graphed by station to show the total number of species identified for each survey.

B. Presence/Absence Data

The Presence/Absence data are binary values associated with each accession number, at each of up to four stations, at each of the 16 survey dates. An example of one possible Presence/Absence data format is given in Appendix B.2.

The surveys and stations for which data are available are as follows:

1951:	spring	1,3,5,6	1968:	spring	1,3,5,6
	fall	1,3,5,6		fall	1,3,5,6
1952:	spring	1,3,5,6	1972:	spring	1,3,5,6
	fall	1,3,5,6		fall	1,3,5,6
1954:	fall	1, 6	1976:	fall	1,3,5,6
1955:	fall	1,3,5,6			
1956:	spring	1,3,5,6			
1960:	spring	1,3,5,6			
	fall	1,3,5,6			
1965:	spring	1,3,5,6			
	fall	1,3,5,6			

C. Diatometer Data

The Diatometer data are recorded as counted frequency values associated with each accession number, at each of up to four stations, for each of four seasons, in each of the 24 study years. These data are different from the diatom taxonomy data, which include only species listings. The diatometer data may be formatted in a number of different ways. One example is presented in Appendix B.3.

The studies and diatometer numbers* for which data are available are as follows:

1953:	fall	2,4						
1954:	winter	2,4	1962:	winter	2,4,8	1970:	winter	2,4,8
	spring	2,3		spring	2,4,8		spring	2,4,8
	summer	1,3		summer	2,4,8		summer	2,4,8
	fall	2,3		fall	2,4,8		fall	2,4,8
1955:	winter	2,3	1963:	winter	2,4,8	1971:	winter	2,4,8
	spring	1,3		spring	2,4,8		spring	2,4,8
	summer	2,3		summer	2,4,8		summer	2,4,8
	fall	2,4		fall	2,4,8		fall	2,4,8
1955:	winter	2,3	1963:	winter	2,4,8	1971:	winter	2,4,8
	spring	1,3		spring	2,4,8		spring	2,4,8
	summer	2,3		summer	2,4,8		summer	2,4,8
	fall	2,4		fall	2,4,8		fall	2,4,8
1956:	winter	2,4	1964:	winter	1,4,8	1972:	winter	2,4,8
	spring	2,4		spring	2,4,8		spring	2,4,8
	summer	2,4		summer	2,4,8		summer	2,4,8
	fall	2,4		fall	2,4,8		fall	2,3,8
1957:	winter	2,4	1965:	winter	2,4,9	1973:	winter	2,4,8
	spring	1,4		spring	2,4,9		spring	2,4,9
	summer	2,4		summer	2,4,8		summer	2,4,8
	fall	1,4		fall	2,4,8		fall	2,4,8
1958:	winter	2,4	1966:	winter	2,4,8	1974:	winter	2,4,8
	spring	1,4		spring	1,4,8		spring	2,4,9
	summer	2,4		summer	2,4,8		summer	2,4,8
	fall	2,4		fall	2,4,8		fall	2,4,8
1959:	winter	2,4,8	1967:	winter	2,4,8	1975:	winter	2,4,8
	spring	2,4,8		spring	2,4,9		spring	2,4,8
	summer	2,3,8		summer	2,4,8		summer	2,4,8
	fall	2,4,8		fall	2,4,8		fall	2,4,8
1960:	winter	2,3,8	1968:	winter	2,4,9	1976:	winter	2,4,8
	spring	2,4,8		spring	2,4,9		spring	2,4,8
	summer	2,4,8		summer	2,4,8		summer	2,4,8
	fall	1,4,8		fall	2,4,8		fall	2,4,8
1961	winter	2,4,8	1969:	winter	2,4,8			
	spring	1,4,8		spring	2,4,8			
	summer	2,4,8		summer	2,4,8			
	fall	2,4,8		fall	2,4,8			

* Two diatometers were placed at each station:

Station 1: Diatometer 1 near the left bank
Diatometer 2 near the right bank

Station 6: Diatometer 3 near the left bank
Diatometer 4 near the right bank

Station AB: Diatometer 8 near the left bank
Diatometer 9 near the right bank

D. Chemical Data

The chemical data are real values of the concentration of the following suite of water-quality parameters:

	(abbreviation)
Alkalinity, Methyl Orange (mg/L as $CaCO_3$)	ALKAMO
Alkalinity, Phenylthphlein (mg/L as $CaCO_3$)	ALKALP
Alkalinity, Carbonate (mg/L)	CO3
Alkalinity, Bicarbonate (mg/L)	HCO3
Bacteria, Coliform Count (col/100 mL)	COLCTN
Bacteria, MPN (cell/100 mL)	MPNCTN
Bacteria, Plate Count (col/mL)	PLACTN
Bacteria, Total Count (col/mL)	TOTCTN
Bacteria, Viable Count (col/mL)	VIACTN
Carbon Dioxide (mg/L)	CO2
Dissolved Oxygen (mg/L)	DO
Chloride (mg/L)	CL
Specific Conductivity (µmho at 25°C)	SPCOND
Hardness, Total (mg/L as $CaCO_3$)	HARD
Hardness, Ca (mg/L as $CaCO_3$)	CACO3
Hardness, Mg (mg/L as $CaCO_3$)	MGCO3
Calcium (mg/L)	CA
Iron (mg/L)	FE
Magnesium (mg/L)	MG
Manganese (mg/L)	MN
Potassium (mg/L)	K
Sodium (mg/L)	NA
Ammonia (mg/L)	NH3-N
Total Kjeldahl Nitrogen (mg/L)	TKN
Nitrate (mg/L)	NO3-N
Nitrite (mg/L)	NO2-N
Biological Oxygen Demand (mg/L)	BOD
Chemical Oxygen Demand (mg/L)	COD
Total Phosphorus (mg/L)	TOTP
Ortho-Phosphorus (mg/L)	PO4-P
Silica (mg/L)	SIO2
Total Solids (mg/L)	TS
Total Dissolved Solids (mg/L)	TDS
Fixed Solids (mg/L)	FIXR
Suspended Solids (mg/L)	SS
Volatile Solids (mg/L)	VS
pH	PH
Temperature (°C)	TEMP
Sulfate (mg/L)	SO4
Transparency (in.)	CLEAR
Turbidity (mg/L)	TURB

The data are available at up to each of four stations in each of the 16 survey years. Examples of Chemical data are presented in Appendix B.4. These examples indicate two ways the data may be formatted.

The studies and stations for which data are available are as follows:

1951:	spring	1,3,5,6
	fall	1,3,5,6
1952:	spring	1,3,5,6
	fall	1,3,5,6
1955:	fall	1,3,5,6
1956:	spring	1,3,5,6
1960:	spring	1,3,5,6
	fall	1,3,5,6
1965:	spring	1,3,5,6
	fall	1,3,5,6
1968:	spring	1,3,5,6
	fall	1,3,5,6
1972:	spring	1,3,5,6
	fall	1,3,5,6
1976:	fall	1,3,5,6

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Appendix A. Savannah River Taxonomic Accession List

A.1 Algae*

A.2 Fishes

A.3 Macro-invertebrates*

A.4 Protozoa

A.5 Unidentified Taxa

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* Synonyms are included at the ends of these subgroups.

APPENDIX A. SAVANNAH RIVER TAXONOMIC ACCESSION LIST

1. ALGAE

NOMENCLATURE	ACCESSION NO.
DIVISION:	
Bacillariophyta	3087
Chlorophyta	3000
Chromophyta	3079
Cyanophyta	3158
Rhodophyta	3204
CLASS:	
Bacillariophyceae	3088
Charophyceae	3074
Cyanophyceae	3159
Euchlorophyceae	3001
Rhodophyceae	3205
Ulothricophyceae	3025
Xanthophyceae	3080
Zygophyceae	3055
ORDER:	
Achnanthales	3118
Acrochaetiales	3211
Bacillariales	3149
Biddulphiales	3096
Chaetophorales	3026
Chamaesiphonales	3161
Charales	3075
Chlorococcales	3002
Chroococcales	3166
Compsopogonales	3207
Epithemiales	3144
Eunotiales	3113
Eupodiscales	3089
Fragilariales	3103
Naviculales	3123
Nemalionales	3216
Nostocales	3176
Oedogoniales	3033
Siphonocladales	3036
Stigonematales	3199

APPENDIX A. SAVANNAH RIVER TAXONOMIC ACCESSION LIST

1. ALGAE

NOMENCLATURE	ACCESSION NO.
ORDER:	
Surirellales	3154
Tetrasporales	3021
Tribonematales	3084
Ulotrichales	3043
Ulvales	3052
Vaucheriales	3081
Zygnematales	3056
FAMILY:	
Achnanthaceae	3119
Acrochaetiaceae	3212
Anaulaceae	3097
Audouinellaceae	3214
Bactrachospermaceae	3217
Biddulphiaceae	3099
Chaetophoraceae	3027
Chamaesiphonaceae	3162
Characeae	3076
Chroococcaceae	3167
Cladophoraceae	3037
Clastidiaceae	3164
Coccomyxaceae	3003
Compsopogonaceae	3208
Coscinodiscaceae	3090
Cylindrocapsaceae	3044
Cymbellaceae	3136
Desmidiaceae	3057
Entomoneidaceae	3142
Entophysalidaceae	3173
Epithemiaceae	3145
Eunotiaceae	3114
Fragilariaceae	3104
Gomphonemaceae	3139
Hydrodictyaceae	3006
Lemaneaceae	3219
Mesotaeniaceae	3065
Microsporaceae	3046
Naviculaceae	3124

APPENDIX A. SAVANNAH RIVER TAXONOMIC ACCESSION LIST

1. ALGAE

NOMENCLATURE	ACCESSION NO.
FAMILY:	
Nitzschiaceae	3150
Nostocaceae	3177
Oedogoniaceae	3034
Oocystaceae	3008
Oscillatoriaceae	3181
Palmellaceae	3014
Rivulariaceae	3190
Scenedesmaceae	3018
Schizomeridaceae	3053
Scytonemataceae	3194
Stigonemataceae	3200
Surirellaceae	3155
Tetrasporaceae	3022
Thalassiosiraceae	3094
Tribonemataceae	3085
Ulotrichaceae	3048
Vaucheriaceae	3082
Zygnemataceae	3070
GENUS & SPECIES:	
Achnanthes affinis Grun.	269
Achnanthes austriaca v. helvetica Hust.	237
Achnanthes biporoma Hohn & Hell.	238
Achnanthes clevei v. rostrata Hust.	240
Achnanthes clevei Grun.	239
Achnanthes decipiens Reim.	241
Achnanthes deflexa Reim.	242
Achnanthes detha Hohn & Hell.	243
Achnanthes exigua v. heterovalva Krasske	245
Achnanthes exigua Grun.	244
Achnanthes flexella (Kutz.) Brun	246
Achnanthes harveyi Reim.	247
Achnanthes hauckiana Grun.	248
Achnanthes hungarica (Grun.) Grun.	249
Achnanthes inflata (Kutz.) Grun.	250
Achnanthes lanceolata (Breb.) Grun.	251
Achnanthes lanceolata v. abbreviata Reim.	252
Achnanthes lanceolata v. apiculata Patr.	253

APPENDIX A. SAVANNAH RIVER TAXONOMIC ACCESSION LIST

1. ALGAE

NOMENCLATURE	ACCESSION NO.
GENUS & SPECIES:	
Achnanthes lanceolata v. dubia Grun.	254
Achnanthes lanceolata v. omissa Reim.	255
Achnanthes lapidosa Krasske	270
Achnanthes lapponica v. ninckei (Guerm. & Mang.) Reim.	272
Achnanthes laterostrata Hust.	256
Achnanthes linearis (W. Sm.) Grun.	257
Achnanthes marginulata Grun.	273
Achnanthes microcephla (Kutz.) Grun.	275
Achnanthes minutissima Kutz.	258
Achnanthes monela Hohn & Hell.	259
Achnanthes nodosa Cl.	260
Achnanthes peragalli v. fossilis Temp. & Perag.	263
Achnanthes peragalli v. parvula (Patr.) Reim.	262
Achnanthes peragalli Brun & Herib.	261
Achnanthes pinnata Hust.	264
Achnanthes sp. 1	274
Achnanthes stewartii Patr.	265
Achnanthes subhudsonis v. kraeuselli Choln.	267
Achnanthes trinodes (W. Sm.) Grun.	268
Actinella punctata Lewis	200
Amphipleura pellucida Kutz.	285
Amphithrix janthina (Mont.) B. & F.	801
Amphora birugula Hohn	560
Amphora normanii Rabh.	561
Amphora ovalis (Kutz.) Kutz.	562
Amphora ovalis v. pediculus (Kutz.) V. H. ex DeT.	563
Amphora perpusilla (Grun.) Grun.	564
Amphora submontana Hust.	565
Amphora veneta Kutz.	566
Anabaina (=Anabaena) circinalis Rabh.	739
Anabaina (=Anabaena) licheniformis Bory	740
Anabaina (=Anabaena) oscillariodes Bory	741
Anabaina (=Anabaena) sp.	743
Anabaina (=Anabaena) variabilis Kutz.	742
Anacystis cyanea (Kutz.) Dr. & Daily	728
Anacystis montana (Lightf.) Dr. & Daily	729
Anacystis montana f. minor (Walle) Dr. & Daily	730
Ankistrodesmus falcatus (Corda) Ralfs	8
Anomoeoneis serians (Breb. ex Kutz.) Cl.	286

APPENDIX A. SAVANNAH RIVER TAXONOMIC ACCESSION LIST

1. ALGAE

NOMENCLATURE	ACCESSION NO.
GENUS & SPECIES:	
Anomoeoneis serians v. brachysira (Breb. ex Kutz.) Hust.	287
Anomoeoneis vitrea (Grun.) Ross	288
Aphanocapsa sp.	731
Aphanochaete repens A. Braun	33
Asterionella formosa Hass.	145
Asterionella ralfsii v. americana Koerner	147
Audouinella violacea (Kutz.) Hamel	819
Bacillaria paradoxa Gmel.	633
Bactrachospermum ectocarpum ? Sird.	821
Bactrachospermum moniliforme Roth	820
Bactrachospermum spp.	822
Basicladia chelonum (Coll.) Hoff. & Tild.	47
Biddulphia laevis Ehr.	143
Caloneis alpestris (Grun.) Cl.	289
Caloneis bacillum (Grun.) Cl.	290
Caloneis hyalina Hust.	291
Caloneis lewisii v. inflata (Schultze) Patr.	293
Caloneis lewisii Patr.	292
Caloneis limosa (Kutz.) Patr.	294
Caloneis schroderi Hust.	295
Caloneis ventricosa (Ehr.) Meist.	296
Caloneis ventricosa v. alpina (Cl.) Patr.	297
Caloneis ventricosa v. truncatula (Grun.) Meist.	298
Calothrix juliana (Menegh.) B. & F.	802
Calothrix parietana (Nag.) Thur.	803
Calothrix sp.	804
Capartogramma crucicula (Grun. ex Cl.) Ross	299
Chaetomorpha sp.	48
Chaetophora attenuata Hazen	34
Chaetophora elegans (Roth) Ag.	35
Chaetophora incrassata (Huds.) Hazen	36
Chaetophora pisiformis (Roth) Ag.	37
Chaetophora sp.	38
Chamaesiphon incrustans Grun.	726
Chara sp.	117
Chroococcus sp.	732
Cladophora glomerata (L.) Kutz.	49
Closterium acerosum (Schrank) Ehr.	68
Closterium leibleinii Kutz.	69

APPENDIX A. SAVANNAH RIVER TAXONOMIC ACCESSION LIST

1. ALGAE

NOMENCLATURE	ACCESSION NO.
GENUS & SPECIES:	
Closterium libellula v. interruptum (West & West) Donat	70
Closterium lunula (Mull.) Nitz.	71
Closterium moniliferum (Bory) Ehr.	72
Closterium parvulum Naeg.	73
Closterium sp.	76
Closterium tumidum Johns.	74
Closterium venus Kutz.	75
Cocconeis diminuta Pant.	276
Cocconeis disculus (Schum.) Cl.	283
Cocconeis fluviatilis Wall.	277
Cocconeis pediculus Ehr.	282
Cocconeis placentula v. euglypta (Ehr.) Cl.	279
Cocconeis placentula v. lineata (Ehr.) V. H.	280
Cocconeis placentula Ehr.	278
Cocconeis thumensis A. May.	281
Coelastrum cambricum Arch.	16
Coelastrum microsporum Naeg.	17
Compsopogon coeruleus (Balb.) Mont.	817
Cosmarium granatum Breb.	77
Cosmarium laeve Rabh.	78
Cosmarium polygonum (Naeg.) Arch.	79
Cosmarium pseudoconnatum Nordst.	80
Cosmarium punctulatum v. subpunctulatum (Nordst.) Borg.	81
Cosmarium pygmaeum Arch.	82
Cosmarium pyramidatum Breb.	83
Cosmarium quadratum Ralfs	84
Cosmarium regnellii Wille	85
Cosmarium sexangulare f. minima Nordst.	86
Cosmarium sp.	91
Cosmarium subcrenatum Hantz.	87
Cosmarium subprotumidum Nordst.	88
Cosmarium subspeciosum Nordst.	89
Cosmarium turpinii Breb.	90
Cyclotella atomus Hust.	121
Cyclotella comta (Ehr.) Kutz.	122
Cyclotella meneghiniana Kutz.	123
Cyclotella pseudostelligera Hust.	124
Cyclotella stelligera Cl. & Grun.	125
Cyclotella striata (Kutz.) Grun.	126

APPENDIX A. SAVANNAH RIVER TAXONOMIC ACCESSION LIST

1. ALGAE

NOMENCLATURE	ACCESSION NO.
GENUS & SPECIES:	
Cylindrocapsa conferta West	52
Cylindrocystis brebissonii Menegh.	104
Cylindrocystis sp.	105
Cylindrospermum catenatum Ralfs	744
Cylindrospermum licheniforme (Bory) Kutz.	745
Cylindrospermum majus Kutz.	746
Cylindrospermum musicola Kutz.	747
Cylindrospermum sp.	748
Cymbella affinis Kutz.	567
Cymbella aspera (Ehr.) H. Per.	568
Cymbella cuspidata Kutz.	581
Cymbella delicatula Kutz.	569
Cymbella erdmannensis Foged	580
Cymbella hybrida Grun. ex. Cl.	570
Cymbella lunata W. Sm.	571
Cymbella mexicana (Ehr.) Cl.	582
Cymbella microcephala Grun.	572
Cymbella minuta v. pseudogracilis (Choln.) Reim.	574
Cymbella minuta v. silesiaca (Bleisch ex Rabh.) Reim.	575
Cymbella minuta Hilse ex Rabh.	573
Cymbella naviculiformis Auersw. ex Heib.	576
Cymbella prostrata v. auerswaldii (Rabh.) Reim.	584
Cymbella sinuata Greg.	577
Cymbella triangulum (Ehr.) Cl.	578
Cymbella tumida (Breb. ex Kutz.) V. H.	579
Denticula elegans Kutz.	620
Denticula tenuis Kutz.	621
Desmidium grevillii (Kutz.) DeBary	92
Desmidium swartzii Ag.	93
Desmococcus viridis (Ag.) Brand	39
Desmogonium rabenhorstianum v. elongatum Patr.	235
Diatoma anceps (Ehr.) Kirchn.	148
Diatoma hiemale (Roth) Heib.	151
Diatoma hiemale v. mesodon (Ehr.) Grun.	152
Diatoma vulgare v. elongatum Lyngb.	150
Diatoma vulgare Bory	149
Dichothrix sp.	805
Dictyosphaerium pulchellum Wood	9
Diploneis elliptica (Kutz.) Cl.	300

APPENDIX A. SAVANNAH RIVER TAXONOMIC ACCESSION LIST

1. ALGAE

NOMENCLATURE	ACCESSION NO.
GENUS & SPECIES:	
Diploneis oblongella (Naeg. ex Kutz.) Ross	301
Diploneis oculata (Breb.) Cl.	302
Diploneis ostracodarum (Pant.) Jur.	306
Diploneis pseudovalis Hust.	303
Diploneis puella (Schum.) Cl.	304
Diploneis smithii (Breb. ex W. Sm.) Cl.	305
Dispora crucigenioides Prin.	1
Draparnaldia plumosa (Vauch.) Ag.	40
Entomoneis alata (Ehr.) Ehr.	618
Entomoneis ornata (J. W. Bail.) Reim.	619
Entophysalis brebissonii (Menegh.) Dr. & Daily	736
Entophysalis lemaniae (Ag.) Dr. & Daily	737
Entophysalis rivularis (Kutz.) Dr.	738
Epithemia adnata (Kutz.) Breb.	622
Epithemia adnata v. porcellus (Kutz.) Patr.	623
Epithemia adnata v. saxonica (Kutz.) Patr.	624
Epithemia argus (Ehr.) Kutz.	625
Epithemia argus v. alpestris Grun.	627
Epithemia argus v. longicornis (Ehr.) Grun.	626
Epithemia muelleri Fricke	628
Epithemia sorex Kutz.	629
Epithemia turgida (Ehr.) Kutz.	630
Euastrum insulare (Wittr.) Roy	94
Eunotia bidentula W. Sm.	230
Eunotia carolina Patr.	201
Eunotia curvata (Kutz.) Lagerst.	202
Eunotia diodon Ehr.	203
Eunotia exigua (Breb. ex Kutz.) Rabh.	204
Eunotia flexuosa v. eurycephala Grun.	206
Eunotia flexuosa Breb. ex Kutz.	205
Eunotia formica Ehr.	207
Eunotia incisa W. Sm. ex Greg.	208
Eunotia maior (W. Sm.) Rabh.	209
Eunotia meisteri Hust.	210
Eunotia microcephala Krasske ex Hust.	232
Eunotia monodon v. constricta Cl.-Eul.	212
Eunotia monodon Ehr.	211
Eunotia naegelii Migula	213
Eunotia pectinalis (O. F. Mull.?) Rabh.	214

APPENDIX A. SAVANNAH RIVER TAXONOMIC ACCESSION LIST

1. ALGAE

NOMENCLATURE	ACCESSION NO.
GENUS & SPECIES:	
Eunotia pectinalis v. minor (Kutz.) Rabh.	215
Eunotia pectinalis v. undulata (Ralfs) Rabh.	216
Eunotia perpusilla Grun.	217
Eunotia praerupta v. bidens (Ehr.) Grun.	219
Eunotia praerupta Ehr.	218
Eunotia quaternaria Ehr.	220
Eunotia rabenhorstii v. monodon Grun.	222
Eunotia serra v. diadema (Ehr.) Patr.	224
Eunotia sudetica O. Mull.	233
Eunotia suecica A.Cl.	231
Eunotia tautoniensis Hust. ex Patr.	229
Eunotia tenella (Grun.) Cl.	225
Eunotia vanheurckii v. intermedia (Krasske ex Hust.) Patr.	227
Eunotia vanheurckii Patr.	226
Eunotia zasuminensis (Cabej.) Korn	228
Fragilaria bicapitata A. Mayer	171
Fragilaria brevistriata Grun.	153
Fragilaria capucina v. mesolepta Rabh.	155
Fragilaria constricta f. stricta (A. Cl.) Hust.	157
Fragilaria construens (Ehr.) Grun.	158
Fragilaria construens v. binodis (Ehr.) Grun.	161
Fragilaria construens v. pumila Grun.	159
Fragilaria construens v. subsalina Hust.	160
Fragilaria construens v. venter (Ehr.) Grun.	162
Fragilaria crotonensis Kitton	163
Fragilaria lapponica Grun.	164
Fragilaria leptostauron (Ehr.) Hust.	165
Fragilaria pinnata v. lancettula (Schum.) Hust.	167
Fragilaria pinnata v. subcapitata Freng.	168
Fragilaria pinnata Ehr.	166
Fragilaria spinosa Skv.	169
Fragilaria strangulata (Zanon) Hust.	172
Fragilaria vaucheriae (Kutz.) Peters.	170
Fragilaria virescens Ralfs	173
Frustulia rhomboides (Ehr.) DeT.	307
Frustulia rhomboides v. amphipleuroides (Grun.) Cl.	308
Frustulia rhomboides v. crassinervia (Breb. ex W. Sm.) Ross	309
Frustulia vulgaris (Thwaites) DeT.	310
Frustulia vulgaris v. muscosa Skv.	311

APPENDIX A. SAVANNAH RIVER TAXONOMIC ACCESSION LIST

1. ALGAE

NOMENCLATURE	ACCESSION NO.
GENUS & SPECIES:	
Frustulia weinholdii Hust.	312
Gloeocystis vesiculosa Naeg.	13
Gomphoneis herculeana (Ehr.) Cl.	617
Gomphonema abbreviatum Ag.	585
Gomphonema acuminatum Ehr.	586
Gomphonema affine v. insigne (Greg.) Andrews	588
Gomphonema affine Kutz.	587
Gomphonema angustatum (Kutz.) Rabh.	589
Gomphonema angustatum v. intermedia Grun.	590
Gomphonema angustatum v. productum Grun.	591
Gomphonema apuncto J.Wallace	612
Gomphonema augur Ehr.	592
Gomphonema borealis v. minor Foged	594
Gomphonema brasiliense Grun.	595
Gomphonema carolinense Hagelst.	596
Gomphonema clevei Fricke	597
Gomphonema dichotomum Kutz.	598
Gomphonema gibba J. Wallace	615
Gomphonema gracile Ehr. emend. V. H.	599
Gomphonema grovei M. Schmidt	600
Gomphonema grunowii Patr.	601
Gomphonema intricatum Kutz.	602
Gomphonema manubrium Fricke	603
Gomphonema olivaceoides v. hutchinsoniana Patr.	614
Gomphonema olivaceum (Lyngb.) Kutz.	611
Gomphonema parvulum Kutz.	604
Gomphonema rhombicum Fricke	605
Gomphonema sparsistriata (O. Mull.) Engler	610
Gomphonema subclavatum (Grun.) Grun.	606
Gomphonema truncatum v. capitatum (Ehr.) Patr.	608
Gomphonema truncatum Ehr.	607
Gomphonema turris Ehr.	609
Gomphonema ventricosum Greg.	616
Gomphosphaeria wichurae (Hilse) Dr. & Daily	733
Gonatozygon pilosum Wolle	106
Gyrosigma acuminatum (Kutz.) Rabh.	313
Gyrosigma exilis (Grun.) Reim.	314
Gyrosigma nodiferum (Grun.) Reim.	315
Gyrosigma scalproides (Rabh.) Cl.	316

APPENDIX A. SAVANNAH RIVER TAXONOMIC ACCESSION LIST

1. ALGAE

NOMENCLATURE	ACCESSION NO.
GENUS & SPECIES:	
Gyrosigma spencerii (Quek.) Griff. & Henfr.	317
Hannaea arcus (Ehr.) Patr.	174
Hantzschia amphioxys Grun.	634
Hantzschia virgata (Roper) Grun.	635
Hapalosiphon fontinalis (Ag.) Born.	814
Hyalotheca dissiliens (J.E.Sm.) Breb.	96
Hyalotheca mucosa (Dillw.) Ehr.	95
Hydrosira triquetra Wall.	144
Kirchneriella contorta (Schmidle) Bohlin	10
Lyngbya aerugineo-caerulea (Kutz.) Gom.	754
Lyngbya aestuarii (Mert.) Liebmann	755
Lyngbya bicolor Wood	756
Lyngbya contorta Lemm.	757
Lyngbya epiphytica Hieronymus	758
Lyngbya putealis Mont. ex Gom.	759
Lyngbya spp.	761
Lyngbya versicolor (Wartm.) Gom.	760
Melosira distans v. alpigena Grun.	128
Melosira granulata (Ehr.) Ralfs	129
Melosira granulata v. angustissima Mull.	130
Melosira italica (Ehr.) Kutz.	131
Melosira italica v. multistriata Patr.	132
Melosira italica v. tenuissima (Grun.)Mull.	133
Melosira roeseana Rabh.	134
Melosira tenella Nyg.	135
Melosira undulata (Ehr.) Kutz.	136
Melosira varians Ag.	137
Meridion circulare (Grev.) Ag.	175
Meridion circulare v. constricta (Ralfs) V. H.	176
Merismopedia tenuissima Lemm.	734
Merismopedia tranquilla (Ehr.) Trevis.	735
Mesotaenium chlamydosporum DeBary	107
Mesotaenium degreyii v. breve West	108
Mesotaenium macrococcum ? (Kutz.)	109
Microcoleus chthonoplastes (Mert.) Zanard	762
Microcoleus irriguus (Kutz.) Dr.	763
Microcoleus lyngbyaceus Kutz.	764
Microcoleus paludosus (Kutz.) Gom.	765
Microcoleus vaginatus (Vauch.) Gom.	766

APPENDIX A. SAVANNAH RIVER TAXONOMIC ACCESSION LIST

1. ALGAE

NOMENCLATURE	ACCESSION NO.
GENUS & SPECIES:	
Microspora loefgrenii (Nordst.) Lag.	53
Microspora pachyderma (Wille) Lag.	54
Microspora quadrata Hazen	55
Microspora sp.	60
Microspora sp. nr. tumidula Hazen	59
Microspora stagnorum (Kutz.) Lag.	56
Microspora tumidula Hazen	57
Microspora wittrockii (Wille) Lag.	58
Mougeotia spp.	114
Nannochloris bacillaris Naum.	2
Navicula accomoda Hust.	318
Navicula adversa Krasske	319
Navicula aikenensis Patr.	320
Navicula americana Ehr.	321
Navicula anglica Ralfs	322
Navicula arvensis Hust.	323
Navicula atomus (Kutz.) Grun.	324
Navicula auriculata Hust.	325
Navicula bacillum Ehr.	326
Navicula bicephala Hust.	327
Navicula biconica Patr.	328
Navicula bryophila Peters.	463
Navicula canalis Patr.	479
Navicula canoris Hohn & Hell.	329
Navicula capitata v. hungarica (Grun.) Ross	331
Navicula capitata Ehr.	330
Navicula carminata Hust.	332
Navicula caroliniana Patr.	333
Navicula cincta (Ehr.) Ralfs	334
Navicula cincta v. minuta Grun.	335
Navicula cincta v. rostrata Reim.	336
Navicula clementis Grun.	337
Navicula cocconeiformis Greg. ex Grev.	338
Navicula confervacea (Kutz.) Grun.	339
Navicula contenta v. biceps (Arn.) V. H.	341
Navicula contraria Patr.	342
Navicula convergens Patr.	343
Navicula creuzburgensis v. multistriata Patr.	345
Navicula creuzburgensis Krasske	344

APPENDIX A. SAVANNAH RIVER TAXONOMIC ACCESSION LIST

1. ALGAE

NOMENCLATURE	ACCESSION NO.
GENUS & SPECIES:	
Navicula cryptocephala v. exilis (Kutz.) Grun.	347
Navicula cryptocephala v. veneta (Kutz.) Rabh.	348
Navicula cryptocephala Kutz.	346
Navicula cuspidata (Kutz.) Kutz.	349
Navicula decussis (Ehr.) Kutz.	350
Navicula digna Hust.	464
Navicula disputans Patr.	351
Navicula duomedia Patr.	474
Navicula dystrophica Patr.	352
Navicula elginensis (Greg.) Ralfs	353
Navicula elginensis v. neglecta (Krasske) Patr.	354
Navicula exigua v. capitata Patr.	356
Navicula exigua Greg. ex Grun.	355
Navicula farta Hust.	472
Navicula festiva Krasske	357
Navicula gastrum (Ehr.) Kutz.	358
Navicula genovefea Fusey	462
Navicula gibbosa Hust.	359
Navicula gibbula Cl.	458
Navicula gottlandica Grun.	465
Navicula graciloides A. May.	461
Navicula gregaria Donk.	475
Navicula grimmei Krasske	360
Navicula gysingensis Foged	361
Navicula halophila (Grun.) Cl.	362
Navicula halophila f. subcapitata Ostrup	364
Navicula halophila f. tenuirostris Hust.	363
Navicula halophilioides Hust.	476
Navicula hambergi Hust.	365
Navicula hassiaca Krasske	366
Navicula heufleri v. leptocephala Grun.	368
Navicula hustedtii Krasske	369
Navicula indifferens Hust.	370
Navicula ingenua Hust.	459
Navicula insociabilis Krasske	371
Navicula integra (W. Sm.) Ralfs	372
Navicula krasskei Hust.	373
Navicula kuripanensis Hust.	477
Navicula lacustris Greg.	374

APPENDIX A. SAVANNAH RIVER TAXONOMIC ACCESSION LIST

1. ALGAE

NOMENCLATURE	ACCESSION NO.
GENUS & SPECIES:	
Navicula laevissima Kutz.	375
Navicula lagerheimii Cl.	376
Navicula lagerstedtii Cl.	377
Navicula lanceolata (Ag.) Kutz.	378
Navicula lapidosa Krasske	379
Navicula latelongitudinalis Patr.	380
Navicula lateropunctata Wallace	381
Navicula laterostrata Hust.	382
Navicula longicephala Hust. nr.	457
Navicula luzonensis Hust.	383
Navicula mediocris v. intermedia Reim.	385
Navicula mediopunctata Hust.	473
Navicula menisculus Schum.	386
Navicula minima Grun.	387
Navicula minuscula Grun.	388
Navicula mobiliensis v. minor Patr.	390
Navicula mobiliensis Boyer	389
Navicula mournei Patr.	391
Navicula muralis Grun.	392
Navicula mutica f. gibbosa McCall	395
Navicula mutica v. cohnii (Hilse) Grun.	394
Navicula mutica v. nivalis (Ehr.) Hust.	396
Navicula mutica v. stigma Patr.	397
Navicula mutica v. tropica Hust.	398
Navicula mutica v. undulata (Hilse) Grun.	399
Navicula mutica Kutz.	393
Navicula muticoides Hust.	400
Navicula nr. canalis Patr.	480
Navicula obsidialis Hust.	466
Navicula ochridana Hust.	401
Navicula omissa Hust.	402
Navicula paratunkae Boy-Pet.	403
Navicula paucivisitata Patr.	404
Navicula pelliculosa (Breb. ex Kutz.) Hilse	405
Navicula perpusilla (Kutz.) Grun.	460
Navicula placenta Ehr.	406
Navicula placentula (Ehr.) Kutz.	407
Navicula poconoensis Patr.	467
Navicula pseudoreinhardtii Patr.	408

APPENDIX A. SAVANNAH RIVER TAXONOMIC ACCESSION LIST

1. ALGAE

NOMENCLATURE	ACCESSION NO.
GENUS & SPECIES:	
Navicula pseudoscutiformis Hust.	409
Navicula pupula v. capitata Skv. & Mey.	411
Navicula pupula v. elliptica Hust.	412
Navicula pupula v. mutata (Krasske) Hust.	413
Navicula pupula v. rectangularis (Greg.) Grun.	414
Navicula pupula Kutz.	410
Navicula pusilla W. Sm.	415
Navicula pygmaea Kutz.	416
Navicula radiosa v. parva Wall.	418
Navicula radiosa Kutz.	417
Navicula reimerites Patr. & Freese	419
Navicula rhynchocephala v. germainii (Wall.) Patr.	421
Navicula rhynchocephala Kutz.	420
Navicula salinarum v. intermedia (Grun.) Cl.	423
Navicula savannahiana Patr.	424
Navicula schonfeldii Hust.	425
Navicula schroeteri v. escambia Patr.	427
Navicula scutelloides W. Sm. ex Greg.	428
Navicula scutiformis Grun. ex A.S.	468
Navicula secura Patr.	469
Navicula seminoides Cl. & Grun.	431
Navicula seminuloides Hust.	432
Navicula seminulum v. intermedia Hust.	434
Navicula seminulum Grun.	433
Navicula simula Patr.	470
Navicula sp. 1	430
Navicula subadnata Hust.	471
Navicula subfasciata Patr.	435
Navicula subhalophila Hust.	436
Navicula subhamulata Grun.	437
Navicula submolesta Hust.	438
Navicula submuralis Hust.	439
Navicula subtilissima Cl.	440
Navicula symmetrica Patr.	441
Navicula taedia Wall.	478
Navicula tantula Hust.	442
Navicula tenelloides Hust.	443
Navicula tenera Hust.	444
Navicula thienemannii Hust.	445

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1. ALGAE

NOMENCLATURE	ACCESSION NO.
GENUS & SPECIES:	
Navicula tridentula Krasske	446
Navicula tripunctata (O. F. Mull.) Bory	447
Navicula tripunctata v. schizonemoides (V. H.) Patr.	448
Navicula tuscula Ehr.	449
Navicula variostriata Krasske	450
Navicula ventralis Krasske	451
Navicula viridula (Kutz.) Kutz. emend. V. H.	452
Navicula viridula v. argunensis Skv.	453
Navicula viridula v. linearis Hust.	454
Navicula viridula v. rostellata (Kutz.?) Cl.	455
Navicula wallacei Reim.	456
Neidium affine (Ehr.) Pfitz.	481
Neidium affine v. amphirhynchus (Ehr.) Cl.	482
Neidium affine v. humerus Reim.	483
Neidium affine v. longiceps (Greg.) Cl.	484
Neidium alpinum Hust.	485
Neidium apiculatum v. constrictum Reim.	487
Neidium apiculatum Reim.	486
Neidium bisulcatum (Lagerst.) Cl.	488
Neidium calvum Ost. (near)	501
Neidium dubium (Ehr.) Cl.	505
Neidium floridanum Reim.	489
Neidium gracile f. aequale Hust.	491
Neidium hankensis Skv.	492
Neidium hercynicum f. subrostratum Wall.	494
Neidium hercynicum A. May.	493
Neidium herrmannii Hust.	502
Neidium hitchcockii (Ehr.) Cl.	495
Neidium iridis (Ehr.) Cl.	496
Neidium iridis v. amphigomphus (Ehr.) A. Mayer	498
Neidium iridis v. ampliatum (Ehr.) Cl.	497
Neidium mirum v. 1	504
Neidium productum (W. Sm.) Cl.	499
Neidium tenuissimum Hust.	500
Netrium digitus (Ehr.) Itz. & Rothe	110
Netrium digitus v. parvum Borge	111
Netrium interruptum (Breb.) Lutkem.	112
Netrium oblongum (DeBary) Lutkem.	113
Nitella spp.	118

APPENDIX A. SAVANNAH RIVER TAXONOMIC ACCESSION LIST

1. ALGAE

NOMENCLATURE	ACCESSION NO.
GENUS & SPECIES:	
Nitzschia accomodata Hust.	636
Nitzschia acicularis W. Sm.	637
Nitzschia adamata Hust.	638
Nitzschia amphibia Grun.	639
Nitzschia apiculata (Greg.) Grun.	640
Nitzschia bacata Hust.	641
Nitzschia biacrula Hohn & Hell.	642
Nitzschia bulnheimiana v. capitata Reim.	702
Nitzschia capitellata (Hust.) Hust.	643
Nitzschia capitellata v. sibirica Skv.	644
Nitzschia circumsuta (Bail.) Grun.	645
Nitzschia clausii Hantz.	646
Nitzschia communis v. hyalina Lund	696
Nitzschia commutata Grun.	647
Nitzschia confinis Hust.	648
Nitzschia constricta v. subconstricta Grun.	650
Nitzschia denticula Grun.	651
Nitzschia diserta Hust.	652
Nitzschia dissipata (Kutz.) Grun.	653
Nitzschia dissipata v. media Hantz.	654
Nitzschia elliptica Hust.	698
Nitzschia filiformis (W. Sm.) Hust.	655
Nitzschia fonticola Grun.	656
Nitzschia frequens Hust.	657
Nitzschia frustulum v. perminuta Grun.	659
Nitzschia frustulum v. subsalina Hust.	660
Nitzschia frustulum Kutz.	658
Nitzschia gracilis Hantz.	661
Nitzschia hungarica Grun.	662
Nitzschia intermedia Hantz. ex Cl. & Grun.	663
Nitzschia kutzingiana Hilse	664
Nitzschia lanceolata W.Sm.	703
Nitzschia limicola Grun.	699
Nitzschia linearis v. tenuis (W. Sm.) Grun.	666
Nitzschia linearis W. Sm.	665
Nitzschia lorenziana v. subtilis Grun.	668
Nitzschia mediastalsis Hohn & Hell.	669
Nitzschia microcephala Grun.	670
Nitzschia obtusa v. scalpelliformis Grun.	705

APPENDIX A. SAVANNAH RIVER TAXONOMIC ACCESSION LIST

1. ALGAE

NOMENCLATURE	ACCESSION NO.
GENUS & SPECIES:	
Nitzschia palea (Kutz.) W. Sm.	671
Nitzschia parvula v. terricola Lund	673
Nitzschia parvula Lewis	672
Nitzschia perversa Grun. in Cl. & Grun.	674
Nitzschia pseudofonticola Hust.	700
Nitzschia recta Hantz.	675
Nitzschia romana Grun.	676
Nitzschia sicula v. migrans (Cl.) Per.	678
Nitzschia sigma (Kutz.) W. Sm.	679
Nitzschia sigmoidea (Ehr.) W. Sm.	680
Nitzschia sinuata (W.Smith) Grun.	681
Nitzschia sinuata v. tabellaria Grun.	682
Nitzschia sociabilis Greg.	683
Nitzschia stagnorum Rabh.	684
Nitzschia subtilis Kutz.	685
Nitzschia tarda Hust.	686
Nitzschia tropica Hust.	694
Nitzschia tryblionella v. calida Grun.	688
Nitzschia tryblionella v. debilis (Arn.) A. May.	689
Nitzschia tryblionella v. levidensis (W. Sm.) Grun.	690
Nitzschia tryblionella v. littoralis Grun.	693
Nitzschia tryblionella v. maxima Grun.	691
Nitzschia tryblionella v. victoriae Grun.	692
Nitzschia umbilicata Hust.	697
Nostoc carneum Ag.	749
Nostoc commune Vauch.	750
Nostoc linckia (Roth) Born. & Thuret	751
Nostoc muscorum Ag.	752
Nostoc sp.	753
Nostochopsis lobatus Wood	815
Oedogonium capillare (L.) Kutz.	44
Oedogonium spp.	46
Oedogonium varians Witt. & Lund	45
Opephora martyi Herib.	177
Oscillatoria (Spirulina) subsala (Oerst.) Bour.	780
Oscillatoria articulata Gardn.	767
Oscillatoria chalybea Mert.	768
Oscillatoria formosa Bory	769
Oscillatoria geminata Schw.	770

APPENDIX A. SAVANNAH RIVER TAXONOMIC ACCESSION LIST

1. ALGAE

NOMENCLATURE	ACCESSION NO.
GENUS & SPECIES:	
Oscillatoria limosa (Roth) Ag.	771
Oscillatoria princeps Vauch.	772
Oscillatoria proboscidea Gom.	773
Oscillatoria retzii Ag.	774
Oscillatoria rubescens DeCand.	775
Oscillatoria splendida Grev.	776
Oscillatoria spp.	779
Oscillatoria submembranacea Ard. & Straff.	777
Oscillatoria tenuis Ag.	778
Palmellococcus miniatus (Kutz.) Chod.	11
Palmogloea protuberans (Sm.&Sow.) Kutz.	14
Pediastrum biradiatum Meyen	3
Pediastrum boryanum (Turp.) Menegh.	4
Pediastrum duplex Meyen	5
Pediastrum tetras (Ehr.) Ralfs	6
Pediastrum tetras v. tetraodon (Corda) Rabh.	7
Penium sp.	97
Phormidium ambiguum Gom.	781
Phormidium autumnale (Ag.) Gom.	782
Phormidium favosum (Bory) Gom.	783
Phormidium inundatum Kutz.	784
Phormidium purpurascens (Kutz.) Gom.	785
Phormidium retzii (Ag.) Gom.	786
Phormidium sp.	789
Phormidium tenue (Menegh.) Gom.	787
Phormidium uncinatum (Ag.) Gom.	788
Pinnularia abaujensis (Pant.) Ross	506
Pinnularia abaujensis v. linearis (Hust.) Patr.	507
Pinnularia abaujensis v. subundulata (A. May. ex Hust.) Patr	508
Pinnularia acrosphaeriae W. Sm.	540
Pinnularia appendiculata (Ag.) Cl.	509
Pinnularia biceps v. petersonnii Ross	511
Pinnularia biceps Greg.	510
Pinnularia borealis v. rectangularis Carlson	513
Pinnularia borealis Ehr.	512
Pinnularia boyeri Patr.	541
Pinnularia braunii (Grun.) Cl.	514
Pinnularia braunii v. amphicephala (A. May.) Hust.	515
Pinnularia brebissonii (Kutz.) Rabh.	516

APPENDIX A. SAVANNAH RIVER TAXONOMIC ACCESSION LIST

1. ALGAE

NOMENCLATURE	ACCESSION NO.
GENUS & SPECIES:	
Pinnularia brebissonii v. diminuta (Grun.) Cl.	517
Pinnularia brevicostata Cl.	518
Pinnularia burkii Patr.	545
Pinnularia cardinaliculus Cl.	546
Pinnularia dactylus Ehr.	519
Pinnularia divergens v. undulata (M. Per. & Herib.) Hust.	521
Pinnularia divergens W. Sm.	520
Pinnularia flexuosa Cl.	522
Pinnularia formica (Ehr.) Patr.	547
Pinnularia gibba v. parva (Ehr.) Grun.	524
Pinnularia globiceps Greg.	525
Pinnularia intermedia (Lag.) Cl.	526
Pinnularia maior (Kutz.) Rabh.	527
Pinnularia mesogongyla Ehr.	528
Pinnularia mesolepta (Ehr.) W. Sm.	529
Pinnularia mesolepta v. angusta Cl.	530
Pinnularia microstauron (Ehr.) Cl.	531
Pinnularia nodosa (Ehr.) W. Sm.	532
Pinnularia obscura Krasske	533
Pinnularia singularis (A. Schm.) Cl.	534
Pinnularia stomatophoroides v. ornata	2463
Pinnularia stomatophoroides v. ornata f. triundulata (Font.)	543
Pinnularia subcapitata v. paucistriata (Grun.) Cl.	536
Pinnularia subcapitata Greg.	535
Pinnularia substomatophora Hust.	537
Pinnularia termitina (Ehr.) Patr.	544
Pinnularia torta (Mann) Patr.	538
Pinnularia viridis (Nitz.) Ehr.	539
Pithophora oedogonia (Mont.) Wittr.	50
Plectonema nostocorum ? Born.	809
Plectonema spp.	810
Plectonema terebrans B. & F.	807
Plectonema tomasinianum (Kutz.) Born.	808
Porphyrosiphon notarisii (Menegh.) Kutz.	790
Porphyrosiphon splendidus (Grev.) Dr.	791
Rhizoclonium hieroglyphicum (C.A.Ag.) Kutz.	51
Rhodochorton violaceum (Kutz.) Dr.	818
Rhoicosphenia curvata (Kutz.) Grun. ex Rabh.	284
Rhopalodia gibba (Ehr.) O. Mull.	631

APPENDIX A. SAVANNAH RIVER TAXONOMIC ACCESSION LIST

1. ALGAE

NOMENCLATURE	ACCESSION NO.
GENUS & SPECIES:	
Rhopalodia gibberula (Ehr.) O. Mull.	632
Scenedesmus abundans (Kirch.) Chod.	18
Scenedesmus acuminatus (Lag.) Chod.	19
Scenedesmus armatus (Chod.) G.M.Smith	25
Scenedesmus bijuga (Turp.) Lagerheim	26
Scenedesmus brasiliensis Bohlin	20
Scenedesmus dimorphus (Turp.) Kutz.	21
Scenedesmus incrassatulus v. mononae G.M.Sm.	22
Scenedesmus opoliensis P. Richter	27
Scenedesmus quadricauda (Turp.) de Breb.	23
Scenedesmus quadricauda v. longispina (Chod.) G.M.Smith	24
Schizochlamys gelatinosa A. Braun	28
Schizomeris leibleinii Kutz.	67
Schizothrix arenaria (Berk.) Gom.	792
Schizothrix calcicola (Ag.) Gom.	793
Schizothrix friesii (Ag.) Gom.	794
Schizothrix purpurascens (Kutz.) Gom.	795
Schizothrix rivularis (Wolle) Dr.	796
Schizothrix rubella Gom.	797
Schizothrix sp.	798
Scytonema hofmannii Ag.	812
Scytonema mirabile (Dillw.) Born.	811
Selenastrum minutum (Naeg.) Collins	12
Sphaerocystis schroeteri Chod.	15
Spirogyra spp.	115
Staurastrum alternans Breb.	98
Staurastrum dilatatum Ehr.	99
Staurastrum margaritaceum (Ehr.) Menegh.	100
Staurastrum orbiculare Ralfs	101
Staurastrum pinnatum v. subpinnatum	102
Staurastrum suborbiculare W. & G. S. West	103
Stauroneis anceps f. gracilis Rabh.	549
Stauroneis anceps v. americana Reim.	550
Stauroneis anceps Ehr.	548
Stauroneis kriegeri Patr.	551
Stauroneis livingstonii Reim.	552
Stauroneis obtusa Lagerst.	553
Stauroneis phoenicenteron (Nitz.) Ehr.	554
Stauroneis phoenicenteron f. gracilis (Ehr.) Hust.	555

APPENDIX A. SAVANNAH RIVER TAXONOMIC ACCESSION LIST

1. ALGAE

NOMENCLATURE	ACCESSION NO.
GENUS & SPECIES:	
Stauroneis smithii v. incisa Pant.	557
Stauroneis smithii Grun.	556
Stauroneis thermicola (Boy-Pet.) Lund	558
Stauroneis thermicola v. lanceolata Hust.	559
Stenopterobia intermedia (Lewis) V. H.	706
Stephanodiscus hantzschii Grun.	140
Stephanodiscus invisitatus Hohn & Hell.	138
Stephanodiscus minutus Pant.	139
Stichococcus bacillaris Nag.	61
Stichosiphon zanzibaricus (Hieron.) Dr. & Daily	727
Stigeoclonium flagelliferum Kutz.	41
Stigeoclonium lubricum (Dillw.) Kutz.	42
Stigeoclonium spp.	43
Stigonema mesentericum Geitl.	816
Surirella adumbratus Hohn & Hell.	707
Surirella alicula Hohn & Hell.	708
Surirella angusta Kutz.	709
Surirella biseriata Breb.	710
Surirella delicatissima Lewis	711
Surirella guatemalensis Ehr.	712
Surirella linearis W. Sm.	713
Surirella minuta Breb.	714
Surirella moelleriana Grun.	715
Surirella ovalis v. brightwellii (W. Sm.) Perag.	717
Surirella ovata v. pinnata (W. Sm.) Hust.	719
Surirella ovata Kutz.	718
Surirella robusta Ehr.	725
Surirella stalagma Hohn & Hell.	720
Surirella striatula Turp.	721
Surirella suecica Zell.	722
Surirella tenera v. nervosa A. Schm.	724
Surirella tenera Greg.	723
Symploca muralis Kutz.	799
Symploca muscorum (Ag.) Gom.	800
Synedra delicatissima v. angustissima Grun.	179
Synedra fasciculata v. truncata (Grev.) Patr.	181
Synedra minuscula Grun.	182
Synedra parasitica (W. Sm.) Hust.	183
Synedra parasitica v. subconstricta (Grun.) Hust.	184

APPENDIX A. SAVANNAH RIVER TAXONOMIC ACCESSION LIST

1. ALGAE

NOMENCLATURE	ACCESSION NO.
GENUS & SPECIES:	
Synedra pulchella v. lacerata Hust.	186
Synedra rumpens v. familiaris (Kutz.) Hust.	188
Synedra rumpens v. meneghiniana Grun.	189
Synedra rumpens v. scotica Grun.	190
Synedra rumpens Kutz.	187
Synedra socia Wall.	191
Synedra sp. 1	197
Synedra tenera W. Sm.	192
Synedra ulna (Nitz.) Ehr.	193
Synedra ulna v. danica (Kutz.) V. H.	194
Synedra ulna v. oxyrhynchus (Kutz.) V. H.	195
Synedra ulna v. ramesi (Herib.) Hust.	196
Tabellaria fenestrata (Lyngb.) Kutz.	198
Tabellaria flocculosa (Roth) Kutz.	199
Terpsinoe musica Ehr.	142
Tetraspora cylindrica (Wahl.) Ag.	29
Tetraspora gelatinosa (Vauch.) Desv.	30
Tetraspora lubrica (Roth) Ag.	31
Tetraspora spp.	32
Thalassiosira fluviatilis Hust.	141
Thorea wrangelii Ag.	806
Tolypothrix tenuis Kutz.	813
Tribonema bombycinium (C. A. Ag.) Derb. & Sol.	120
Tuomeya fluviatilis Harv.	823
Ulothrix aequalis Kutz.	62
Ulothrix oscillarina Kutz.	63
Ulothrix subtilissima Rabh.	64
Ulothrix zonata (Weber & Mohr) Kutz.	65
Uronema elongatum Hodg.	66
Vaucheria spp.	119
Zygnema spp.	116

Synonyms of the Division Cyanophyta according to Frances Drouet

Synonym	ID. No.	Computer Nomenclature
Agmenellum guadruplicatum (Menegh.) Breb	734	Merismopedia tenuissima Lemm.
	735	M. tranquilla (Ehr.) Trevis.
Entophysalis lemaniae (Ag.) Dr. & Daily	726	Chamaesiphon incrustans Grun.
Stigonema muscicola (Thur.) Borzi	814	Hapalosiphon Fontinale (Ag.) Born.
S. ocellatum (dillw.) Thur.	816	Stigonema mesentericum Geitl.
Scytonema hofmannii Ag.	806	Thorea wrangelii Ag.
	811	Scytonema mirabile (Dillw.) Born.
	813	Tolypothrix tenuis Kutz.
Schizothrix calcicola (Ag.) Gom.	807	Plectonema terebrans B. & F.
	809	P. nostocorm ? Born.
	801	Amphithrix janthina (Mont.) B. & F.
	758	Lyngbya epiphytica Hieronymus
	757	L. contorta Lemm.
	760	L. versicolor (Wartm.) Gom.
	770	Oscillatoria geminata Schw.
	785	Phormidium purpurascens (Kutz.) Gom.
	787	P. tenue (Menegh.) Gom.
Porphyrosiphon notarisii (Menegh.) Kutz	808	Plectonema tomasinianum (Kutz.) Born.
	768	Oscillatoria chalybea Mert.
	792	Schizothrix aernaria (Berk.) Gom.
Calothrix parietana (Nag.) Thur.	802	Calothrix juliana (Menegh.) B. & F.
	751	Nostoc linckia (Roth) Born & Thuret
Nostoc commune Vauch.	739	Anabaina (=Anabaena) circinalis Rabh.
	749	Nostoc carneum Ag.
	752	N. muscorum Ag.
Anabaina oscillariodes Bory	742	Anabaina variabilis Kutz.

Synonym	ID. No.	Computer Nomenclature
Anabaina licheniformis Bory	744	Cylindrospermum catenatum Ralfs
	745	C. licheniforme (Bory) Kutz.
	746	C. majus Kutz.
	747	C. musicola Kutz.
Microcoleus vaginatus (Vauch.) Gom	754	Lyngbya aerugineo-caerulea (Kutz.) Gom.
	781	Phormidium ambiguum Gom.
	782	P. autumnale (Ag.) Gom.
	783	P. favosum (Bory) Gom.
	788	P. uncinatum (Ag.) Gom.
M. lyngbyaceus Ketz.	755	Lyngbya aestuarii (Mert.) Liebmann
	767	Oscillatoria articulatata Gardn.
	771	O. limosa (Roth) Ag.
	775	O. rubescens DeCand.
	778	O. tenuis Ag.
Oscillatoria retzii Ag.	756	Lyngbya bicolor Wood
	786	Phormidium retzii (Ag.) Gom.
	800	Symploca muscorum (Ag.) Gom.
Schizothrix mexicana Gom.	759	Lyngbya putealis Mont. ex Gom.
S. arenaria (Berk.) Gom.	762	Microcoleus chthonoplastes (Mert.) Zanard
S. rubella Gom.	765	M. paludosus (Kutz.) Gom.
	784	Phormidium inundatum Kutz.
	799	Symploca muralis Kutz.
Porphyrosiphon animals (Ag.) Dr.	769	Oscillatoria formosa Bory
Oscillatoria princeps Vauch.	773	O. proboscidea Gom.
Porphyrosiphon splendidus (Grev.) Dr.	776	O. splendida Grev.
Schizothrix friesii (Ag.) Gom.	796	Schizothrix rivularis (Wolle) Dr.

APPENDIX A. SAVANNAH RIVER TAXONOMIC ACCESSION LIST

2. FISHES

NOMENCLATURE	ACCESSION NO.
PHYLUM:	
Chordata	4313
CLASS:	
Osteichthyes	4314
ORDER:	
Amiiformes	4315
Anguilliformes	4318
Atheriniformes	4323
Clupeiformes	4332
Cypriniformes	4339
Perciformes	4355
Percopsciformes	4374
Pleuronectiformes	4379
Salmoniformes	4384
Semionotiformes	4389
Siluriformes	4392
FAMILY:	
Amblyopsidae	4375
Amiidae	4316
Anguillidae	4319
Aphredoderidae	4377
Atherinidae	4324
Belonidae	4326
Catostomidae	4340
Centrarchidae	4356
Clupeidae	4333
Cyprinidae	4346
Cyprinodontidae	4328
Echelidae	4321
Engraulidae	4337
Esocidae	4385
Ictaluridae	4393
Lepisosteidae	4390
Mugilidae	4364

APPENDIX A. /SAVANNAH RIVER TAXONOMIC ACCESSION LIST

2. FISHES

NOMENCLATURE	ACCESSION NO.
FAMILY:	
Paralichthidae	4380
Percichthyidae	4366
Percidae	4368
Poeciliidae	4330
Sciaenidae	4372
Soleidae	4382
Umbridae	4387
GENUS & SPECIES:	
Acantharchus pomotis (Baird)	2404
Alosa aestivalis (Mitchill)	2361
Alosa chrysochloris (Rafinesque)	2362
Alosa mediocris (Mitchill)	2363
Alosa sapidissima (Wilson)	2364
Alosa sp.	2365
Amia calva Linnaeus	2353
Anchoa mitchilli (Valenciennes)	2369
Anguilla rostrata (Lesueur)	2354
Aphredoderus sayanus (Gilliams)	2439
Aplodinotus grunniens Rafinesque	2437
Brevoortia tyrannus (Latrobe)	2366
Carpiodes carpio (Rafinesque)	2370
Carpiodes cyprinus (Lesueur)	2371
Carpiodes spp.	2372
Centrarchus macropterus (Lacepede)	2405
Chologaster cornuta Agassiz	2438
Cyprinus carpio Linnaeus	2380
Dorosoma cepedianum (Lesueur)	2367
Dorosoma petenense (Gunther)	2368
Elassoma zonatum Jordan	2406
Enneacanthus gloriosus (Holbrook)	2407
Enneacanthus sp.	2408
Erimyzon oblongus (Mitchill)	2373
Erimyzon spp.	2375
Erimyzon sucetta (Lacepede)	2374
Esox americanus vermiculatus Lesueur	2443
Esox americanus Gmelin	2442
Esox niger Lesueur	2444

APPENDIX A. SAVANNAH RIVER TAXONOMIC ACCESSION LIST

2. FISHES

NOMENCLATURE	ACCESSION NO.
GENUS & SPECIES:	
Esox sp.	2445
Etheostoma fricksium Hildebrand	2425
Etheostoma fusiforme (Girard)	2426
Etheostoma fusiforme barratti (Holbrook)	2427
Etheostoma hopkinsi (Fowler)	2428
Etheostoma inscriptum (Jordan & Brayton)	2429
Etheostoma nigrum Rafinesque	2430
Etheostoma olmstedi Storer	2431
Etheostoma serriferum (Hubbs & Cannon)	2432
Etheostoma spp.	2433
Fundulus lineolatus (Agassiz)	2358
Fundulus notti (Agassiz)	2359
Gambusia affinis (Baird & Girard)	2360
Hybognathus nuchalis regius Girard	2382
Hybognathus nuchalis Agassiz	2381
Hybopsis amblops (Rafinesque)	2383
Hybopsis rubrifrons (Jordan)	2384
Hypentelium nigricans (Lesueur)	2376
Ictalurus brunneus (Jordan)	2450
Ictalurus catus (Linnaeus)	2451
Ictalurus melas (Rafinesque)	2452
Ictalurus natalis (Lesueur)	2453
Ictalurus nebulosus (Lesueur)	2454
Ictalurus platycephalus (Girard)	2455
Ictalurus punctatus (Rafinesque)	2456
Labidesthes sicculus (Cope)	2356
Lepisosteus oculatus (Winchell)	2447
Lepisosteus osseus (Linnaeus)	2448
Lepisosteus platyrhincus DeKay	2449
Lepomis auritus (Linnaeus)	2409
Lepomis cyanellus Rafinesque	2410
Lepomis gibbosus (Linnaeus)	2411
Lepomis gulosus (Cuvier)	2412
Lepomis macrochirus Rafinesque	2413
Lepomis marginatus (Holbrook)	2414
Lepomis megalotis (Rafinesque)	2415
Lepomis microlophus (Gunther)	2416
Lepomis punctatus (Valenciennes)	2417
Micropterus punctulatus (Rafinesque)	2418

APPENDIX A. SAVANNAH RIVER TAXONOMIC ACCESSION LIST

2. FISHES

NOMENCLATURE	ACCESSION NO.
GENUS & SPECIES:	
Micropterus salmoides (Lacepede)	2419
Minytrema melanops (Rafinesque)	2377
Morone chrysops (Rafinesque)	2423
Morone saxatilis (Walbaum)	2424
Moxostoma anisurum Rafinesque	2378
Moxostoma spp.	2379
Mugil cephalus Linnaeus	2422
Myrophis punctatus Lutken	2355
Nocomis leptocephalus bellus Girard	2386
Nocomis leptocephalus Girard	2385
Nocomis micropogon (Cope)	2387
Notemigonus crysoleucas (Mitchill)	2388
Notropis ardens (Cope)	2389
Notropis chalybaeus (Cope)	2390
Notropis cummingsae Myers	2391
Notropis emiliae (Hay)	2392
Notropis hudsonius (Clinton)	2393
Notropis leedsi Fowler	2394
Notropis lutipinnis (Jordan & Brayton)	2395
Notropis maculatus (Hay)	2396
Notropis niveus (Cope)	2397
Notropis petersoni Fowler	2398
Notropis spilopterus (Cope)	2399
Notropis spp.	2401
Notropis xaenocephalus (Jordan)	2400
Noturus gyrinus (Mitchill)	2457
Noturus insignis (Richardson)	2458
Noturus leptacanthus Jordan	2459
Noturus sp.	2460
Paralichthys lethostigma Jordan & Gilbert	2440
Perca flavescens (Mitchill)	2434
Percina caprodes (Rafinesque)	2435
Percina nigrofasciata (Agassiz)	2436
Pimephales vigilax (Baird & Girard)	2402
Pomoxis annularis Rafinesque	2420
Pomoxis nigromaculatus (Lesueur)	2421
Pylodictis olivaris (Rafinesque)	2461
Semotilus atromaculatus (Mitchill)	2403
Strongylura marina (Walbaum)	2357

APPENDIX A. SAVANNAH RIVER TAXONOMIC ACCESSION LIST

2. FISHES

NOMENCLATURE	ACCESSION NO.
GENUS & SPECIES:	
Trinectes maculatus (Block & Schneider)	2441
Umbra pygmaea (DeKay)	2446

APPENDIX A. SAVANNAH RIVER TAXONOMIC ACCESSION LIST

3. MACRO-INVERTEBRATES

NOMENCLATURE	ACCESSION NO.
PHYLUM:	
Annelida	3735
Arthropoda	3877
Aschelminthes	3649
Bryozoa	3719
Mollusca	3808
Nemertea	3644
Platyhelminthes	3623
Porifera	3615
Tardigrada	3714
CLASS:	
Arachnoidea	3928
Bivalvia	3849
Crustacea	3878
Demospongae	3616
Ectoprocta	3720
Enopla	3645
Eutardigrada	3715
Gastropoda	3809
Gastrotricha	3699
Hirudinoidia	3736
Insecta	3959
Nematoda	3703
Nematomorpha	3710
Oligochaeta	3760
Rotifera	3650
Turbellaria	3624
ORDER:	
Alloeocoela	3638
Amphipoda	3911
Arhynchobdellidae	3754
Basommatophora	3831
Bdelloidea	3654
Branchiura	3900
Catenulida	3629
Cladocera	3881

APPENDIX A. SAVANNAH RIVER TAXONOMIC ACCESSION LIST

3. MACRO-INVERTEBRATES

NOMENCLATURE	ACCESSION NO.
ORDER:	
Coleoptera	4100
Decapoda	3919
Diptera	4208
Ephemeroptera	3994
Eucopepoda	3896
Gordioidea	3711
Gymnolaemata	3721
Haplosclerina	3617
Haplotaxida	3767
Hemiptera	4059
Hoplonemertea	3646
Hydrocarina	3929
Isopoda	3906
Lepidoptera	4205
Lumbriculida	3761
Macrobiotoidea	3716
Megaloptera	4094
Mermithoidea	3707
Mesogastropoda	3811
Monogononta	3657
Neorhabdocoela	3634
Neuroptera	4091
Odonata	3960
Phylactolaemata	3726
Plecoptera	4037
Rhynchobdellae	3741
Trichoptera	4169
Tricladida	3625
Unionoida	3851
Veneroida	3867
FAMILY:	
Aeolosomatidae	3806
Aeshnidae	3977
Ancylidae	3838
Argulidae	3902
Arrenuridae	3930
Asellidae	3908

APPENDIX A. SAVANNAH RIVER TAXONOMIC ACCESSION LIST

3. MACRO-INVERTEBRATES

NOMENCLATURE	ACCESSION NO.
FAMILY:	
Astacidae	3923
Baetidae	4000
Belostomatidae	4083
Brachionidae	3681
Brachycentridae	4194
Caenidae	4030
Calopterygidae	3962
Capniidae	4044
Catenulidae	3630
Ceratopogonidae	4224
Chaoboridae	4222
Chironomidae	4229
Chydoridae	3886
Coenagrionidae	3965
Corbiculidae	3870
Corduliidae	3984
Corixidae	4087
Corydalidae	4097
Culicidae	4219
Cyclopidae	3898
Dalyelliidae	3635
Dicranophoridae	3667
Dolichopodidae	4304
Dryopidae	4159
Dytiscidae	4108
Elmidae	4162
Empididae	4302
Enchytraeidae	3770
Ephemerellidae	4019
Ephemeridae	4032
Ephydridae	4311
Erpobdellidae	3755
Eylaidae	3933
Flosculariidae	3697
Fredericellidae	3727
Gammaridae	3914
Gastropodidae	3674
Gelastocoridae	4077
Gerridae	4062

APPENDIX A. SAVANNAH RIVER TAXONOMIC ACCESSION LIST

3. MACRO-INVERTEBRATES

NOMENCLATURE	ACCESSION NO.
FAMILY:	
Glossiphoniidae	3744
Glossoscolecidae	3792
Gomphidae	3970
Gordiidae	3712
Gyrinidae	4130
Haliplidae	4104
Heptageniidae	4009
Hydrobiidae	3821
Hydrodromidae	3935
Hydrometridae	4074
Hydrophilidae	4135
Hydropsychidae	4178
Hydroptilidae	4184
Hygrobatidae	3937
Krendowskiidae	3941
Lebertiidae	3943
Lecanidae	3691
Lepidostomatidae	4197
Leptoceridae	4199
Leptophlebiidae	4016
Libellulidae	3988
Limnephilidae	4189
Limnesiidae	3945
Lindiidae	3665
Lophopodidae	3729
Lumbricidae	3796
Lumbriculidae	3762
Lymnaeidae	3833
Macrobiotidae	3717
Macromiidae	3982
Megascolecidae	3801
Mermithidae	3708
Mesoveliidae	4072
Naididae	3778
Naucoridae	4081
Nemouridae	4040
Neoephemeridae	4028
Nepidae	4079
Notommatidae	3660

APPENDIX A. SAVANNAH RIVER TAXONOMIC ACCESSION LIST

3. MACRO-INVERTEBRATES

NOMENCLATURE	ACCESSION NO.
FAMILY:	
Notonectidae	4085
Oligoneuriidae	4007
Omophronidae	4102
Oxidae	3948
Palaemonidae	3920
Paludicellidae	3722
Perlidae	4052
Perlodidae	4049
Philopotamidae	4171
Physidae	3847
Pionidae	3950
Piscicolidae	3750
Plagiostomidae	3639
Planariidae	3626
Planorbidae	3842
Pleuroceridae	3828
Plumatellidae	3732
Polycentropodidae	4173
Pteronarcidae	4047
Pyralidae	4206
Rhagionidae	4299
Sciomyzidae	4308
Sialidae	4095
Sididae	3884
Simuliidae	4289
Siphlonuridae	3995
Sisyridae	4092
Sphaeriidae	3872
Spongillidae	3618
Stenostomidae	3632
Stratiomyidae	4294
Synchaetidae	3677
Tabanidae	4296
Taeniopterygidae	4042
Talitridae	3912
Testudinellidae	3695
Tetrastemmatidae	3647
Tipulidae	4211
Trichocercidae	3671

APPENDIX A. SAVANNAH RIVER TAXONOMIC ACCESSION LIST

3. MACRO-INVERTEBRATES

NOMENCLATURE	ACCESSION NO.
FAMILY:	
Tricorythidae	4025
Tubificidae	3773
Unionicolidae	3954
Unionidae	3853
Valvatidae	3818
Veliidae	4068
Victorellidae	3724
Viviparidae	3815
GENUS & SPECIES:	
Ablabesmyia mallochi (Walley)	2265
Ablabesmyia nr. monilis (L.)	2266
Ablabesmyia nr. philosphagnos Beck & Beck	2268
Ablabesmyia poss. aspera Roback	2267
Ablabesmyia sp. e Roback	2269
Ablabesmyia spp.	2270
Acroneuria abnormis (Newman)	1994
Acroneuria arida (Hagen)	1995
Acroneuria georgiana Banks	1996
Acroneuria sp.	1998
Acroneuria sp. a. Frison	1997
Aeolosoma sp(p?).	1761
Aeshna sp.	1939
Alasmidonta arcula Lea	1797
Alasmidonta triangulata (Lea)	1798
Alona guttata Sars	1864
Amnicola (Lyogyrus) sp.	1770
Amnicola limosa (Say)	1767
Amnicola n. sp. a	1768
Amnicola n. sp. b	1769
Anacaena infuscata Motschulsky	2131
Ancyronyx sp.	2177
Ancyronyx variegatus (Germar)	2176
Anodonta cataracta Say	1799
Anodonta couperiana Lea	1801
Anodonta hallenbeckii Lea	1802
Anodonta imbecillis Say	1803
Anodonta nr. cataracta Say	1800

APPENDIX A. SAVANNAH RIVER TAXONOMIC ACCESSION LIST

3. MACRO-INVERTEBRATES

NOMENCLATURE	ACCESSION NO.
GENUS & SPECIES:	
Anopheles sp.	2250
Arcteonais lomondi (Martin)	1727
Argia apicalis (Say)	1914
Argia moesta (Hagen)	1915
Argia sedula (Hagen)	1916
Argia sp.	1920
Argia tibialis (Rambur)	1917
Argia translata Hagen	1918
Argia violacea (Hagen)	1919
Argulus sp.	1869
Arrenurus sp(p?).	1889
Asellus attenuatus Richardson	1870
Asellus communis (Say)	1871
Asellus militaris Hay	1872
Aspelta aper (Harring)	1612
Atanytarsus sp.	2336
Atherix sp.	2348
Atractides sp.	1893
Atrichopogon sp.	2253
Aulophorus furcatus (Muller)	1728
Baetis spp.	1959
Basiaeschna janata (Say)	1940
Batracobdella phalera (Graf)	1682
Belostoma flumineum Say	2038
Belostoma lutarium (Stal)	2039
Belostoma sp.	2040
Berosus aculeatus Leconte	2132
Berosus exiguus Say	2133
Berosus fraternus Leconte	2134
Berosus infuscatus Leconte	2135
Berosus pantherinus Leconte	2136
Berosus peregrinus (Herbst)	2137
Berosus pugnax ? Leconte	2139
Berosus sp.	2140
Berosus striatus (Say)	2138
Bezzia or Probezzia sp.	2254
Bidessus obesus ? Shp.	2075
Boyeria vinosa (Say)	1941
Brachionus calyciflorus Pallas	1630

APPENDIX A. SAVANNAH RIVER TAXONOMIC ACCESSION LIST

3. MACRO-INVERTEBRATES

NOMENCLATURE	ACCESSION NO.
GENUS & SPECIES:	
Brachionus havanaensis Rousselet	1631
Brachionus quadridentatus Hermann	1632
Brachycentrus numerosus (Say)	2226
Brillia par (Coquillett) var.	2273
Caborius sp.	2222
Caenis spp.	1983
Callibaetis sp.	1960
Calopteryx maculata Beauvais	1910
Calopteryx sp.	1911
Campeloma decisum (Say)	1763
Campeloma lima Anthony	1764
Campeloma sp.	1765
Carunculina parva (Barnes)	1805
Carunculina patrickae Bates	1806
Carunculina pulla (Conrad)	1807
Castrella sp.	1588
Catenula sp.	1586
Centroptilum sp.	1961
Cephalodella auriculata (Muller)	1597
Cephalodella eva (Gosse)	1598
Cephalodella forficula (Ehrenberg)	1599
Cephalodella gibba (Ehrenberg)	1600
Cephalodella gracilis (Ehrenberg)	1601
Cephalodella hiulca Myers	1602
Cephalodella hoodi (Gosse)	1603
Cephalodella intuta Myers	1604
Cephalodella megalocephala (Glasscott)	1605
Cephalodella tenuior (Gosse)	1606
Ceraclea maculata (Banks)	2229
Ceraclea nr. mentiea (Walker)	2231
Ceraclea nr. spongillivorax (Resh)	2232
Ceraclea transversa (Hagen)	2230
Cercyon sp.	2167
Chaetogaster diaphanus (Gruithuisen)	1729
Chaetogaster limnaei von Baer	1730
Chaetogaster sp(p?).	1731
Chaoborus punctipennis (Say)	2252
Chauliodes sp.	2052
Chernovskiia sp.	2298

APPENDIX A. SAVANNAH RIVER TAXONOMIC ACCESSION LIST

3. MACRO-INVERTEBRATES

NOMENCLATURE	ACCESSION NO.
GENUS & SPECIES:	
Cheumatopsyche spp.	2209
Chimarra nr. feria Ross	2202
Chimarra prob. aterrima Hagen	2201
Chimarra prob. socia Hagen	2203
Chimarra sp.	2204
Chironomus decorus Johannsen	2299
Chromogaster ovalis (Bergendal)	1623
Chrysops sp.	2346
Cladopelma nais ? (Townes)	2300
Climacea areolaris Hagen	2050
Clinotanypus pinguis (Loew)	2259
Cloeon sp.	1962
Coelambus (Hygrotus) spp.	2080
Coelambus dissimilis Gemminger & Harold	2076
Coelambus inaequalis (Fabricius)	2077
Coelambus laccophilinus Leconte	2078
Coelambus spp.	2079
Coelotanypus scapularis (Loew)	2257
Coelotanypus tricolor (Loew)	2258
Colurella anodonta Carlin	1633
Colurella colura (Ehrenberg)	1635
Colurella obtusa (Gosse)	1636
Colurella sinistra Carlin	1637
Colurella uncinata (Muller)	1638
Copelatus glyphicus (Say)	2096
Copelatus sp.	2097
Coptotomus interrogatus (Fabricius)	2098
Coptotomus spp.	2099
Corbicula fluminea (Muller)	1841
Corbicula manilensis (Philippi)	1842
Cordites sp.	2274
Corydalus cornutus (Linnaeus)	2053
Corynoneura (Corynoneura) nr. celeripes Winnertz	2275
Corynoneura (Corynoneura) nr. taris Roback	2276
Corynoneura (Thienemanniella) nr. xena Roback	2277
Corynoneura (Thienemanniella) sp.	2278
Crangonyx gracilis Smith	1875
Crenitis subcupreus (Say)	2141
Cricotopus bicinctus (Meigen)	2279

APPENDIX A. SAVANNAH RIVER TAXONOMIC ACCESSION LIST

3. MACRO-INVERTEBRATES

NOMENCLATURE	ACCESSION NO.
GENUS & SPECIES:	
Cricotopus nr. slossonae Malloch	2281
Cricotopus poss. fugax (Johannsen)	2280
Cricotopus sp. ("Sylvestris group")	2282
Cryptochironomus digitatus (Malloch)	2301
Cryptochironomus nr. argus Roback	2302
Cryptochironomus sp.	2303
Cryptocladopelma amachaerus (Townes)	2304
Cryptocladopelma poss. viridulus (Linnaeus)	2305
Cryptopleurum minutum (Fabricius)	2168
Cryptotendipes pseudotener (Goetghebuer)	2306
Culex sp.	2251
Culicoides ? sp.	2255
Cymbiodyta lacustris Leconte	2142
Dalyellia sp.	1589
Dapidia calpidia Myers	1639
Demicryptochironomus sp.	2307
Dero digitata (Muller)	1732
Dero sp.	1733
Deronectes sp.	2081
Desmopachria convexa Aube	2082
Desmopachria granum (Leconte)	2083
Dicranomyia sp.	2244
Dicranophorus artamus Harring & Myers	1613
Dicranophorus myriophylli (Harring)	1614
Dicrotendipes modestus (Johannsen)	2308
Dicrotendipes nervosus (Staeger)	2309
Dicrotendipes nr. neomodestus (Malloch)	2310
Dicrotendipes sp.	2311
Dictya sp.	2351
Dina parva Moore	1704
Dina sp. 1	1705
Dina sp. 2	1706
Dineutes analis Regimbart	2105
Dineutes angustus Leconte	2106
Dineutes assimilis (Kirby)	2107
Dineutes carolinus Leconte	2108
Dineutes discolor Aube	2109
Dineutes emarginatus Say	2110
Dineutes horni Roberts	2111

APPENDIX A. SAVANNAH RIVER TAXONOMIC ACCESSION LIST

3. MACRO-INVERTEBRATES

NOMENCLATURE	ACCESSION NO.
GENUS & SPECIES:	
Dineutes spp.	2113
Dineutes vittatus (Germar)	2112
Diplodontus despiciens (Muller)	1892
Diurella bidens Luck	1616
Dubiraphia bivittata Leconte	2178
Dubiraphia quadrinotata (Say)	2179
Dubiraphia sp.	2181
Dubiraphia vittata (Melscheimer)	2180
Dugesia tigrina (Girard)	1584
Eclipidrilus sp.	1711
Eisenella tetraedra (Savigny)	1751
Elliptio arctatus (Conrad)	1819
Elliptio complanata (Lightfoot)	1820
Elliptio complanatus (Solander)	1821
Elliptio complanatus northamptonensis (Lea)	1822
Elliptio congaraea (Lea)	1823
Elliptio crassidens (Lamarck)	1824
Elliptio crassidens congareus Lea	1825
Elliptio fisherianus Lea	1826
Elliptio forbesiana (Lea)	1827
Elliptio fraterna (Lea)	1828
Elliptio hopetonensis Lea	1829
Elliptio icterina (Conrad)	1830
Elliptio incrassatus Lea	1831
Elliptio lanceolata (Lea)	1832
Elliptio lecontianus (Lea)	1833
Elliptio obnubilus (Lea)	1834
Elliptio productus (Conrad)	1835
Elliptio subinflatus (Conrad)	1836
Elliptio tuomeyi (Lea)	1837
Enallagma civile (Hagen)	1921
Enallagma divagans Selys	1922
Enallagma exsulans (Hagen)	1923
Enallagma signatum (Hagen)	1924
Enallagma spp.	1926
Enallagma weewa Byers	1925
Encentrum grande (Western)	1615
Endochironomus nigricans (Johannsen)	2312
Enochrus cinctus (Say)	2143

APPENDIX A. SAVANNAH RIVER TAXONOMIC ACCESSION LIST

3. MACRO-INVERTEBRATES

NOMENCLATURE	ACCESSION NO.
GENUS & SPECIES:	
Enochrus nebulosus (Say)	2144
Enochrus ochraceus Melsheimer	2145
Enochrus perplexus Leconte	2146
Enochrus spp.	2147
Ephemerella (Dannella) simplex McD.	1973
Ephemerella (Ephemerella) rotunda Morgan	1974
Ephemerella (Ephemerella) spp.	1975
Ephemerella (Eurylophella) nr. temoporalis McD.	1977
Ephemerella (Eurylophella) spp.	1978
Ephemerella (Eurylophella) temporalis McD.	1976
Ephemerella (Serratella) deficiens Morgan	1979
Ephemerella spp.	1972
Ephydra sp.	2352
Epicordulia princeps (Hagen)	1946
Epicordulia sp.	1947
Erpetogomphus designatus Hagen	1931
Erpobdella punctata (Leidy)	1707
Erythemis simplicicollis (Say)	1951
Euchlanis dilatata Ehrenberg	1640
Euchlanis meneta Myers	1641
Euchlanis parva Rousselet	1642
Euchlanis triquetra Ehrenberg	1643
Eucrangonyx gracilis Smith	1876
Eukiefferiella poss. sordens Johannsen	2283
Eukiefferiella sp.	2284
Eupera cubensis (Prime)	1843
Eupera singleyi Pilsbry	1844
Eupera spp.	1845
Eurycercus lamellatus (Muller)	1865
Eylais sp.	1891
Ferrissia fusca (C.B. Adams)	1783
Ferrissia rivularis (Say)	1782
Ferrissia spp.	1784
Fredericella sultana (Blumenbach)	1673
Galba humilis modicella (Say)	1777
Gammarus fasciatus Say	1877
Gammarus sp.	1878
Gastropus hytopus (Ehrenberg)	1624
Gelastocoris oculatus (Fabricius)	2031

APPENDIX A. SAVANNAH RIVER TAXONOMIC ACCESSION LIST

3. MACRO-INVERTEBRATES

NOMENCLATURE	ACCESSION NO.
GENUS & SPECIES:	
Geosargus sp.	2345
Geranomyia sp.	2246
Gerris alacris Hussey	2007
Gerris canaliculatus Say	2008
Gerris conformis Uhler	2009
Gerris marginatus Say	2010
Gerris nebularis Drake & Hottes	2011
Gerris nr. buenoi Hungerford	2012
Gerris sp.	2013
Glossiphonia complanata (Linnaeus)	1683
Glossiphonia heteroclita (Linnaeus)	1684
Glossiphonia nepheloidea (Graf)	1685
Glyptotendipes lobiferus ? (Say)	2313
Glyptotendipes spp.	2315
Glyptotendipes spp. nr. senilis (Johannsen)	2314
Gomphus (Gomphurus) lividus Selys	1932
Gomphus (Gomphurus) spp.	1934
Gomphus (Gomphurus) vastus Walsh	1933
Gomphus (Stylurus) plagiatus Selys	1935
Gomphus (Stylurus) sp.	1936
Goniobasis caternia (Say)	1774
Goniobasis sp.	1775
Gordius spp.	1669
Gyraulus parvus (Say)	1787
Gyraulus sp(p).	1788
Gyrinus affinis Aube	2114
Gyrinus analis Say	2115
Gyrinus borealis lugens Leconte	2116
Gyrinus dichrous Leconte	2117
Gyrinus fraternus Couper	2118
Gyrinus gibber Leconte	2119
Gyrinus limbatus Say	2120
Gyrinus lugens Leconte	2121
Gyrinus minutus Fabricius	2122
Gyrinus nr. rockinghamensis Leconte	2125
Gyrinus opacus Sahlberg	2123
Gyrinus pectoralis Leconte	2124
Gyrinus spp.	2126
Hagenius brevistylus Selys	1937

APPENDIX A. SAVANNAH RIVER TAXONOMIC ACCESSION LIST

3. MACRO-INVERTEBRATES

NOMENCLATURE	ACCESSION NO.
GENUS & SPECIES:	
Haliplus borealis Leconte	2055
Haliplus punctatus Aube	2056
Haliplus sp.	2058
Haliplus triopsis Say	2057
Helichus fastigiatus (Say)	2171
Helichus lithophilus Germar	2172
Helichus sp.	2174
Helichus striatus Leconte	2173
Helisoma anceps (Menke)	1789
Helisoma trivolvis (Say)	1790
Helobdella elongata (Castle)	1686
Helobdella fusca (Castle)	1687
Helobdella lineata (Verrill)	1688
Helobdella nepheloidea (Graf)	1689
Helobdella papillata Moore	1690
Helobdella punctata Moore	1691
Helobdella spp.	1693
Helobdella staghalis (Linnaeus)	1692
Helochares (Creniphilus) sp.	2150
Helochares maculicollis Mulsant	2148
Helochares sp.	2149
Helophorus lineatus Say	2127
Helophorus sp.	2129
Helophorus tuberculatus Gyll.	2128
Hemerodromia sp.	2349
Heptagenia spp.	1966
Herpobdella punctata (Leidy)	1708
Hesperophylax sp.	2223
Hetaerina americana (Fabricius)	1912
Hetaerina titia (Drury)	1913
Heterocloeon sp.	1963
Heteromeyenia ryderii Potts	1578
Hexagenia sp.	1984
Homeoneuria dolani Edmunds, Berner, Travis	1965
Hyalella azteca (Saussure)	1874
Hyalinella punctata (Hancock)	1676
Hydaticus bimarginatus Say	2103
Hydaticus laevipennis Thompson	2104
Hydrobaenus pilipes ? (Malloch)	2285

APPENDIX A. SAVANNAH RIVER TAXONOMIC ACCESSION LIST

3. MACRO-INVERTEBRATES

NOMENCLATURE	ACCESSION NO.
GENUS & SPECIES:	
Hydrobius tesselatus Zimm.	2151
Hydrobius tumidus Leconte	2152
Hydrocanthus iricolor Say	2068
Hydrochoreutes sp.	1904
Hydrochus subcupreus Rand.	2130
Hydrolimax grisea Haldeman	1590
Hydrometra hungerfordi Bueno	2029
Hydrometra martini Kirkaldy	2030
Hydrophilus obtusatus Say	2153
Hydrophilus sp.	2154
Hydrophorus? sp.	2350
Hydroporus clypealis Sharp	2084
Hydroporus consimilis Leconte	2085
Hydroporus lynceus Sharp	2086
Hydroporus mellitus Leconte	2087
Hydroporus nr. mixtus Leconte	2093
Hydroporus pilatei Fall.	2088
Hydroporus proximus Aube	2089
Hydroporus pulcher Leconte	2090
Hydroporus spp.	2094
Hydroporus undulatus Say	2091
Hydroporus wickhami Zaitzev	2092
Hydropsyche nr. cuanis Ross	2212
Hydropsyche orris Ross	2210
Hydropsyche prob. frisoni Ross	2213
Hydropsyche prob. venularis Banks	2211
Hydropsyche sp.	2214
Hydroptila sp.	2219
Hydrovatus pustulatus (Melsheimer)	2095
Hygrobates sp.	1894
Hypsibius sp.	1670
Illinobdella moorei Meyer	1701
Ilybius ignarus Leconte	2100
Ischnura posita (Hagen)	1927
Ischnura ramburi ? (Selys)	1929
Ischnura sp.	1930
Ischnura verticalis (Say)	1928
Isogenus sp.	1992
Isonychia spp.	1958

APPENDIX A. SAVANNAH RIVER TAXONOMIC ACCESSION LIST

3. MACRO-INVERTEBRATES

NOMENCLATURE	ACCESSION NO.
GENUS & SPECIES:	
Isoperla spp.	1993
Keratella cochlearis (Gosse)	1644
Keratella gracilenta Ahlstrom	1645
Krendowskia similis Viets	1896
Labrundinia pilosella (Loew)	2271
Laccobius agilis Rand.	2155
Laccobius sp.	2156
Laccophilus fasciatus Aube	2071
Laccophilus maculosus Say	2072
Laccophilus proximus Say	2073
Laccophilus sp.	2074
Laevapex fuscus (C. B. Adams)	1785
Lampsilis cariosa (Say)	1808
Lampsilis dolabraeformis (Lea)	1809
Lampsilis radiata (Lea)	1810
Lampsilis radiata splendida (Lea)	1811
Lampsilis recta Lamarck	1812
Lampsilis sp.	1814
Lampsilis splendida (Lea)	1813
Lebertia sp. 1	1897
Lebertia sp. 2	1898
Lebertia sp. 3	1899
Lebertia sp(p?).	1900
Lecane aegaena Harring	1654
Lecane bulla (Gosse)	1655
Lecane closterocerca (Schmarda)	1656
Lecane elachis (Harring & Myers)	1657
Lecane flexilis (Gosse)	1658
Lecane hamata Stokes	1659
Lecane luna (Muller)	1660
Lecane quadridentata (Ehrenberg)	1661
Lepadella acuminata (Ehrenberg)	1646
Lepadella ovalis (Muller)	1647
Lepadella patella (Muller)	1648
Lepadella sp.	1650
Lepadella venifica Myers	1649
Lepidostoma sp.	2228
Leptohyphes dolani Allen	1980
Leptophlebia sp.	1970

APPENDIX A. SAVANNAH RIVER TAXONOMIC ACCESSION LIST

3. MACRO-INVERTEBRATES

NOMENCLATURE	ACCESSION NO.
GENUS & SPECIES:	
Libellula sp.	1953
Libellula vibrans Fabricius	1952
Limnephilus sp.	2224
Limnesia sp(p?).	1901
Limnodrilus hoffmeisteri Claparede	1718
Limnodrilus sp.	1720
Limnodrilus udekemianus Claparede	1719
Limogonus hesione Kirkaldy	2014
Limogonus sp.	2015
Limonia sp.	2247
Lindia pallida Harring & Myers	1611
Lirceus brachyurus (Harger)	1873
Lophopodella carteri (Hyatt)	1674
Lumbriculus inconstans Smith	1712
Lumbricus variegatus (Muller)	1752
Lymnaea columella Say	1778
Lymnaea humilis Say	1779
Lymnaea sp.	1780
Machronychus glabratus (Say)	2182
Machronychus sp.	2183
Macrobrachium acanthurus (Wiegmann)	1879
Macrobrachium ohione (Smith)	1880
Macromia georgina (Selys)	1943
Macromia sp.	1945
Macromia taeniolata Rambur	1944
Macronema carolina Banks	2215
Macronema sp.	2217
Macronema zebratum (Hagen)	2216
Matus bicarinatus Say	2101
Megapus ? sp.	1895
Menetus dilatatus (Gould)	1791
Mesovelia bisignata Uhler	2027
Mesovelia mulsanti White	2028
Metrobates hesperius Uhler	2016
Micrasema sp.	2227
Microcylloepus pusillus (Leconte)	2184
Micromya ogeecheensis (Conrad)	1815
Micromya vibex Conrad	1816
Micropsectra prob. flavella Zetterstedt	2337

APPENDIX A. SAVANNAH RIVER TAXONOMIC ACCESSION LIST

3. MACRO-INVERTEBRATES

NOMENCLATURE	ACCESSION NO.
GENUS & SPECIES:	
Microvelia sp.	2024
Monommata astia Myers	1607
Monommata sp.	1608
Monopylephorus sp.	1721
Monostyla lunaris (Ehrenberg)	1662
Mooreobdella microstoma (Moore)	1709
Mooreobdella sp(p?).	1710
Musculium spp.	1847
Musculium transversum (Say)	1846
Mystacides nr. sepulchralis (Walker)	2233
Myzobdella lugubris Leidy	1702
Naidium osborni Walton	1734
Naidium sp(p?).	1735
Nais communis Piguet	1736
Nais obtusa (Gervais)	1737
Nais sp(p?).	1738
Nasiaeschna pentacantha (Rambur)	1942
Nectopsyche nr. candida (Hagen)	2234
Nectopsyche nr. exquisita (Walker)	2235
Nectopsyche spp.	2236
Nemocapnia carolina Banks	1989
Nemoura sp.	1987
Neoephemera sp.	1982
Neoperla clymene (Newman)	1999
Neumania sp.	1907
Neureclipsis sp.	2205
Neurocordulia molesta Walsh	1948
Neurocordulia sp.	1949
Notholca longispina (Kellicott)	1651
Notommata pachyura (Gosse)	1609
Notonecta indica Linnaeus	2041
Notonecta irrorata Uhler	2042
Notonecta sp.	2044
Notonecta uhleri Kirkaldy	2043
Nyctiophylax sp.	2206
Ochrotrichia sp.	2220
Oecetis inconspicua ? (Walker)	2239
Oecetis nr. cinerascens (Hagen)	2237
Oecetis prob. eddlestoni Ross	2238

APPENDIX A. SAVANNAH RIVER TAXONOMIC ACCESSION LIST

3. MACRO-INVERTEBRATES

NOMENCLATURE	ACCESSION NO.
GENUS & SPECIES:	
Oecetis sp.	2240
Omophron americanum Dejean	2054
Ophidonais serpentina (Muller)	1739
Ophidonais sp(p?).	1740
Orthocladius nr. carlatus Roback	2286
Orthocladius nr. dorenus Roback	2287
Orthocladius nr. obumbratus Johannsen	2288
Orthocladius spp.	2289
Oxus sp.	1903
Oxyethira sp.	2221
Pachydiplax longipennis (Burmeister)	1954
Palaemonetes kadiakensis Rathbun	1881
Palaemonetes paludosus (Gibbes)	1882
Palaemonetes spp.	1883
Palmacorixa buenoi Abbott	2045
Paludicella articulata (Ehrenberg)	1671
Parachironomus nr. abortiva (Malloch)	2317
Parachironomus tenuicaudata (Malloch)	2316
Paracymus digestus (Leconte)	2157
Paracymus spp.	2160
Paracymus subcupreus (Say)	2158
Paracymus suturalis (Leconte)	2159
Paragnetina kansensis Banks	2000
Paragnetina media (Walker)	2001
Paragnetina nr. kansensis Banks	2002
Paragnetina sp.	2003
Paraleptophlebia sp.	1971
Parapoynx sp.	2243
Paratanytarsus spp.	2338
Pectinatella magnifica Leidy	1675
Pelocoris femoratus Palisot de Beauvais	2037
Peloscolex multisetosus Smith	1722
Peloscolex spp.	1724
Peloscolex variegatus Leidy	1723
Peltodytes (Cnemidotus) sp.	2067
Peltodytes festivus (Wehncke)	2059
Peltodytes floridensis ? Sanderson	2065
Peltodytes littoralis Matheson	2060
Peltodytes muticus (Leconte)	2061

APPENDIX A. SAVANNAH RIVER TAXONOMIC ACCESSION LIST

3. MACRO-INVERTEBRATES

NOMENCLATURE	ACCESSION NO.
GENUS & SPECIES:	
Peltodytes pedunculatus Blatchley	2062
Peltodytes sexmaculatus Roberts	2063
Peltodytes simplex (Leconte)	2064
Peltodytes sp.	2066
Periscolex? sp.	1749
Perithemis tenera (Say)	1955
Perlesta placida (Hagen)	2004
Perlinella drymo ? (Newman)	2005
Phaenonotum estriatum (Say)	2169
Phaenonotum spp.	2170
Phaenopsectra spp.	2318
Phagocata velata (Stringer)	1585
Phanocerus sp.	2185
Phasganophora capitata Pictet	2006
Phylocentropus sp.	2207
Physa crocata Lea	1793
Physa gyrina Say	1794
Physa heterostropha (Say)	1795
Physa sp(p?).	1796
Pilaria sp.	2248
Piona sp.	1905
Pisidium aequilaterale Prime	1848
Pisidium amnicum Muller	1849
Pisidium casertanum (Poli)	1850
Pisidium compressum Prime	1851
Pisidium dubium (Say)	1852
Pisidium milium Held	1853
Pisidium nitidum Jenyns	1854
Pisidium obtusale Pfeiffer	1855
Pisidium sp(p?).	1857
Pisidium walkeri Sterki	1856
Placobdella carolinensis Sawyer & Shelley	1694
Placobdella montifera Moore	1695
Placobdella papillifera (Verrill)	1696
Placobdella parasitica (Say)	1697
Placobdella picta (Verrill)	1698
Placobdella rugosa (Verrill)	1699
Planorbula sp.	1792
Plathemis lydia (Drury)	1956

APPENDIX A. SAVANNAH RIVER TAXONOMIC ACCESSION LIST

3. MACRO-INVERTEBRATES

NOMENCLATURE	ACCESSION NO.
GENUS & SPECIES:	
Platyias patulus (Muller)	1652
Plumatella emarginata Allman?	1677
Plumatella repens Linnaeus	1678
Plumatella sp(p?).	1679
Polyarthra remata (Skorikov)	1625
Polyarthra trigla Ehrenberg	1626
Polyarthra vulgaris (Carlin)	1627
Polycentropus sp.	2208
Polypedilum fallax (Johannsen)	2319
Polypedilum halterale (Coquillett)	2320
Polypedilum illinoense (Malloch)	2321
Polypedilum poss. convictum (Walker)	2323
Polypedilum scalaenum (Schrank)	2322
Polypedilum sp. nr. fallax (Johannsen)	2324
Polypedilum spp.	2325
Pomatiopsis lapidaria (Say)	1771
Potamyia flava (Hagen)	2218
Pottsiella erecta (Potts)	1672
Pristina longiseta leidyi Smith	1742
Pristina sp(p?).	1743
Procambarus hirsutus Hobbs	1885
Procambarus pubescens (Faxon)	1886
Procambarus troglodytes (Le Conte)	1887
Procladius (Procladius) sp.	2263
Procladius (Psilotanypus) bellus (Loew)	2262
Progomphus obscurus Rambur	1938
Prostoma rubrum (Leidy)	1592
Psectrocladius elatus ? Roback	2290
Psectrocladius nr. simulans Johannsen	2292
Psectrocladius poss. nigrus Roback	2291
Psectrocladius sp. 3 Roback	2293
Psectrocladius spp.	2294
Pseudiron sp.	1969
Pseudochironomus nr. richardsoni (Malloch)	2326
Pseudocloeon sp.	1964
Pseudosuccinea columella (Say)	1781
Pteronarcys dorsata (Say)	1990
Pteronarcys spp.	1991
Pycnopsyche sp.	2225

APPENDIX A. SAVANNAH RIVER TAXONOMIC ACCESSION LIST

3. MACRO-INVERTEBRATES

NOMENCLATURE	ACCESSION NO.
GENUS & SPECIES:	
Quadrula sp.	1838
Ranatra australis Hungerford	2032
Ranatra buenoi Hungerford	2033
Ranatra fusca Hungerford	2034
Ranatra kirkaldyi Bueno	2035
Ranatra nigra Herr.-Sch.	2036
Rhagovelia obesa Uhler	2025
Rhanthus bistriatus Borgstrasser	2102
Rheorthocladius spp.	2295
Rheotanytarsus exigua ? Johanssen	2339
Rheumatobates hungerfordi ? Wiley	2019
Rheumatobates rileyi Bergroth	2017
Rheumatobates sp.	2020
Rheumatobates tenuipes Meinert	2018
Rhynchelmis elrodi (?) Smith & Dickey	1713
Rhynchelmis sp(p?).	1715
Rhynchelmis tetratheca (Michaelsen)	1714
Robackia claviger Townes	2327
Scaridium longicaudum (Muller)	1610
Sialis sp.	2051
Sida crystallina (Muller)	1863
Sigara sp.	2046
Simulium jenningsi (Malloch)	2342
Simulium poss. decorum (Walker)	2343
Simulium spp.	2344
Sinantherina semibullata (Thorpe)	1664
Siphlonurus sp. nr. marshalli Traver	1957
Slavina appendiculata (d'Udekem)	1744
Somatogyrus virginicus Walker	1772
Sparganophilus sp.	1750
Sphaerium lacustre (Muller)	1858
Sphaerium securis Prime	1859
Sphaerium spp.	1861
Sphaerium transversum (Say)	1860
Spongilla aspinosa Potts	1579
Spongilla fragilis Leidy	1580
Spongilla lacustris (Linnaeus)	1581
Stenacron spp.	1967
Stenelmis antennalis Sanderson	2186

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3. MACRO-INVERTEBRATES

NOMENCLATURE	ACCESSION NO.
GENUS & SPECIES:	
Stenelmis beameri Sanderson	2187
Stenelmis bicarinata Leconte	2188
Stenelmis convexula Sanderson	2189
Stenelmis crenata (Say)	2190
Stenelmis decorata Sanderson	2191
Stenelmis douglasensis Sanderson	2192
Stenelmis fuscata (Blatchey)	2193
Stenelmis grossa Sanderson	2194
Stenelmis hungerfordi Sanderson	2195
Stenelmis musgravei Sanderson	2196
Stenelmis parva Sanderson	2197
Stenelmis quadrimaculatus Horn	2198
Stenelmis sinuata Leconte	2199
Stenelmis spp.	2200
Stenochironomus sensu Johannsen	2329
Stenochironomus sp.	2330
Stenochironomus spp.	2328
Stenonema spp.	1968
Stenostomum sp.	1587
Stictochironomus devinctus (Say)	2331
Strophitus undulatus (Say)	1804
Stylaria fossularis Leidy	1745
Stylaria lacustris (Linnaeus)	1746
Suphisellus bicolor (Say)	2069
Suphisellus gibbulus (Aube)	2070
Synchaeta oblonga Ehrenberg	1628
Synchaeta sp.	1629
Synorthocladius semivirens (Kieffer)	2296
Tabanus sp.	2347
Taeniopteryx prob. lonicera Ricker & Ross	1988
Tanypus punctipennis Meigen	2260
Tanypus stellatus Coquillett	2261
Tanytarsus poss. guerla (Roback)	2340
Tanytarsus spp.	2341
Testudinella patina (Hermann)	1663
Tetragoneuria cynosura (Say)	1950
Throscinus spp.	2175
Tipula sp.	2249
Tortopus poss. incertus Traver	1985

APPENDIX A. SAVANNAH RIVER TAXONOMIC ACCESSION LIST

3. MACRO-INVERTEBRATES

NOMENCLATURE	ACCESSION NO.
GENUS & SPECIES:	
Tortopus sp.	1986
Trepobates inermis Esaki	2021
Trepobates sp.	2023
Trepobates subnitidus Esaki	2022
Triaenodes sp.	2242
Triaenodes tarda ? Milne	2241
Tribelos jucundus (Walker)	2332
Trichocerca dixonnuttalli (Jennings)	1617
Trichocerca rattus (Muller)	1618
Trichocerca similis Wierzejski	1619
Trichocerca sp.	1622
Trichocerca tenuior (Gosse)	1620
Trichocerca uncinata (Voigt)	1621
Trichocladius sp.	2297
Trichocorixa calva (Say)	2047
Trichocorixa kanza Sailer	2048
Trichocorixa naias Kirkaldy	2049
Trichotria similis (Stenroos)	1653
Tricorythodes spp.	1981
Trochospongilla horrida (Weltner)	1582
Trochospongilla leidyi (Bowerbank)	1583
Tropisternus glaber Herbst	2161
Tropisternus lateralis (Fabricius)	2162
Tropisternus mixtus Leconte	2163
Tropisternus spp.	2166
Tropisternus striolatus Leconte	2164
Tropisternus sublaevis Leconte	2165
Tubifex sp(p?).	1726
Tubifex tubifex (Muller)	1725
Tyrrellia sp.	1902
Undet. Genus (? Eriopterini tribe) sp.	2245
Undet. Genus ("Palpomyia group") spp.	2256
Undet. Genus ("Thienemannimyia group") spp.	2272
Undet. Genus nr. Microtendipes sp.	2335
Undet. Genus sp. a Roback	2334
Uniomerus obesus (Lea)	1839
Uniomerus tetralasmus (Say)	1840
Unionicola sp(p?).	1908
Valvata tricarinata (Say)	1766

APPENDIX A. SAVANNAH RIVER TAXONOMIC ACCESSION LIST

3. MACRO-INVERTEBRATES

NOMENCLATURE	ACCESSION NO.
GENUS & SPECIES:	
Velia brachialis ? Stal	2026
Villosa delumbis (Conrad)	1817
Villosa vibex (Conrad)	1818
Xenochironomus xenolabis (Kieffer)	2333

Synonyms of the Phylum Mollusca according to Sam Fuller

Synonym	ID. No.	Computer Nomenclature
Campeloma sp.	1763	Campeloma decisum (Say)
	1764	C. lima Anthony
Amnicola limosa (Say)	1768	Amnicola n. sp. a
Amnicola (Lyogyrus) sp.	1769	A. n. sp. b
Goniobasis caternia (Say)	1775	Goniobasis sp.
Lymnaea humilis Say	1777	Galba humilis modicella (Say)
	1780	Lymnaea sp.
Lymnaea collumella Say	1781	Pseudosuccinea columella (Say)
Laevapex fuscus (C. B. Adams)	1783	Ferrissia fusca (C. B. Adams)
Physa sp(p?).	1793	Physa crocata Lea
	1794	P. gyrina Say
	1795	P. heterostopha (Say)
Alasmidonta triangulata (Lea)	1797	Alasmidonta arcula Lea
Anodonta cataracta Say	1800	Anodonta nr. cataracta Say
	1802	A. hallenbackii Lea
Carunculina pulla (Conrad)	1805	Carunculina parva (Barnes)
	1806	C. patrickae Bates
Lampsilis cariosa (Say)	1809	Lampsilis dolabraeformis (Lea)
Lampsilis radiata splendida (Lea)	1810	L. radiata (Lea)
	1813	L. splendida (Lea)
Villosa delumbis (Conrad)	1815	Micromya ogeecheensis (Conrad)
Villosa vibex (Conrad)	1816	M. vibrex (Conrad)
Elliptio lanceolata (Lea)	1819	Elliptio arctatus (Conrad)
	1826	E. fisherianus Lea
	1835	E. productus (Conrad)
Elliptio complanata (Lightfoot)	1821	E. complanatus (Solander)
	1822	E. compalatus northamptonenesis (Lea)
	1829	E. hopetonensis Lea
	1836	E. subinflatus (Conrad)
Elliptio congaraea (Lea)	1824	E. crassidens (Lamarack)
	1825	E. crassidens congareus Lea
	1827	E. forbesiana (Lea)
	1831	E. incrassatus Lea
	1833	E. lecontianus (Lea)
Elliptio icterina (Conrad)	1834	E. obnubilus (Lea)
	1837	E. tuomeyi (Lea)
Uniomerus obesus (Lea)	1840	Uniomerus tetralasmus (Say)

Synonym	ID. No.	Computer Nomenclature
Corbicula fluminea (Muller)	1842	Corbicula manilensis (Philippi)
Eypera cubensis (Prime)	1844	Eupera singleyi Pilsbry
	1845	E. spp.
Musculium transversum (Say)	1847	Musculium spp.
	1858	Sphaerium lacustre (Muller)
	1859	S. securis Prime
	1860	S. transversum (Say)
	1861	S. spp.
Pisidium compressum Prime	1848	Pisidium aequilaterale Prime
Pisidium amnicum Muller	1850	P. casertanum (Poli)
	1853	P. milium Held
	1854	P. nitidum Jenyns
	1855	P. obtusale Pfeiffer
	1856	P. walkeri Sterki

APPENDIX A. SAVANNAH RIVER TAXONOMIC ACCESSION LIST

4. PROTOZOA

NOMENCLATURE	ACCESSION NO.
PHYLUM:	
Protozoa	3221
CLASS:	
Ciliata	3423
Mastigophora	3222
Sarcodina	3351
Suctoria	3600
ORDER:	
Amoebida	3357
Chloromonadida	3300
Chrysomonadida	3223
Cryptomonadida	3243
Dinoflagellida	3304
Euglenoidida	3271
Gymnostomatida	3424
Heliozoida	3403
Heterotrichida	3520
Hymenostomatida	3485
Hypotrichida	3546
Odontostomatida	3576
Oligotrichida	3536
Peritrichida	3581
Phytomonadida	3250
Polymastigida	3344
Proteomyxida	3352
Protomonadida	3323
Rhizomastigida	3315
Suctorida	3601
Testacida	3371
Tintinnida	3542
Trichostomatida	3474
FAMILY:	
Acanthocystidae	3404
Acinetidae	3602

APPENDIX A. SAVANNAH RIVER TAXONOMIC ACCESSION LIST

4. PROTOZOA

NOMENCLATURE	ACCESSION NO.
FAMILY:	
Actinophryidae	3409
Amoebidae	3358
Amphileptidae	3425
Amphimonadidae	3324
Anisonemidae	3272
Arcellidae	3372
Aspidiscidae	3547
Astasiidae	3283
Bicosoecidae	3327
Bodonidae	3330
Bursariidae	3521
Carteriidae	3251
Chlamydodontidae	3429
Chlamydomonadidae	3255
Chloromonadae	3301
Chromulinidae	3224
Ciliophryidae	3412
Clathrellidae	3414
Clathrulinidae	3416
Codosigidae	3337
Coelosomididae	3475
Cohnilembidae	3486
Colepidae	3433
Colpodidae	3477
Condylostomidae	3525
Cryptomonadidae	3244
Cystodiniidae	3305
Dendrosomatidae	3608
Didiniidae	3435
Difflugiidae	3381
Dysteriidae	3439
Epalxellidae	3577
Epistylidae	3582
Euglenidae	3291
Euglyphidae	3393
Euplotidae	3549
Frontoniidae	3489
Gromiidae	3398
Gymnodiniidae	3307

APPENDIX A. SAVANNAH RIVER TAXONOMIC ACCESSION LIST

4. PROTOZOA

NOMENCLATURE	ACCESSION NO.
FAMILY:	
Halteriidae	3537
Heterophryidae	3418
Hexamitidae	3345
Holophryidae	3441
Lithocollidae	3420
Loxodidae	3456
Mastigamoebidae	3316
Mayorellidae (=Paramoebidae, in Page)	3367
Metopidae	3527
Microthoracidae	3479
Monadidae	3340
Multiciliidae	3321
Naegleriidae	3369
Nassulidae	3458
Ochromonadidae	3230
Oikomonadidae	3342
Ophrydiidae	3589
Ophryoglenidae	3501
Oxytrichidae	3551
Parameciidae	3503
Peridiniidae	3312
Phacotidae	3262
Philasteridae	3505
Pleuronematidae	3507
Podophryidae	3610
Spathidiidae	3463
Spirostomatidae	3530
Spirozonidae	3483
Stentoridae	3533
Strobilidiidae	3540
Syncryptidae	3240
Tetrahymenidae	3511
Tetramitidae	3347
Tintinnidae	3543
Trachelliidae	3470
Trimastigidae	3349
Vaginicolidae	3591
Vampyrellidae	3353
Volvocidae	3264

APPENDIX A. SAVANNAH RIVER TAXONOMIC ACCESSION LIST

4. PROTOZOA

NOMENCLATURE	ACCESSION NO.
FAMILY:	
Vorticellidae	3596
GENUS & SPECIES:	
Acanthamoeba castellanii (Douglas)	1114
Acanthamoeba hyalina (Dob. & O'Conn.)	1115
Acanthamoeba sp.	1116
Acanthocystis aculeata Hart. & Less.	1201
Acanthocystis turfacea (Cart.)	1202
Acineta spp.	1560
Actinophrys sol Ehr.	1207
Actinophrys spp.	1209
Actinophrys vesiculata Pen.	1208
Actinosphaerium eichhorni Ehr.	1210
Amoeba discoides Schaef.	1117
Amoeba dubia Schaef.	1118
Amoeba gorgonia Pen.	1119
Amoeba guttula Duj.	1120
Amoeba limicola Rhumb.	1121
Amoeba proteus (Pallas)	1122
Amoeba radiosa Ehr.	1123
Amoeba spp.	1129
Amoeba spumosa Gruber	1128
Amoeba striata Pen.	1124
Amoeba verrucosa Ehr.	1125
Amoeba vespertilio Pen.	1126
Amoeba villosa Wall. (=Trichamoeba villosa Wall., in Page)	1127
Amphidinium sp.	1046
Amphileptus claparedei Stein	1217
Amphisiella oblonga Schew.	1447
Amphisiella sp.	1448
Anarma brevis Goodr. & Jahn	1561
Ancyromonas contorta (Klebs)	1105
Anisonema acinus Duj.	907
Anisonema emarginatum Stokes	908
Anisonema ovale Klebs	909
Anisonema pusillum Stokes	910
Anisonema truncatum Stein	911
Anthophysis steinii Senn	838

APPENDIX A. SAVANNAH RIVER TAXONOMIC ACCESSION LIST

4. PROTOZOA

NOMENCLATURE	ACCESSION NO.
GENUS & SPECIES:	
Anthophysis vegetans (Mull.)	839
Arcella arenaria Greeff	1143
Arcella catinus Pen.	1144
Arcella dentata Ehr.	1145
Arcella discoides Ehr.	1146
Arcella hemisphaerica Perty	1147
Arcella mitrata Leidy	1148
Arcella polypora Pen..	1149
Arcella spp.	1151
Arcella vulgaris Ehr.	1150
Artodiscus saltans Pen.	1197
Ascoglena sp.	948
Aspidisca costata (Duj.)	1430
Aspidisca lynceus Ehr.	1431
Aspidisca marsupialis Pen.	1432
Aspidisca spp.	1435
Aspidisca steini Buddenbrock	1433
Aspidisca sulcata Kahl	1434
Astasia curvata Klebs	930
Astasia dangeardii Lemm.	931
Astasia inflata Duj.	932
Astasia klebsi Lemm.	933
Astasia mobilis (Rehberg)	934
Astasia ocellata Khawkine	935
Astasia spp.	936
Astramoeba sp.	1130
Astrodisculus sp.	1215
Blepharisma coeruleum Gaj.	1402
Blepharisma lateritium (Ehr.)	1403
Bodo alexeieffii Lemm.	1075
Bodo amoebinus Lemm.	1076
Bodo angustus (Duj.)	1077
Bodo caudatus (Duj.)	1078
Bodo celer Klebs	1079
Bodo compressus Lemm.	1080
Bodo edax Klebs	1081
Bodo fusiformis (Stokes)	1082
Bodo globosus Stein	1083
Bodo lens (Mull.)	1084

APPENDIX A. SAVANNAH RIVER TAXONOMIC ACCESSION LIST

4. PROTOZOA

NOMENCLATURE	ACCESSION NO.
GENUS & SPECIES:	
Bodo minimus Klebs	1085
Bodo mutabilis Klebs	1086
Bodo obovatus Lemm.	1087
Bodo parvus (Naegler)	1088
Bodo putrinus Lemm.	1089
Bodo repens Klebs	1090
Bodo rostratus (Kent)	1091
Bodo saltans Ehr.	1092
Bodo spp.	1094
Bodo triangularis (Stokes)	1093
Bullinula sp.	1160
Bursaria sp.	1393
Bursaria truncatella Mull.	1392
Bursaridium pseudobursaria Faure-Fr.	1394
Caenomorpha medusula Perty	1397
Campanella sp.	1517
Campanella umbellaria (L.)	1516
Campascus sp.	1161
Carchesium polypinum (L.)	1538
Carteria cordiformis Cart.	874
Carteria ellipsoidalis Bold	875
Carteria globosa Korsch.	876
Carteria spp.	877
Centropyxis aculeata Stein	1162
Centropyxis ecornis (Ehr.)	1163
Ceratium hirundinella (Mull.)	1054
Cercobodo laciniaegerens Krassil.	1058
Cercobodo longicauda (Stein)	1059
Cercobodo sp.	1060
Cercomonas crassicauda Duj.	1095
Cercomonas longicauda Duj.	1096
Chaetospira remex Hudson	1449
Chilodonella caudata (Stokes)	1227
Chilodonella cucullulus (Mull.)	1228
Chilodonella fluviatilis (Stokes)	1229
Chilodonella spp.	1231
Chilodonella uncinata (Ehr.)	1230
Chilodontopsis muscorum Kahl	1280
Chilodontopsis sp.	1282

APPENDIX A. SAVANNAH RIVER TAXONOMIC ACCESSION LIST

4. PROTOZOA

NOMENCLATURE	ACCESSION NO.
GENUS & SPECIES:	
Chilodontopsis vorax (Stokes)	1281
Chilomonas paramecium Ehr.	862
Chilophrya labiata (Edmondson)	1247
Chlamydodon sp.	1232
Chlamydomonas angulosa Dill.	880
Chlamydomonas compressa Pasch.	881
Chlamydomonas conica Dang.	882
Chlamydomonas depauperata Pasch.	883
Chlamydomonas globosa Snow	884
Chlamydomonas gracilis Snow	885
Chlamydomonas monadina Stein	886
Chlamydomonas pomiformis Pasch.	887
Chlamydomonas regularis Korsch.	888
Chlamydomonas sectilis Korsch.	889
Chlamydomonas snowiae Printz	890
Chlamydomonas spp.	891
Chlamydomyxa montana Lankester	1109
Chlamydophrys stercorea Cienk.	1152
Chlorogonium elegans Playf.	892
Chlorogonium sp.	893
Chromulina ovalis Klebs	824
Chromulina rosanoffii Butschli	825
Chromulina spp.	826
Chroomonas norstedtii Hansgirg	863
Chrysosphaerella spp.	827
Ciliophrys infusionum Cienk.	1211
Cinetochilum margaritaceum Perty	1328
Cladomonas fruticulosa Stein	1068
Cladonema pauperum Pasch.	1562
Clathrella foreli Pen.	1212
Clathrulina elegans (Leidy)	1213
Climacostomum sp.	1411
Clypeolina marginata Pen.	1164
Coccomonas orbicularis Stein	894
Cochliopodium bilimbosum (Auerbach)	1153
Cochliopodium digitatum (Greeff)	1154
Codonella cratera (Leidy)	1427
Codonoeca sp.	1071
Cohnilembus fusiformis (Cohn)	1326

APPENDIX A. SAVANNAH RIVER TAXONOMIC ACCESSION LIST

4. PROTOZOA

NOMENCLATURE	ACCESSION NO.
GENUS & SPECIES:	
Coleps bicuspis Noland	1234
Coleps elongatus Ehr.	1235
Coleps hirtus (Mull.)	1236
Coleps octospinus Noland	1237
Coleps spp.	1239
Coleps striatus Smith	1238
Colpidium campylum (Stokes)	1373
Colpidium colpoda (Ehr.)	1374
Colpoda aspera Kahl	1314
Colpoda cucullus Mull.	1315
Colpoda henneguyi Fabre-Dom.	1316
Colpoda inflata (Stokes)	1317
Colponema loxodes Stein	1097
Colponema sp.	1098
Condylostoma sp.	1396
Copromonas subtilis Dob.	937
Cothurnia annulata Stokes	1525
Cothurnia ovata Fromentel	1526
Cothurnia pupa Eichwald	1527
Cothurnia sp.	1528
Cranotheridium taeniatum Schew.	1290
Cristigera phoenix Pen.	1359
Crobylura pelagica Andre	1248
Cryptochrysis commutata Pasch.	864
Cryptochrysis polychrysis Pasch.	865
Cryptoglena pigra Ehr.	949
Cryptoglena spp.	950
Cryptomonas compressa Pasch.	866
Cryptomonas erosa Ehr.	867
Cryptomonas nasuta Pasch.	868
Cryptomonas obovoidea Pasch.	869
Cryptomonas ovata Ehr.	870
Cryptomonas reflexa Marsson	871
Cryptomonas spp.	872
Cucurbitella mespiliformis Pen.	1165
Cyathomonas truncata Ehr.	873
Cyclidium brandoni Kahl	1360
Cyclidium citrullus Cohn	1361
Cyclidium elongatum Schew.	1362

APPENDIX A. SAVANNAH RIVER TAXONOMIC ACCESSION LIST

4. PROTOZOA

NOMENCLATURE	ACCESSION NO.
GENUS & SPECIES:	
Cyclidium glaucoma Mull.	1363
Cyclidium granulosum Kahl	1364
Cyclidium instabile Clark	1365
Cyclidium litomesum Stokes	1366
Cyclidium musicola Kahl	1367
Cyclidium pellucidium Kahl	1368
Cyclidium spp.	1370
Cyclidium versatile Pen.	1369
Cyclogramma sp.	1284
Cyclogramma trichocystis (Stokes)	1283
Cyclonexis annularis Stokes	840
Cyclotrichium sphaericum Faure-Fr.	1240
Cyphoderia ampulla (Ehr.)	1185
Cyrtolophosis elongata Schew.	1329
Cyrtolophosis mucicola Stokes	1330
Dallingeria drysdali Kent	1108
Dendromonas virgaria (Weisse)	841
Diaphoropodon sp.	1166
Dichilum cuneiforme Schew.	1375
Didinium balbianii (Fabre-Dom.)	1241
Didinium nasutum (Mull.)	1242
Difflugia areolata Ehr.	1167
Difflugia constricta Ehr.	1168
Difflugia corona Wall.	1169
Difflugia globulosa Duj.	1170
Difflugia globulus (Ehr.)	1171
Difflugia gramen Pen.	1172
Difflugia lanceolata Pen.	1173
Difflugia oblonga Ehr.	1174
Difflugia spiralis Leclerc	1175
Difflugia spp.	1178
Difflugia tuberculata Wall.	1176
Difflugia urceolata Cart.	1177
Dileptus americanus Kahl	1303
Dileptus anser Mull.	1304
Dileptus bivacuolatus da Cunha	1305
Dileptus cygnus (Clap. & Lachm.)	1306
Dileptus gracilis Kahl	1307
Dileptus monilatus (Stokes)	1308

APPENDIX A. SAVANNAH RIVER TAXONOMIC ACCESSION LIST

4. PROTOZOA

NOMENCLATURE	ACCESSION NO.
GENUS & SPECIES:	
Dileptus sp.	1309
Dinamoeba mirabilis L.	1131
Dinamoeba sp.	1132
Dinema griseolum Perty	912
Dinobryon sertularia Ehr.	842
Dinomonas sp.	1070
Dinomonas vorax Kent	1069
Diplophrys sp.	1198
Disematostoma sp.	1331
Enchelydium fusidens Kahl	1291
Enchelydium virens Kahl	1292
Enchelys arcuata Clap. & Lachm.	1249
Enchelys gasterosteus Kahl	1250
Enchelys variabilis Svec	1251
Entosiphon ovatum Stokes	913
Entosiphon sulcatum (Duj.)	914
Epalxis (=Epalxella, in Kudo) mirabilis (Roux)	1513
Epistylus plicatilis Ehr.	1518
Epistylus sp.	1519
Espejoia musicola Pen.	1332
Espejoia sp.	1333
Eudorina elegans Ehr.	899
Eudorina sp.	900
Euglena acus Ehr.	951
Euglena acutissima Lemm.	952
Euglena agilis Cart.	953
Euglena caudata Hubner	954
Euglena chlamydophora Mainx	955
Euglena clavata Skuja	956
Euglena deses Ehr.	957
Euglena ehrenbergi Klebs	958
Euglena fusca (Klebs)	959
Euglena geniculata (Duj.)	960
Euglena gracilis Klebs	961
Euglena granulata Lemm.	962
Euglena haematodes Ehr.	963
Euglena intermedia Schmitz	964
Euglena klebsi Mainx	965
Euglena limnophila Lemm.	966

APPENDIX A. SAVANNAH RIVER TAXONOMIC ACCESSION LIST

4. PROTOZOA

NOMENCLATURE	ACCESSION NO.
GENUS & SPECIES:	
Euglena minima France	967
Euglena minuta Prescott	968
Euglena mutabilis mainxi Gojd.	970
Euglena mutabilis Schmitz	969
Euglena oxyuris Schmarda	971
Euglena pisciformis Klebs	972
Euglena platydesma Skuja	973
Euglena proxima Dang.	974
Euglena rubra Hardy	975
Euglena sanguinea Ehr.	976
Euglena sociabilis Dang.	977
Euglena spirogyra Ehr.	978
Euglena splendens Dang.	979
Euglena spp.	985
Euglena terricola (Dang.)	980
Euglena torta Korsch.	981
Euglena tripteris (Duj.)	982
Euglena truncata Walton	983
Euglena viridis Ehr.	984
Euglenopsis vorax Klebs	915
Euglypha acanthophora Ehr.	1186
Euglypha cristata Leidy	1187
Euglypha elongata Leidy	1188
Euglypha mucronata Leidy	1189
Euglypha scutigera Pen.	1190
Euglypha spp.	1191
Euplotes aediculatus Pierson	1436
Euplotes affinis Duj.	1437
Euplotes carinatus Stokes	1438
Euplotes eurystomus Wrzes.	1439
Euplotes leticiensis Bovee	1440
Euplotes moebiusi Kahl	1441
Euplotes muscicola Kahl	1442
Euplotes patella (Mull.)	1443
Euplotes plumipes Stokes	1444
Euplotes spp.	1446
Euplotes taylori Garnjobst	1445
Eutreptia viridis Perty	986
Flabellula velata Jahn	1133

APPENDIX A. SAVANNAH RIVER TAXONOMIC ACCESSION LIST

4. PROTOZOA

NOMENCLATURE	ACCESSION NO.
GENUS & SPECIES:	
Frontonia acuminata (Ehr.)	1334
Frontonia acuminata angusta Kahl	1335
Frontonia depressa (Stokes)	1336
Frontonia elliptica Beardsley	1337
Frontonia leucas Ehr.	1338
Frontonia spp.	1339
Frontoniella complanata Wetzel	1340
Gastrostyla muscorum Kahl	1450
Gastrostyla steini Engelmann	1451
Gigantochloris sp.	895
Glaucoma avellana Kahl	1376
Glaucoma reniformis Schew.	1377
Glaucoma scintillans Ehr.	1378
Glaucoma setosa Schew.	1379
Glaucoma spp.	1380
Glenodinium cinctum Ehr.	1044
Glenodinium neglectum Schilling	1045
Gonium formosum Pasch.	901
Gonium pectorale Mull.	902
Gonostomum affine (Stein)	1452
Gonostomum strenuum (Engelmann)	1453
Gonyostomum semen Diesing	1041
Gonyostomum sp.	1042
Gromia nigricans (Pen.)	1199
Gymnodinium aeruginosum Stein	1047
Gymnodinium fuscum Ehr.	1048
Gymnodinium palustre Schilling	1049
Gymnodinium rotundatum Klebs	1050
Gymnodinium spp.	1051
Gyrodinium hyalinum Schilling	1052
Hallezia brachypoda (Stokes)	1563
Halteria grandinella (Mull.)	1422
Hartmannella hyalina Dang.	1134
Heleopera sp.	1179
Hemicycliostyla sp.	1455
Hemicycliostyla sphagni Stokes	1454
Heterochromonas (=Monas, in Pascher) sp.	1104
Heteronema acus (Ehr.)	916
Heteronema acutissimum Lemm.	917

APPENDIX A. SAVANNAH RIVER TAXONOMIC ACCESSION LIST

4. PROTOZOA

NOMENCLATURE	ACCESSION NO.
GENUS & SPECIES:	
Heteronema klebsii Senn	918
Heteronema mutabile (Stokes)	919
Heteronema spp.	921
Heteronema tremulum Zach.	920
Heterophrys myriopoda Archer	1214
Histrio (=Oxytricha, in Kudo) histrio (Mull.)	1456
Holophrya simplex Schew.	1252
Holophrya spp.	1253
Holosticha discocephalus Kahl	1457
Holosticha kessleri (Wrzes.)	1458
Holosticha spp.	1461
Holosticha vernalis Stokes	1459
Holosticha violacea Kahl	1460
Homalozoon vermiculare Stokes	1293
Hyalobryon sp.	843
Hyalosphenia sp.	1155
Kahlia acrobates Horv.	1462
Keronopsis flavicans Kahl	1463
Keronopsis muscorum Kahl	1464
Keronopsis similis (Stokes)	1465
Keronopsis sp.	1466
Khawkinea halli Jahn & McKib.	987
Khawkinea sp.	988
Lacrymaria olor (Mull.)	1254
Lacrymaria sp.	1255
Lagynophrya mutans Kahl	1256
Lagynophrya simplex Kahl	1257
Lembadion bullinum Perty	1341
Lembadion lucens (Mast)	1342
Lembadion magnum (Stokes)	1343
Lembadion spp.	1344
Lepocinclis acicularis France	989
Lepocinclis capito Wehrle	990
Lepocinclis caudata Da Cunha	991
Lepocinclis fusiformis (Cart.)	992
Lepocinclis ovum (Ehr.)	993
Lepocinclis sp.	997
Lepocinclis sphagnophila Lemm.	994
Lepocinclis steinii Lemm.	995

APPENDIX A. SAVANNAH RIVER TAXONOMIC ACCESSION LIST

4. PROTOZOA

NOMENCLATURE	ACCESSION NO.
GENUS & SPECIES:	
Lepocinclis texta (Duj.)	996
Leptopharynx spp. (includes Trichopelma)	1318
Lionotus (=Litonotus, in Kudo) armillatus Pen.	1218
Lionotus (=Litonotus, in Kudo) cygnus (Mull.)	1219
Lionotus (=Litonotus, in Kudo) fasciola (Ehr.)	1220
Lionotus (=Litonotus, in Kudo) spp. (includes Hemiophrys)	1223
Lionotus (=Litonotus, in Kudo) trichocystis Stokes	1221
Lionotus (=Litonotus, in Kudo) triqueter Pen.	1222
Lithocolla globosa Schulze	1216
Lobomonas sp.	896
Loxocephalus plagius (Stokes)	1381
Loxodes magnus Stokes	1275
Loxodes rostrum Ehr.	1276
Loxodes sp.	1279
Loxodes striatus Pen.	1277
Loxodes vorax Stokes	1278
Loxophyllum meleagris Duj.	1224
Loxophyllum spp.	1226
Loxophyllum utriculariae (Pen.)	1225
Malacophrys rotans Kahl	1345
Mallomonas acaroides Perty	828
Mallomonas litomosa Stokes	829
Mallomonas sp.	830
Marsupiogaster sp.	922
Massartia musei (Danysz)	1053
Mastigamoeba longifilum Stokes	1061
Mastigamoeba radiosa Lackey	1062
Mastigamoeba trichophora Laut.	1063
Mastigella radicula (Moroff)	1064
Mastigella simplex (Kent)	1065
Mastigosphaera gobii Schew.	903
Mayorella sp.	1141
Menoidium incurvum (Fres.)	938
Menoidium pellucidum Perty	939
Mesodinium acarus Stein	1243
Mesodinium pulex (Clap. & Lachm.)	1244
Mesodinium spp.	1245
Metacineta mystacina (Ehr.)	1567
Metanema variabile Klebs	923

APPENDIX A. SAVANNAH RIVER TAXONOMIC ACCESSION LIST

4. PROTOZOA

NOMENCLATURE	ACCESSION NO.
GENUS & SPECIES:	
Metopus es Mull.	1398
Metopus fuscus Kahl	1399
Metopus mucicola Kahl	1400
Metopus striatus McMurrich	1401
Microgromia socialis (Archer)	1200
Microregma auduboni (Smith)	1258
Microthorax elegans Kahl	1319
Microthorax sp.	1321
Microthorax tridentatus Pen.	1320
Monas amoebina Meyer	845
Monas arhabdomonas (Fisch)	844
Monas dangeardii Lemm.	846
Monas elongata (Stokes)	847
Monas guttula Ehr.	848
Monas sociabilis Meyer	849
Monas socialis (Kent)	850
Monas spp.	853
Monas vestita (Stokes)	851
Monas vulgaris (Cienk.)	852
Monochilum frontatum Schew.	1382
Monochilum ovale (Schew.)	1383
Monochilum tesselatum Pen.	1384
Monosiga ovata Kent	1102
Multicilia lacustris Laut.	1067
Naegleria spp.	1142
Nassula aurea Ehr.	1285
Nassula gracilis Kahl	1286
Nassula ornata Ehr.	1287
Nassula spp.	1288
Nebela caudata Leidy	1192
Nebela collaris (Ehr.)	1193
Nebela spp.	1195
Nebela vitrea Wailes	1194
Notosolenus apocamptus Stokes	924
Notosolenus sinuatus Stokes	925
Nuclearia delicatula (Cash)	1110
Nuclearia simplex Cienk.	1111
Ochromonas crenata Klebs	854
Ochromonas mutabilis Klebs	855

APPENDIX A. SAVANNAH RIVER TAXONOMIC ACCESSION LIST

4. PROTOZOA

NOMENCLATURE	ACCESSION NO.
GENUS & SPECIES:	
Ochromonas spp.	856
Oikomonas mutabilis Kent	831
Oikomonas obliqua Kent	832
Oikomonas quadrata Kent	833
Oikomonas socialis Moroff	834
Oikomonas spp.	836
Oikomonas termo (Ehr.)	835
Onychodromopsis flexilis Maupas	1467
Onychodromus grandis Stein	1468
Opercularia plicatilis Stokes	1520
Ophrydium vernalis (Stokes)	1524
Ophryoglena atra Lieberkuhn	1350
Opisthostyla pusilla Stokes	1521
Opisthotricha (=Oxytricha, in Kudo) procera Kahl	1469
Opisthotricha (=Oxytricha, in Kudo) similis Engelmann	1470
Orthodonella sp.	1289
Oxytricha bifaria Stokes	1471
Oxytricha chlorelligera Kahl	1472
Oxytricha fallax Stein	1473
Oxytricha furcata Smith	1474
Oxytricha hymenostoma Stokes	1475
Oxytricha ludibunda Stokes	1476
Oxytricha minor Kahl	1477
Oxytricha setigera Stokes	1478
Oxytricha sp.	1480
Oxytricha tricornis Milne	1479
Pamphagus mutabilis Bailey	1156
Pandorina morum (Mull.)	904
Paracineta spp.	1568
Paradileptus robustus Wenrich	1310
Paraholosticha herbicola Kahl	1481
Paramastix conifera Skuja	1106
Paramecium aurelia Ehr.	1351
Paramecium bursaria (Ehr.)	1352
Paramecium calkinsi Woodruff	1353
Paramecium caudatum Ehr.	1354
Paramecium multimicronucleatum Powers & Mitchell	1355
Paramecium putrinum Clap. & Lachm.	1356
Paramecium trichium Stokes	1357

APPENDIX A. SAVANNAH RIVER TAXONOMIC ACCESSION LIST

4. PROTOZOA

NOMENCLATURE	ACCESSION NO.
GENUS & SPECIES:	
Paruroleptus sp.	1482
Pelodinium reniforme Laut.	1514
Pelomyxa carolinensis Wilson	1135
Pelomyxa palustris Greeff	1136
Pelomyxa spp.	1137
Penardiella crassa (Pen.)	1294
Peranema curvicauda Skuja	926
Peranema granulifera Pen.	927
Peranema trichophorum (Ehr.)	928
Peridinium cinctum (Mull.)	1055
Peridinium sp.	1057
Peridinium tabulatum (Clap. & Lachm.)	1056
Petalomonas curvata Skuja	940
Petalomonas mediocanellata Stein	941
Petalomonas sexlobata Klebs	942
Petalomonas sinuata Stein	943
Petalomonas steinii Klebs	944
Phacotus lenticularis (Ehr.)	898
Phacus acuminata Stokes	998
Phacus alata Klebs	999
Phacus anacoelus Stokes	1000
Phacus brevicaudata (Klebs)	1001
Phacus caudata Hubner	1002
Phacus clavata Dang.	1003
Phacus helicoides Poch.	1004
Phacus longicauda (Ehr.)	1005
Phacus norstedtii Lemm.	1006
Phacus orbicularis Hubner	1007
Phacus oscillans Klebs	1008
Phacus pleuronectes Mull.	1009
Phacus pyrum (Ehr.)	1010
Phacus spp.	1016
Phacus stokesii Lemm.	1011
Phacus striata France	1012
Phacus torta Lemm.	1013
Phacus tripteris (Duj.)	1014
Phacus triqueter (Ehr.)	1015
Phascolodon sp.	1233
Philaster armata (Kahl)	1358

APPENDIX A. SAVANNAH RIVER TAXONOMIC ACCESSION LIST

4. PROTOZOA

NOMENCLATURE	ACCESSION NO.
GENUS & SPECIES:	
Phryganella paradoxa Pen.	1180
Phyllomitus amylophagus Klebs	1099
Pithothorax simplex Kahl	1259
Placus ovum Kahl	1260
Placus sp.	1262
Placus striatus France	1261
Plagiophrys parvipunctata Pen.	1157
Platycola sp.	1529
Platydorina caudata Kofoid	905
Platynematum sociale (Pen.)	1346
Platynematum sp.	1347
Platyophrya lata Kahl	1263
Pleodorina sp.	906
Pleuromonas jaculans (Perty)	1100
Pleuronema crassum Duj.	1371
Pleuronema sp.	1372
Pleurotricha grandis Stein	1483
Pleurotricha lanceolata (Ehr.)	1484
Podophrya fixa Mull.	1569
Podophrya sp.	1570
Polytomella sp.	878
Pompholyxophrys punicea Archer	1203
Pontigulasia elisa Schouteden	1181
Prorodon discolor Ehr.	1264
Prorodon griseus (Clap. & Lachm.)	1265
Prorodon margaritifer Clap. & Lachm.	1266
Prorodon minutus Kahl	1267
Prorodon ovum Ehr.	1268
Prorodon sp.	1269
Pseudochlamys sp.	1158
Pseudodifflugia fulva Archer	1182
Pseudodifflugia gracilis Schlum.	1183
Pseudodifflugia spp.	1184
Pseudoglaucoma muscorum Kahl	1385
Pseudomicrothorax agilis Mermod	1322
Pseudomicrothorax dubius (Maupas)	1323
Pseudomicrothorax sp.	1324
Pseudoprorodon farctus (Clap. & Lachm.)	1313
Pteridomonas sp.	1066

APPENDIX A. SAVANNAH RIVER TAXONOMIC ACCESSION LIST

4. PROTOZOA

NOMENCLATURE	ACCESSION NO.
GENUS & SPECIES:	
Pyxidicula operculata (Agardh)	1159
Pyxidium sp.	1522
Raphidiophrys pallida Schulze	1204
Raphidiophrys viridis (Leidy)	1205
Raphidocystis sp.	1206
Rhabdostyla sp.	1523
Rhynchomonas nasuta (Stokes)	1101
Salpingoeca buetschlii Lemm.	1072
Salpingoeca frequentissima Lemm.	1073
Salpingoeca spp.	1074
Saprodinium dentatum Laut.	1515
Saprophilus muscorum Kahl	1386
Scourfieldia complanata West	897
Scytomonas pusilla (Stein)	945
Spathidioides sulcata Brodsky	1295
Spathidium brunneum Kahl	1296
Spathidium caudatum Wetzel	1297
Spathidium faurei Kahl	1298
Spathidium gibbum Kahl	1299
Spathidium sp.	1302
Spathidium sp. (nr. frontinale Pen.)	1301
Spathidium spathula Mull.	1300
Spermatozopsis exultans Korsch.	879
Sphaeroeca sp.	1103
Sphaerophrya magna Maupas	1571
Sphaerophrya soliformis Laut.	1572
Sphaerophrya sp.	1574
Sphaerophrya stentoris Maupas	1573
Sphaleromantis sp.	837
Sphenomonas teres (Stein)	946
Spirostomum ambiguum Ehr.	1404
Spirostomum filum (Ehr.)	1405
Spirostomum intermedium Kahl	1406
Spirostomum loxodes Stokes	1407
Spirostomum minus Roux	1408
Spirostomum sp.	1410
Spirostomum teres Clap. & Lachm.	1409
Spirozona caudata Kahl	1325
Steinia (=Oxytricha, in Kudo) gracilis Kahl	1485

APPENDIX A. SAVANNAH RIVER TAXONOMIC ACCESSION LIST

4. PROTOZOA

NOMENCLATURE	ACCESSION NO.
GENUS & SPECIES:	
Stentor amethystinus Leidy	1412
Stentor coeruleus Ehr.	1413
Stentor igneus Ehr.	1414
Stentor mulleri (Borg)	1415
Stentor multiformis (Mull.)	1416
Stentor niger (Mull.)	1417
Stentor polymorphus (Mull.)	1418
Stentor pyriformis Johns.	1419
Stentor roeseli Ehr.	1420
Stentor sp.	1421
Stichotricha aculeata Wrzes.	1486
Stichotricha intermedia Froud	1487
Stichotricha secunda Perty	1488
Stichotricha spp.	1489
Stokesiella sp.	857
Strobilidium gyrans (Stokes)	1425
Strobilidium velox Faure-Fr.	1426
Strombidium fallax (Zach.)	1423
Strombidium spp.	1424
Strongylidium crassum Sterki	1490
Stylonychia curvata Kahl	1491
Stylonychia mytilus (Mull.)	1492
Stylonychia notophora Stokes	1493
Stylonychia pustulata (Ehr.)	1494
Stylonychia putrina Stokes	1495
Stylonychia sp.	1496
Stylopyxis mucicola Bolochonzew	858
Syncrypta sp.	859
Synura adamsi Smith	860
Synura uvella Ehr.	861
Tachysoma pellionella (Mull.)	1497
Tetrahymena geleii Furg.	1387
Tetrahymena patula (Ehr.)	1388
Tetrahymena pyriformis Ehr.	1389
Tetrahymena sp.	1391
Tetrahymena vorax (Kid., Lilly & Claff)	1390
Tetramitus rostratus Perty	1107
Thurcicola folliculata (Mull.)	1530
Thylacidium truncatum Schew.	1395

APPENDIX A. SAVANNAH RIVER TAXONOMIC ACCESSION LIST

4. PROTOZOA

NOMENCLATURE	ACCESSION NO.
GENUS & SPECIES:	
Tintinnopsis cylindrata (Entz)	1428
Tintinnopsis sp.	1429
Tokophrya infusionum (Stein)	1564
Tokophrya sp.	1565
Trachelius ovum Ehr.	1311
Trachelius sp.	1312
Trachelocerca phoenicopterus Cohn	1270
Trachelocerca sp.	1271
Trachelomonas acanthostoma Stokes	1017
Trachelomonas acuminata (Schmarda)	1018
Trachelomonas annulata Daday	1019
Trachelomonas armata (Ehr.)	1020
Trachelomonas crebea Kellicott	1021
Trachelomonas dubia Deflandre	1022
Trachelomonas ensifera Daday	1023
Trachelomonas hispida (Perty)	1024
Trachelomonas horrida Palmer	1025
Trachelomonas intermedia Dang.	1026
Trachelomonas oblonga Lemm.	1027
Trachelomonas perforata Awerinzew	1028
Trachelomonas piscatoris (Fisch.)	1029
Trachelomonas raciborskii Wolosz.	1030
Trachelomonas rugulosa Stein	1031
Trachelomonas saccata Lemm.	1032
Trachelomonas setosa Zykoff	1033
Trachelomonas spiculifera Palmer	1034
Trachelomonas spp.	1040
Trachelomonas urceolata Stokes	1035
Trachelomonas vermiculosa Palmer	1036
Trachelomonas verrucosa Stokes	1037
Trachelomonas volvocina Ehr.	1038
Trachelomonas zmiewika Swir.	1039
Trachelophyllum clavatum Stokes	1272
Trachelophyllum pusillum (Clap. & Lachm.)	1273
Trentonia flagellata Stokes	1043
Trichophyra epistylidis Clap. & Lachm.	1566
Trinema enchelys (Ehr.)	1196
Trochilia palustris Stein	1246
Tropidoscyphus octocostatus Stein	929

APPENDIX A. SAVANNAH RIVER TAXONOMIC ACCESSION LIST

4. PROTOZOA

NOMENCLATURE	ACCESSION NO.
GENUS & SPECIES:	
Urceolus sabulosus (Stokes)	947
Urocentrum turbo (Mull.)	1348
Uroleptus caudatus (Clap. & Lachm.)	1498
Uroleptus dispar Stokes	1499
Uroleptus gibbus (Clap. & Lachm.)	1500
Uroleptus limnetis Stokes	1501
Uroleptus longicaudatus Stokes	1502
Uroleptus mobilis Engelmann	1503
Uroleptus muscorum Kahl	1504
Uroleptus piscis (Mull.)	1505
Uroleptus sp.	1506
Uronema sp.	1327
Urosoma acuminata (Stokes)	1507
Urosoma caudata (Stokes)	1508
Urosoma spp.	1509
Urostyla spp.	1512
Urostyla trichogaster Kahl	1510
Urostyla viridis Stein	1511
Urotricha agilis (Stokes)	1274
Urozona butschlii Schew.	1349
Vaginicola annulata Stokes	1531
Vaginicola inclinata From.	1532
Vaginicola ingenita Mull.	1533
Vaginicola leptosoma Stokes	1534
Vaginicola longipes Stokes	1535
Vaginicola spp.	1537
Vaginicola tincta Ehr.	1536
Vahlkampfia "limax type"	1139
Vahlkampfia limax (Duj.)	1138
Vahlkampfia spp.	1140
Vampyrella lateritia (Fres.)	1112
Vampyrella sp.	1113
Vorticella aequilata Kahl	1539
Vorticella campanula Ehr.	1540
Vorticella citrina Mull.	1541
Vorticella communis From.	1542
Vorticella convallaria (L.)	1543
Vorticella cupifera Kahl	1544
Vorticella extensa Kahl	1545

APPENDIX A. SAVANNAH RIVER TAXONOMIC ACCESSION LIST

4. PROTOZOA

NOMENCLATURE	ACCESSION NO.
GENUS & SPECIES:	
Vorticella floridensis Stokes	1546
Vorticella kenti Kahl	1547
Vorticella limnetis Stokes	1548
Vorticella microstoma Ehr.	1549
Vorticella monilata Tatem	1550
Vorticella picta (Ehr.)	1551
Vorticella similis Stokes	1552
Vorticella sphaerica d'Udekem	1553
Vorticella spp.	1557
Vorticella submicrostoma Ghosh	1554
Vorticella utriculus Stokes	1555
Vorticella vestita Stokes	1556
Zoothamnium arbuscula Ehr.	1558
Zoothamnium simplex Kent	1559

Appendix A. Savannah River Taxonomic Accession List

V. Unidentified Taxa*

	Lowest Identified Classification	Unidentified Taxa Accession No.
(3878)	CLASS CRUSTACEAE:	3892
		3893
		1866
		1867
(3699)	CLASS GASTROTRICHA:	3700
		3701
		1665
(3736)	CLASS HIRUDINOIDIA:	3738
		3739
		1680
(3703)	CLASS NEMATOD:	3704
		3705
		1666
(3760)	CLASS OLIGOCHAETA:	3803
		3804
		1755
		1756
		1757
		1758
		1759
		1760
(3650)	CLASS ROTIFERA:	3651
		3652
		1593
(3624)	CLASS TURBELLARIA:	3641
		3642
		1591
(3654)	ORDER BDELLOIDEA:	3655
		1594
		1595
		1596
(3881)	ORDER CLADOCERA:	3882
		1862

* All taxa are in macroinvertebrate subgroup.

(3711)	ORDER GORDIOIDEA:	1668
(3929)	ORDER HYDROCARINA:	3957 1909
(3811)	ORDER MESOGASTROPODA:	3812 1762
(3741)	ORDER RHYNCHOBDELLAE:	3742 1681
(3838)	FAMILY ANCYLIDAE:	1786
(3930)	FAMILY ARRENURIDAE:	1890
(3923)	FAMILY ASTACIDAE:	1884 1888
(4229)	FAMILY CHIRONOMIDAE:	2264
(3898)	FAMILY CYCLOPIDAE:	1868
(3770)	FAMILY ENCHYTRAEIDAE:	1717
(3744)	FAMILY GLOSSIPHONIIDAE:	1700 1703
(3792)	FAMILY GLOSSOSCOLECIDAE:	1748
(3821)	FAMILY HYDROBIIDAE:	1773
(3796)	FAMILY LUMBRICIDAE:	1753
(3762)	FAMILY LUMBRICULIDAE:	1716
(3801)	FAMILY MEGASCOLECIDAE:	1754
(3708)	FAMILY MERMITHIDAE:	1667
(3778)	FAMILY NAIDIDAE	1747
(3950)	FAMILY PIONIDAE	1906
(3618)	FAMILY SPONGILLIDAE	1575 1576 1577

Appendix B. Sample Data Presentations

B.1 Savannah River Taxonomic Data Summary.

B.2 Sample Presence/Absence Data for Two Diatom Species.

B.3 Sample Diatometer Data.

B.4 Savannah River Water Chemistry Summary.

B.1. Savannah River Taxonomic Data

Taxonomic data from all 16 major river surveys have been summarized in Figures B.1.1-B.1.36. These data have been condensed into major taxonomic subgroups and graphed to show general trends over time at each survey station.

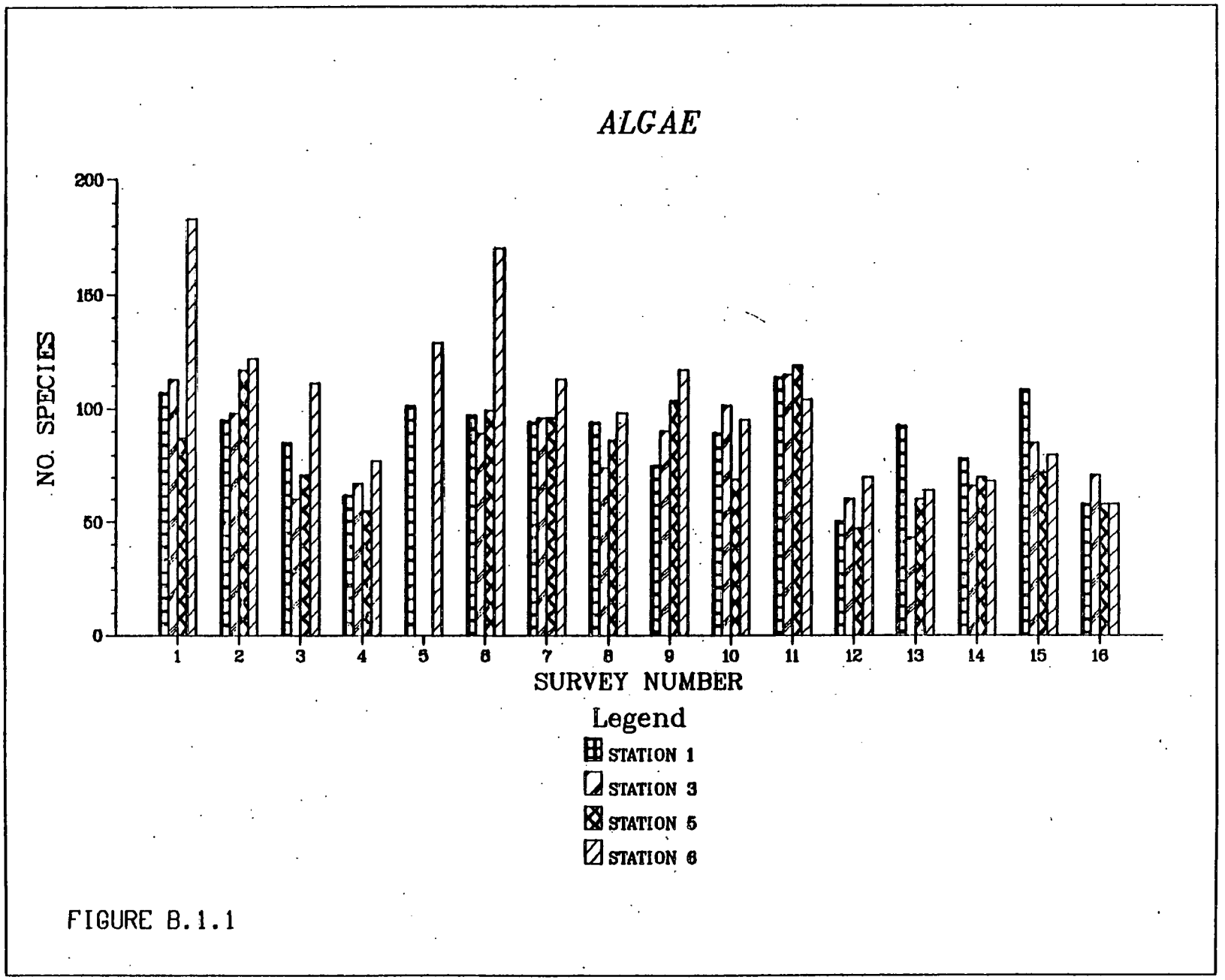

ALGAE
NO. SPECIES
200
150
100
50
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
SURVEY NUMBER
Legend
STATION 1
STATION 3
STATION 5
STATION 6

FIGURE B.1.1

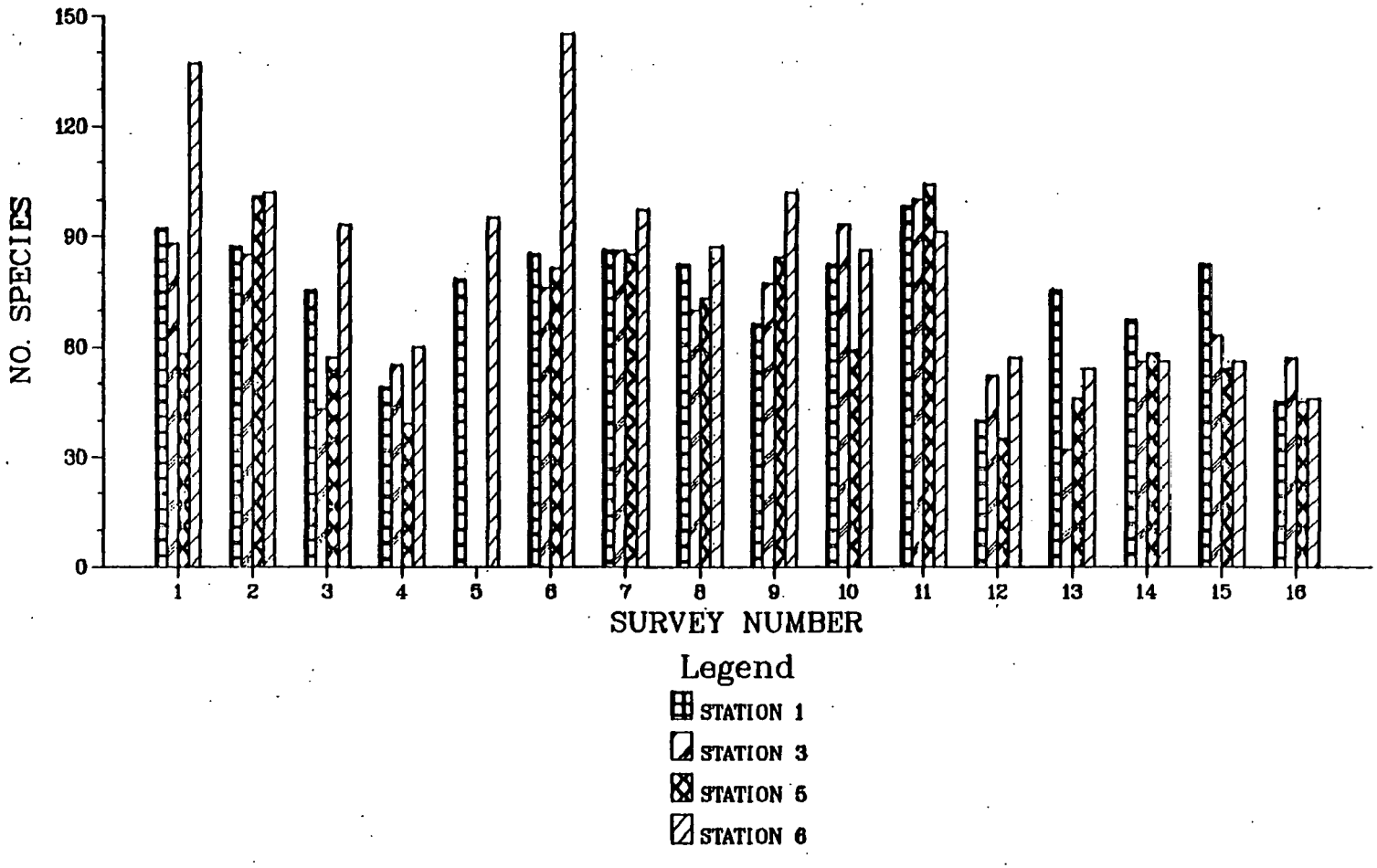

DIVISION BACILLARIOPHYTA
(Diatoms)
NO. SPECIES
150
120
90
60
30
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
SURVEY NUMBER
Legend
STATION 1
STATION 3
STATION 5
STATION 6

FIGURE B.1.2

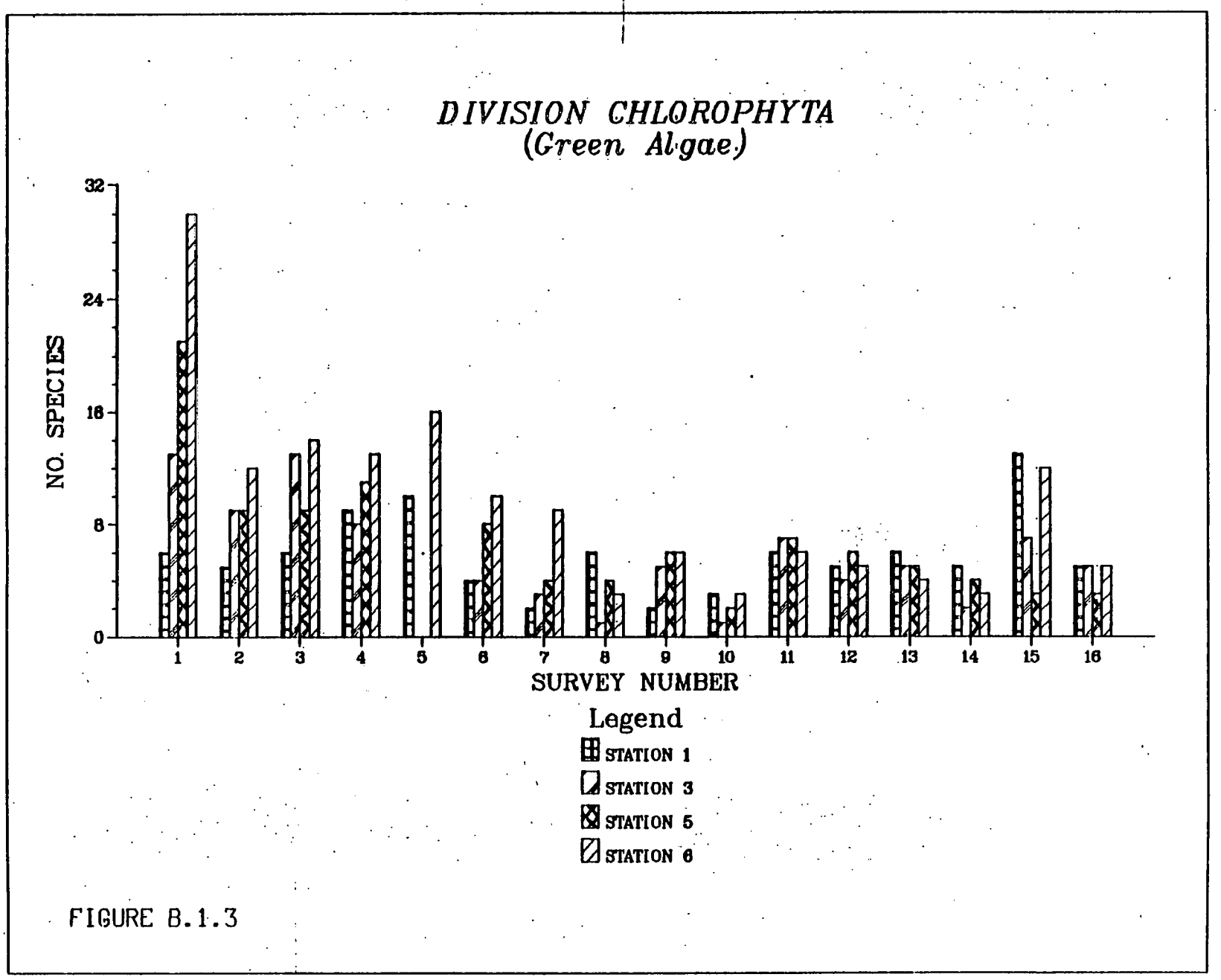

DIVISION CHLOROPHYTA
(Green Algae)
NO. SPECIES
32
24
16
8
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
SURVEY NUMBER
Legend
STATION 1
STATION 3
STATION 5
STATION 6

FIGURE B.1.3

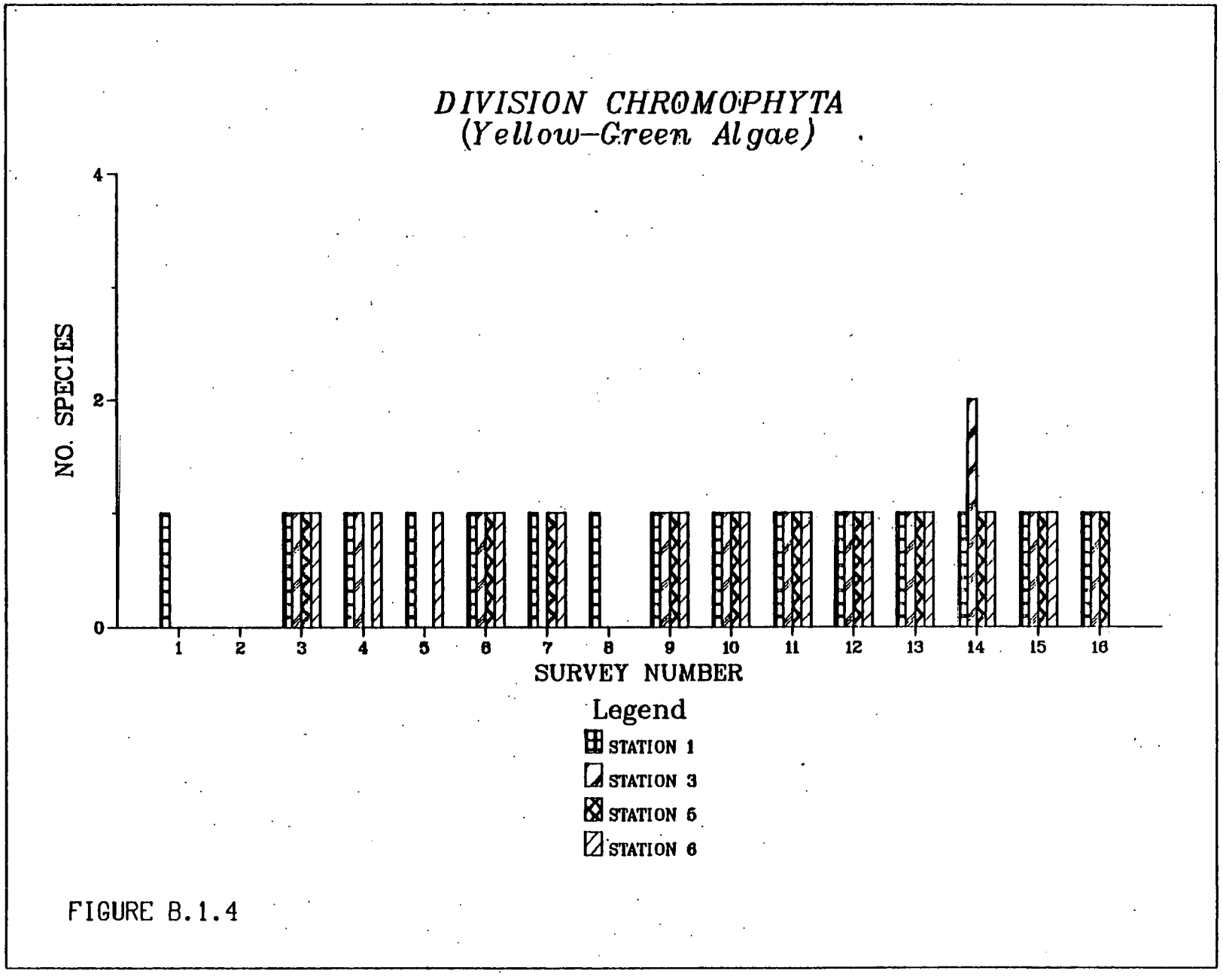

DIVISION CHROMOPHYTA
(Yellow-Green Algae)
NO. SPECIES
0
2
4
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
SURVEY NUMBER
Legend
STATION 1
STATION 3
STATION 5
STATION 6

FIGURE B.1.4

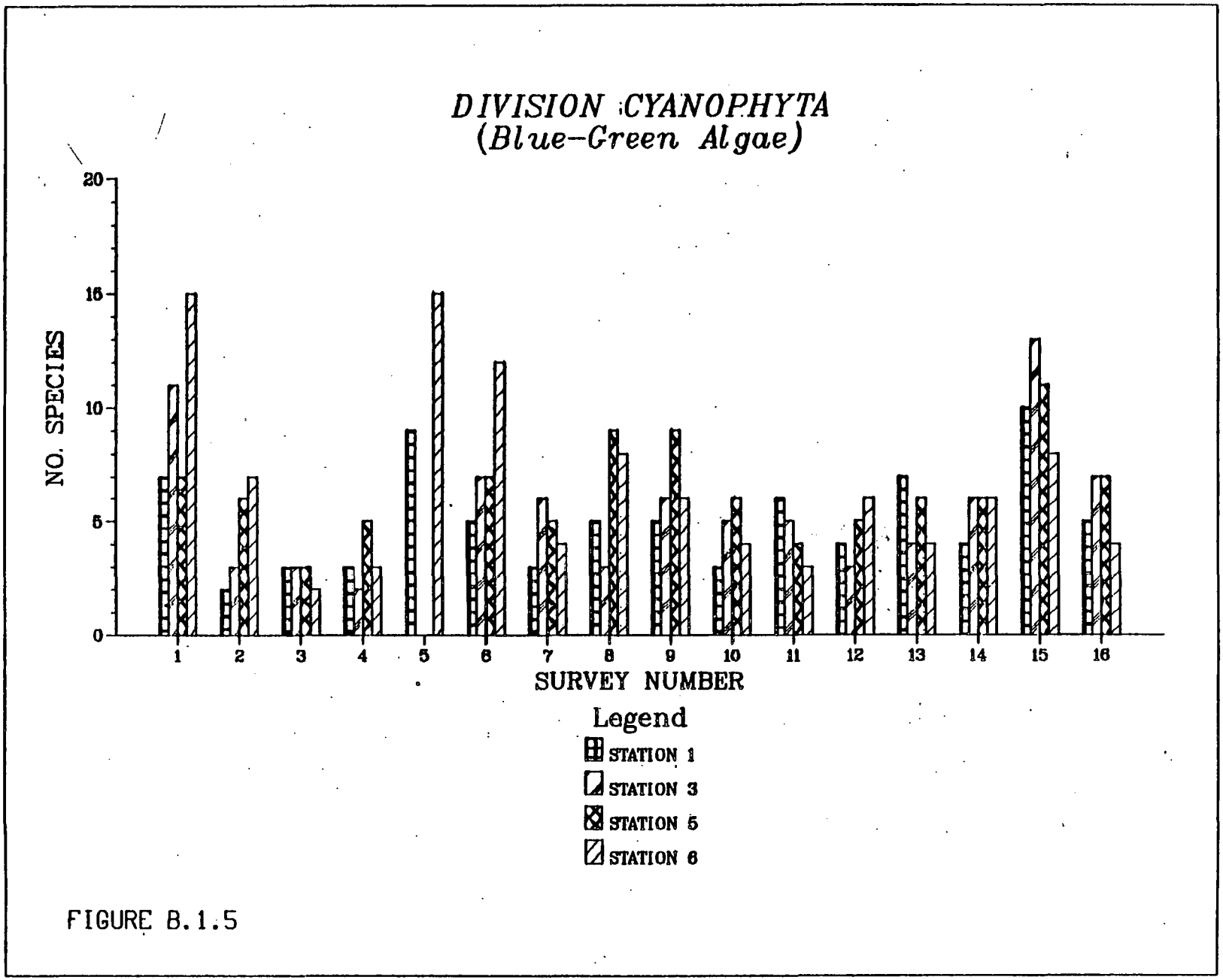

DIVISION CYANOPHYTA
(Blue-Green Algae)
NO. SPECIES
20
15
10
5
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
SURVEY NUMBER
Legend
STATION 1
STATION 3
STATION 5
STATION 6

FIGURE B.1.5

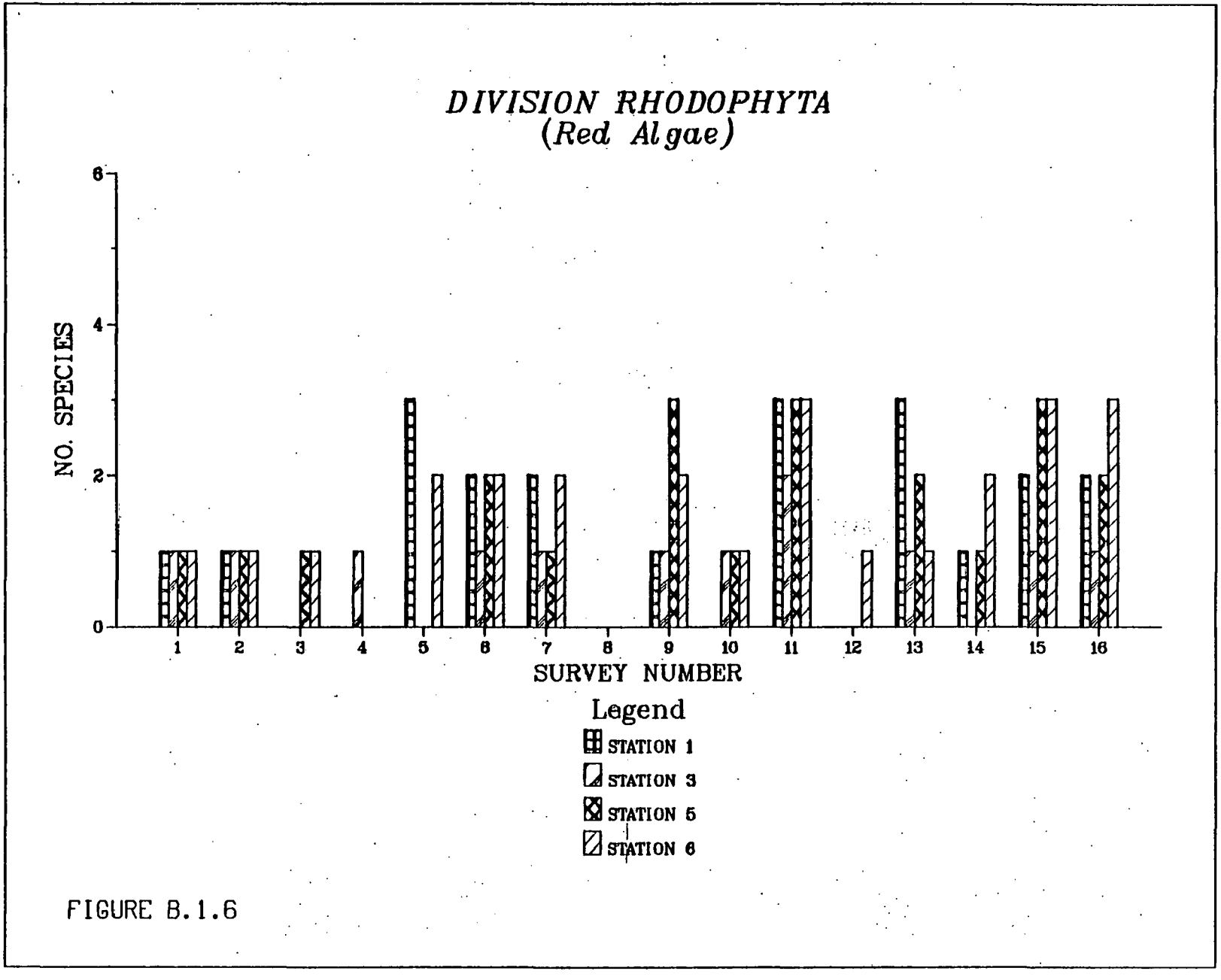

DIVISION RHODOPHYTA
(Red Algae)
NO. SPECIES
0
2
4
6
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
SURVEY NUMBER
Legend
STATION 1
STATION 3
STATION 5
STATION 6

FIGURE B.1.6

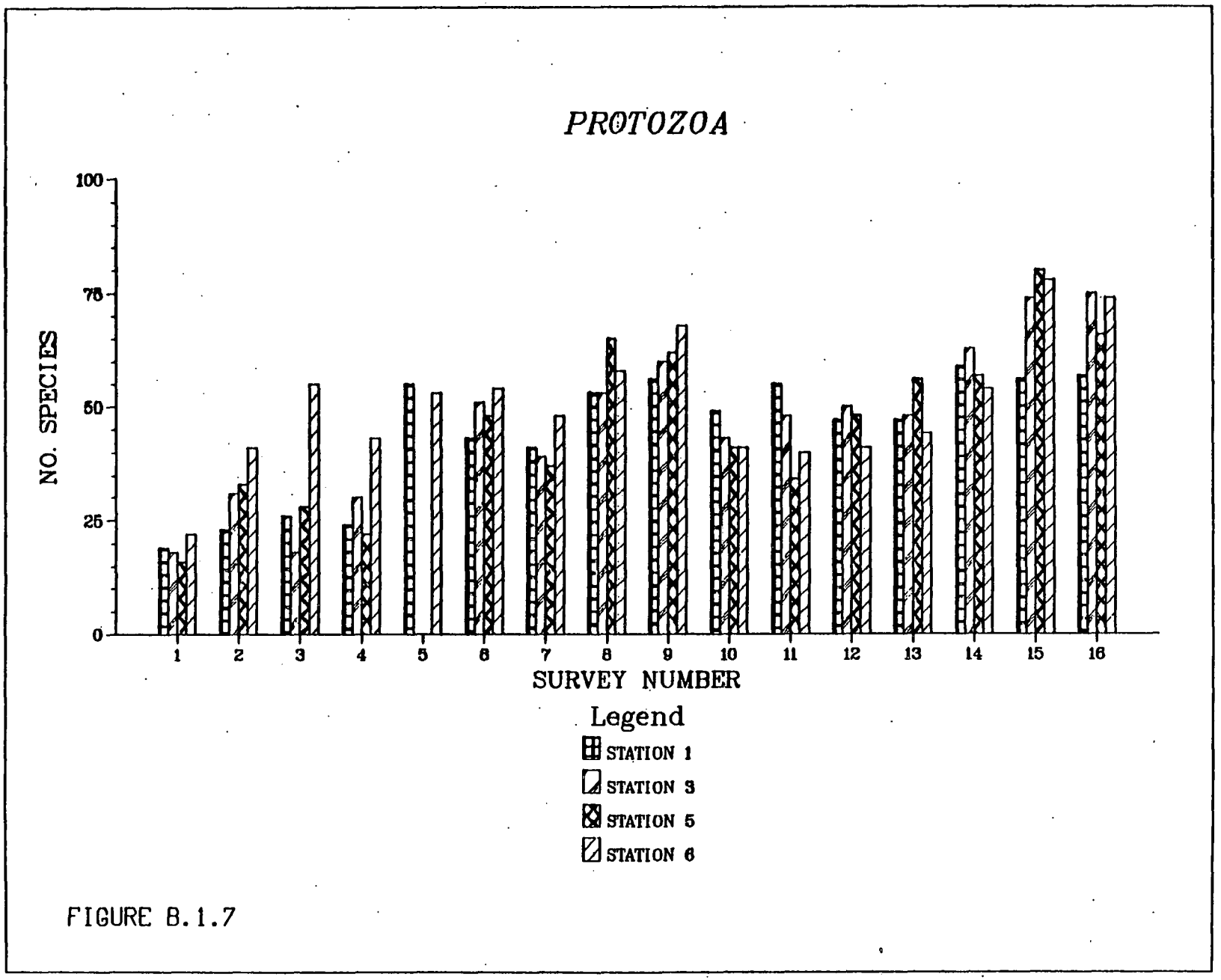

PROTOZOA
100
75
50
25
0
NO. SPECIES
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
SURVEY NUMBER
Legend
STATION 1
STATION 3
STATION 5
STATION 6

FIGURE B.1.7

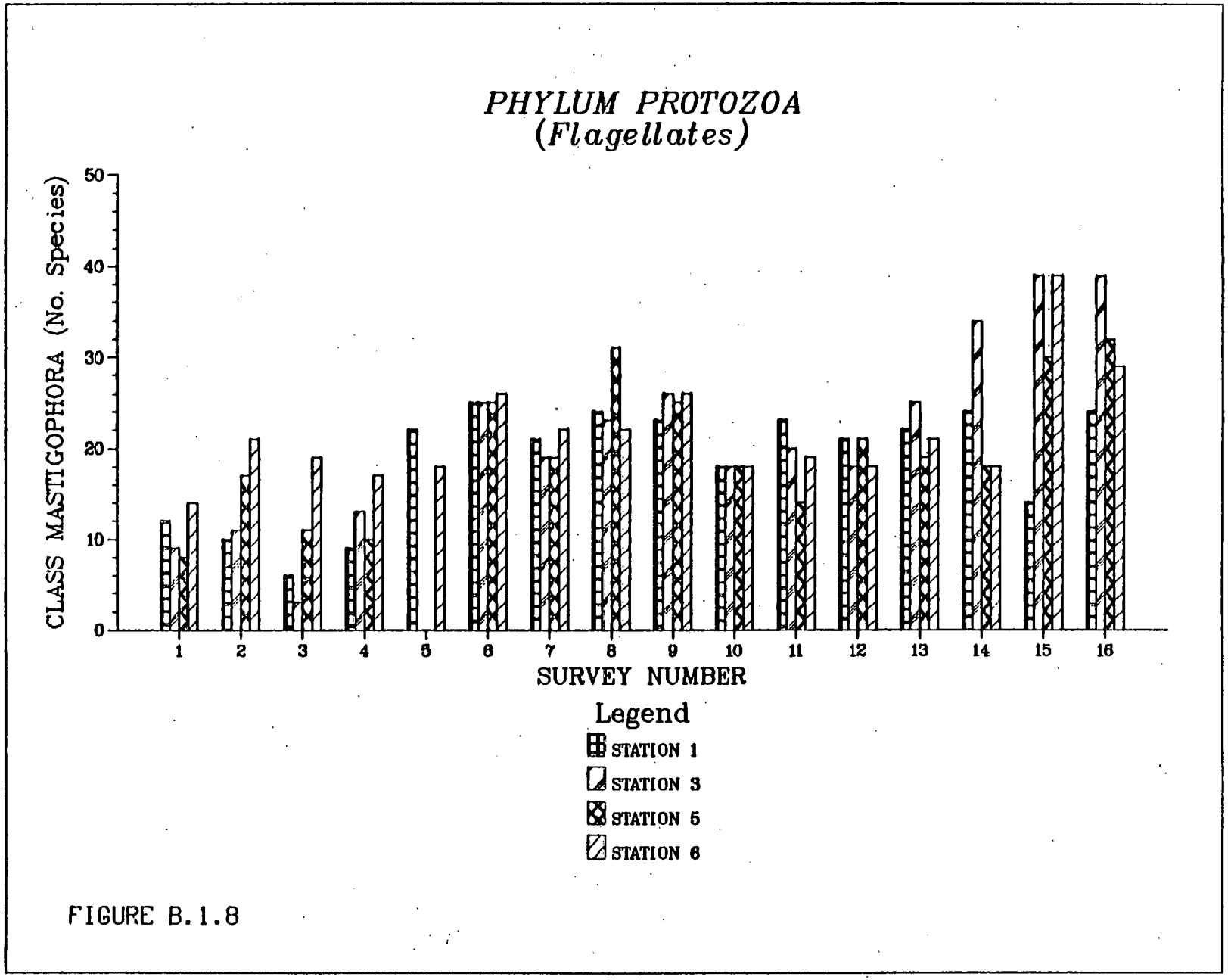

PHYLUM PROTOZOA
(Flagellates)
CLASS MASTIGOPHORA (No. Species)
0
10
20
30
40
50
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
SURVEY NUMBER
Legend
STATION 1
STATION 3
STATION 5
STATION 6

FIGURE B.1.8

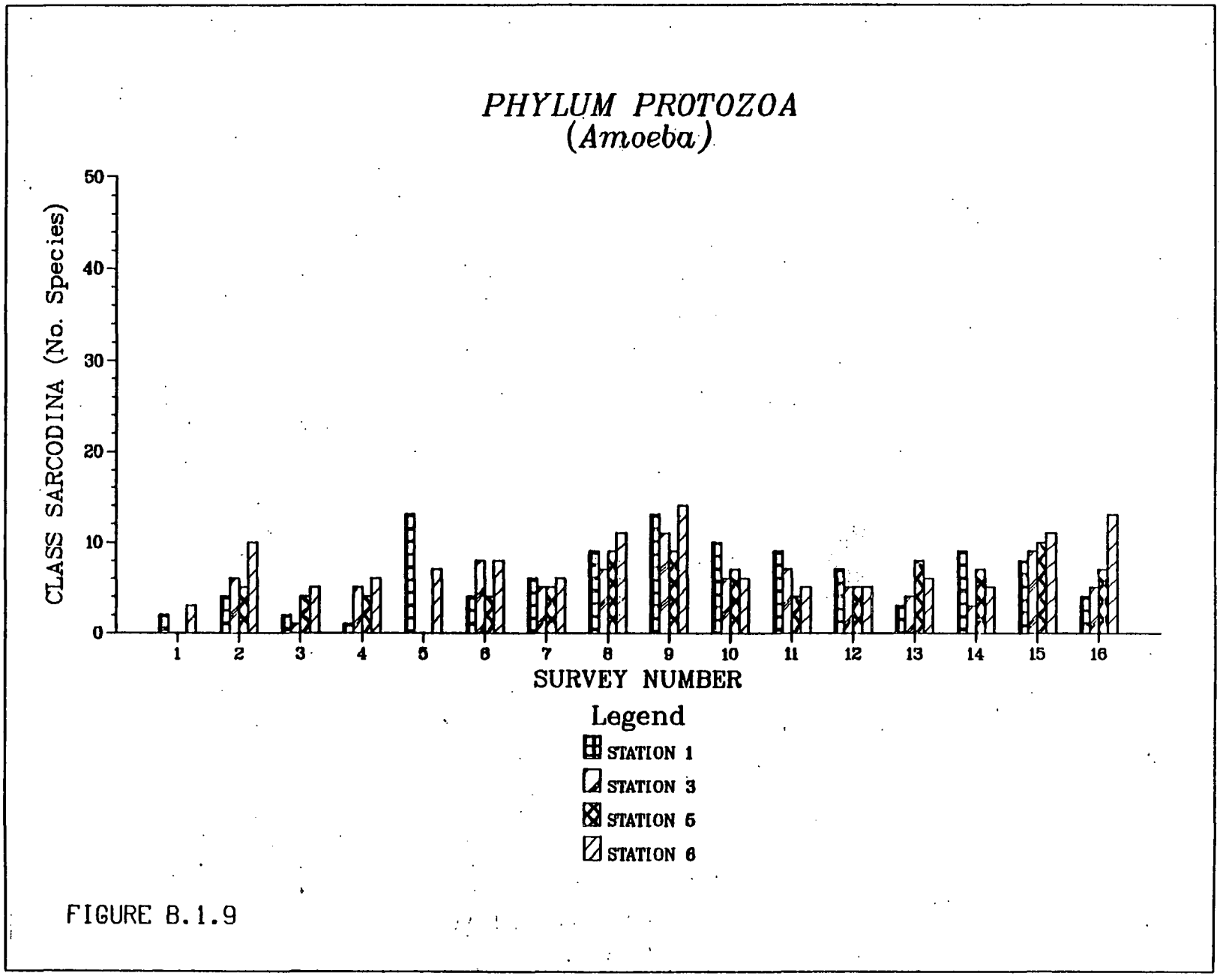

PHYLUM PROTOZOA
(Amoeba)
CLASS SARCODINA (No. Species)
50
40
30
20
10
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
SURVEY NUMBER
Legend
STATION 1
STATION 3
STATION 5
STATION 6

FIGURE B.1.9

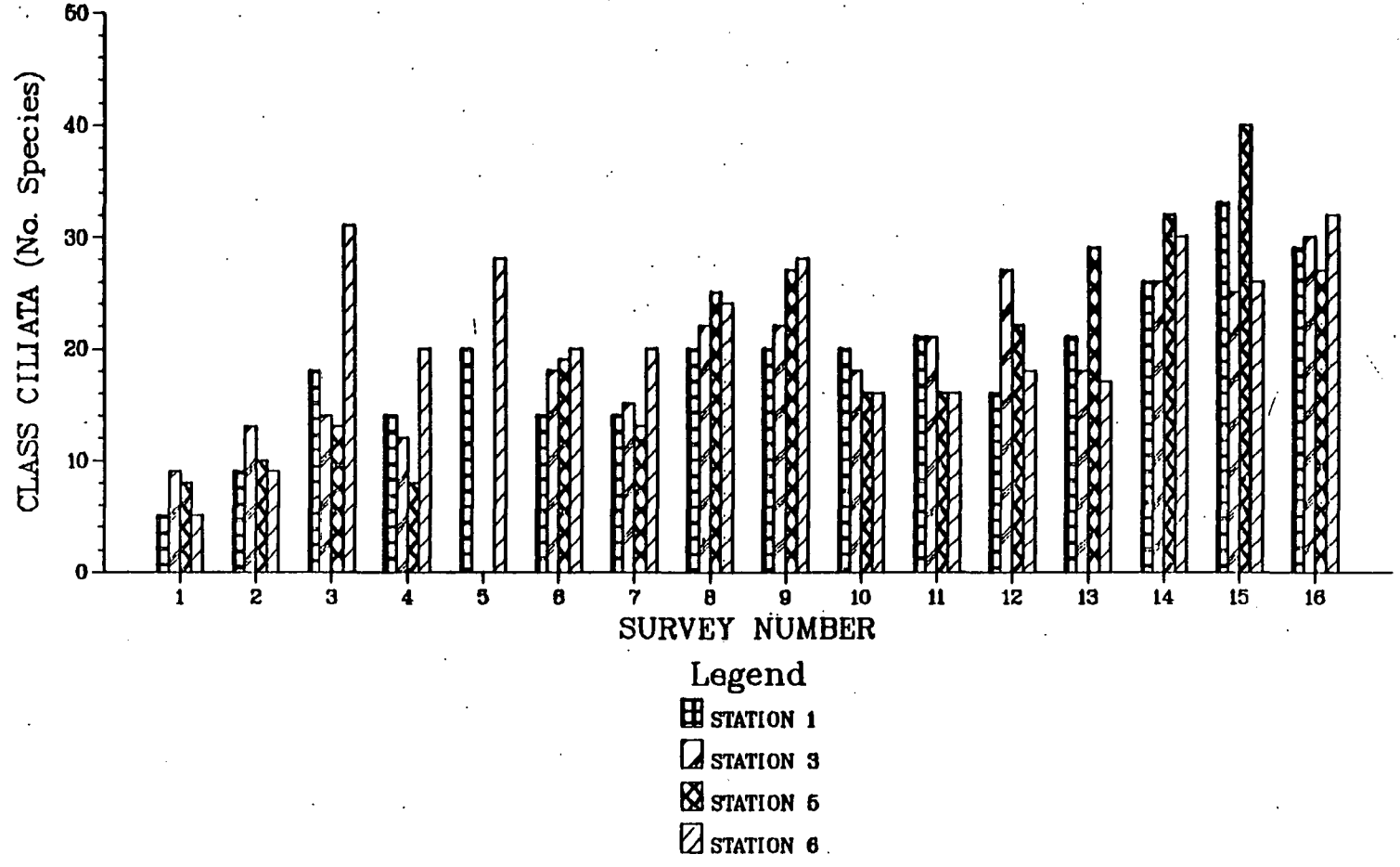

PHYLUM PROTOZOA
(Ciliates)
CLASS CILIATA (No. Species)
0
10
20
30
40
50
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
SURVEY NUMBER
Legend
STATION 1
STATION 3
STATION 5
STATION 6

FIGURE B.1.10

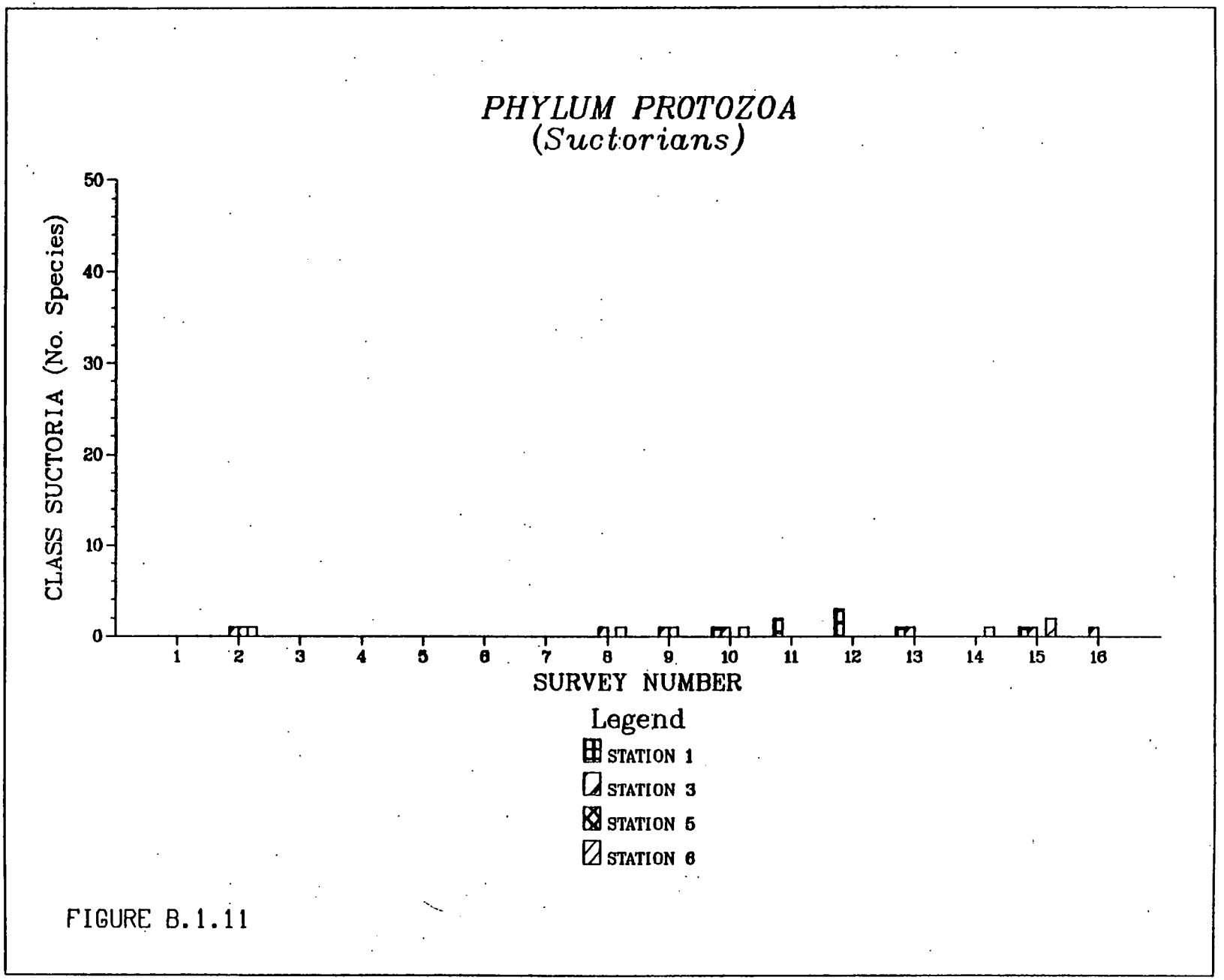

PHYLUM PROTOZOA
(Suctorians)
CLASS SUCTORIA (No. Species)
50
40
30
20
10
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
SURVEY NUMBER
Legend
STATION 1
STATION 3
STATION 5
STATION 6

FIGURE B.1.11

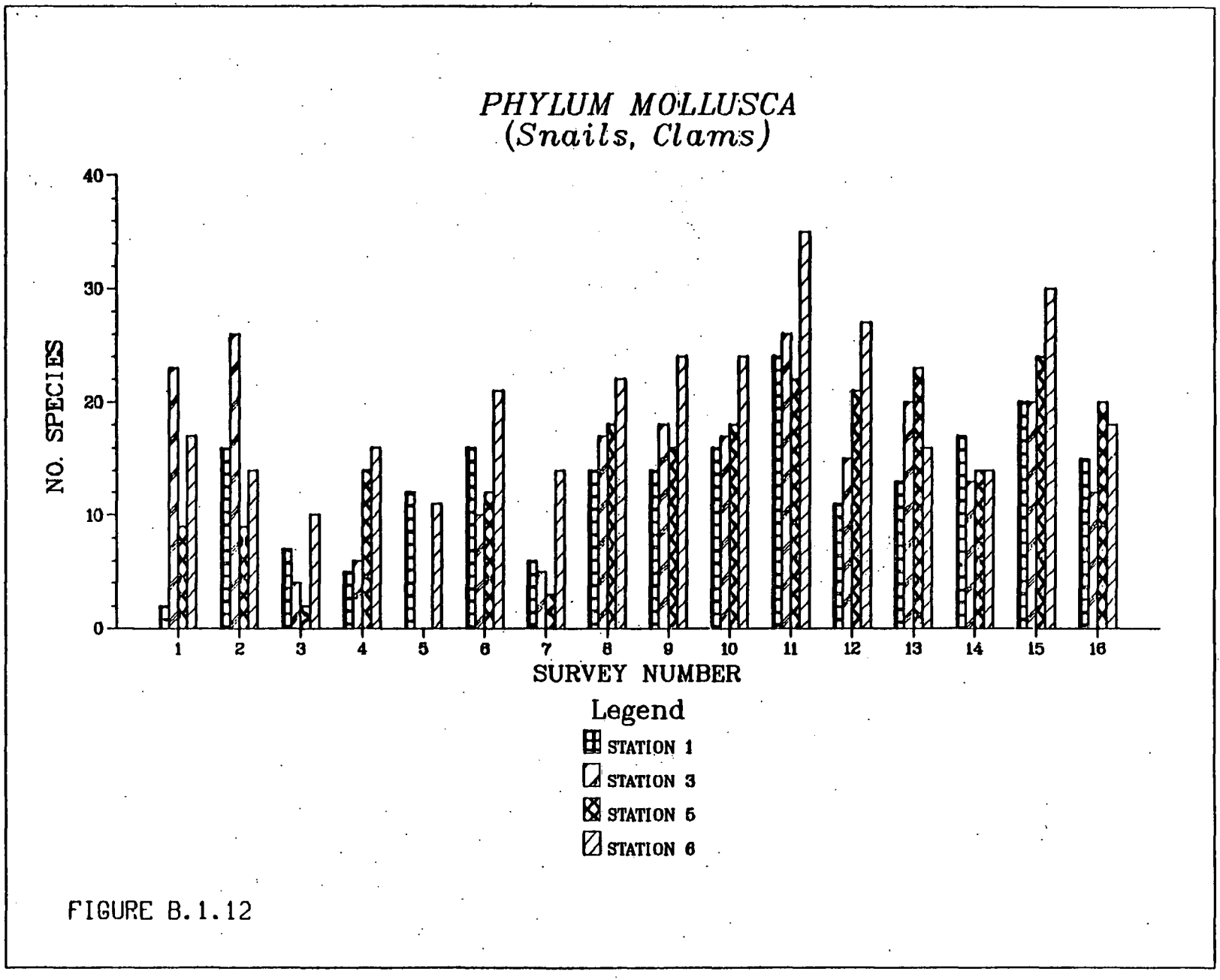

PHYLUM MOLLUSCA
(Snails, Clams)
NO. SPECIES
0
10
20
30
40
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
SURVEY NUMBER
Legend
STATION 1
STATION 3
STATION 5
STATION 6

FIGURE B.1.12

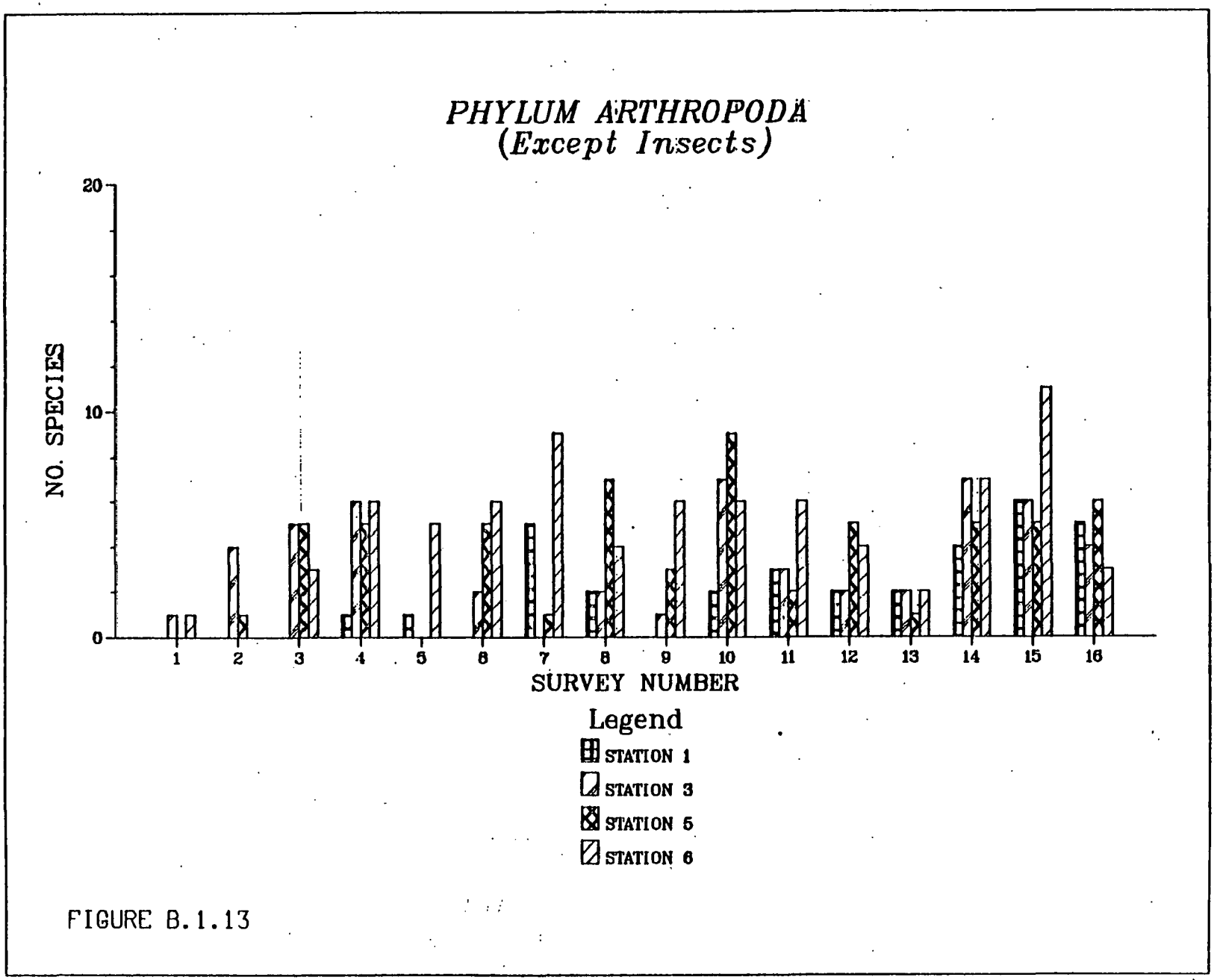

PHYLUM ARTHROPODA
(Except Insects)
NO. SPECIES
20
10
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
SURVEY NUMBER
Legend
STATION 1
STATION 3
STATION 5
STATION 6

FIGURE B.1.13

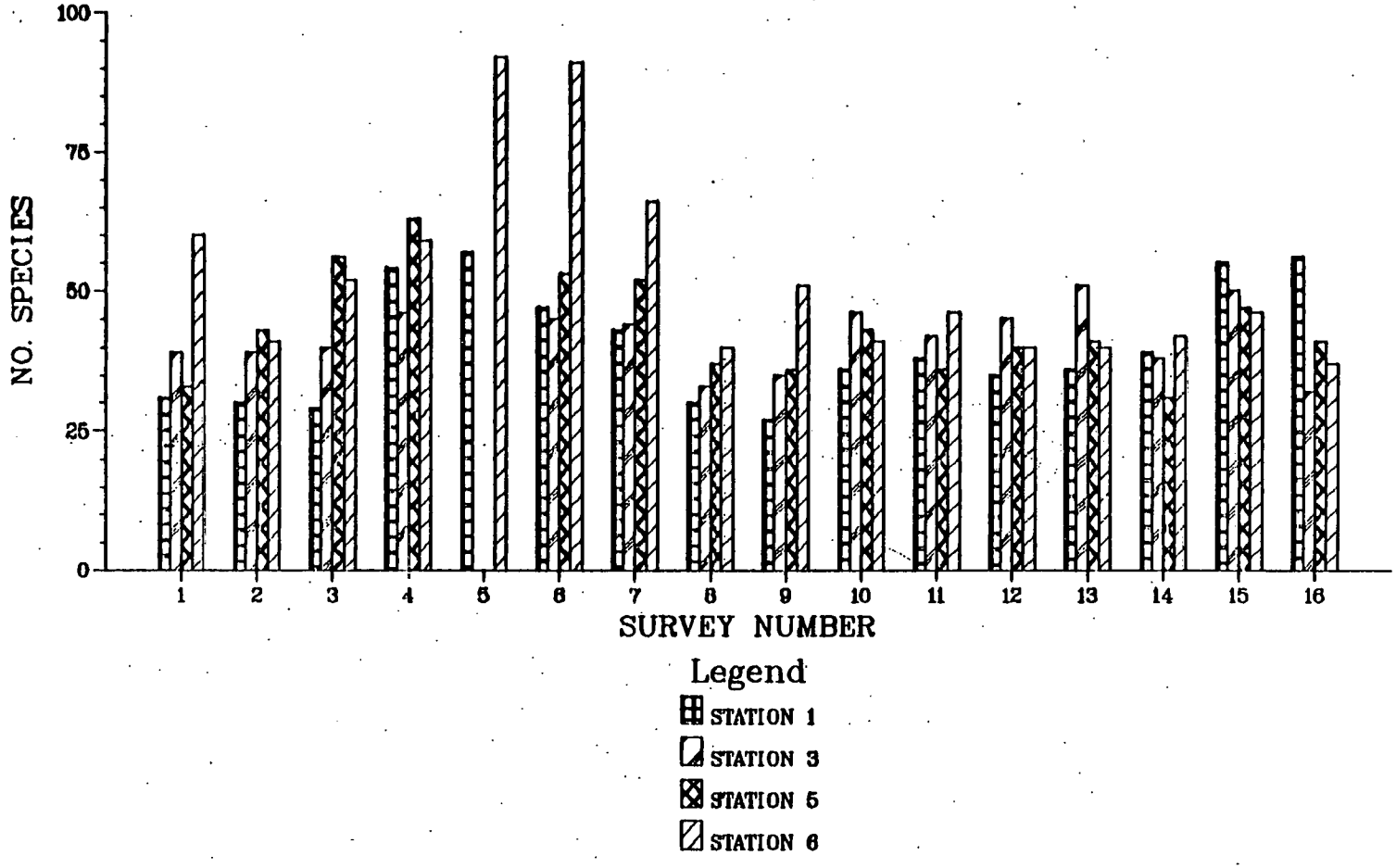

PHYLUM ARTHROPODA, CLASS INSECTA
NO. SPECIES
100
75
50
25
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
SURVEY NUMBER
Legend
STATION 1
STATION 3
STATION 5
STATION 6

FIGURE B.1.14

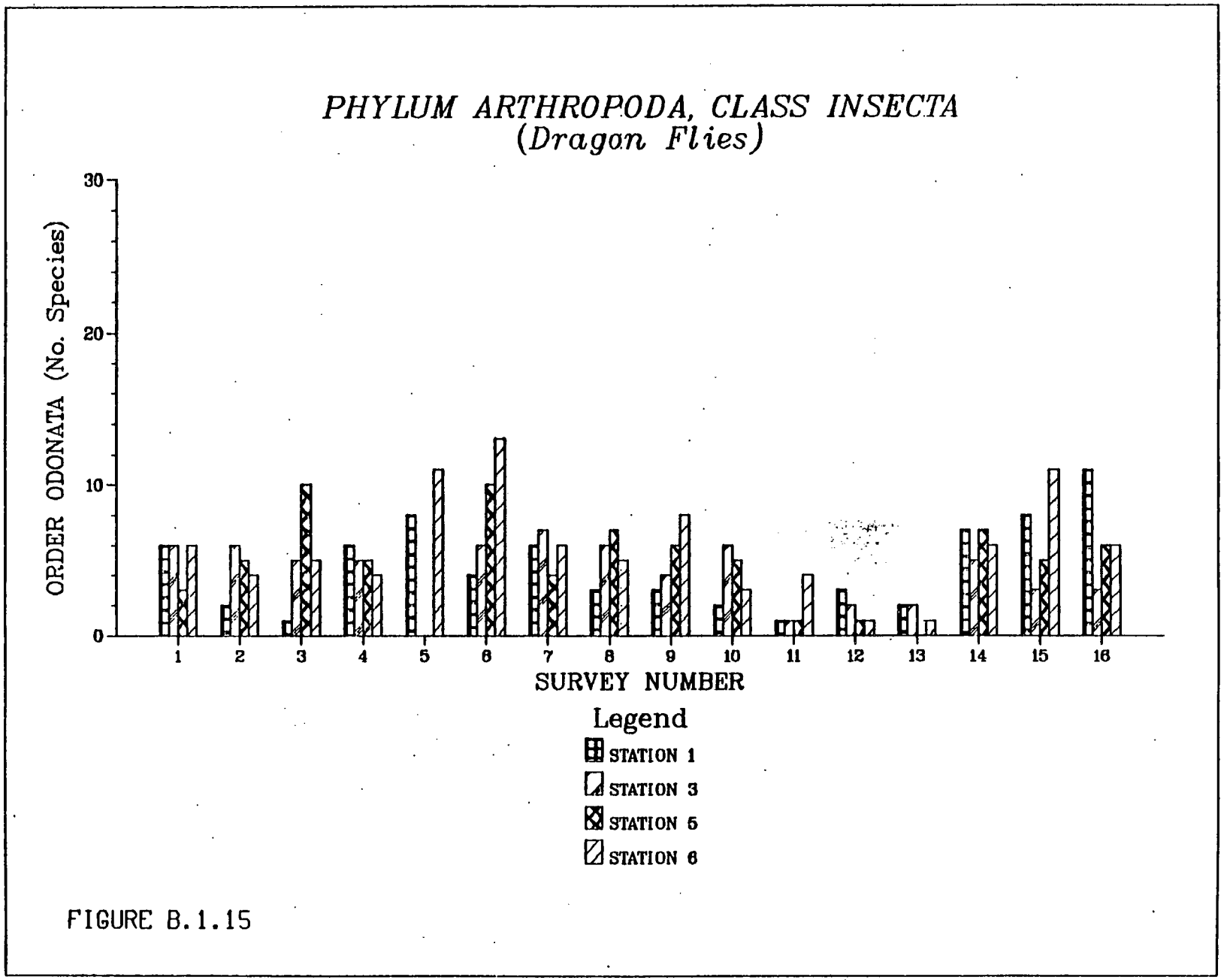

PHYLUM ARTHROPODA, CLASS INSECTA
(Dragon Flies)
ORDER ODONATA (No. Species)
30
20
10
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
SURVEY NUMBER
Legend
STATION 1
STATION 3
STATION 5
STATION 6

FIGURE B.1.15

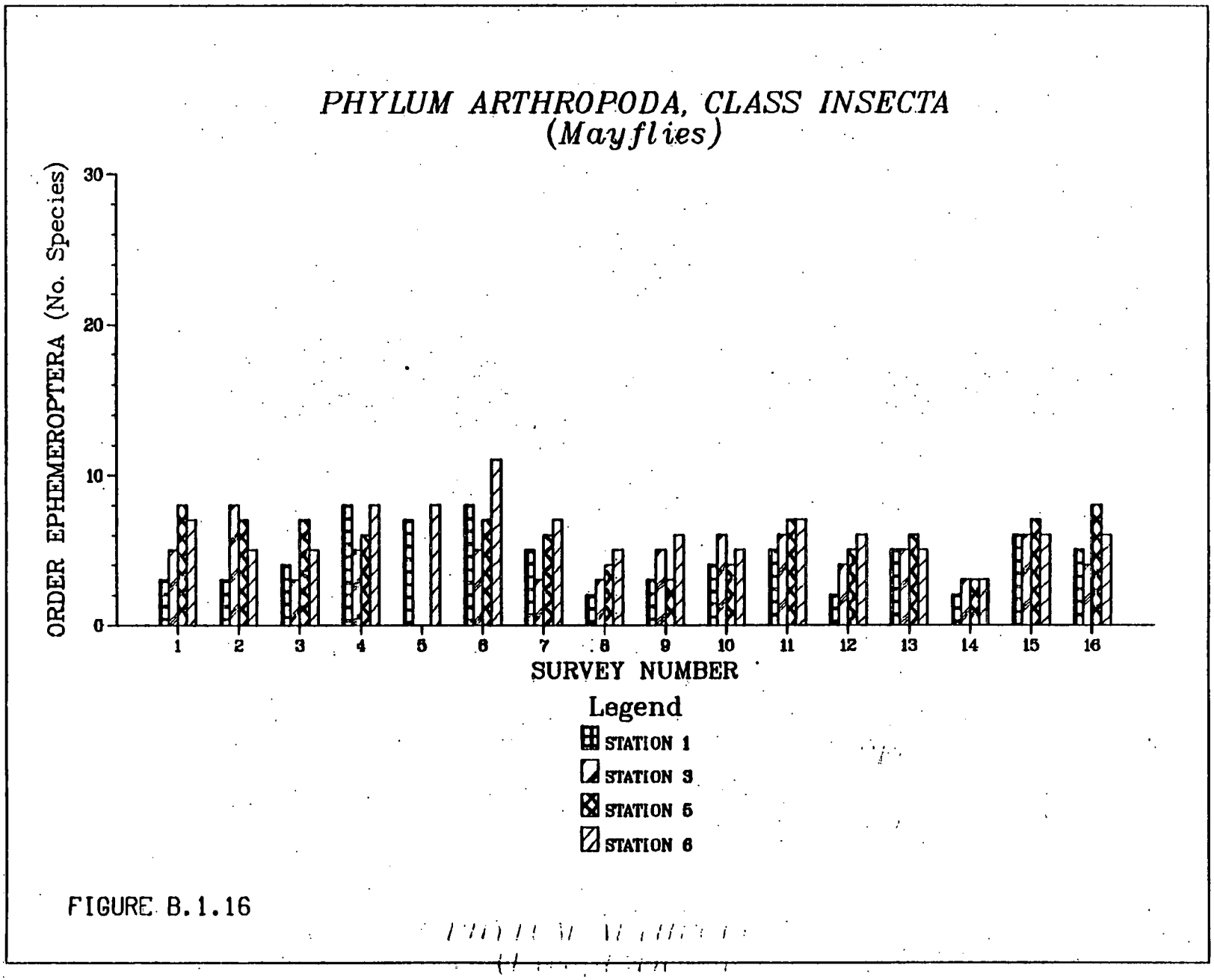

PHYLUM ARTHROPODA, CLASS INSECTA
(Mayflies)
ORDER EPHEMEROPTERA (No. Species)
30
20
10
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
SURVEY NUMBER
Legend
STATION 1
STATION 3
STATION 5
STATION 6

FIGURE B.1.16

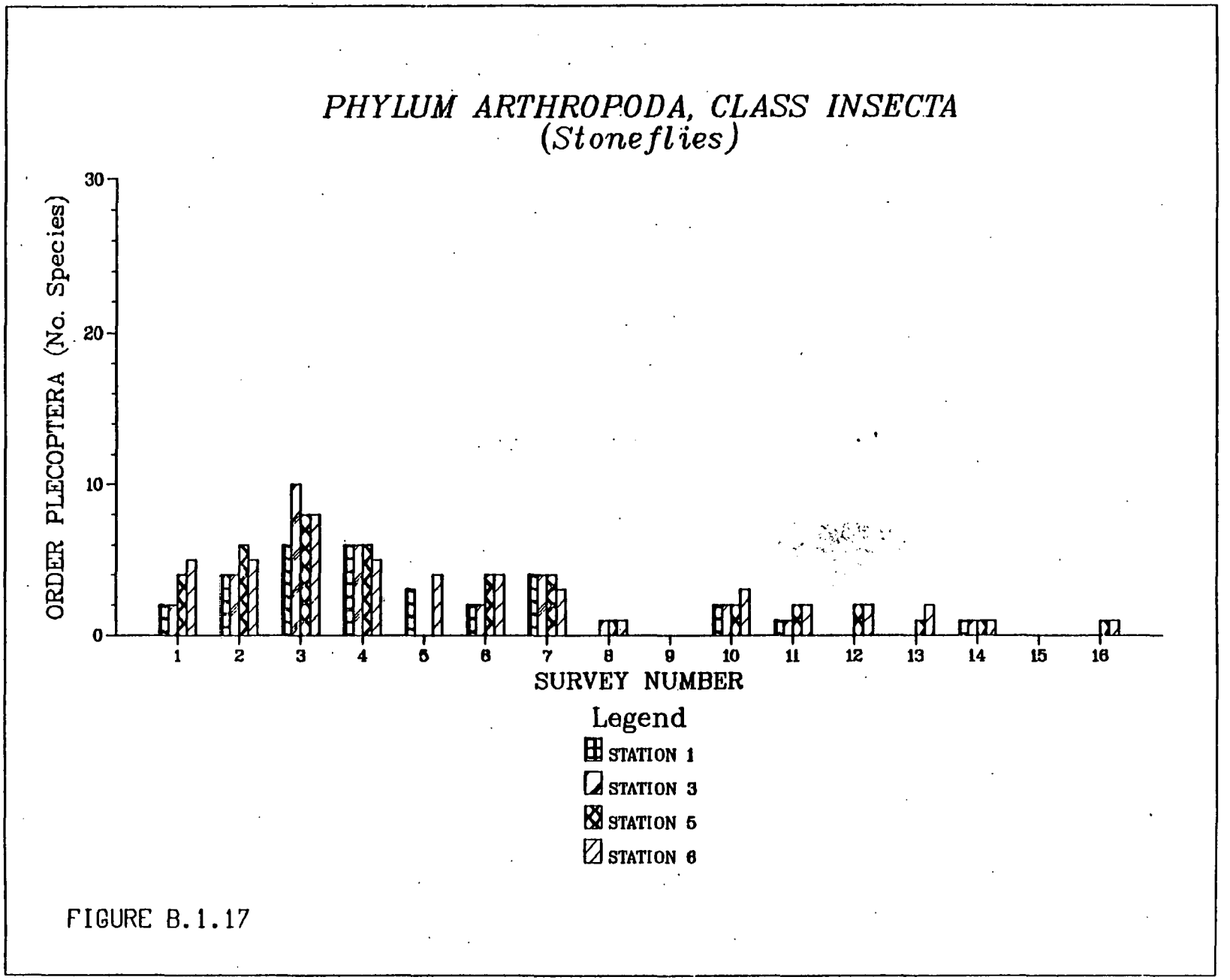

PHYLUM ARTHROPODA, CLASS INSECTA
(Stoneflies)
ORDER PLECOPTERA (No. Species)
30
20
10
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
SURVEY NUMBER
Legend
STATION 1
STATION 3
STATION 5
STATION 6

FIGURE B.1.17

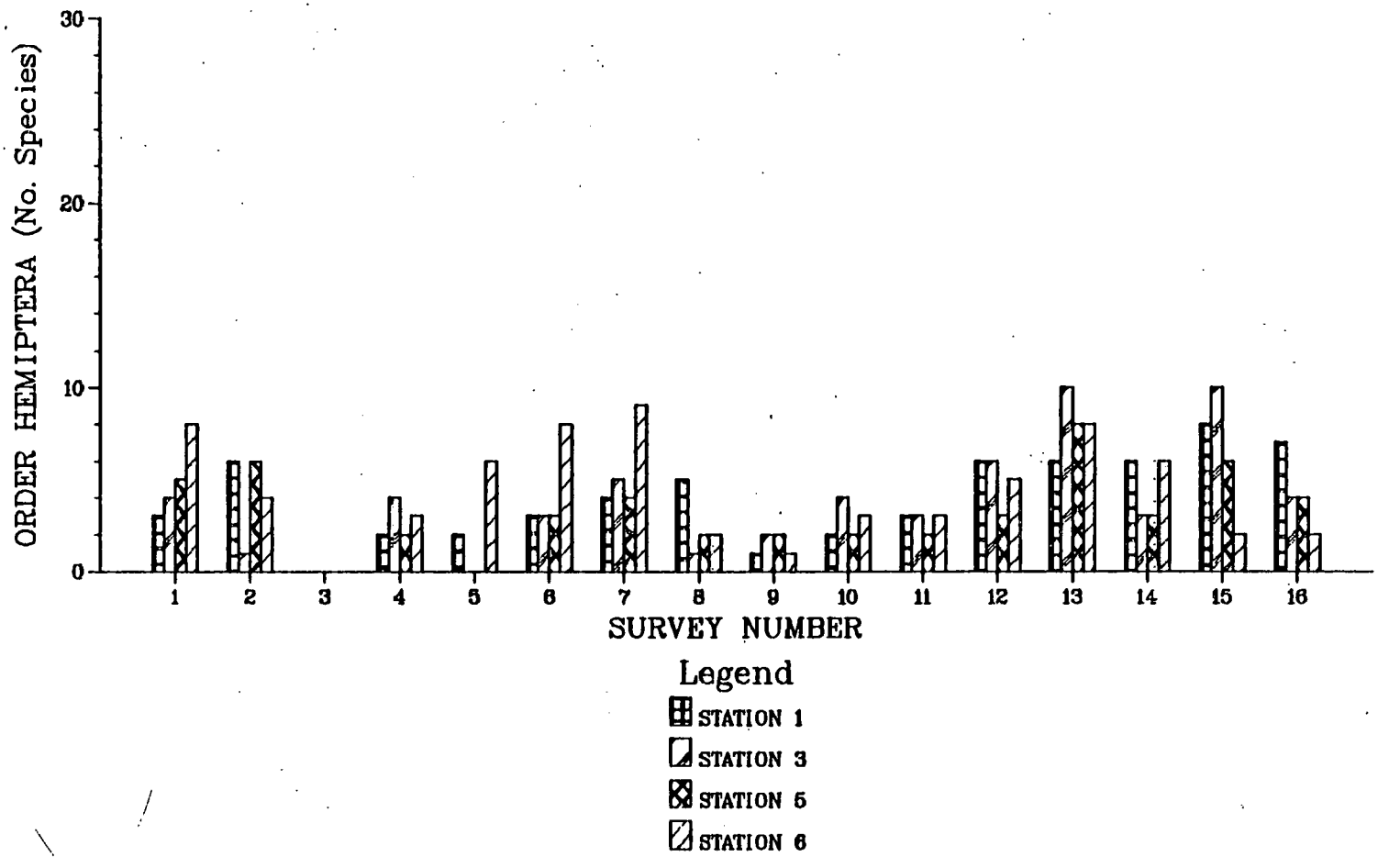

PHYLUM ARTHROPODA, CLASS INSECTA
(True Bugs)
ORDER HEMIPTERA (No. Species)
30
20
10
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
SURVEY NUMBER
Legend
STATION 1
STATION 3
STATION 5
STATION 6

FIGURE B.1.18

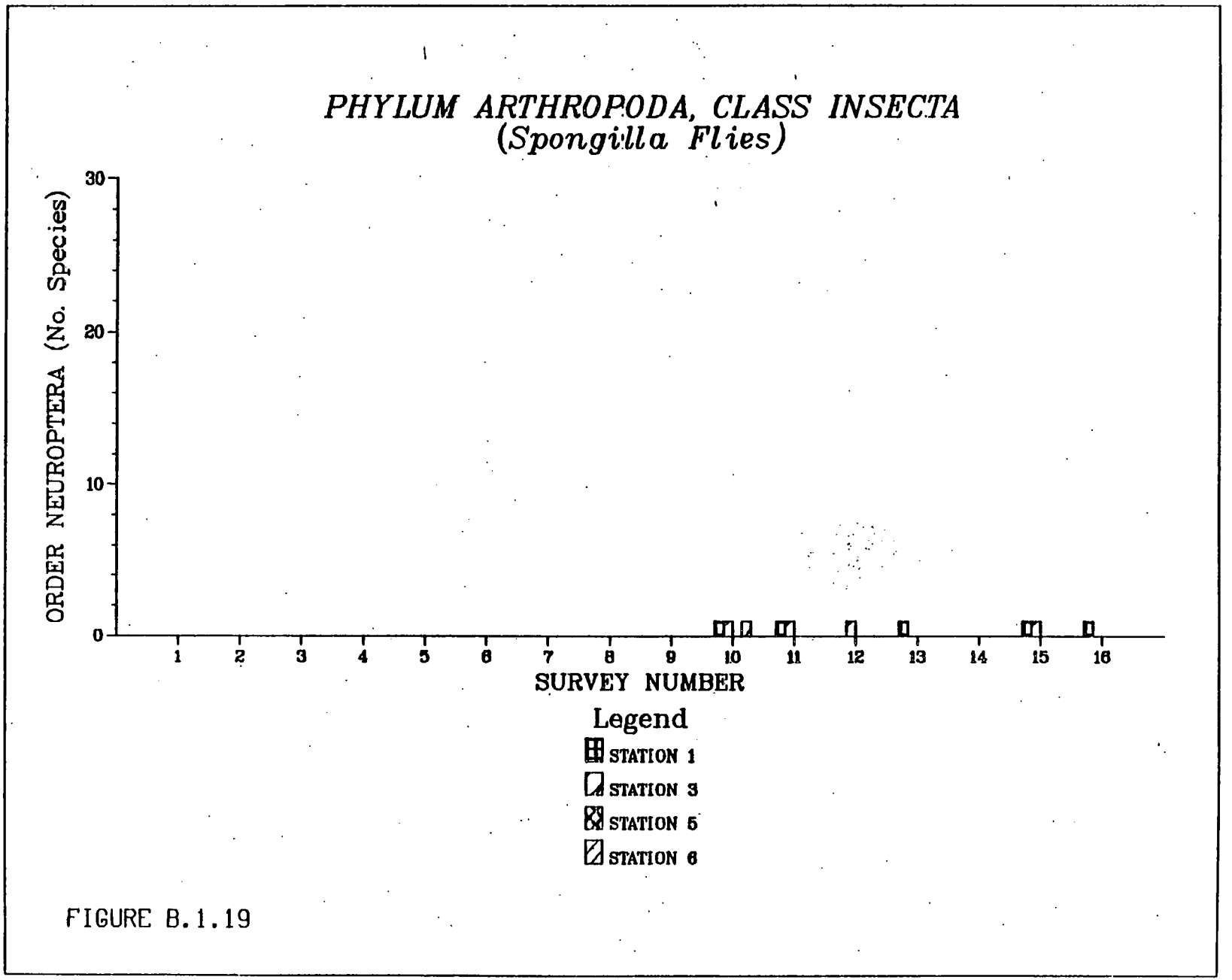

PHYLUM ARTHROPODA, CLASS INSECTA
(Spongilla Flies)
ORDER NEUROPTERA (No. Species)
30
20
10
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
SURVEY NUMBER
Legend
STATION 1
STATION 3
STATION 5
STATION 6

FIGURE B.1.19

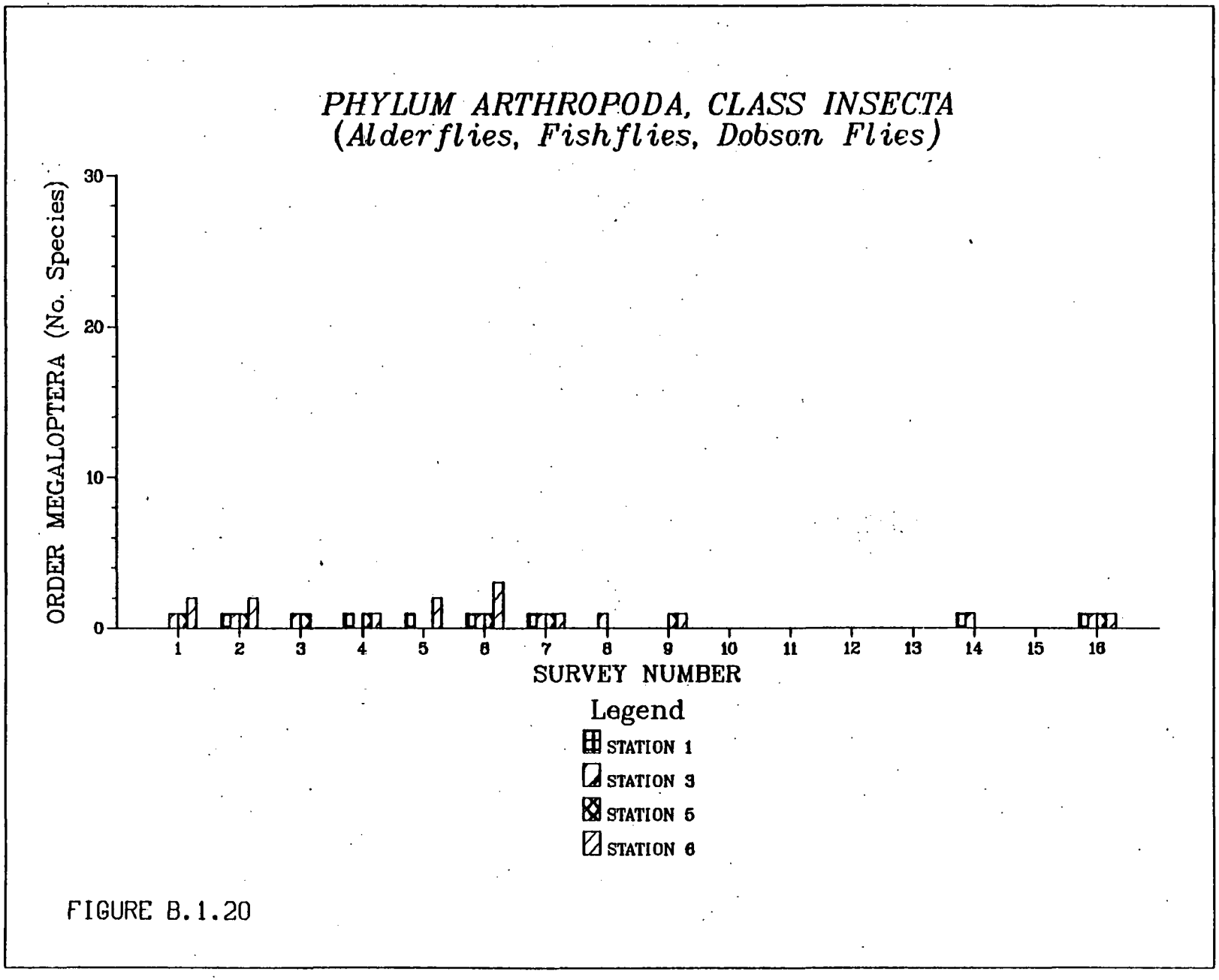

PHYLUM ARTHROPODA, CLASS INSECTA
(Alderflies, Fishflies, Dobson Flies)
ORDER MEGALOPTERA (No. Species)
30
20
10
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
SURVEY NUMBER
Legend
STATION 1
STATION 3
STATION 5
STATION 6

FIGURE B.1.20

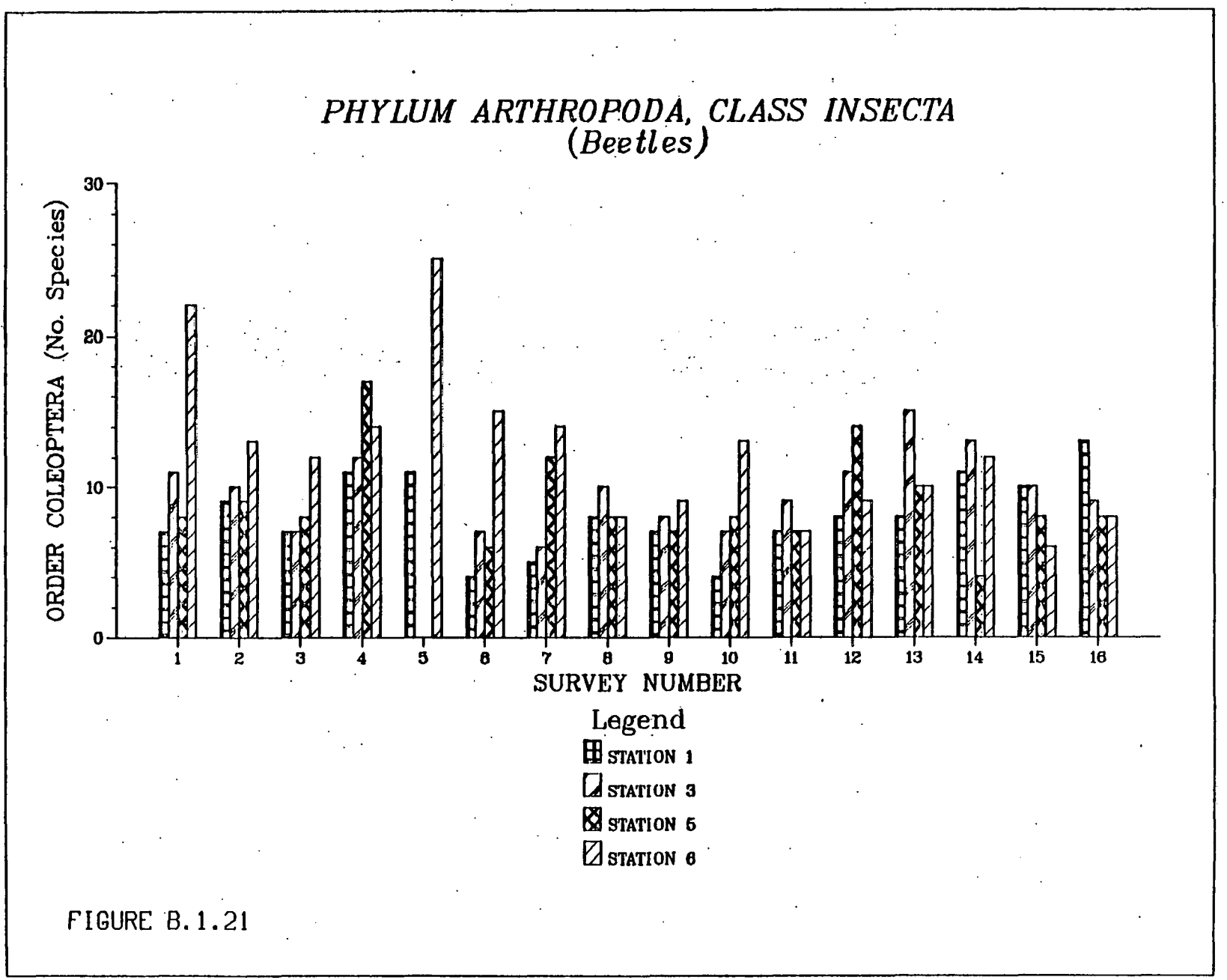

PHYLUM ARTHROPODA, CLASS INSECTA
(Beetles)
ORDER COLEOPTERA (No. Species)
30
20
10
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
SURVEY NUMBER
Legend
STATION 1
STATION 3
STATION 5
STATION 6

FIGURE B.1.21

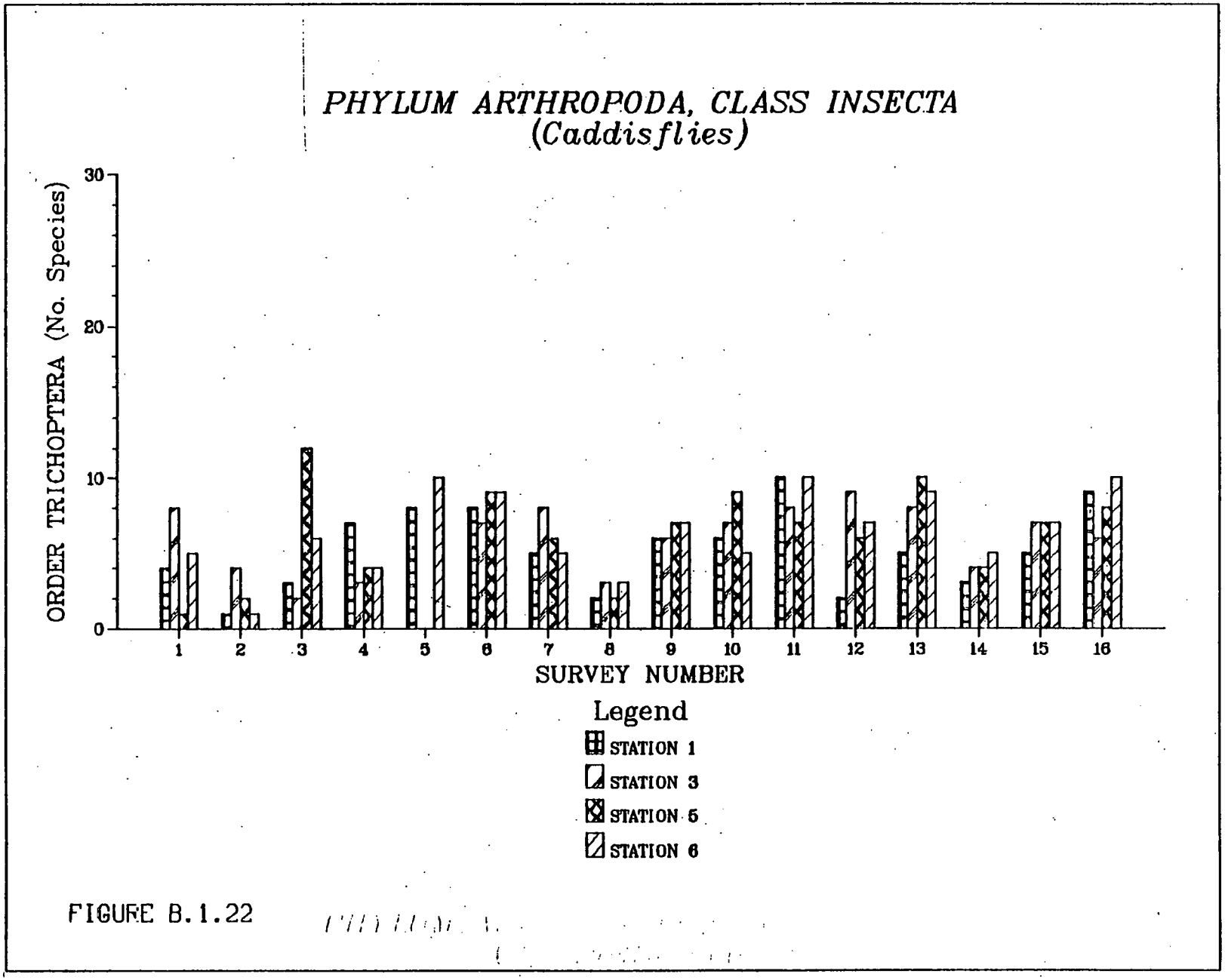

PHYLUM ARTHROPODA, CLASS INSECTA
(Caddisflies)
ORDER TRICHOPTERA (No. Species)
30
20
10
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
SURVEY NUMBER
Legend
STATION 1
STATION 3
STATION 5
STATION 6

FIGURE B.1.22

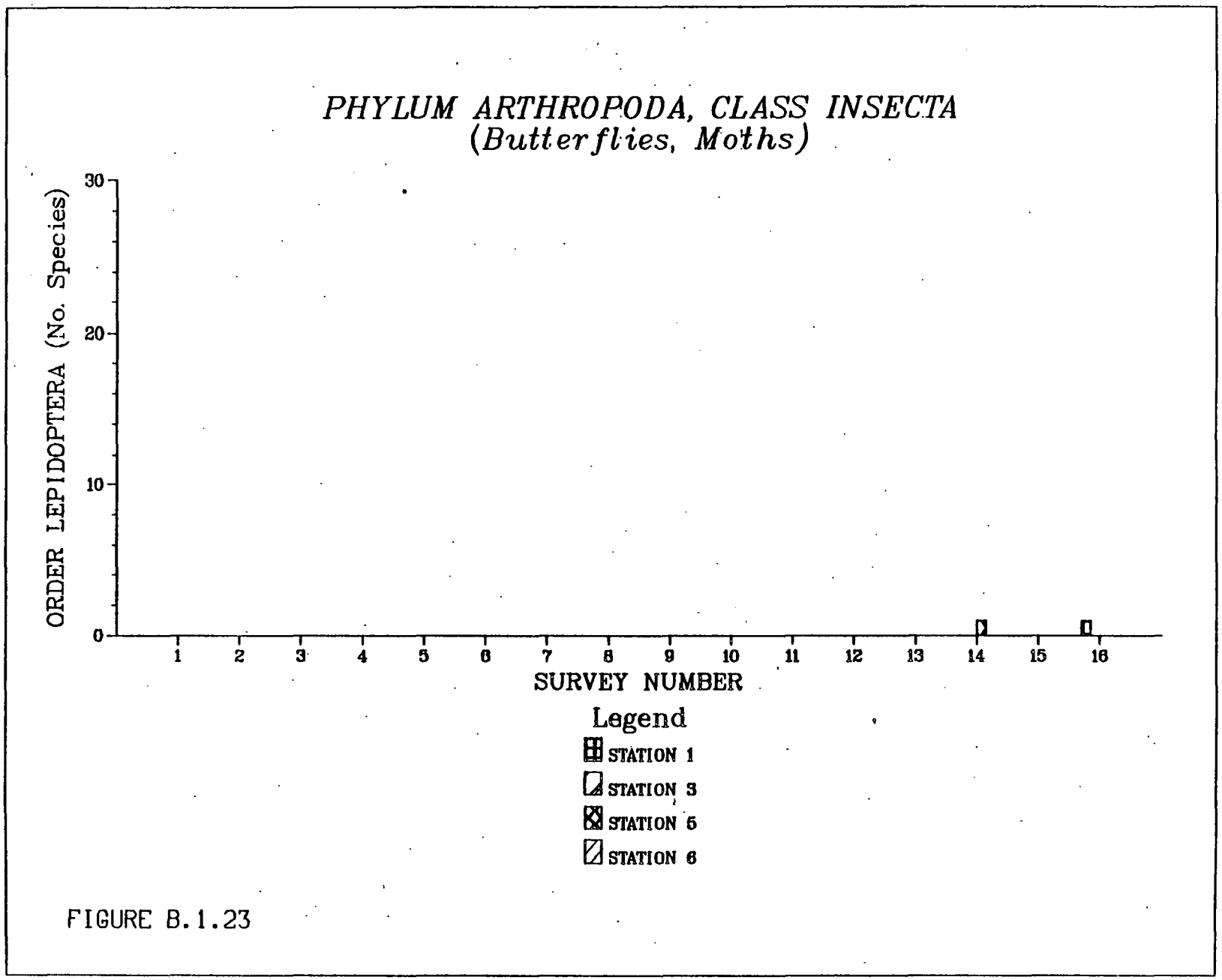

PHYLUM ARTHROPODA, CLASS INSECTA
(Butterflies, Moths)
ORDER LEPIDOPTERA (No. Species)
30
20
10
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
SURVEY NUMBER
Legend
STATION 1
STATION 3
STATION 5
STATION 6

FIGURE B.1.23

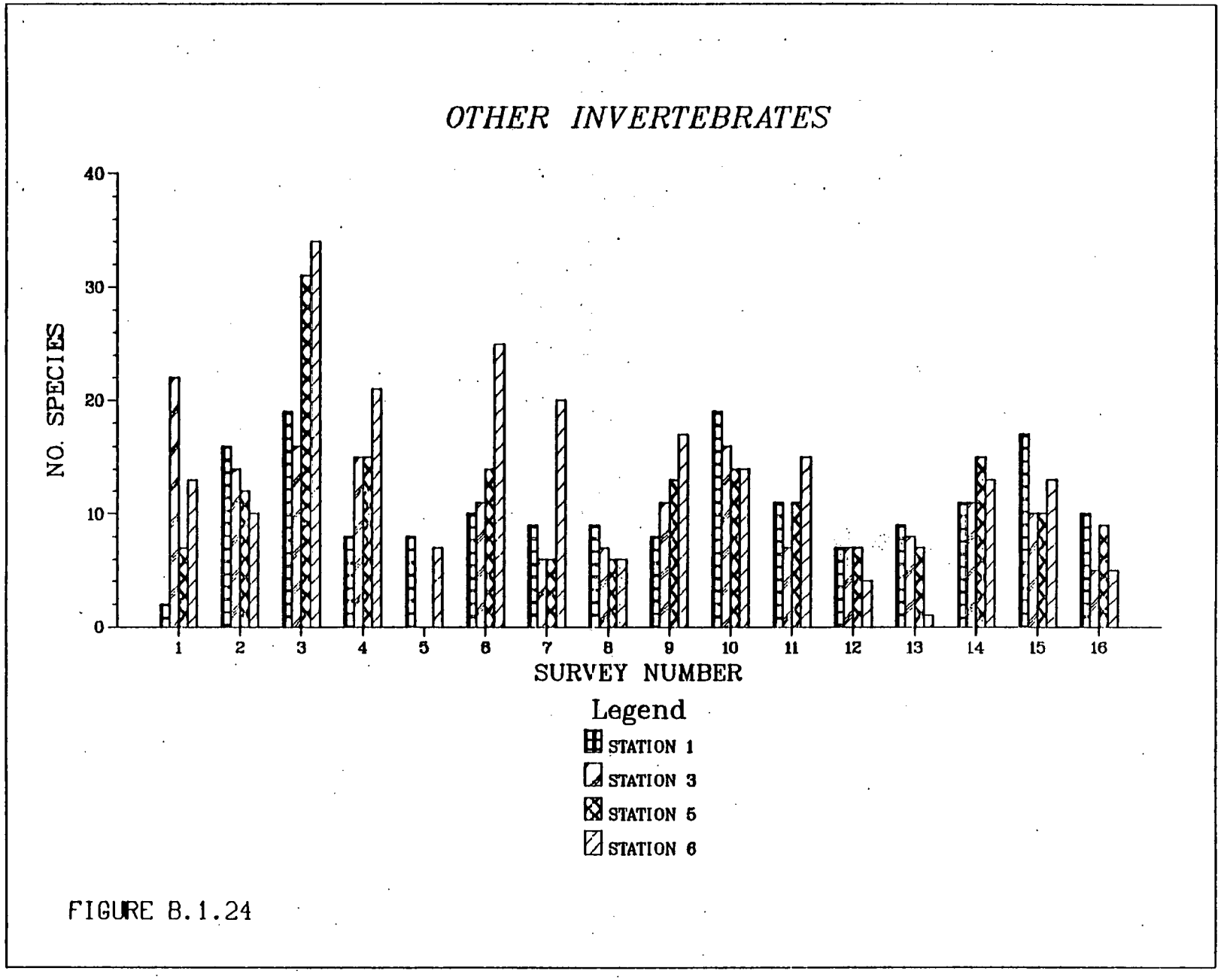

OTHER INVERTEBRATES
NO. SPECIES
0
10
20
30
40
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
SURVEY NUMBER
Legend
STATION 1
STATION 3
STATION 5
STATION 6

FIGURE B.1.24

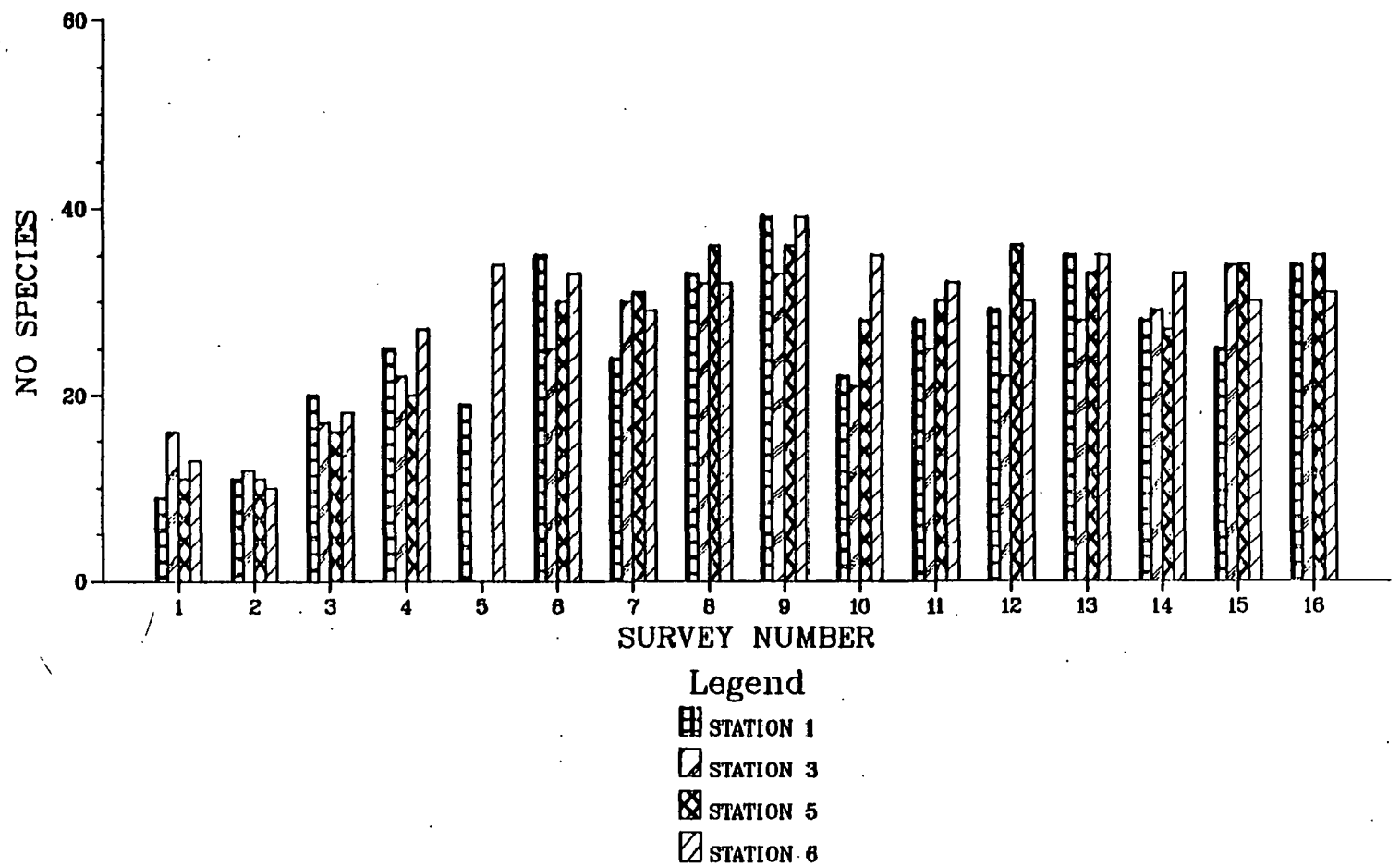

PHYLUM CHORDATA
(FISH)
NO SPECIES
60
40
20
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
SURVEY NUMBER
Legend
STATION 1
STATION 3
STATION 5
STATION 6

FIGURE B.1.25

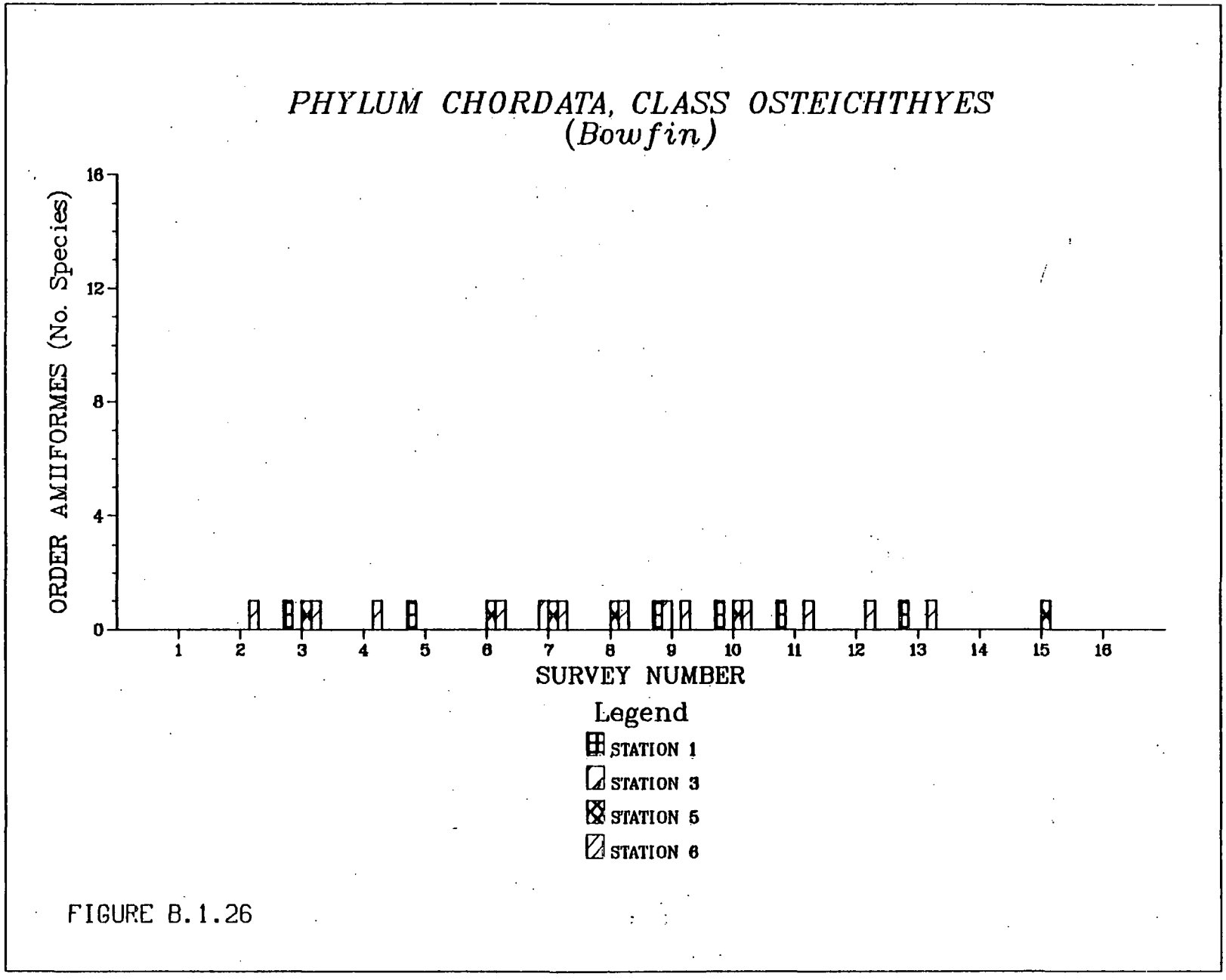

PHYLUM CHORDATA, CLASS OSTEICHTHYES
(Bowfin)
ORDER AMIIFORMES (No. Species)
16
12
8
4
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
SURVEY NUMBER
Legend
STATION 1
STATION 3
STATION 5
STATION 6

FIGURE B.1.26

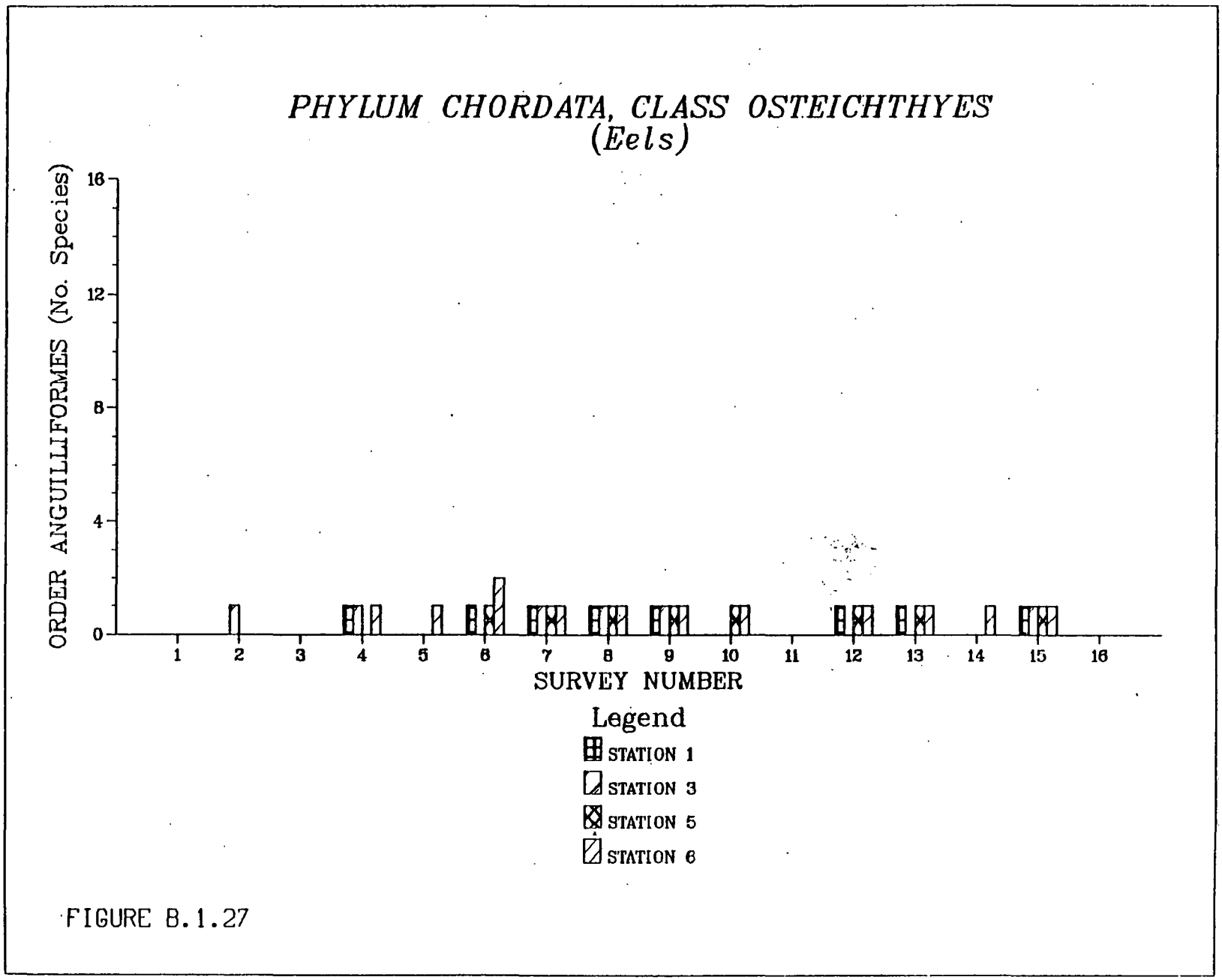

PHYLUM CHORDATA, CLASS OSTEICHTHYES
(Eels)
ORDER ANGUILLIFORMES (No. Species)
16
12
8
4
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
SURVEY NUMBER
Legend
STATION 1
STATION 3
STATION 5
STATION 6

FIGURE B.1.27

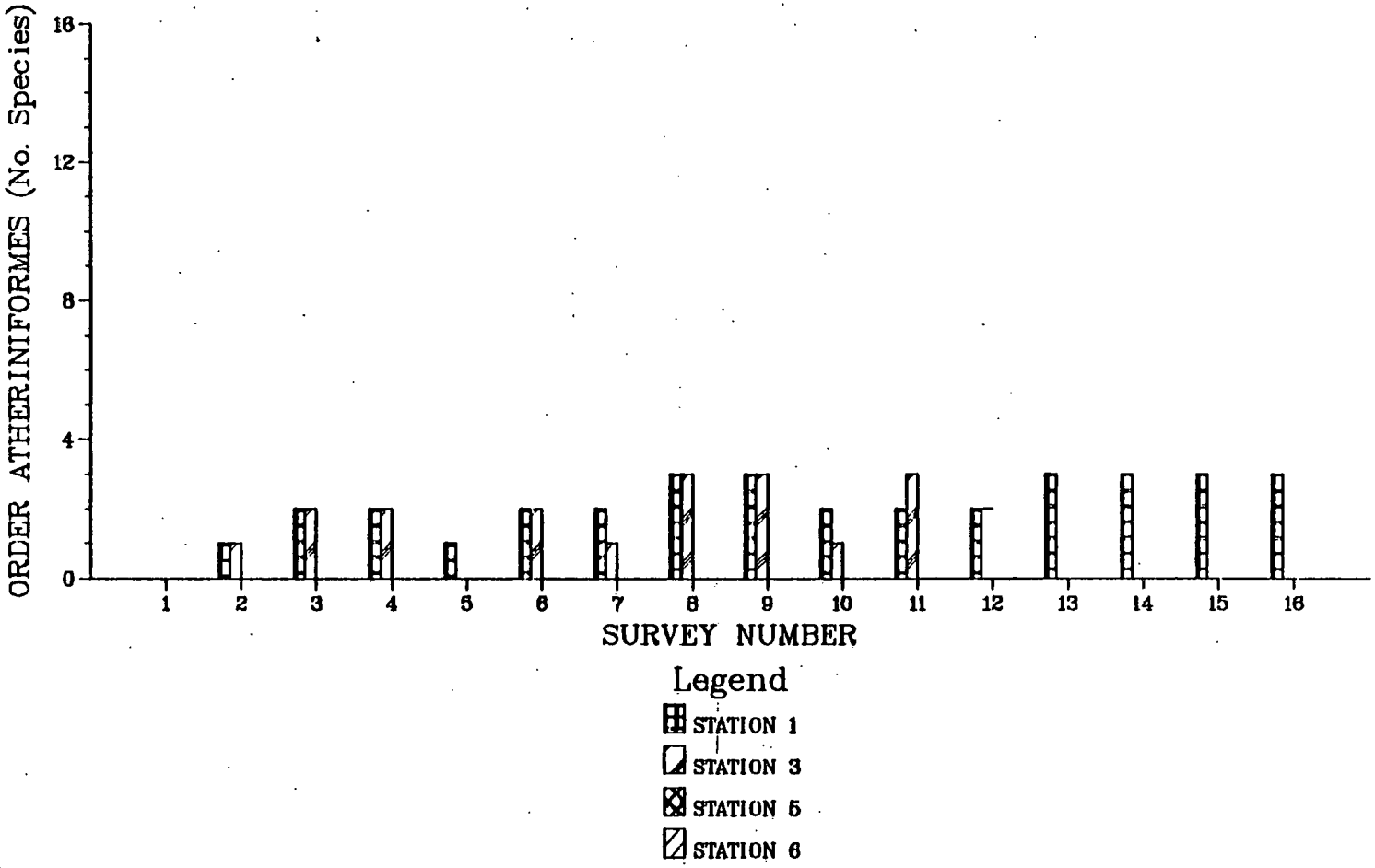

PHYLUM CHORDATA, CLASS OSTEICHTHYES
(Silversides)
ORDER ATHERINIFORMES (No. Species)
16
12
8
4
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
SURVEY NUMBER
Legend
STATION 1
STATION 3
STATION 5
STATION 6

FIGURE B.1.28

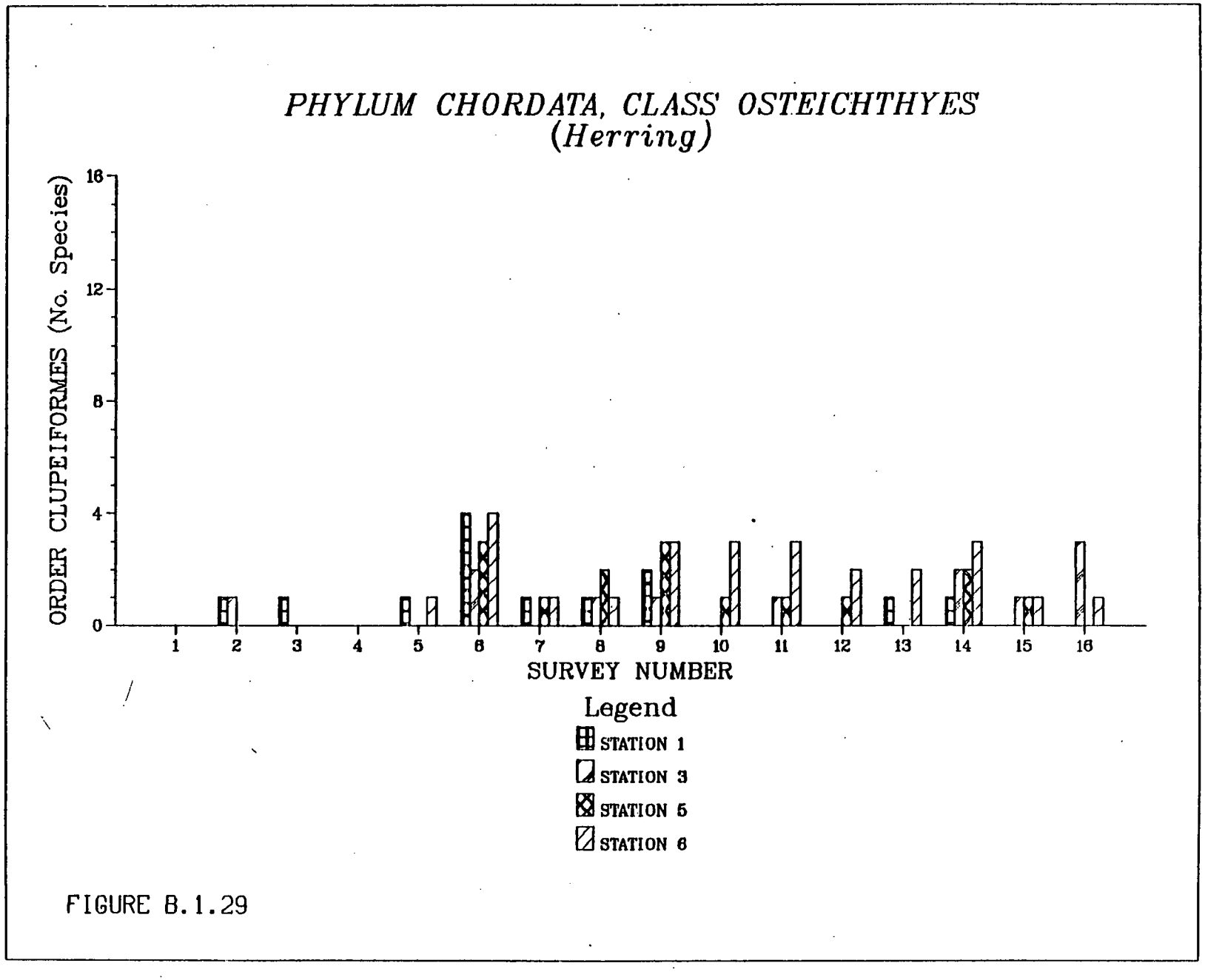

PHYLUM CHORDATA, CLASS OSTEICHTHYES
(Herring)
ORDER CLUPEIFORMES (No. Species)
16
12
8
4
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
SURVEY NUMBER
Legend
STATION 1
STATION 3
STATION 5
STATION 6

FIGURE B.1.29

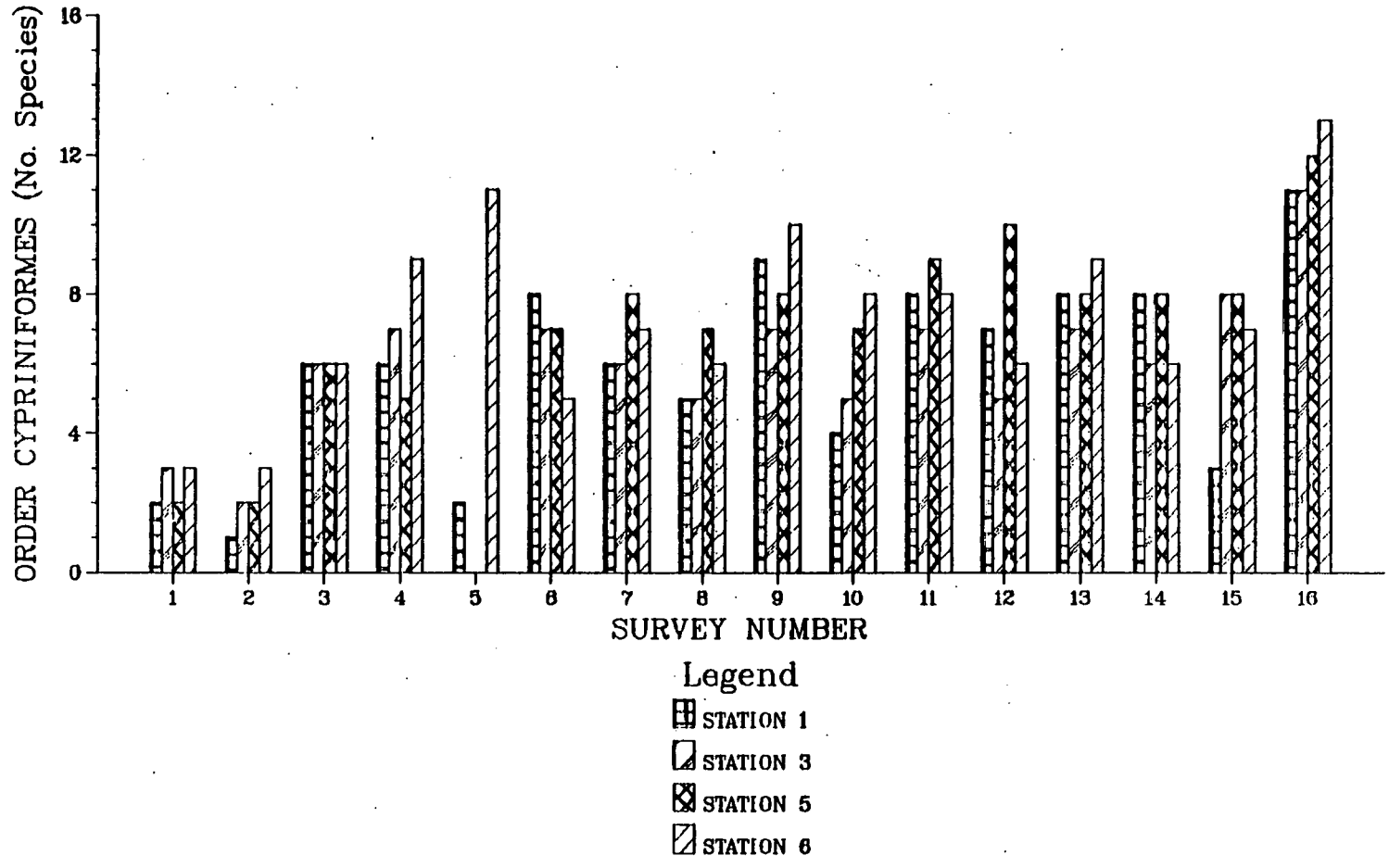

PHYLUM CHORDATA, CLASS OSTEICHTHYES
(Suckers, Minnows)
ORDER CYPRINIFORMES (No. Species)
0
4
8
12
16
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
SURVEY NUMBER
Legend
STATION 1
STATION 3
STATION 5
STATION 6

FIGURE B.1.30

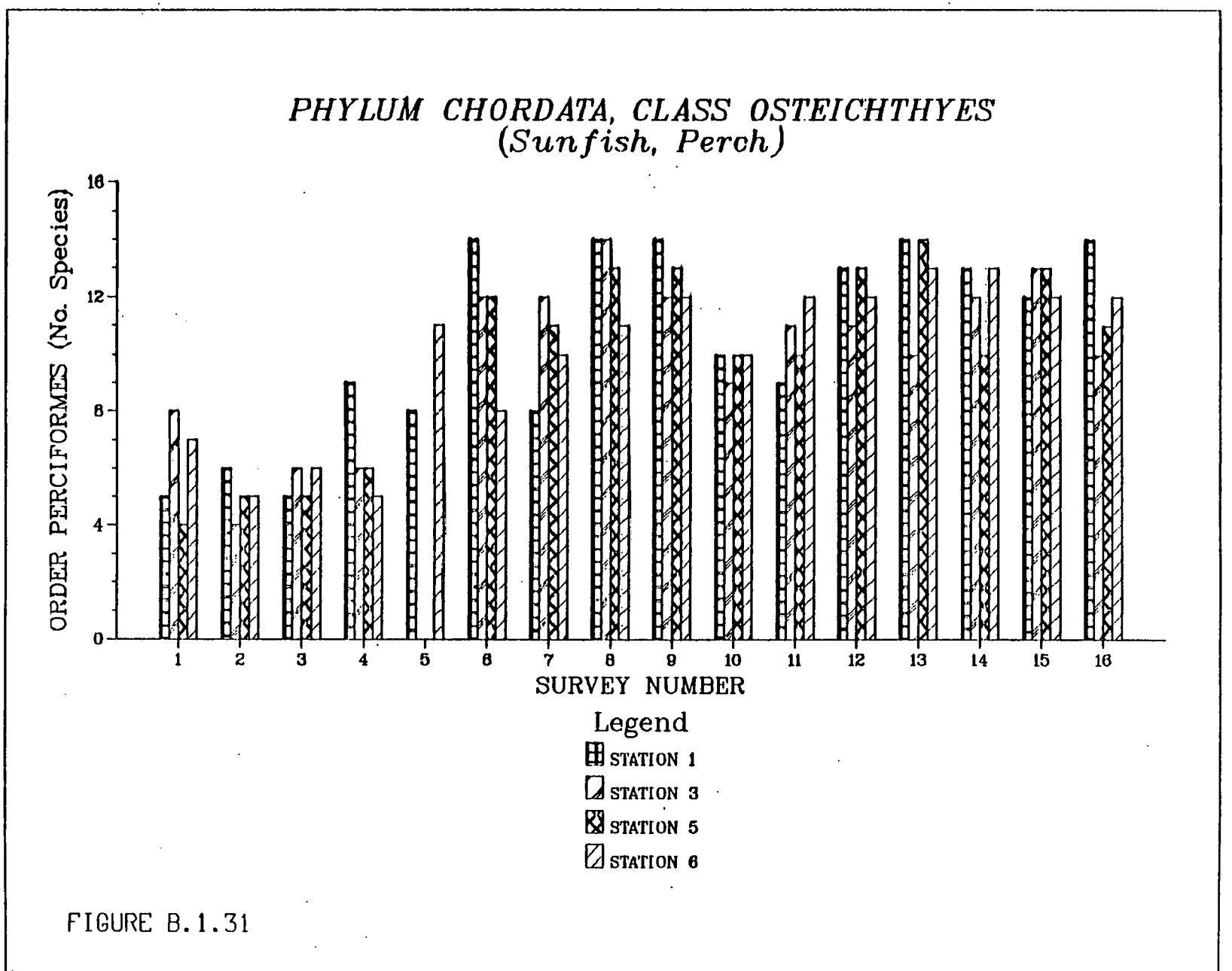

PHYLUM CHORDATA, CLASS OSTEICHTHYES
(Sunfish, Perch)
ORDER PERCIFORMES (No. Species)
0
4
8
12
16
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
SURVEY NUMBER
Legend
STATION 1
STATION 3
STATION 5
STATION 6

FIGURE B.1.31

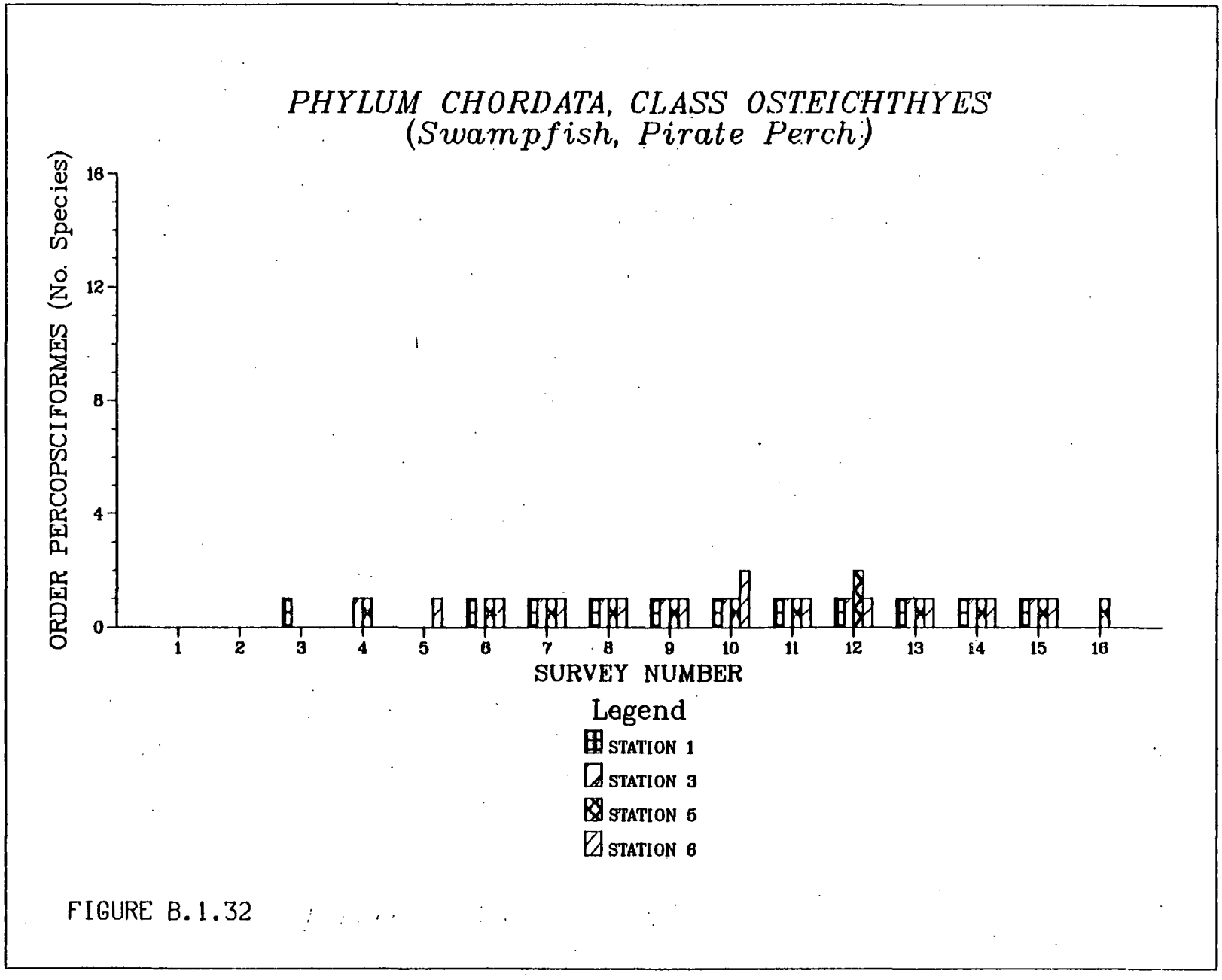

PHYLUM CHORDATA, CLASS OSTEICHTHYES
(Swampfish, Pirate Perch)
ORDER PERCOPSCIFORMES (No. Species)
16
12
8
4
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
SURVEY NUMBER
Legend
STATION 1
STATION 3
STATION 5
STATION 6

FIGURE B.1.32

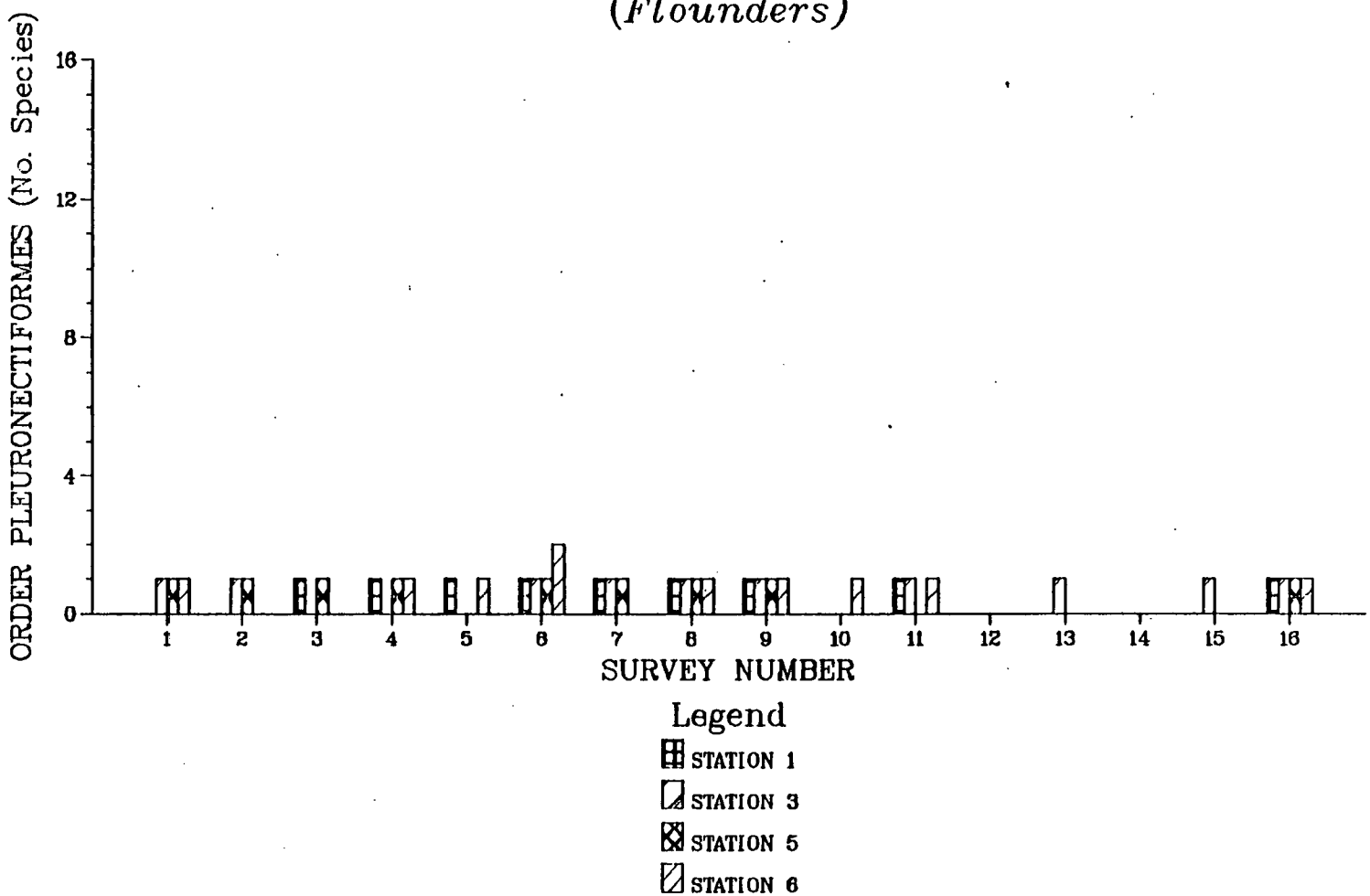

PHYLUM CHORDATA, CLASS OSTEICHTHYES
(Flounders)
ORDER PLEURONECTIFORMES (No. Species)
16
12
8
4
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
SURVEY NUMBER
Legend
STATION 1
STATION 3
STATION 5
STATION 6

FIGURE B.1.33

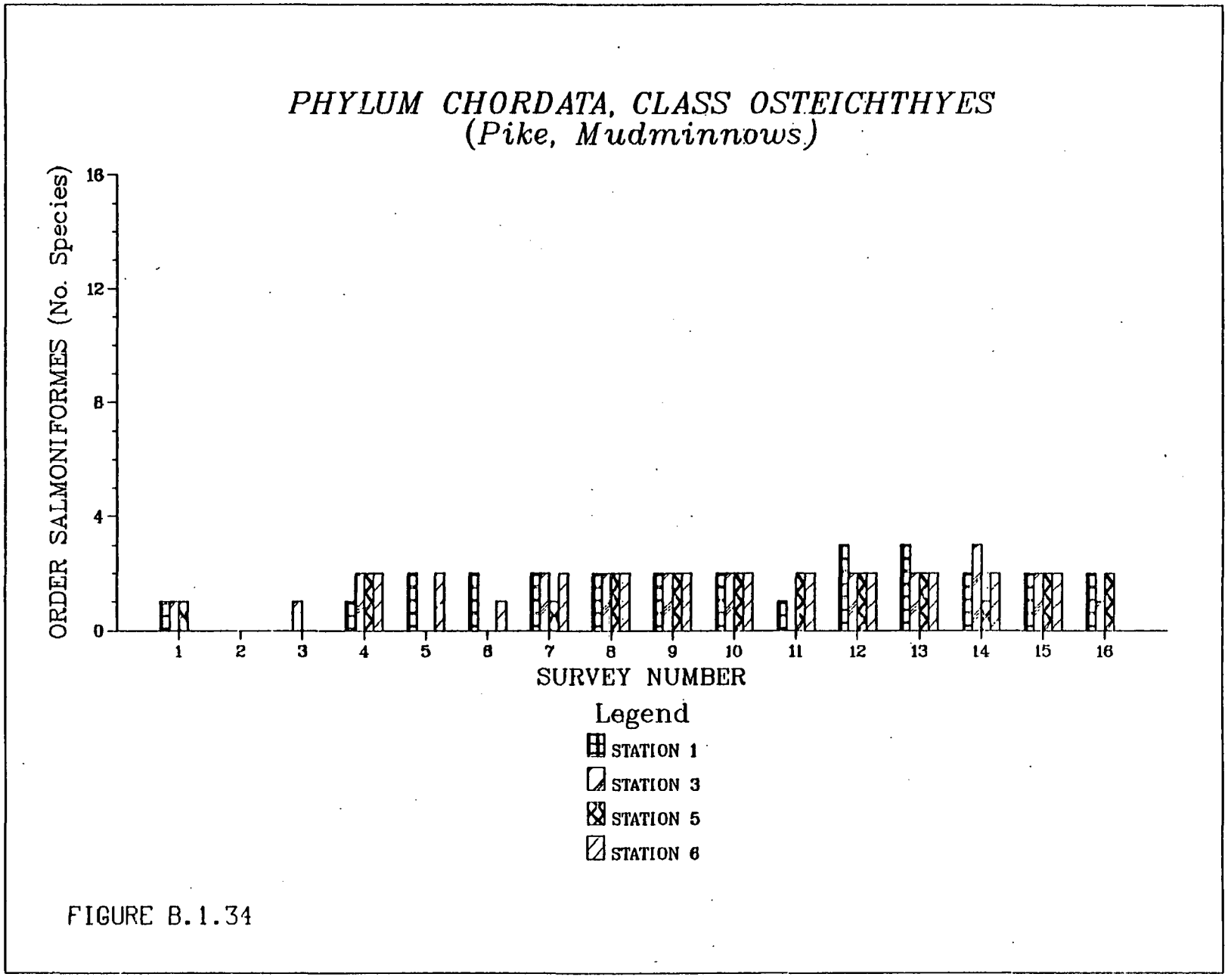

PHYLUM CHORDATA, CLASS OSTEICHTHYES
(Pike, Mudminnows)
ORDER SALMONIFORMES (No. Species)
0
4
8
12
16
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
SURVEY NUMBER
Legend
STATION 1
STATION 3
STATION 5
STATION 6

FIGURE B.1.34

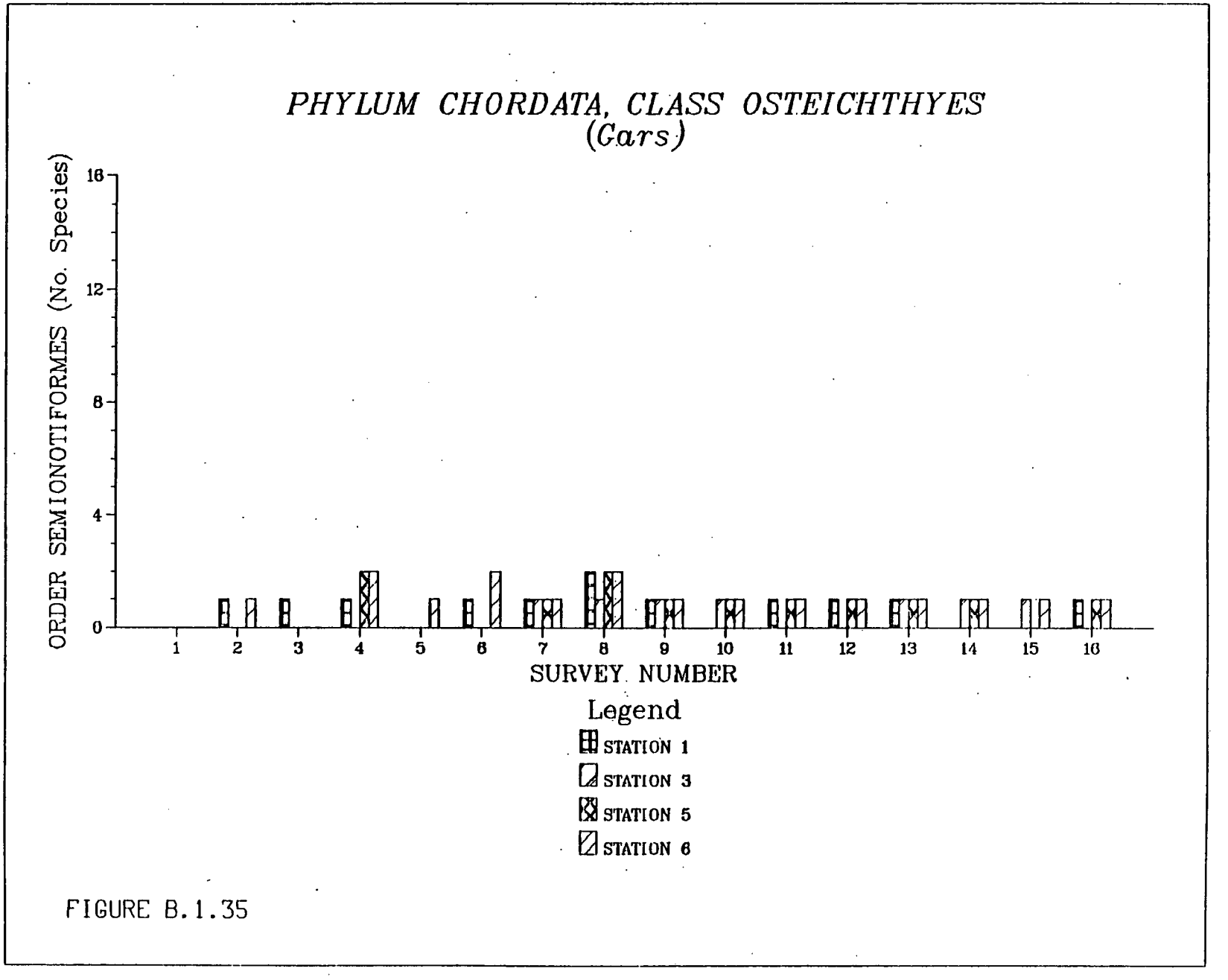

PHYLUM CHORDATA, CLASS OSTEICHTHYES
(Gars)
ORDER SEMIONOTIFORMES (No. Species)
16
12
8
4
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
SURVEY NUMBER
Legend
STATION 1
STATION 3
STATION 5
STATION 6

FIGURE B.1.35

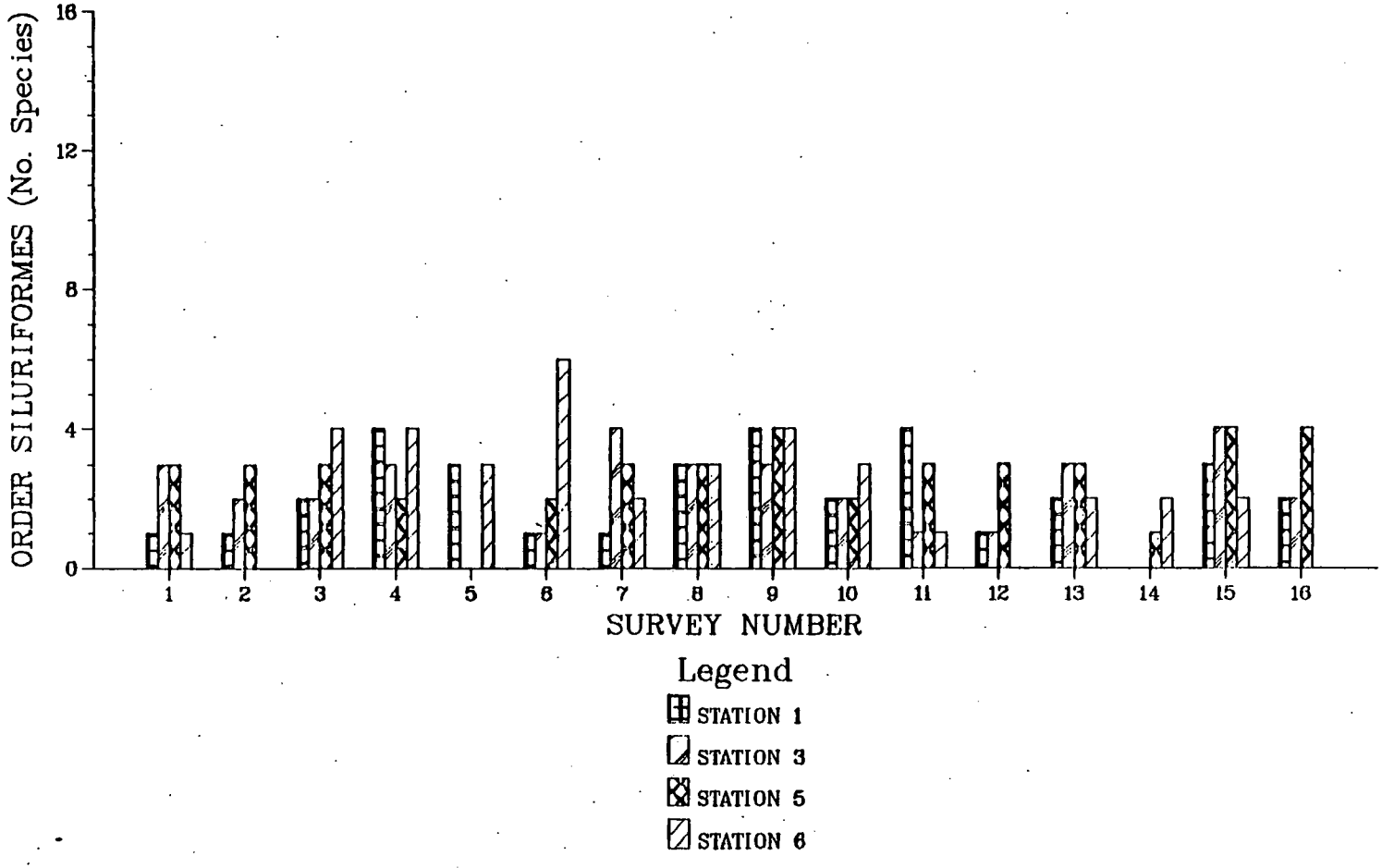

PHYLUM CHORDATA, CLASS OSTEICHTHYES
(Catfish)
ORDER SILURIFORMES (No. Species)
0
4
8
12
16
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
SURVEY NUMBER
Legend
STATION 1
STATION 3
STATION 5
STATION 6

FIGURE B.1.36

B.2. Sample Presence/Absence Data for Two Diatom Species

A complete Presence/Absence list is available for each biological organism identified during the surveys. This list is quite extensive. Two representative species from the diatom genus, Gomphonema, have been chosen to show the general format:

G. parvulum Kutz.

Survey 1 Station 1,3,5,6
Survey 2 Station 1,3,5,6
Survey 3 Station 1,3,5,6
Survey 4 Station 1,3,5,6
Survey 5 Station 1,6
Survey 6 Station 1,3,5,6
Survey 7 Station 1,3,5,6
Survey 8 Station 1,3,5,6
Survey 9 Station 1,3,5,6
Survey 10 Station 1,3,5,6
Survey 11 Station 1,3,5,6
Survey 12 Station 1,3,5,6
Survey 13 Station 1,3,5,6
Survey 14 Station 1,3,5,6
Survey 15 Station 1,3,5,6
Survey 16 Station 1,3,5,6

G. truncatum v. capitatum (Ehr.) Patr.

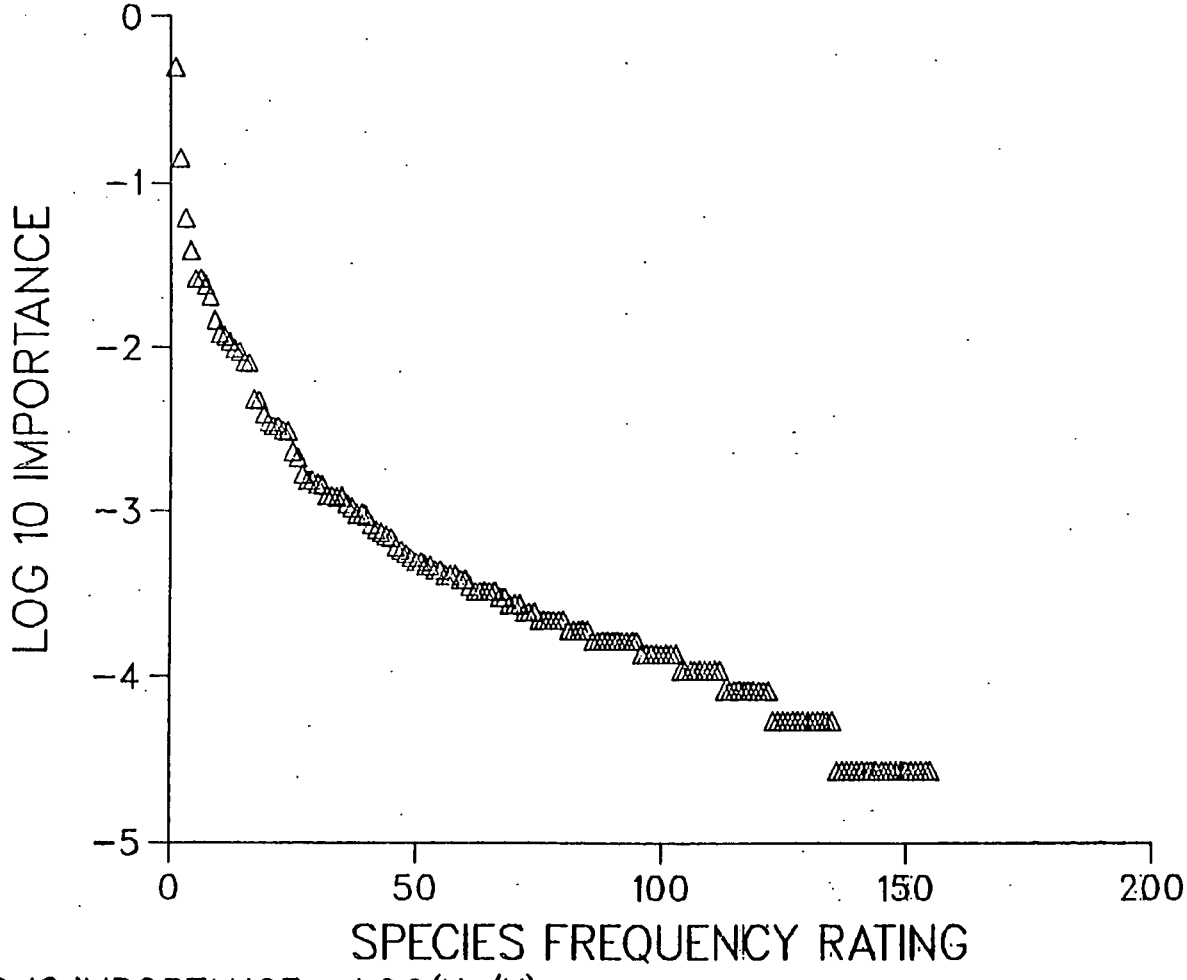
Survey 7 Station 1,
Survey 8 Station 1,5

These data indicate that Gomphonema parvulum was present during all the surveys, at nearly all stations. By contrast, G. truncatum v. capitatum was rarely encountered.

B.3. Sample Diatometer Data

One way to format the diatometer frequency data is to graph species frequency distributions for each station by survey. Two examples of this type of format are shown in Figures B.3.1 and B.3.2. These figures reflect two different community dominance patterns. Figure B.3.1 indicates that the diatom community was dominated by Gomphonema parvulum, which represented about 50 percent of the total number of individuals counted. Figure B.3.2 shows a diatom community that contains several dominant species, none of which have frequencies greater than about 12 percent.

FIGURE B.3.1 DIATOMETER FREQUENCY DISTRIBUTION STATION 1 (FALL,1953)



LOG 10 IMPORTANCE = LOG(N_i/N)
WHERE N_i = DIATOM COUNT AT INDEX i, N=TOTAL DIATOM COUNT

FIGURE B.3.1. Diatometer Frequency Distribution at Station 1 (Fall 1953)

SPECIES FREQUENCY RATING		% OF TOTAL DIATOM COUNT
1	Gomphonema parvulum Kutz	50.0780
2	G. intermedia Grun	14.0500
3	Melosira varians Ag	6.1164
4	Synedra rumpens Kutz	3.9408
5	Gomphonema grunowii Patr	2.6600
6	Synedra socia Wall	2.6600
7	S.ulna (Nitz.) Ehr	2.4247
8	S.minuscula Grun	2.0689
9	Fragilaria vaucheriae (Kutz.) Peters	1.4778
10	Melosira alpigena Grun	1.2288
11	Cymbella minuta Hilse ex Rabh	1.1740
12	Synedra familiaris (Kutz.) Hust	1.0837
13	S.meneghiniana Grun	.9852
14	Frustulia rhomboides (Ehr.) DeT	.9469
15	Cyclotella stelligera Cl. & Grun	.8237
16	Navicula nr. canalis Patr	.8073
17	Synedra scotica Grun	.4926
18	Tabellaria flocculosa (Roth) Kutz	.4789
19	Gomphonema gracile Ehr. emend. V. H	.3941
20	Eunotia naegelii Migula	.3503
21	Melosira angustissima Mull	.3284
22	Navicula lateropunctata Wallace	.3284
23	Cymbella affinis Kutz	.3092
24	Achnanthes minutissima Kutz	.3065
25	Gomphonema clevei Fricke	.2299
26	Eunotia maior (W. Sm.) Rabh	.2107
27	Cymbella pseudogracilis (Choln.) Reim	.1669
28	Navicula germainii (Wall.) Patr	.1533
29	Frustulia crassinervia (Breb. ex W. Sm.) Ross	.1533
30	Nitzschia kutzingiana Hilse	.1450
31	Frustulia vulgaris (Thwaites) DeT	.1423
32	Eunotia minor (Kutz.) Rabh	.1231
33	Cymbella silesiaca (Bleisch ex Rabh.) Reim	.1231
34	C. lunata W. Sm	.1204
35	Synedra tenera W. Sm	.1204
36	Tabellaria fenestrata (Lyngb.) Kutz	.1095
37	Navicula mutica Kutz	.1040
38	Amphipleura pellucida Kutz	.0957
39	Surirella delicatissima Lewis	.0957
40	Gyrosigma spencerii (Quek.) Griff. & Henfr	.0930
41	Eunotia curvata (Kutz.) Lagerst	.0821
42	Pinnularia biceps Greg	.0766
43	Eunotia tenella (Grun.) Cl	.0738
44	Navicula symmetrica Patr	.0711
45	N.escambia Patr	.0684
46	Capartogramma crucicula (Grun. ex Cl.) Ross	.0602
47	Cocconeis lineata (Ehr.) V. H	.0574
48	Frustulia weinholdii Hust	.0547
49	Nitzschia frustulum Kuta	.0520
50	Gomphonema capitatum (Ehr.) Patr	.0492

FIGURE B.3.1. (Contd)

SPECIES FREQUENCY RATING		% OF TOTAL DIATOM COUNT
51	Pinnularia abaujensis (Pant.) Ross	.0492
52	Nitzschia clausii Hantz	.0465
53	Synedra oxyrhynchus (Kutz.) V. H.	.0465
54	Nitzschia filiformis (W. Sm.) Hust	.0437
55	Navicula linearis Hust	.0437
56	Eunotia undulata (Ralfs) Rabh	.0410
57	Synedra angustissima Grun	.0410
58	Fragilaria subcapitata Freng	.0410
59	Achnanthes heterovalva Krasske	.0383
60	Navicula menisculus Schum	.0383
61	Achnanthes abbreviata Reim	.0355
62	Navicula pupula Kutz	.0328
63	Cymbella naviculiformis Auersw. ex Heib	.0328
64	Navicula biceps (Arn.) V. H.	.0328
65	Opephora martyi Herib	.0328
66	Bacillaria paradoxa Gmel	.0328
67	Eunotia zasuminensis (Cabej.) Korn	.0301
68	Melosira italica (Ehr.) Kutz	.0301
69	Nitzschia intermedia Hantz. ex Cl. & Grun	.0273
70	Cymbella aspera (Ehr.) H. Per	.0273
71	Navicula cryptocephala Kutz	.0273
72	Cyclotella meneghiniana Kutz	.0246
73	Pinnularia obscura Krasske	.0246
74	Surirella ovata Kutz	.0246
75	Navicula schizonemoides (V. H.) Patr	.0218
76	Epithemia adnata (Kutz.) Breb	.0218
77	E.turgida (Ehr.) Kutz	.0218
78	Achnanthes stewartii Patr	.0218
79	Nitzschia amphibia Grun	.0218
80	Synedra sp. 1	.0218
81	Anomoeoneis vitrea (Grun.) Ross	.0191
82	Cocconeis thumensis A. May	.0191
83	Navicula grimmei Krasske	.0191
84	Diploneis oblongella (Naeg. ex Kutz.) Ross	.0191
85	Melosira undulata (Ehr.) Kutz	.0191
86	Achnanthes lanceolata (Breb.) Grun	.0164
87	Stauroneis phoenicenteron (Nitz.) Ehr	.0164
88	Amphora pediculus (Kutz.) V. H. ex DeT	.0164
89	Navicula capitata Skv. & Mey	.0164
90	N.canalis Patr	.0164
91	N. confervacea (Kutz.) Grun	.0164
92	Neidium amphirhynchus (Ehr.) Cl	.0164
93	Nitzschia tenuis (W. Sm.) Grun	.0164
94	Cocconeis fluviatilis Wall	.0164
95	Caloneis bacillum (Grun.) Cl	.0164
96	Navicula aikenensis Patr	.0136
97	N.anglica Ralfs	.0136
98	Cyclotella pseudostelligera Hust	.0136
99	Gomphonema brasiliense Grun	.0136
100	Nitzschiz parvula Lewis	.0136

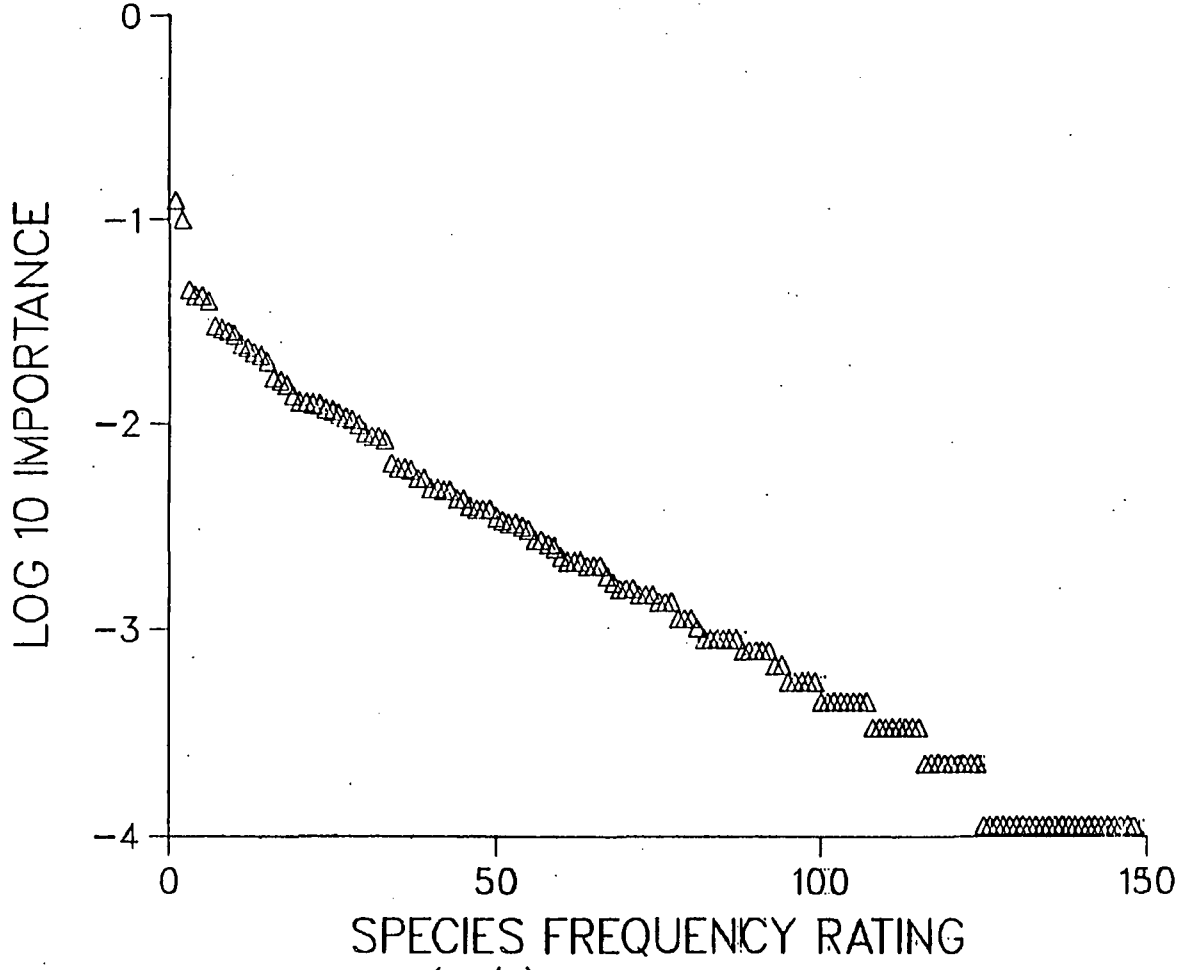
FIGURE B.3.1. (Contd)

SPECIES FREQUENCY RATING		% OF TOTAL DIATOM COUNT
101	N.dissipata (Kutz.) Grun	.0136
102	Pinnularia mesogongyla Ehr	.0136
103	Surirella suecica Zell	.0136
104	Achnanthes dubia Grun	.0109
105	Cocconeis euglypta (Ehr.) Cl	.0109
106	Frustulia amphipleuroides (Grun.) Cl	.0109
107	Hantzschia amphioxys Grun	.0109
108	Melosira tenella Nyg	.0109
109	Fragilaria pinnata Ehr	.0109
110	Navicula seminoides Cl. & Grun	.0109
111	Amphora submontana Hust	.0109
112	Surirella nervosa A. Schm	.0109
113	Synedra ramesi (Herib.) Hust	.0082
114	Pinnularia maior (Kutz.) Rabh	.0082
115	Navicula minima Grun	.0082
116	Nitzschia palea (Kutz.) W. Sm	.0082
117	Gyrosigma nodiferum (Grun.) Reim	.0082
118	Surirella angusta Kutz	.0082
119	Navicula caroliniana Patr	.0082
120	Neidium hitchcockii (Ehr.) Cl	.0082
121	Achnanthes apiculata Patr	.0082
122	Cymbella tumida (Breb. ex Kutz.) V. H	.0082
123	Amphora perpusilla (Grun.) Grun	.0054
124	Entomoneis ornata (J. W. Bail.) Reim	.0054
125	Caloneis lewisii Patr	.0054
126	Navicula capitata Patr	.0054
127	Melosira tenuissima (Grun.) Mull	.0054
128	Navicula laevissima Kutz	.0054
129	Nitzschia debilis (Arn.) A. May	.0054
130	N. victoriae Grun	.0054
131	N.acicularis W. Sm	.0054
132	Stauroneis livingstonii Reim	.0054
133	Gomphonema grovei M. Schmidt	.0054
134	Navicula tridentula Krasske	.0054
135	Caloneis hyalina Hust	.0054
136	Navicula capitata Ehr	.0027
137	Diploneis oculata (Breb.) Cl	.0027
138	Achnanthes clevei Grun	.0027
139	Nitzschia gracilis Hantz	.0027
140	Melosira granulata (Ehr.) Ralfs	.0027
141	Navicula thienemannii Hust	.0027
142	N.contraria Patr	.0027
143	Nitzschia subtilis Grun	.0027
144	N.mediastalsis Hohn & Hell	.0027
145	Pinnularia nodosa (Ehr.) W. Sm	.0027
146	Achnanthes flexella (Kutz.) Brun	.0027
147	Rhopalodia gibberula (Ehr.) O. Mull	.0027
148	Navicula nivalis (Ehr.) Hust	.0027
149	N.cuspidata (Kutz.) Kutz	.0027
150	Stauroneis smithii Grun	.0027

FIGURE B.3.1. (Contd)

SPECIES FREQUENCY RATING		% OF TOTAL DIATOM COUNT
151	Surirella linearis W. Sm.....	.0027
152	Amphora normanii Rabh.....	.0027
153	Surirella stalagma Hohn & Hell.....	.0027
154	Synedra danica (Kutz.) V. H.....	.0027
155	Nitzschia subconstricta Grun.....	.0027

FIGURE B.3.2 DIATOMETER FREQUENCY DISTRIBUTION
STATION 6 (WINTER,1954)



LOG 10 IMPORTANCE = LOG(N_i/N)
WHERE N_i= DIATOM COUNT AT INDEX i, N=TOTAL DIATOM COUNT

FIGURE B.3.2. Diatometer Frequency Distribution at Station 6 (Winter 1954)

SPECIES FREQUENCY RATING		% OF TOTAL DIATOM COUNT
1	Synedra ulna (Nitz.) Ehr	12.4112
2	Gomphonema parvulum Kutz	9.9650
3	Melosira alpigena Grun	4.5316
4	Navicula cryptocephala Kutz	4.2273
5	Synedra oxyrhynchus (Kutz.) V. H.	4.1934
6	S.rumpens Kutz	3.9680
7	Melosira varians Ag	2.9985
8	Fragilaria mesolepta Rabh	2.8971
9	Gomphonema affine Kutz	2.8182
10	Achnanthes minutissima Kutz	2.7054
11	Nitzschia palea (Kutz.) W. Sm	2.4349
12	Synedra danica (Kutz.) V. H	2.3447
13	Gomphonema gracile Ehr. emend. V. H	2.2094
14	Synedra augustissima Grun	2.1418
15	Navicula nr. canalis Patr	2.0065
16	Cyclotella stelligera Cl. & Grun	1.6684
17	Synedra familiaris (Kutz.) Hust	1.6120
18	Tabellaria fenestrata (Lyngb.) Kutz	1.5331
19	Nitzschia filiformis (W. Sm.) Hust	1.3640
20	Gomphonema capitatum (Ehr.) Patr	1.2851
21	G.productum Grun	1.2738
22	Synedra socia Wall	1.2513
23	Melosira italica (Ehr.) Kutz	1.2400
24	Gomphonema grunowii Patr	1.1836
25	Nitzschia acicularis W. Sm	1.1498
26	Pinnularia biceps Greg	1.1160
27	Synedra tenera W. Sm	1.0709
28	Cymbella minuta Hilse ex Rabh	1.0371
29	Eunotia naegelii Migula	.9807
30	Navicula lateropunctata Wallace	.9018
31	Frustulia vulgaris (Thwaites) DeT	.8680
32	Navicula mutica Kutz	.8680
33	N.rhynchocephala Kutz	.8342
34	Surirella angusta Kutz	.6425
35	Fragilaria vaucheriae (Kutz.) Peters	.6087
36	Cyclotella meneghiniana Kutz	.6087
37	Synedra meneghiniana Grun	.5975
38	Nitzschia clausii Hantz	.5411
39	Surirella ovata Kutz	.5411
40	Navicula capitata Ehr	.4847
41	Nitzschia parvula Lewis	.4847
42	Synedra minuscula Grun	.4735
43	Navicula linearis Hust	.4735
44	Amphipleura pellucida Kutz	.4284
45	Synedra scotica Grun	.4284
46	Eunotia maior (W. Sm) Rabh	.3945
47	Navicula biceps (Arn.) V. H	.3833
48	Cymbella silesiaca (Bleisch ex Rabh.) Reim	.3833
49	Frustulia rhomboides (Ehr.) DeT	.3833
50	Gyrosigma spencerii (Quek.) Griff. & Henfr	.3495

FIGURE B.3.2. (Contd)

SPECIES FREQUENCY RATING		% OF TOTAL DIATOM COUNT
51	Eunotia minor (Kutz.) Rabh	.3382
52	Cymbella affinis Kutz	.3269
53	Nitzschia amphibia Grun	.3269
54	Gomphonema clevei Fricke	.3156
55	Surirella suecica Zell	.3044
56	Achnanthes heterovalva Krasske	.2705
57	Navicula germainii (Wall.) Patr	.2705
58	N.minima Grun	.2593
59	Cymbella tumida (Breb. ex Kutz.) V. H	.2480
60	Tabellaria flocculosa (Roth) Kutz	.2255
61	Cocconeis lineata (Ehr.) V. H	.2142
62	Navicula cohnii (Hilse) Grun	.2142
63	Achnanthes lanceolata (Breb.) Grun	.2142
64	A.linearis (W. Sm.) Grun	.2029
65	Fragilaria spinosa Skv	.2029
66	Achnanthes dubia Grun	.2029
67	Melosira tenella Nyg	.1804
68	Frustulia crassinervia (Breb. ex W. Sm.) Ross	.1691
69	Cymbella aspera (Ehr.) H. Per	.1578
70	Nitzschia sibirica Skv	.1578
71	Navicula rectangularis (Greg.) Grun	.1578
72	N.tropica Hust	.1465
73	Gomphonema intermedia Grun	.1465
74	Eunotia curvata (Kutz.) Lagerst	.1465
75	Nitzschia frustulum Kutz	.1353
76	Surirella stalagma Holn & Hell	.1353
77	Eunotia incisa W. Sm. ex Greg	.1353
78	Opephora martyi Herib	.1127
79	Melosira tenuissima (Grun.) Mull	.1127
80	Synedra ramesi (Herib.) Hust	.1127
81	Navicula capitata Skv. & Mey	.1015
82	Achnanthes clevei Grun	.0901
83	Stauroneis smithii Grun	.0901
84	Fragilaria subcapitata Freng	.0901
85	Bacillaria paradoxa Gmel	.0901
86	Navicula pupula Kutz	.0901
87	Nitzschia kutzingiana Hilse	.0901
88	Meridion circulare (Grev.) Ag	.0789
89	Surirella minuta Breb	.0789
90	Pinnularia mesogongyla Ehr	.0789
91	Cymbella lunata W. Sm	.0789
92	Pinnularia abaujensis (Pant.) Ross	.0789
93	Entomoneis ornata (J. W. Bail.) Reim	.0676
94	Capartogramma crucicula (Grun. ex Cl.) Ross	.0676
95	Gomphonema intricatum Kutz	.0563
96	Epithemia adnata (Kutz.) Breb	.0563
97	Pinnularia mesolepta (Ehr.) W. Sm	.0563
98	Melosira angustissima Mull	.0563
99	Nitzschia subtilis Kutz	.0563
100	Cymbella naviculiformis Auersw. ex Heib	.0450

FIGURE B.3.2. (Contd)

SPECIES FREQUENCY RATING		% OF TOTAL DIATOM COUNT
101	Amphora ovalis (Kutz.) Kutz	.0450
102	Nitzschia bacata Hust	.0450
103	Cocconeis diminuta Pant	.0450
104	Navicula schonfeldii Hust	.0450
105	Pinnularia viridis (Nitz.) Ehr	.0450
106	Stauroneis phoenicenteron (Nitz.) Ehr	.0450
107	Pinnularia maior (Kutz.) Rabh	.0450
108	Eunotia pectinalis (O. F. Mull.?) Rabh	.0338
109	Nitzschia recta Hantz	.0338
110	Achnanthes abbreviata Reim	.0338
111	Cymbella pseudogracilis (Choln.) Reim	.0338
112	Anomoeoneis vitrea (Grun.) Ross	.0338
113	Synedra parasitica (W. Sm.) Hust	.0338
114	Cocconeis euglypta (Ehr.) Cl	.0338
115	Gomphonema acuminatum Ehr	.0338
116	Pinnularia microstauron (Ehr.) Cl	.0225
117	Navicula accomoda Hust	.0225
118	N.atomus (Kutz.) Grun	.0225
119	Eunotia exigua (Breb. ex Kutz.) Rabh	.0225
120	Surirella linearis W. Sm	.0225
121	Fragilaria pinnata Ehr	.0225
122	Nitzschia gracilis Hantz	.0225
123	Cocconeis placentula Ehr	.0225
124	Navicula capitata Patr	.0225
125	Caloneis bacillum (Grun.) Cl	.0112
126	Gyrosigma nodiferum (Grun.) Reim	.0112
127	Navicula grimmei Krasske	.0112
128	N.lacustris Greg	.0112
129	Nitzschia subconstricta Grun	.0112
130	Gomphonema brasiliense Grun	.0112
131	Gyrosigma scalproides (Rabh.) Cl	.0112
132	Nitzschia perminuta Grun	.0112
133	Amphora pediculus (Kutz.) V. H. ex DeT	.0112
134	Gomphonema grovei M. Schmidt	.0112
135	Nitzschia subtilis Grun	.0112
136	Caloneis hyalina Hust	.0112
137	Neidium amphirhynchus (Ehr.) Cl	.0112
138	N.bisulcatum (Lagerst.) Cl	.0112
139	Gomphonema subclavatum (Grun.) Grun	.0112
140	Nitzschia debilis (Arn.) A. May	.0112
141	N.victoriae Grun	.0112
142	Stenopterobia intermedia (Lewis) V. H	.0112
143	Cocconeis thumensis A. May	.0112
144	Diploneis oblongella (Naeg. ex Kutz.) Ross	.0112
145	Denticula tenuis Kutz	.0112
146	Navicula bicephala Hust	.0112
147	Melosira undulata (Ehr.) Kutz	.0112
148	Synedra sp. 1	.0112

B.4. Savannah River Water Chemistry Summary

The water chemistry data may be formated separately from, or in combination with, the biological data. Figures B.4.1-B.4.23 show one type of independent format. In these figures, the water chemistry data are plotted by station for each parameter over the entire survey period. This type of format may be used to look for long-term trends or unusual station values.

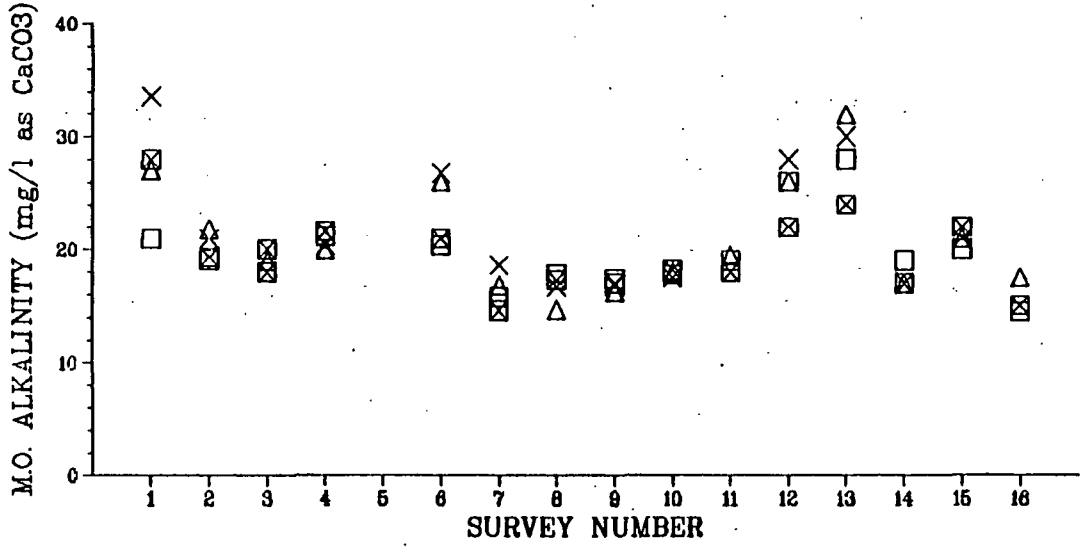
Cross formatting between water chemistry data and biological data may be used for a variety of purposes. One type of format lists the chemical ranges encountered for each survey organism. For example, the diatom species Gomphonema parvulum was found in the following chemical ranges:*

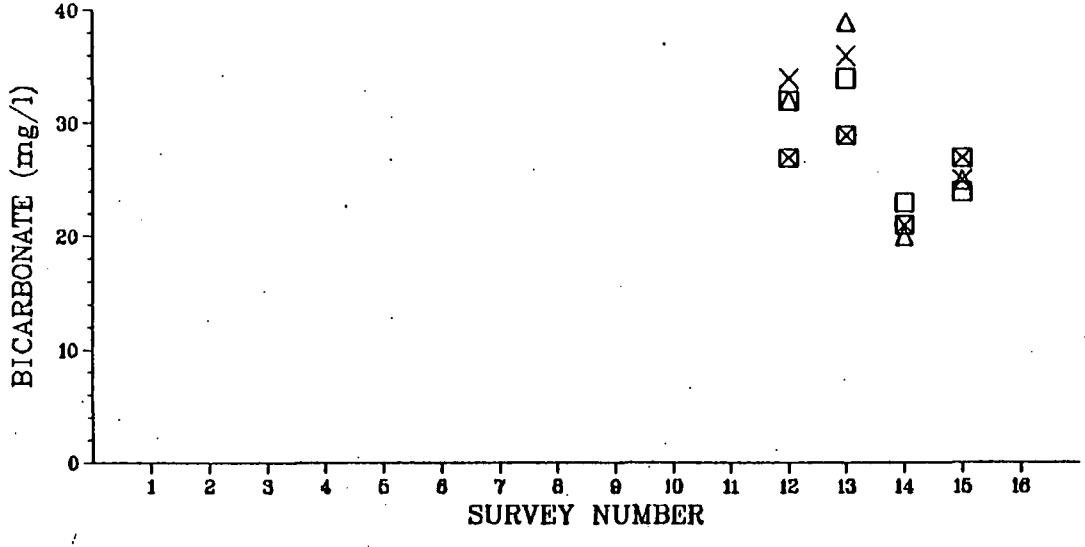
0.145E+02	≤	ALKALMO	≤	0.336E+02
0.0	≤	ALKALP	≤	0.0
0.100E+00	≤	BOD	≤	0.290E+01
0.200E+01	≤	CA	≤	0.584E+01
0.600E+01	≤	CACO3	≤	0.160E+02
0.600E+00	≤	CL	≤	0.130E+02
0.900E+01	≤	CLEAR	≤	0.360E+02
0.155E+02	≤	COD	≤	0.635E+02
0.360E+01	≤	CO2	≤	0.106E+02
0.0	≤	CO3	≤	0.0
0.585E+01	≤	DO	≤	0.107E+02
0.600E-02	≤	FE	≤	0.141E+-1

* Chemical abbreviations are identified in Chapter VIII.D.

B.4 (Contd)

0.160E+02	≤	FIXR	≤	0.158E+03
0.800E+01	≤	HARD	≤	0.340E+02
0.200E+02	≤	HC03	≤	0.390E+02
0.120E+01	≤	K	≤	0.140E+01
0.340E+00	≤	MG	≤	0.333E+01
0.300E+01	≤	MGC03	≤	0.180E+02
0.600E-01	≤	MN	≤	0.195E+00
0.570E+01	≤	NA	≤	0.990E+01
0.100E-02	≤	NH3-N	≤	0.270E+00
0.100E-02	≤	N02-N	≤	0.154E-01
0.300E-01	≤	N03-N	≤	0.539E+00
0.650E+01	≤	PH	≤	0.780E+01
0.400E-02	≤	P04-P	≤	0.860E-01
0.434E+01	≤	SI02	≤	0.146E+02
0.100E+01	≤	S04	≤	0.110E+02
0.290E-04	≤	SPCOND	≤	0.683E+03
0.900E+01	≤	SS	≤	0.130E+02
0.995E+02	≤	TDS	≤	0.187E+03
0.110E+02	≤	TEMP	≤	0.295E+02
0.700E-01	≤	TKN	≤	0.118E+01
0.160E+00	≤	TOTP	≤	0.220E+00
0.280E+02	≤	TS	≤	0.250E+03
0.105E+02	≤	TURB	≤	0.548E+03
0.00	≤	VS	≤	0.234E+03


M.O. ALKALINITY (mg/l as CaCO3)
0
10
20
30
40
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
SURVEY NUMBER


BICARBONATE (mg/l)
0
10
20
30
40
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
SURVEY NUMBER

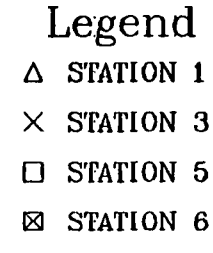

Legend
STATION 1
STATION 3
STATION 5
STATION 6

FIGURE B.4.1

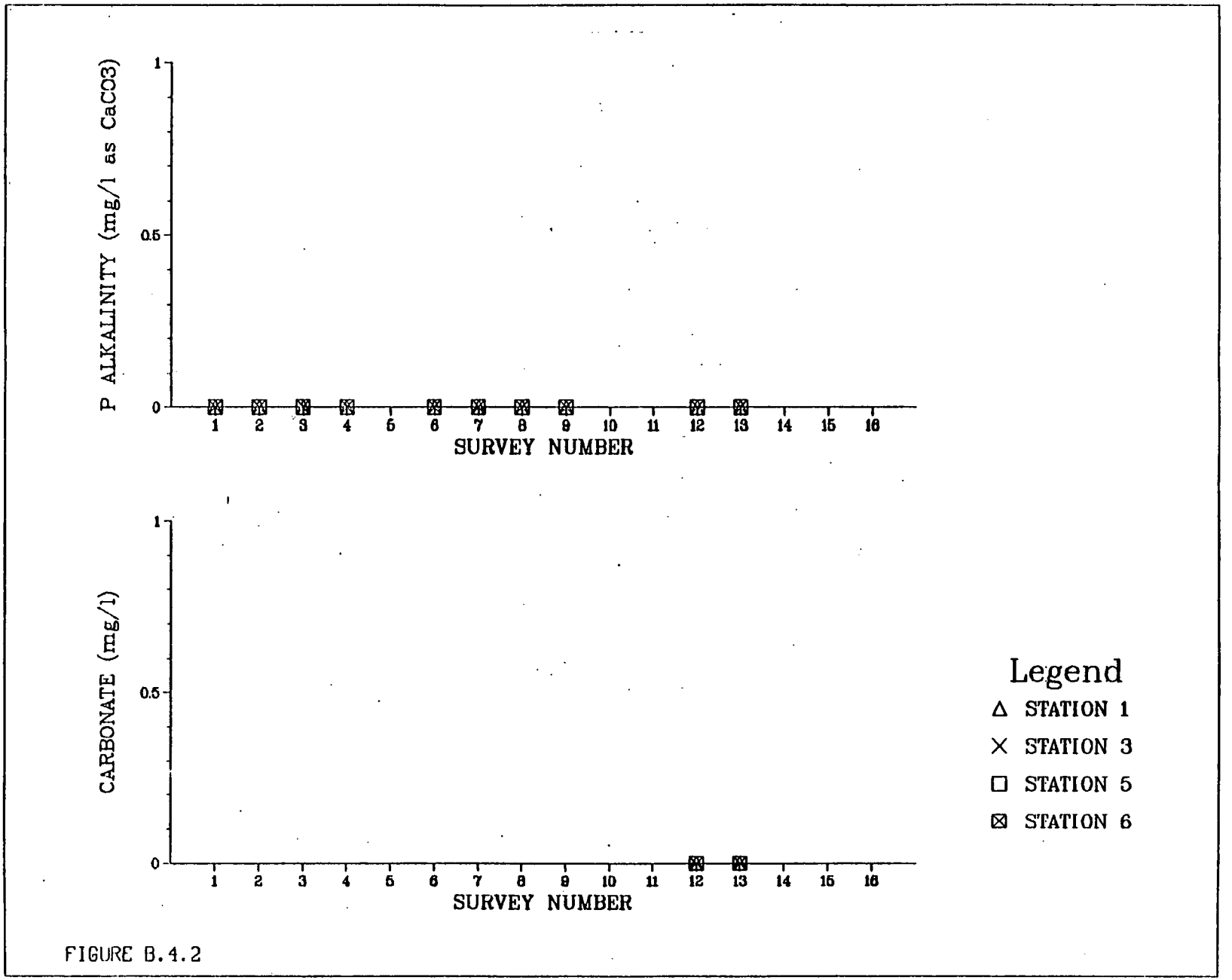
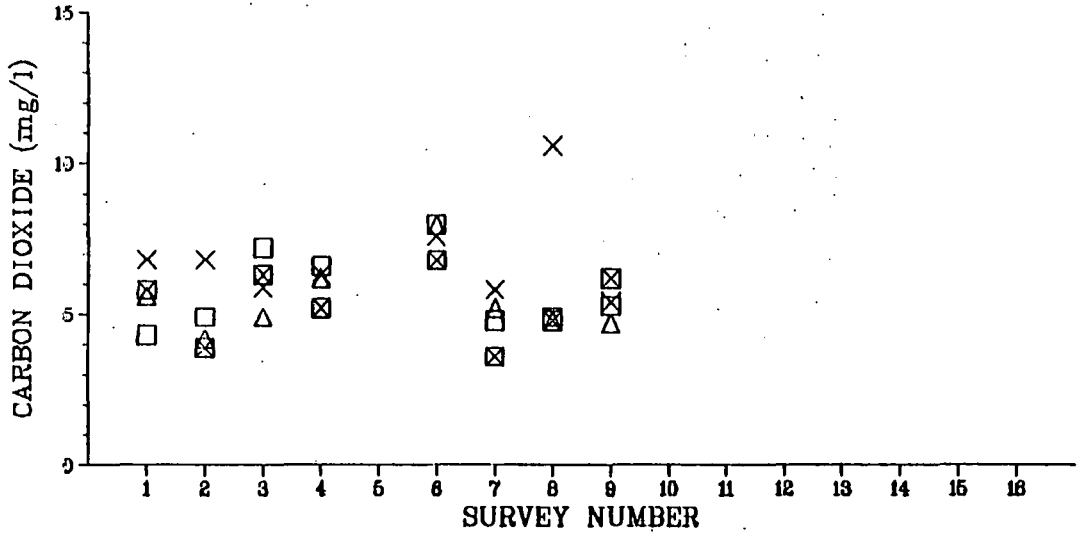
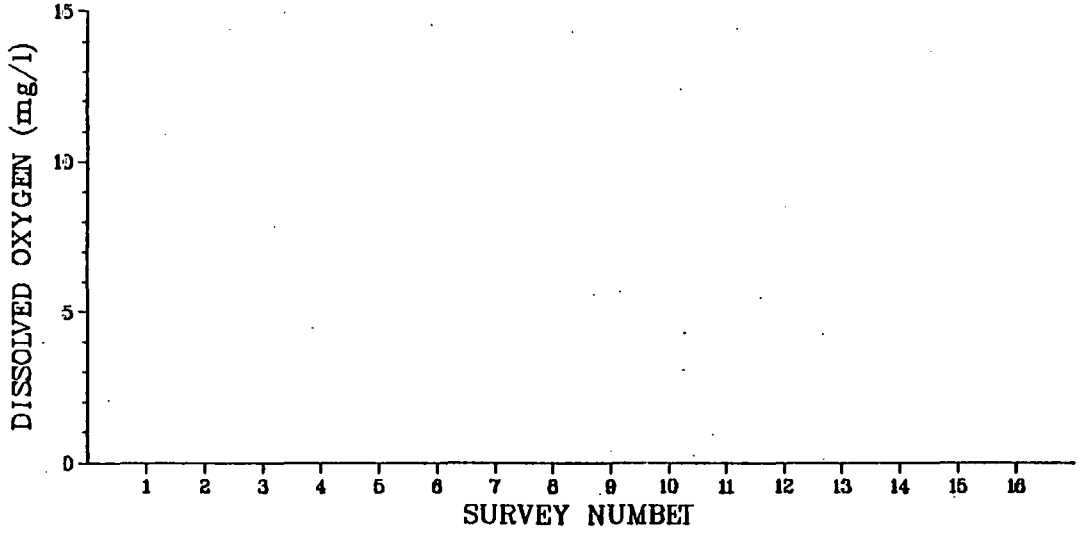

P ALKALINITY (mg/l as CaCO3)
1
0.5
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
SURVEY NUMBER
CARBONATE (mg/l)
1
0.5
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
SURVEY NUMBER
Legend
STATION 1
STATION 3
STATION 5
STATION 6

FIGURE B.4.2


CARBON DIOXIDE (mg/l)
15
10
5
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
SURVEY NUMBER


DISSOLVED OXYGEN (mg/l)
15
10
5
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
SURVEY NUMBET

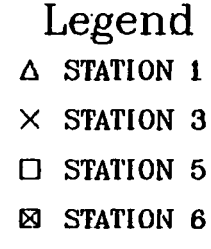
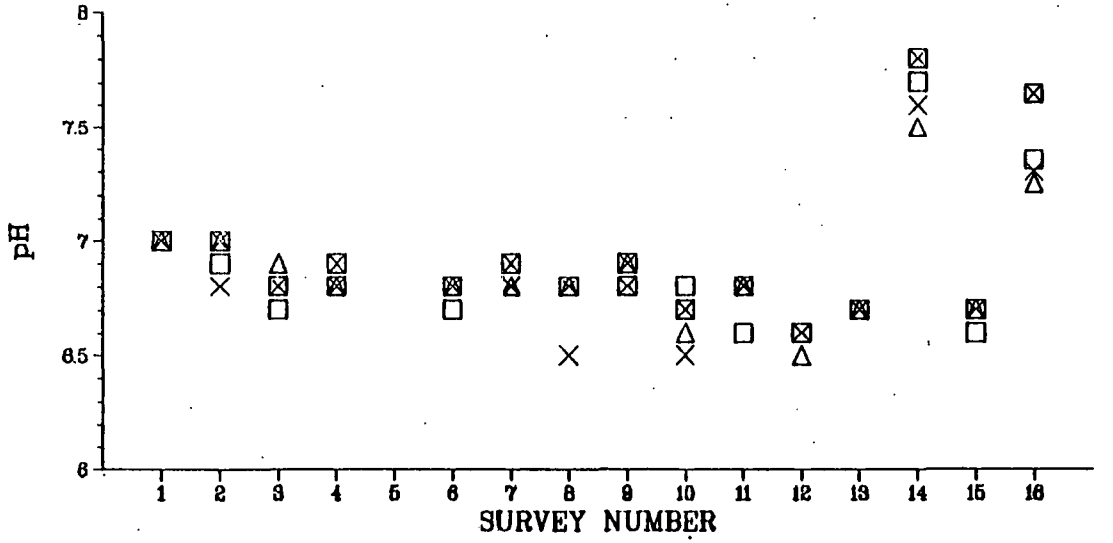
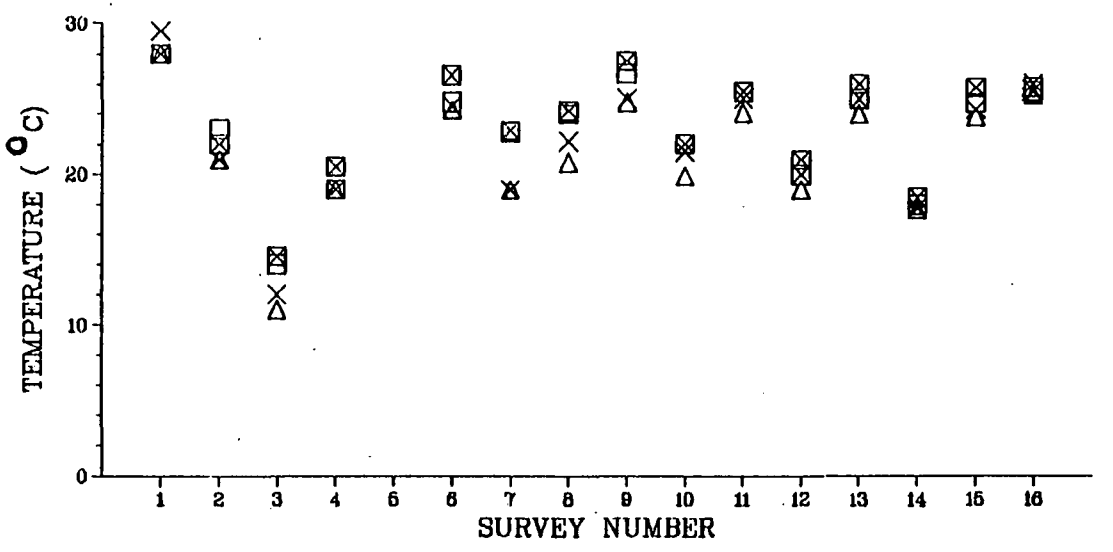

Legend
STATION 1
STATION 3
STATION 5
STATION 6

FIGURE B.4.3


8
7.5
7
6.5
6
pH
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
SURVEY NUMBER


30
20
10
0
TEMPERATURE (°C)
1 2 3 4 6 6 7 8 9 10 11 12 13 14 15 16
SURVEY NUMBER

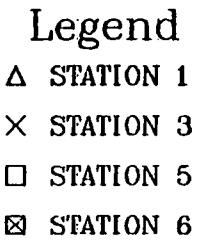
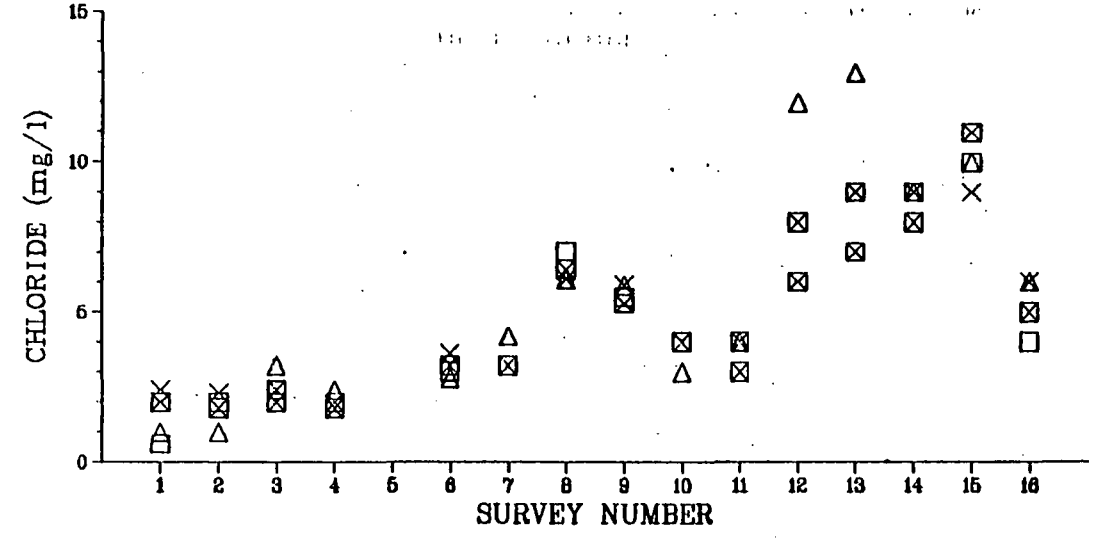
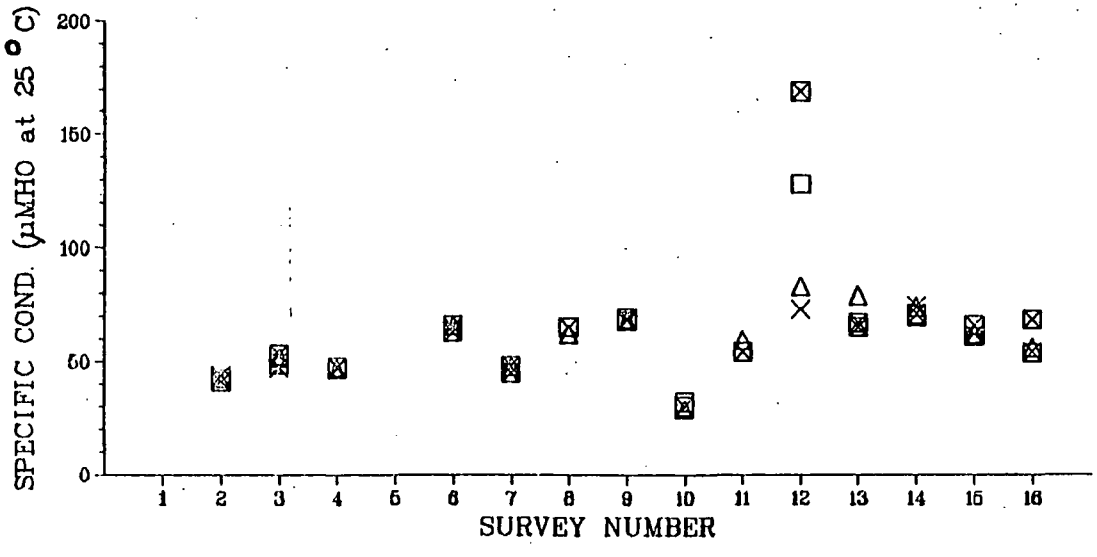

Legend
STATION 1
STATION 3
STATION 5
STATION 6

FIGURE B.4.4


CHLORIDE (mg/l)
0
6
10
15
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
SURVEY NUMBER


SPECIFIC COND. (µMHO at 25 °C)
0
50
100
150
200
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
SURVEY NUMBER

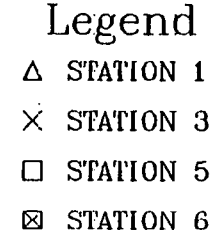

Legend
STATION 1
STATION 3
STATION 5
STATION 6

FIGURE B.4.5

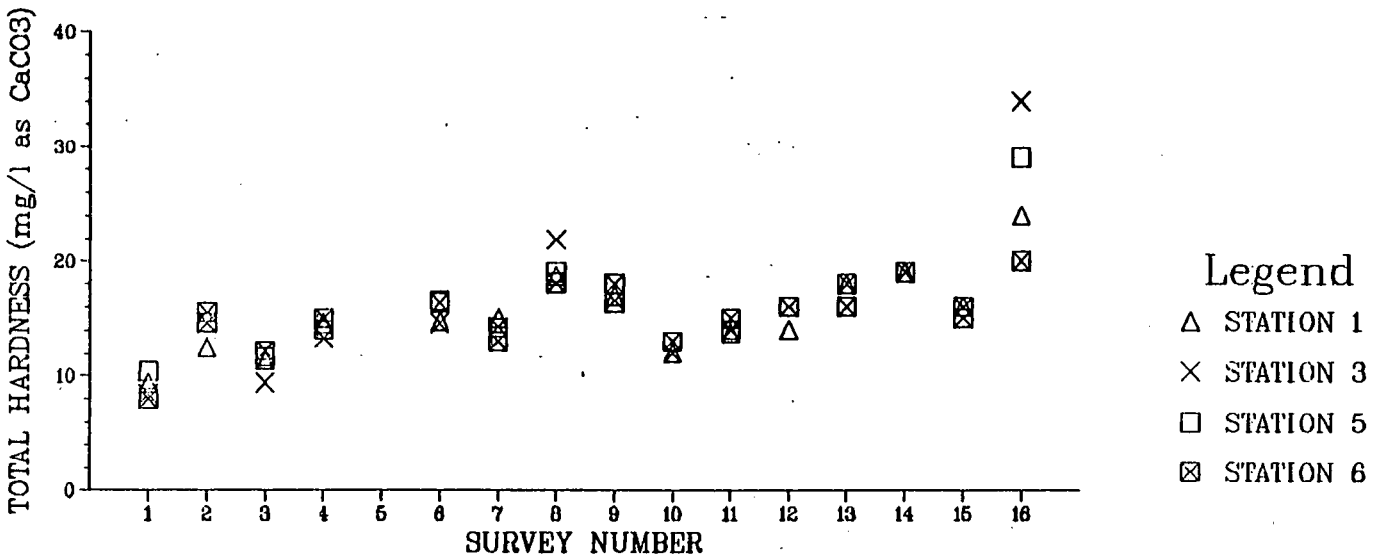
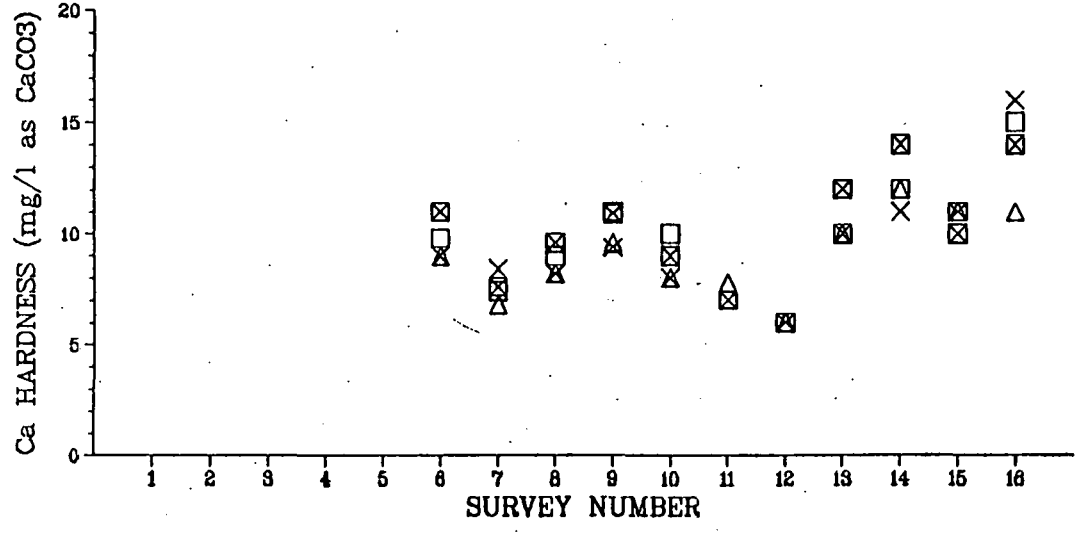
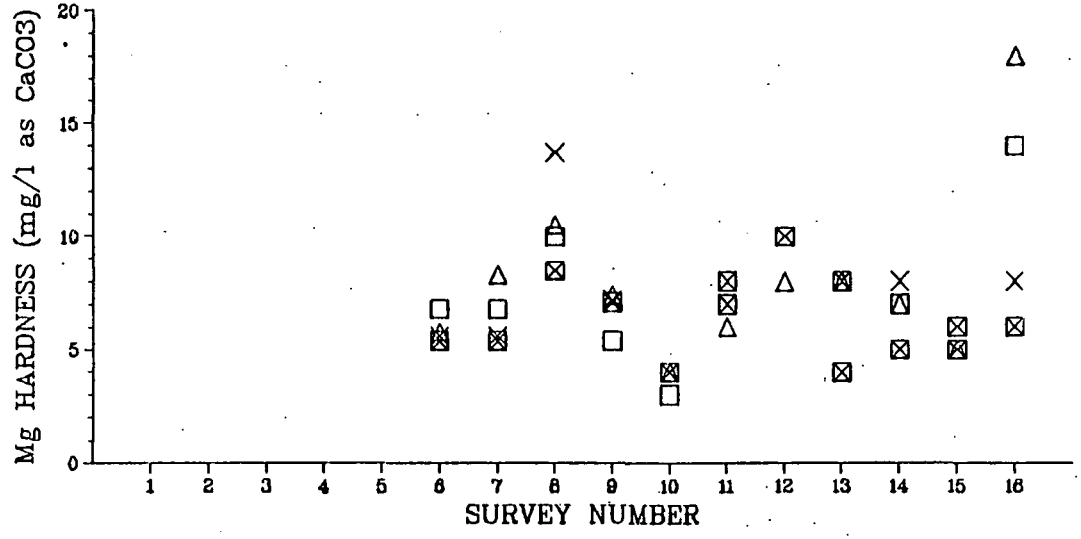

TOTAL HARDNESS (mg/l as CaCO3)
40
30
20
10
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
SURVEY NUMBER
Legend
STATION 1
STATION 3
STATION 5
STATION 6

FIGURE B.4.6


Ca HARDNESS (mg/l as CaCO3)
0
5
10
15
20
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
SURVEY NUMBER


Mg HARDNESS (mg/l as CaCO3)
0
5
10
15
20
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
SURVEY NUMBER

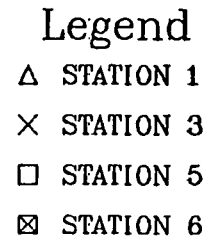

Legend
STATION 1
STATION 3
STATION 5
STATION 6

FIGURE B.4.7

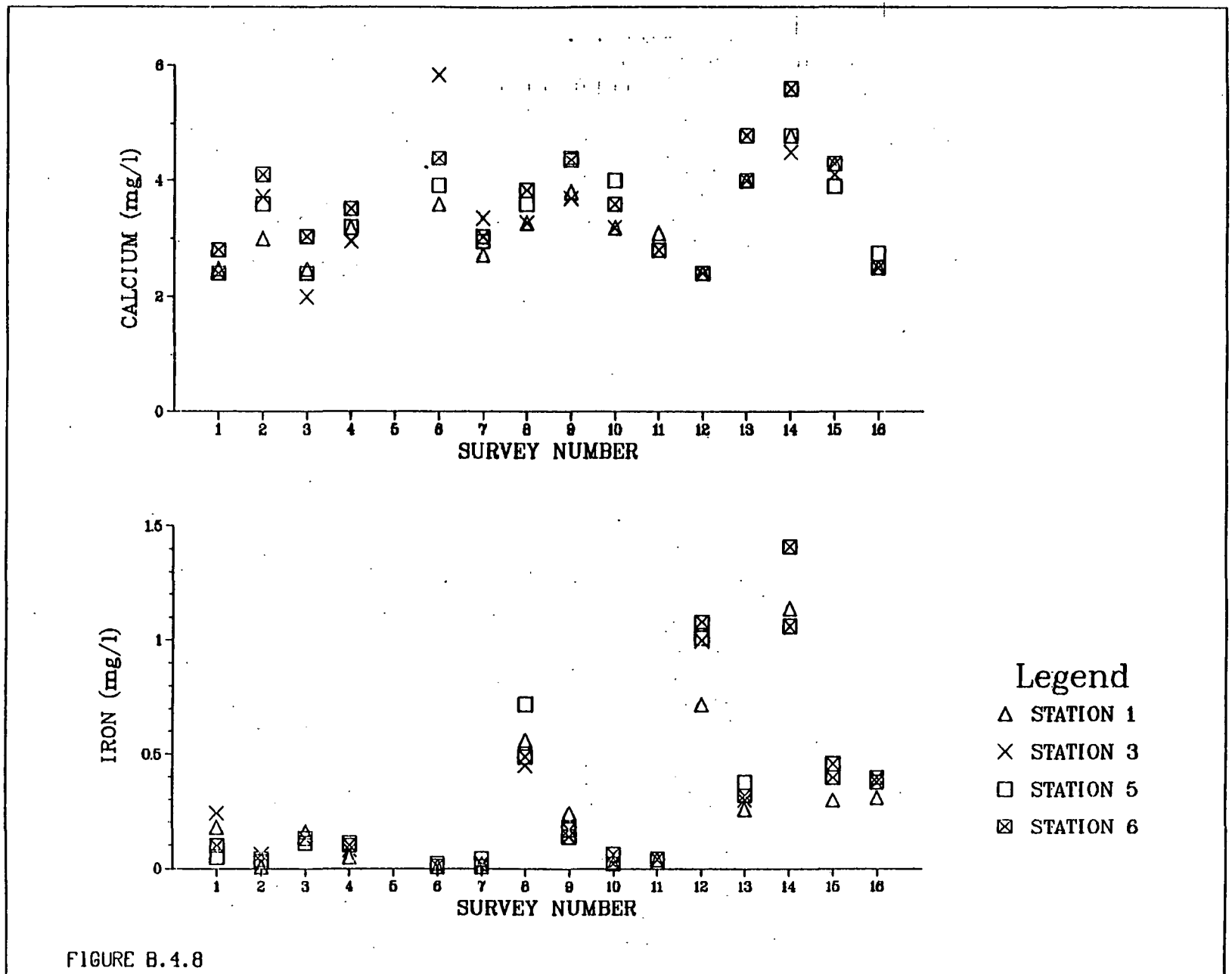
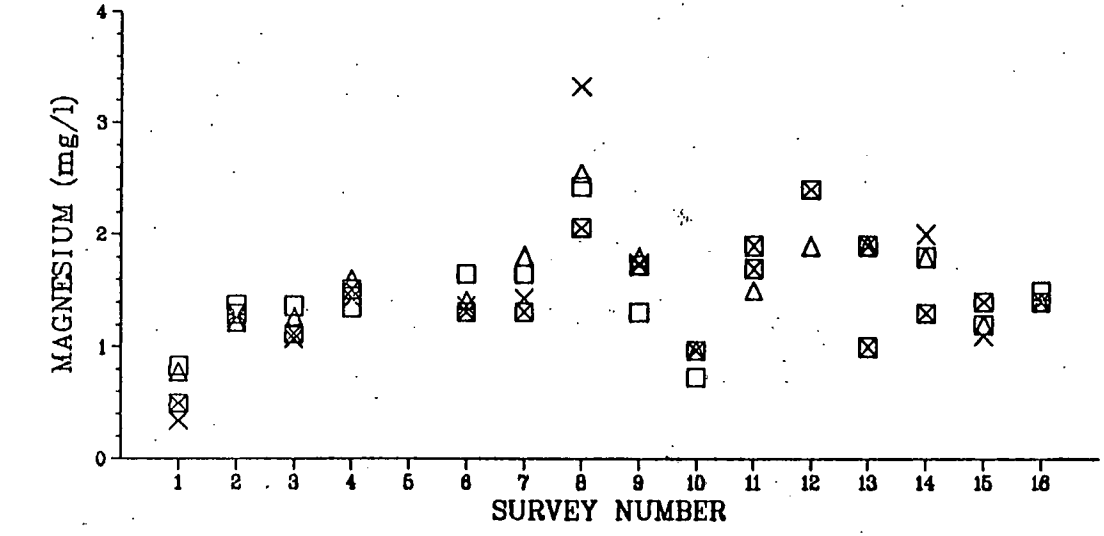
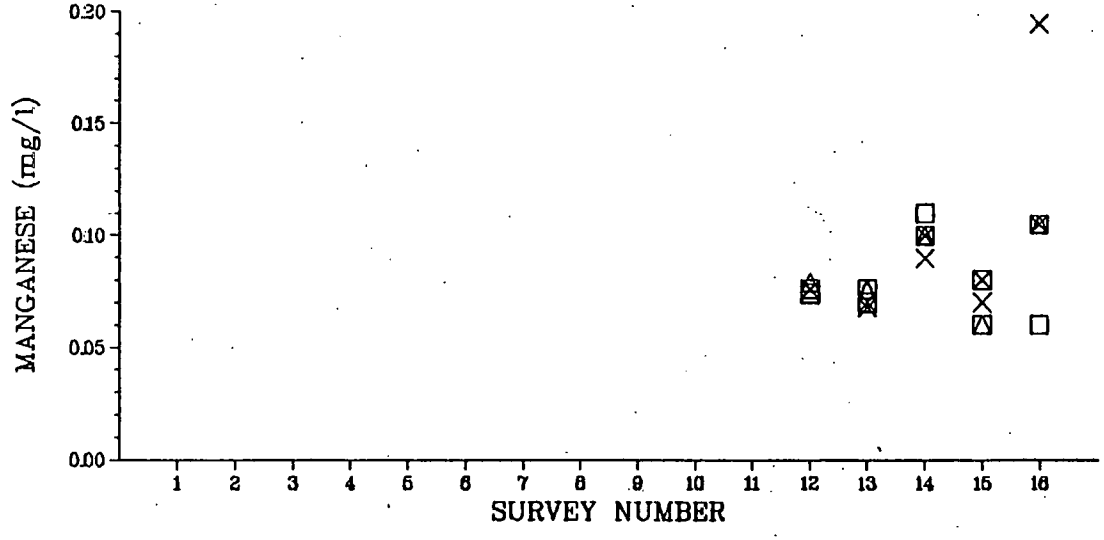

CALCIUM (mg/l)
0
2
4
6
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
SURVEY NUMBER
IRON (mg/l)
0
0.5
1
1.5
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
SURVEY NUMBER
Legend
STATION 1
STATION 3
STATION 5
STATION 6

FIGURE 8.4.8


MAGNESIUM (mg/l)
0
1
2
3
4
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
SURVEY NUMBER


MANGANESE (mg/l)
0.00
0.05
0.10
0.15
0.20
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
SURVEY NUMBER

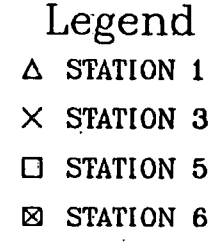

Legend
STATION 1
STATION 3
STATION 5
STATION 6

FIGURE B.4.9

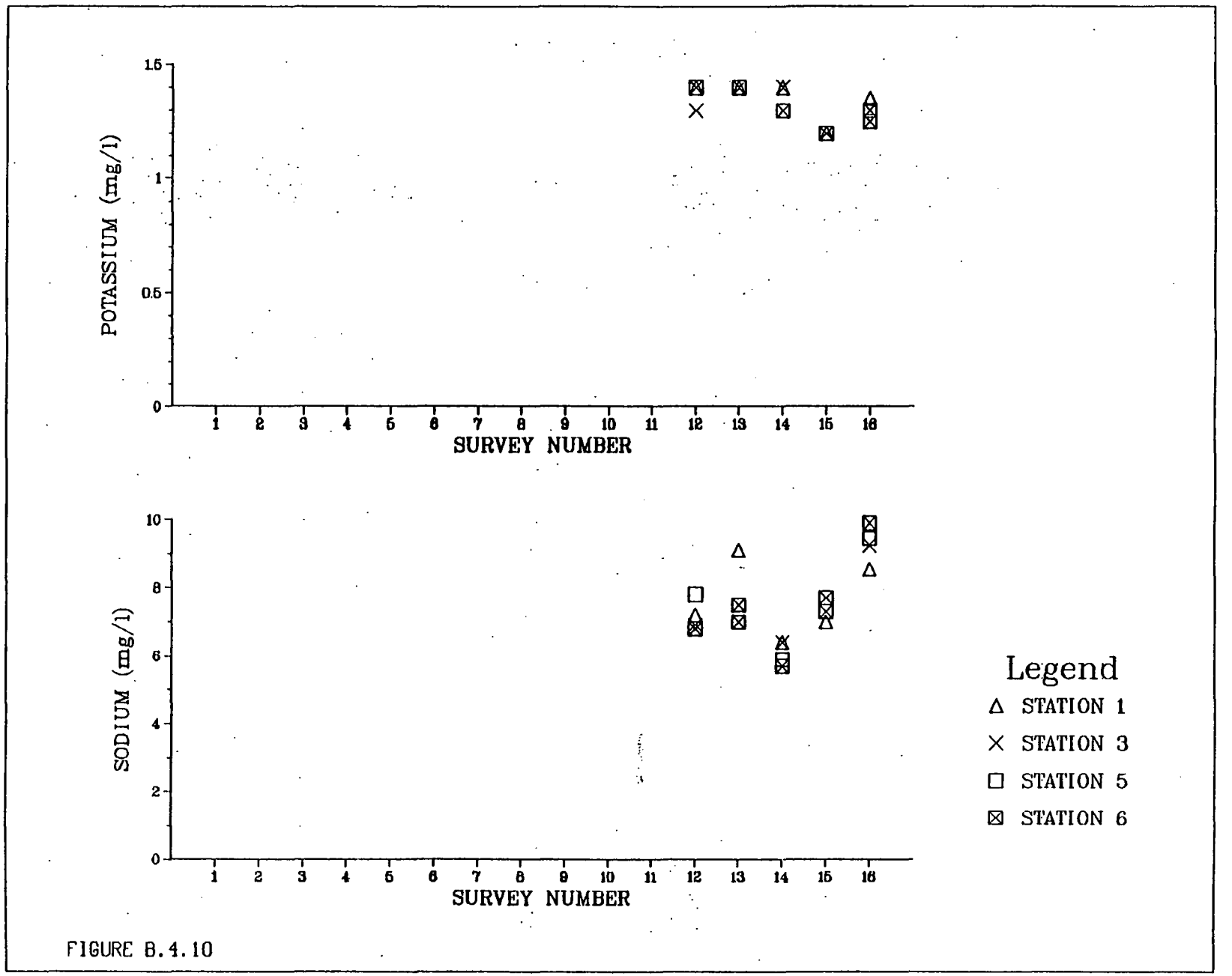
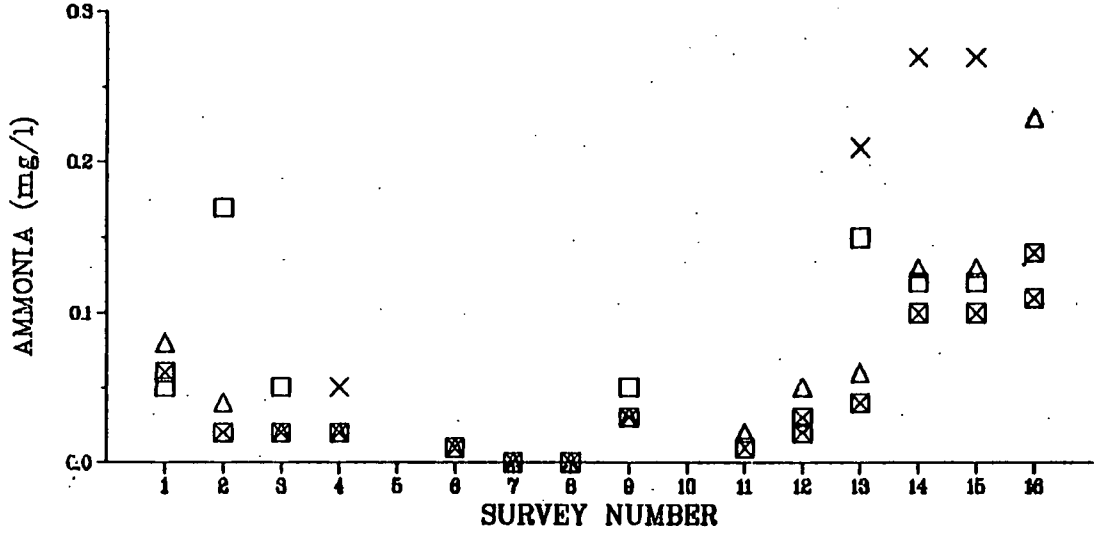
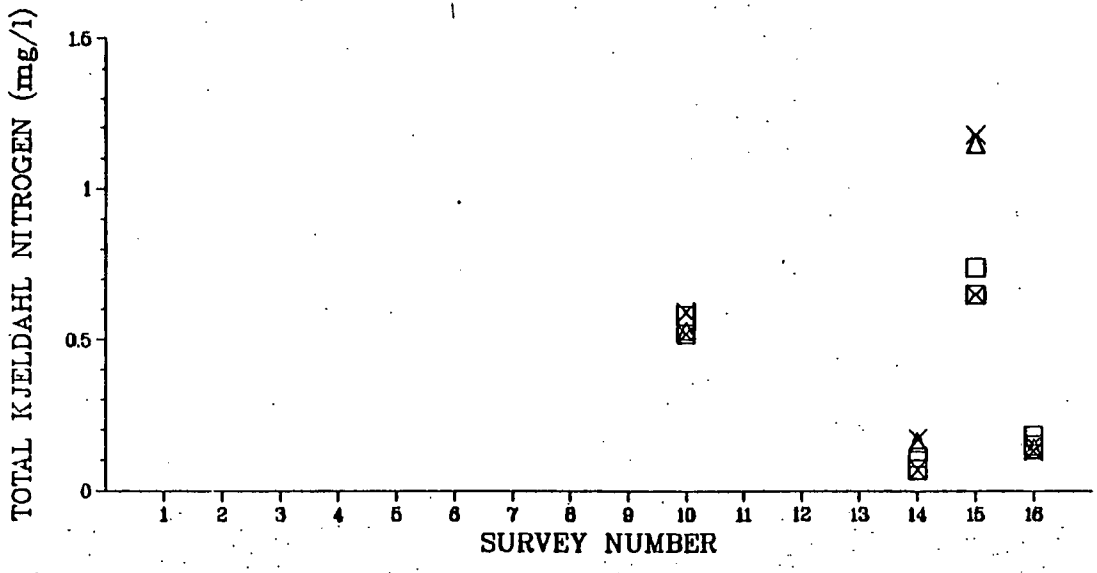

POTASSIUM (mg/l)
1.5
1
0.5
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
SURVEY NUMBER
SODIUM (mg/l)
10
8
6
4
2
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
SURVEY NUMBER
Legend
STATION 1
STATION 3
STATION 5
STATION 6

FIGURE B.4.10


AMMONIA (mg/l)
0.3
0.2
0.1
0.0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
SURVEY NUMBER


TOTAL KJELDAHL NITROGEN (mg/l)
1.5
1
0.5
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
SURVEY NUMBER

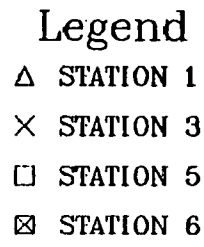
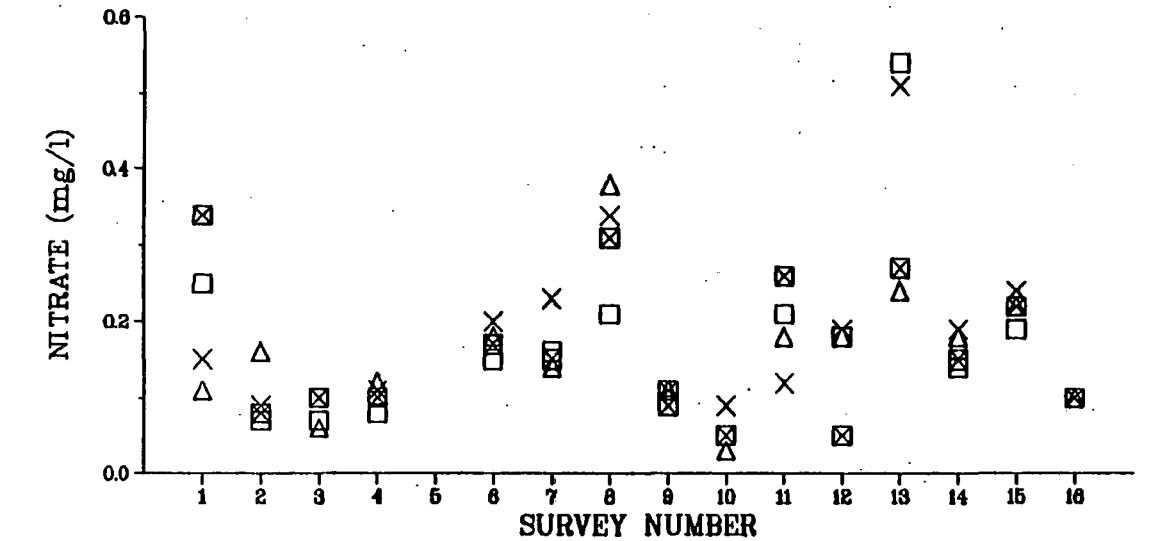
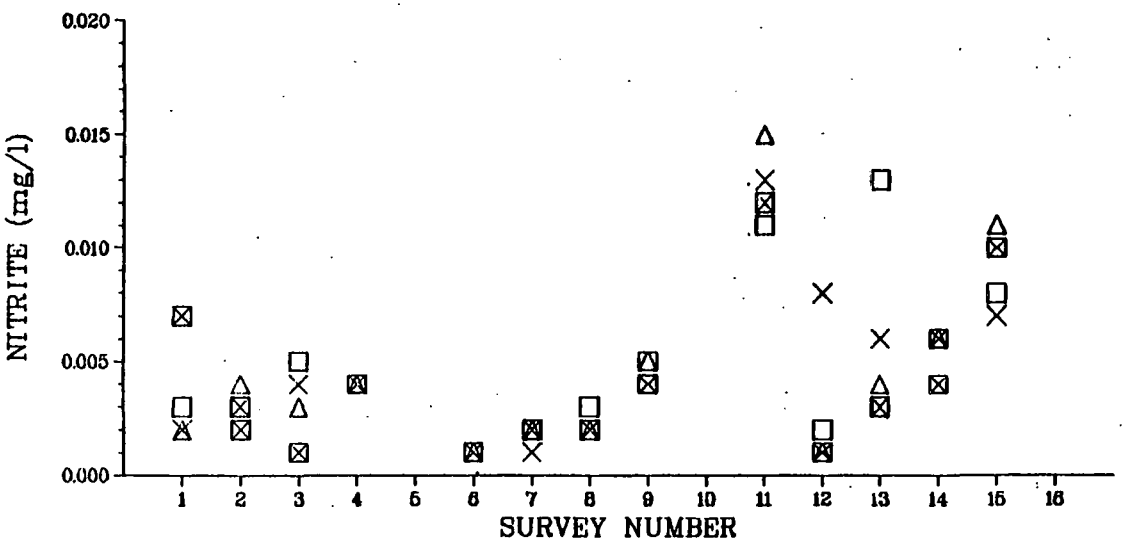

Legend
STATION 1
STATION 3
STATION 5
STATION 6

FIGURE B.4.11


NITRATE (mg/l)
0.6
0.4
0.2
0.0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
SURVEY NUMBER


NITRITE (mg/l)
0.020
0.015
0.010
0.005
0.000
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
SURVEY NUMBER

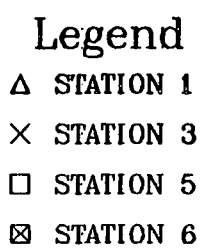
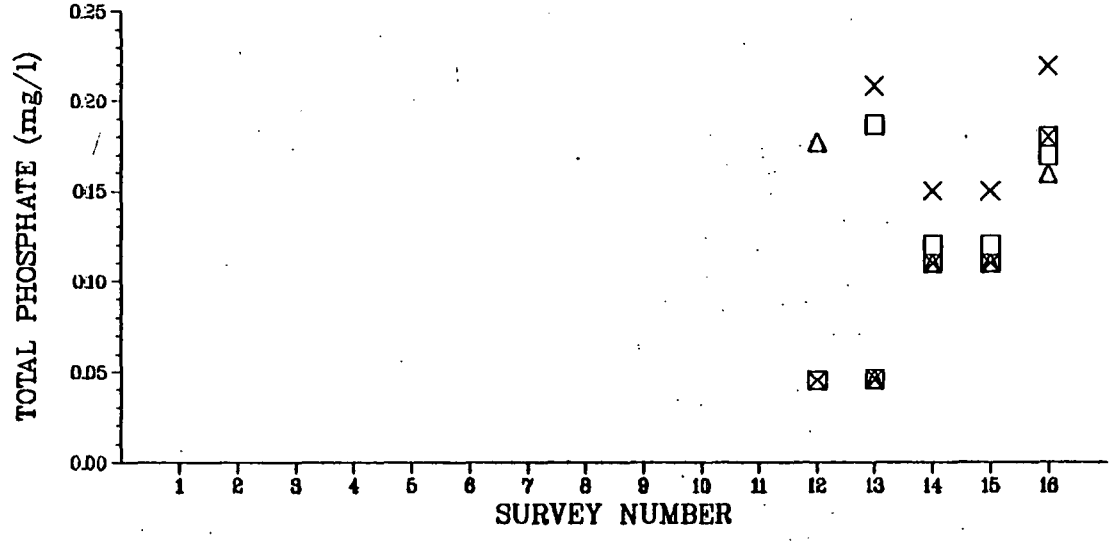
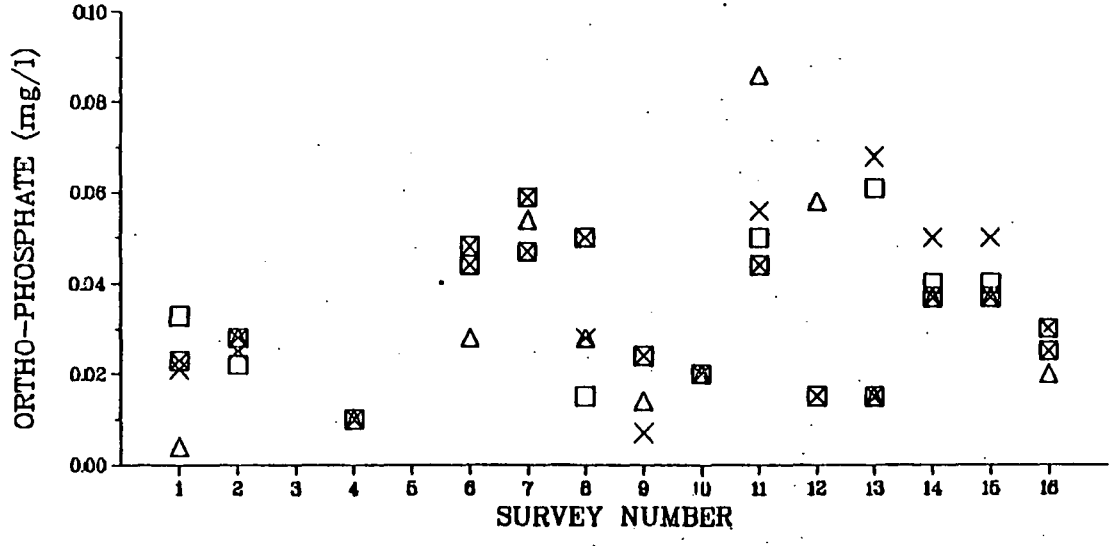

Legend
STATION 1
STATION 3
STATION 5
STATION 6

FIGURE B.4.12


TOTAL PHOSPHATE (mg/l)
0.25
0.20
0.15
0.10
0.05
0.00
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
SURVEY NUMBER


ORTHO-PHOSPHATE (mg/l)
0.10
0.08
0.06
0.04
0.02
0.00
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
SURVEY NUMBER

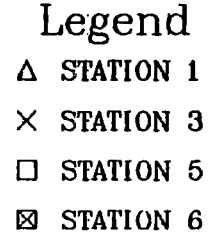

Legend
STATION 1
STATION 3
STATION 5
STATION 6

FIGURE B.4.13

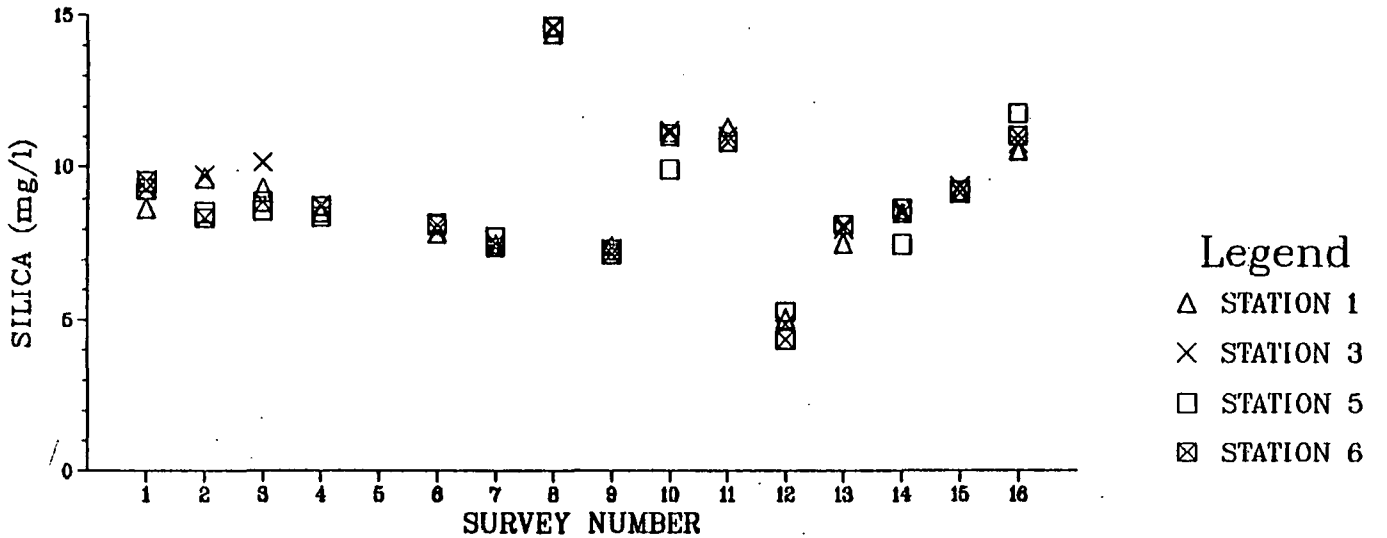

SILICA (mg/l)
15
10
5
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
SURVEY NUMBER
Legend
STATION 1
STATION 3
STATION 5
STATION 6

FIGURE B.4.14

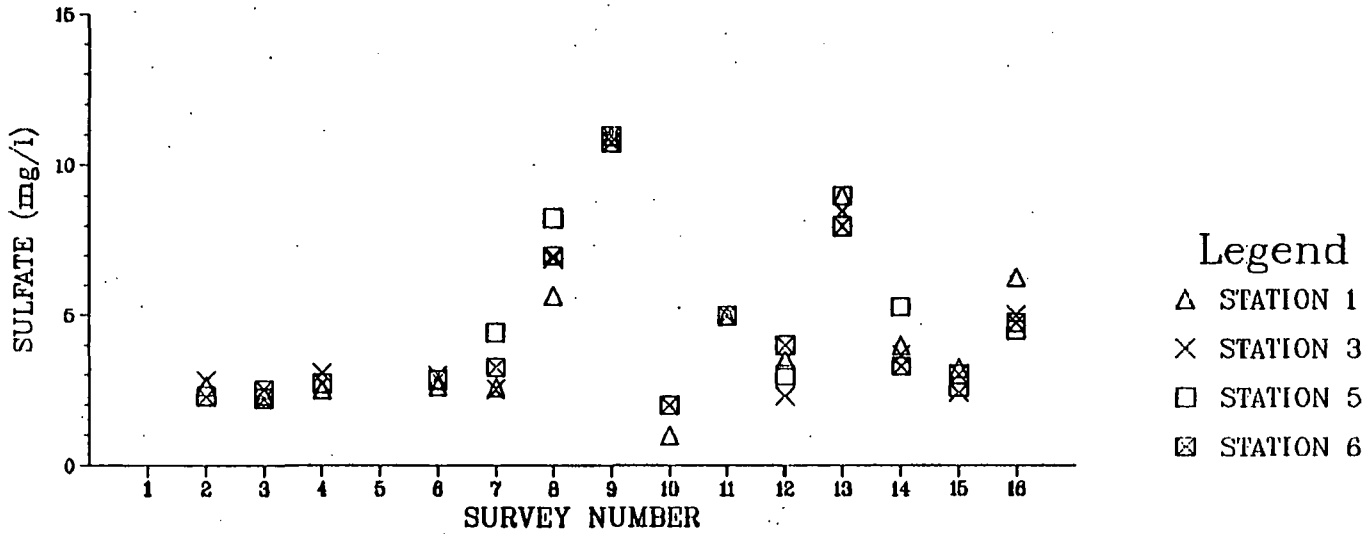
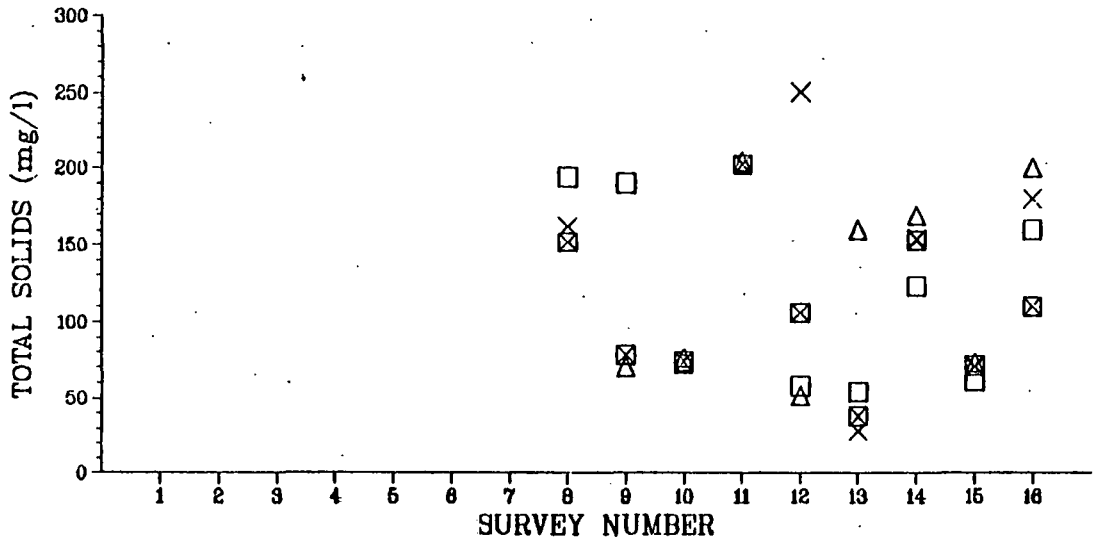
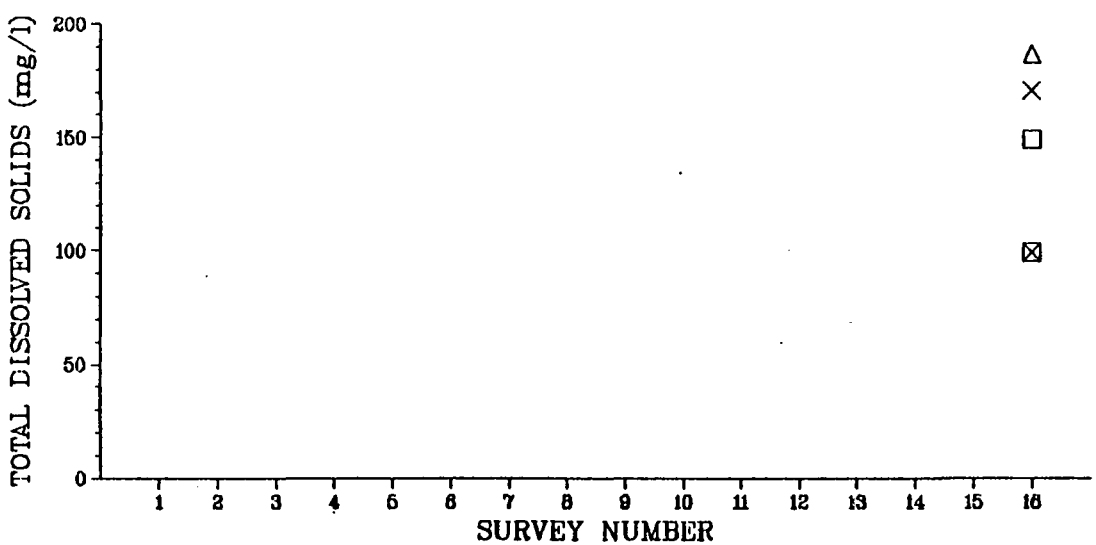

SULFATE (mg/l)
15
10
5
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
SURVEY NUMBER
Legend
STATION 1
STATION 3
STATION 5
STATION 6

FIGURE B.4.15


TOTAL SOLIDS (mg/l)
300
250
200
150
100
50
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
SURVEY NUMBER


TOTAL DISSOLVED SOLIDS (mg/l)
200
150
100
50
0
1 2 3 4 6 6 7 8 9 10 11 12 13 14 15 16
SURVEY NUMBER

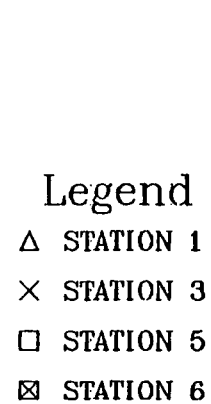
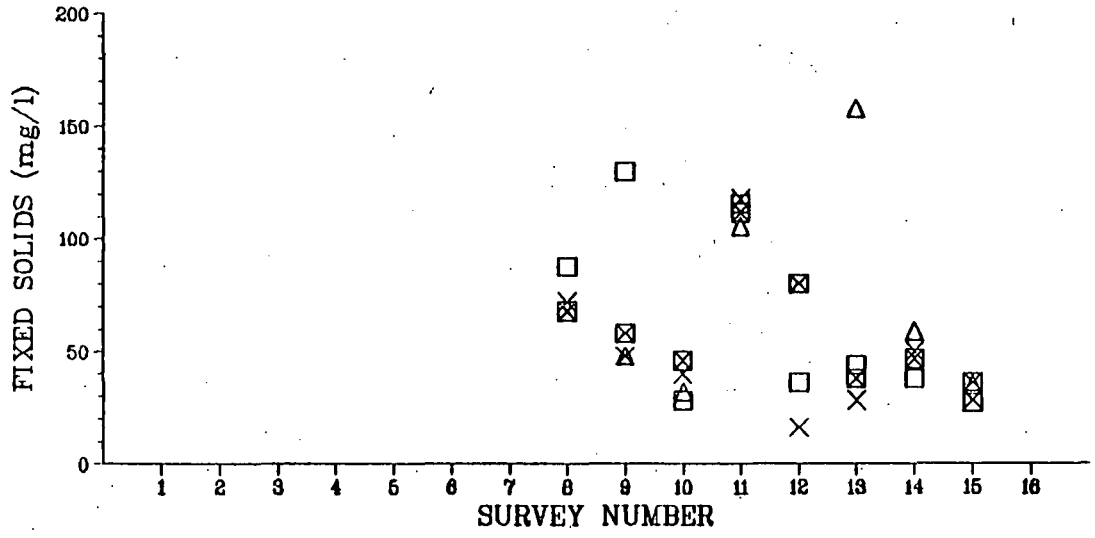
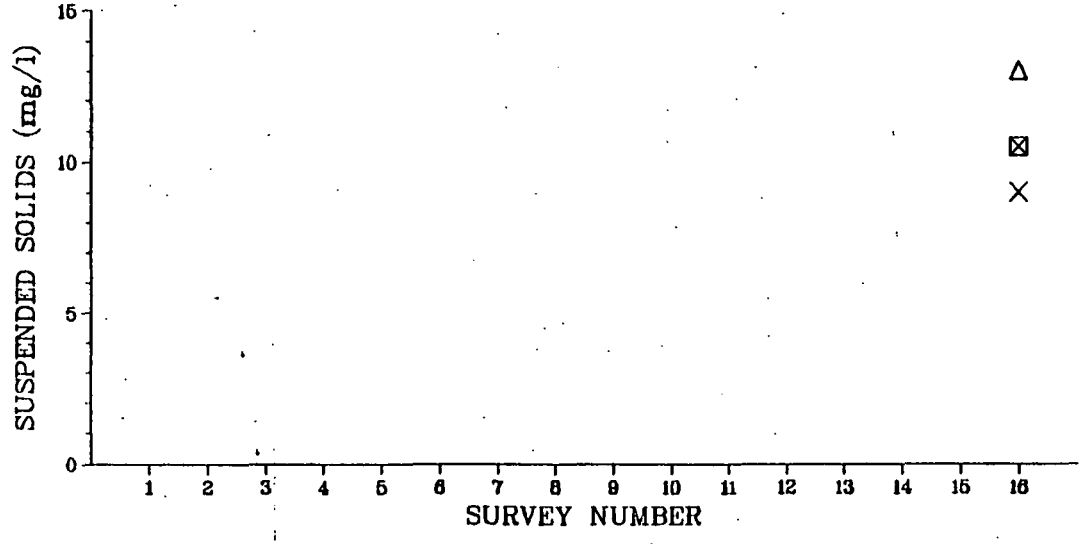

Legend
STATION 1
STATION 3
STATION 5
STATION 6

FIGURE B.4.16


FIXED SOLIDS (mg/l)
200
150
100
50
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
SURVEY NUMBER


SUSPENDED SOLIDS (mg/l)
15
10
5
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
SURVEY NUMBER

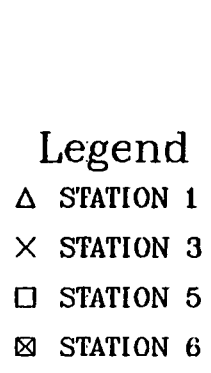

Legend
STATION 1
STATION 3
STATION 5
STATION 6

FIGURE B.4.17

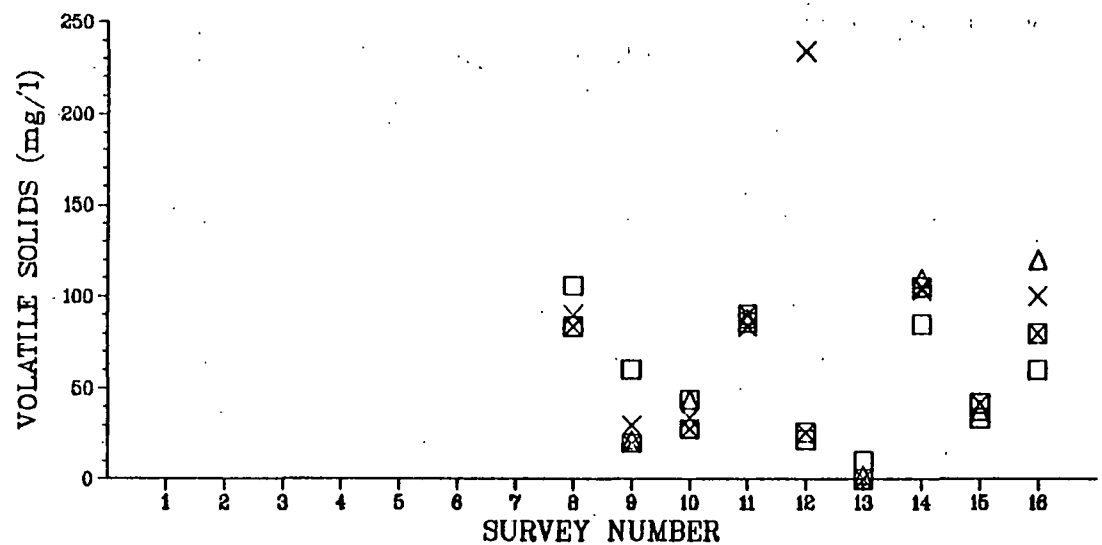
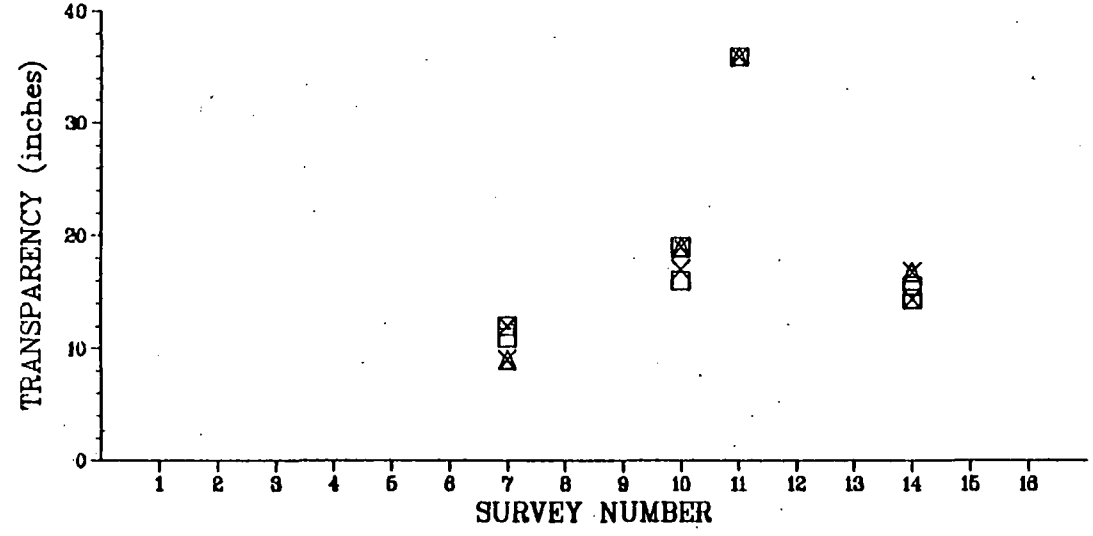
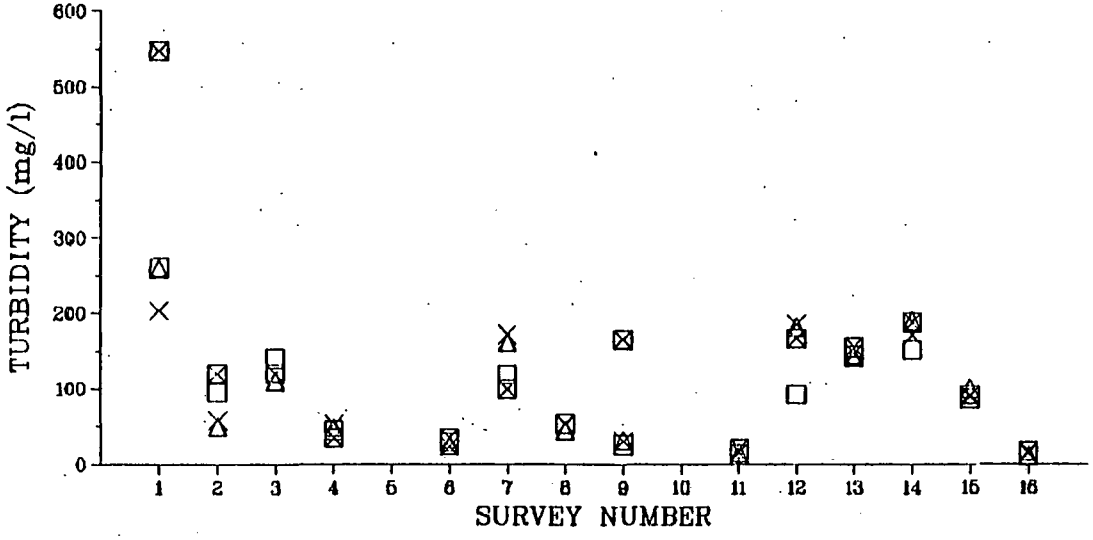

VOLATILE SOLIDS (mg/l)
250
200
150
100
50
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
SURVEY NUMBER
Legend
STATION 1
STATION 3
STATION 5
STATION 6

FIGURE B.4.18


TRANSPARENCY (inches)
0
10
20
30
40
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
SURVEY NUMBER


TURBIDITY (mg/l)
0
100
200
300
400
500
600
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
SURVEY NUMBER

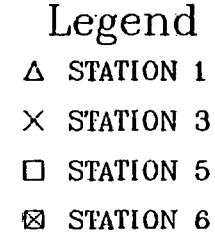
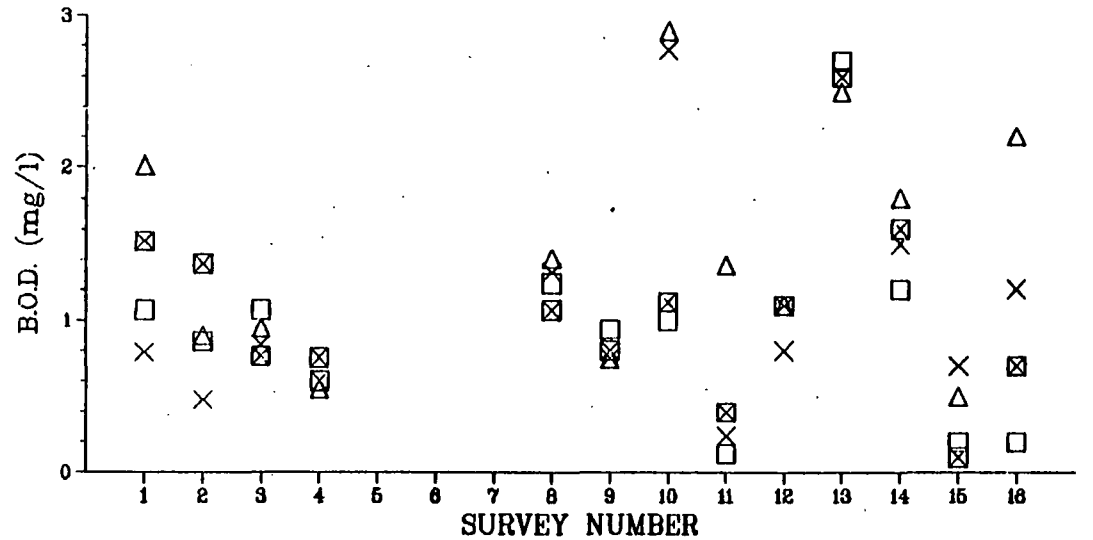
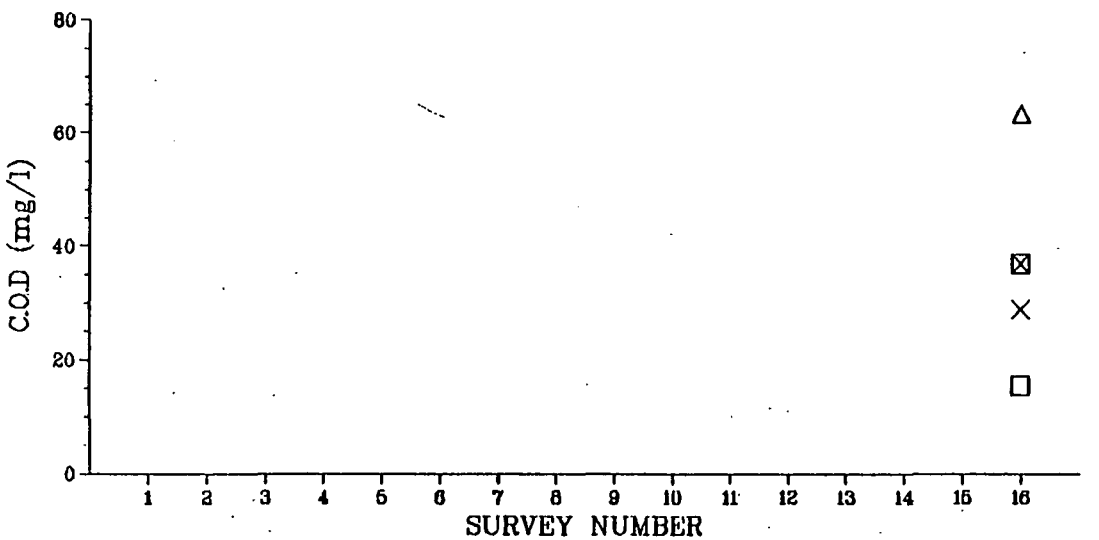

Legend
STATION 1
STATION 3
STATION 5
STATION 6

FIGURE B.4.19


B.O.D. (mg/l)
0
1
2
3
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
SURVEY NUMBER


C.O.D (mg/l)
0
20
40
60
80
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
SURVEY NUMBER

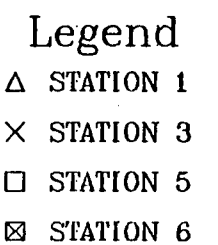
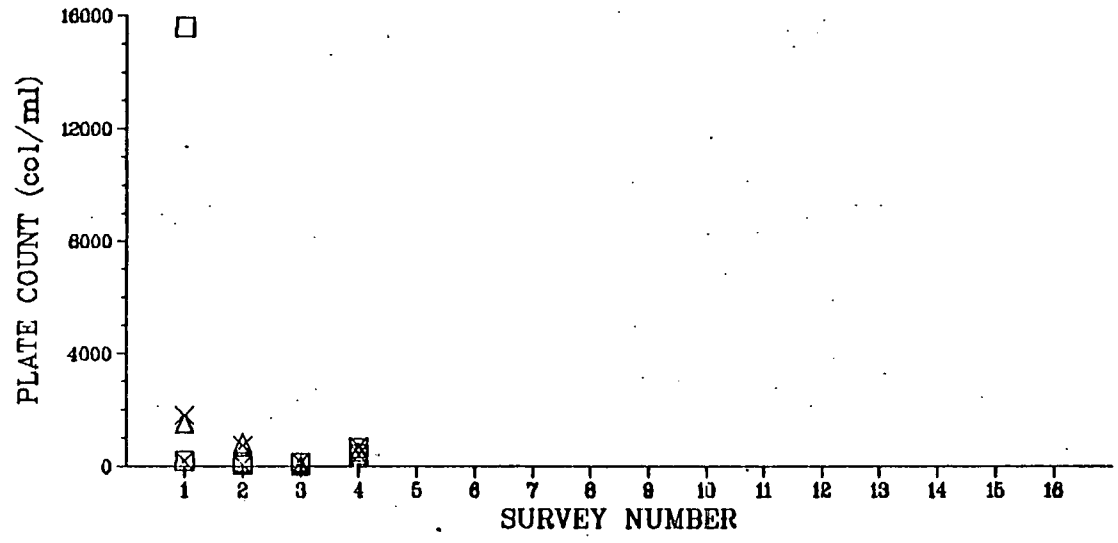
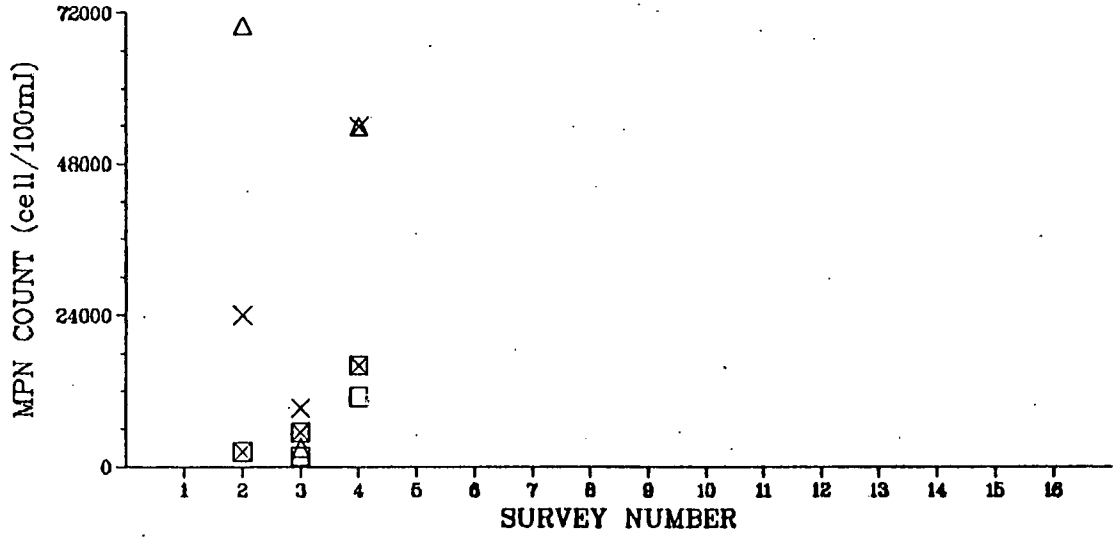

Legend
STATION 1
STATION 3
STATION 5
STATION 6

FIGURE B.4.20


16000
12000
8000
4000
0
PLATE COUNT (col/ml)
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
SURVEY NUMBER


72000
48000
24000
0
MPN COUNT (cell/100ml)
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SURVEY NUMBER

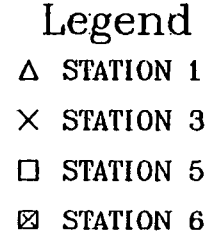

Legend
STATION 1
STATION 3
STATION 5
STATION 6

FIGURE B.4.21

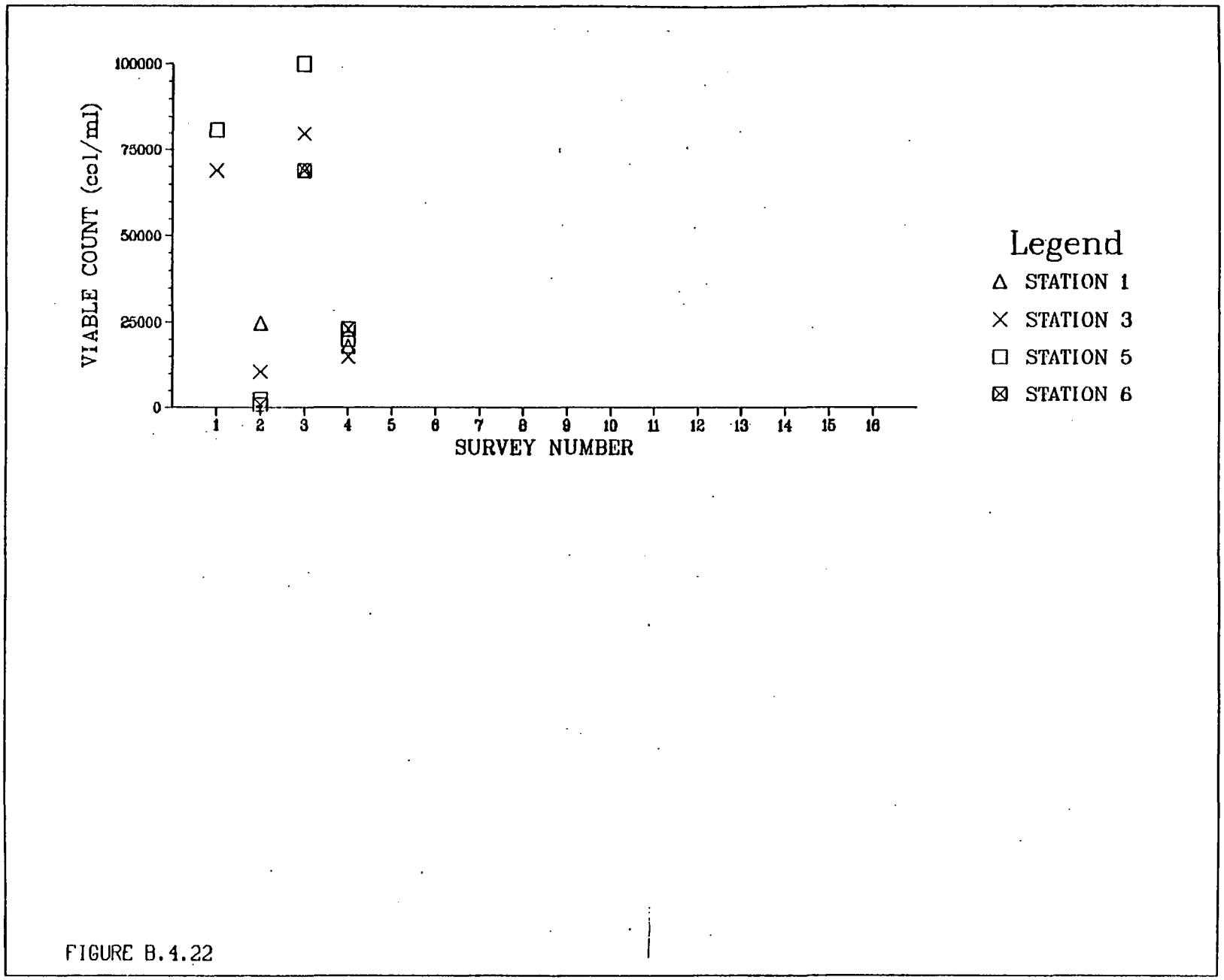
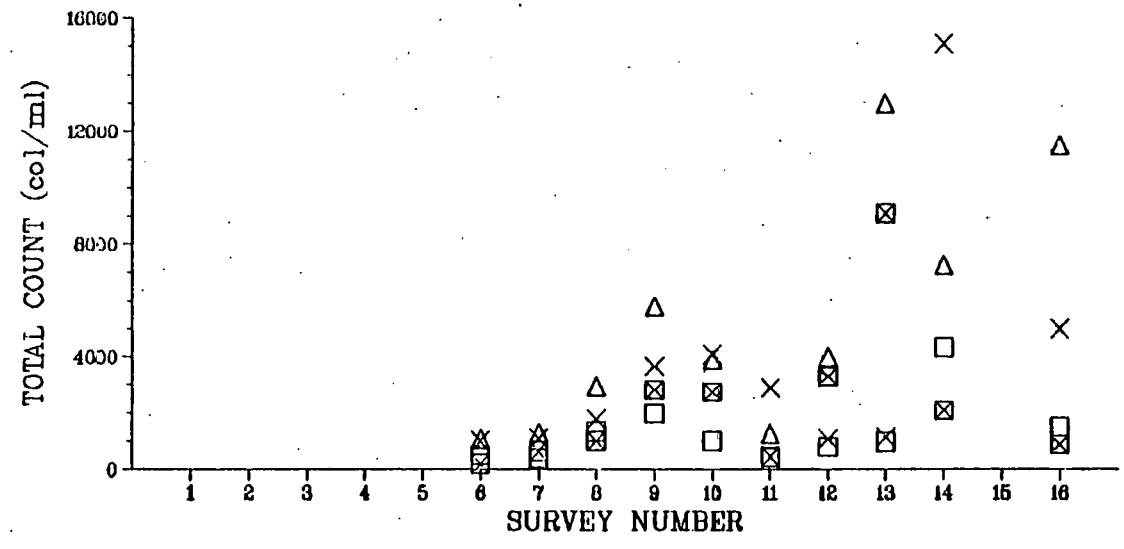
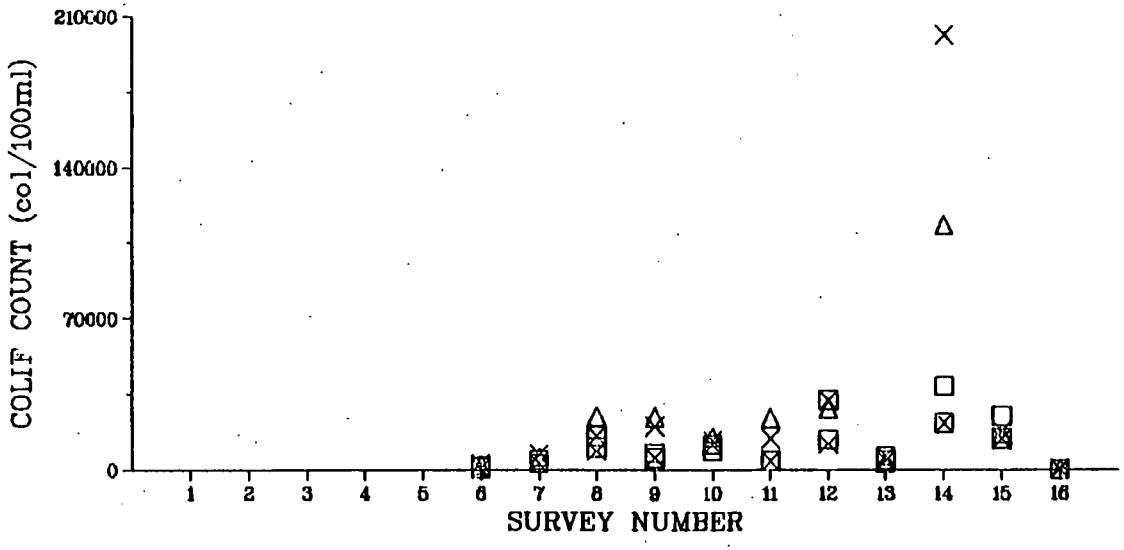

100000
75000
50000
25000
0
VIABLE COUNT (col/ml)
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
SURVEY NUMBER
Legend
STATION 1
STATION 3
STATION 5
STATION 6

FIGURE B.4.22


TOTAL COUNT (col/ml)
16000
12000
8000
4000
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
SURVEY NUMBER


COLIF COUNT (col/100ml)
210000
140000
70000
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
SURVEY NUMBER

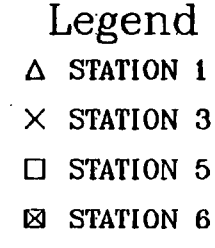

Legend
STATION 1
STATION 3
STATION 5
STATION 6

FIGURE B.4.23

Appendix C. Savannah River Flow and Temperature Data

C.1 Savannah River Flow and Temperature Data at Augusta (A) or Jackson (J).

C.2 Savannah River Daily Flow at Augusta during the Academy of Natural Sciences of Philadelphia Surveys.

Appendix C.1. Savannah River Flow and Temperature Data at Augusta (A) or Jackson (J)*

Year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Water Year Ave.
1976-77													
flow (A)**	8880	9583	20530	13210	8924	13020	20180	8396	7745	7612	7235	6909	11030
temp (A)***	20.0	14.0	10.0	6.5	7.0	11/5	14/5	18.0	19.5	22.0	23.5	24.0	16.0
temp (J)	19.5	m	m	6.0	7.5	12.5	15.5	19.5	22.0	23.0	24.5	24.5	17.0
1975-76													
flow (A)	11100	13150	12680	12260	10420	16750	12600	11120	16950	13200	7380	7614	12110
temp (A)	21.0	18.0	13.0	9.0	10.0	12.5	16.0	17.5	m	21.5	23.5	22.5	17.0
temp (J)	21.0	17.5	12.5	9.0	11.0	13.5	16.5	18.5	20.5	22.5	24.0	23.0	17.5
1974-75													
flow (A)	6451	6814	7043	12171	18143	28493	21382	13425	9235	8230	7545	7882	12196
temp (A)	21.0	17.0	11.0	10.5	11.5	15.0	17.5	m	22.0	23.0	22.5	16.5	16.5
temp (J)	19.5	16.0	11.0	10.5	11.0	12.0	15.5	18.5	21.0	22.5	24.0	23.0	17.0
1973-1974													
flow (A)	6076	6153	7845	16160	22350	8762	13900	7865	7093	7302	8181	7238	9822
temp (A)	21.5	17.5	13.0	12.0	m	m	m	19.5	21.5	m	23.0	23.0	18.5
temp (J)	21.0	17.0	12.5	12.5	m	m	17.0	20.5	22.5	23.5	23.5	23.0	18.5
1972-1973													
flow (A)	6581	6386	12550	15260	19080	18180	25620	11030	22830	7906	7469	6345	13200
temp (J)	20.5	16.5	12.5	9.5	9.0	13.0	15.0	18.0	20.0	23.5	23.5	24.0	17.0
1971-1972													
flow (A)	7198	7504	14160	19260	16160	8569	7737	9347	10390	8429	7129	7078	10240
temp (J)	20.5	16.5	12.5	m	9.5	13.0	16.5	18.0	21.0	23.5	24.5	23.5	17.5
1970-1971													
flow (A)	6460	6283	6536	7152	7314	21580	8658	9374	7339	7248	8471	7306	8668
temp (J)	m	m	m	m	m	m	m	m	m	m	m	m	m
1969-1970													
flow (A)	6602	6587	6867	6945	7093	8552	8093	6582	6548	7059	6889	6562	7032
temp (J)	20.6	15.0	11.5	8.5	9.7	12.8	16.6	19.7	m	m	m	m	

* Augusta measurements are taken 0.2 mi (0.3 km) upstream from Butler Creek at mile 187.4. Jackson measurements are taken 1.4 mi (2.3 km) downstream from Upper Three Runs Creek at mile 156.8. References 19, 30.

** Flow values are given in cfs.

*** Temperature values are given in °C.

Appendix C.1. (cont)

Year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Water Year Ave.
1968-1969													
flow (A)	6649	6834	6469	10210	13590	11350	20800	13680	7370	6942	7128	7177	9812
temp (J)	19.7	15.0	10.2	7.8	7.9	9.8	15.2	19.3	21.9	23.2	22.3	21.9	
1967-1968													
flow (A)	6286	7593	15090	18440	7175	7199	7555	7620	9607	7366	7500	6809	9043
temp (J)	19.9	15.6	12.7	8.0	8.2	11.2	15.1	17.3	20.0	22.7	23.4	21.7	
1966-1967													
flow (A)	6478	6478	6795	8718	8439	9228	6870	7036	14440	8713	8625	8740	8372
temp (J)	20.3	17.0	12.2	9.5	9.7	13.1	16.6	18.4	18.7	22.2	22.9	21.7	
1965-1966													
flow (A)	7057	6958	7060	8783	13610	23610	7201	10480	9031	6830	6731	6896	9509
temp (J)	20.2	17.8	13.7	9.3	8.3	10.3	15.5	17.2	20.0	22.9	22.9	21.9	
1964-1965													
flow (A)	17740	10950	17670	17610	10120	17450	16370	9574	12760	7652	9027	7959	12940
temp (J)	18.5	16.4	12.5	9.8	9.6	10.5	14.4	18.4	19.3	21.8	22.0	22.1	
1963-1964													
flow (A)	6559	6826	9818	16360	16720	27510	43850	27050	7143	10970	11900	14480	16580
temp (J)	20.1	16.4	9.6	7.1	7.3	12.0	14.1	17.7	22.5	21.9	22.6	22.3	
1962-1963													
flow (A)	5960	5852	5865	9178	9885	18460	7675	14900	10090	11220	7875	7488	9554
temp (J)	20.0	15.1	10.5	8.4	7.5	11.0	16.7	17.5	20.8	22.4	23.6	21.8	
1961-1962													
flow (A)	5680	5537	12700	14960	9978	13180	15420	7963	8190	5676	5992	6050	9276
temp (J)	19.6	17.8	12.7	8.6	10.2	10.7	14.1	20.2	21.5	23.8	23.7	22.5	
1960-1961													
flow (A)	6514	5867	5943	6198	9951	11980	21770	7425	6783	8840	7700	7835	8873
temp (J)	22.0	16.5	10.3	8.4	9.3	12.7	14.4	19.5	22.1	22.5	22.9	22.9	

* Augusta measurements are taken 0.2 mi (0.3 km) upstream from Butler Creek at mile 187.4. Jackson measurements are taken 1.4 mi (2.3 km) downstream from Upper Three Runs Creek at mile 156.8. References 19, 30.

** Flow values are given in cfs.

*** Temperature values are given in °C.

Appendix C.1. (cont)

Year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Water Year Ave.
1959-1960													
flow (A)	12680	12400	9298	15070	23480	18660	18020	9029	6267	6414	7344	6538	12450
temp (J)	22.3	16.3	11.7	9.9	9.0	8.6	15.0	18.2	22.1	23.5	24.2	24.7	
1958-1959													
flow (A)	5722	5675	5763	6026	7395	7322	6721	5781	13060	6613	7070	8559	7125
temp (J)	21.1	17.4	11.1	9.6	11.2	12.8	17.7	20.9	21.8	25.3	26.3	24.9	
1957-58													
flow (A)	7347	9310	13130	12780	14030	15120	23520	12260	6609	8796	7835	5879	11360
temp (J)	19.2	15.8	11.2	8.2	6.8	9.4	13.6	18.1	21.8	23.5	24.9	25.4	
1956-1957													
flow (A)	5437	5622	5962	6105	5988	6772	8225	9802	6138	6143	6171	6452	
temp (J)	19.5	15.5	12.5	10.2	12.6	13.0	17.6	19.5	22.6	24.2	24.9	25.0	
1955-1956													
flow (A)	4976	5076	5150	4418	4861	5668	6171	6031	5425	5266	5547	6189	5398
temp (J)	21.4	15.7	11.2	8.8	11.7	13.5	16.2	19.9	21.9	23.9	24.1	22.7	
1954-1955													
flow (A)	5818	5846	4982	4600	5278	5767	7119	5804	5227	5206	5226	4995	5487
temp (J)	data not available												
1953-1954													
flow (A)	7172	6498	7115	7247	7269	9420	11460	7306	6575	6230	5677	5584	7293
1952-1953													
flow (A)	3385	4017	3751	4084	5889	11390	6460	15150	5778	5750	5696	7232	6561
1951-1952													
flow (A)	2728	4196	8662	8654	5842	29090	21810	6782	4342	3627	3889	3332	8596
1950-1951													
flow (A)	8541	5166	8319	6581	7451	9764	11440	6580	5963	4570	3465	3389	6766

* Augusta measurements are taken 0.2 mi (0.3 km) upstream from Butler Creek at mile 187.4. Jackson measurements are taken 1.4 mi (2.3 km) downstream from Upper Three Runs Creek at mile 156.8. References 19, 30.

** Flow values are given in cfs.

*** Temperature values are given in °C.

Appendix C.2. Savannah River Daily Flow at Augusta during the Academy of Natural Sciences of Philadelphia Surveys*

Survey	Date	Flow (cfs)
1. 1951:	Jun. 25	6430
	26	6830
	27	6230
	28	5640
	29	5360
	30	5080
	Jul. 1	5260
	2	5840
	3	8080
	4	6030
	5	5550
	6	5640
	7	5460
	8	5360
	9	5460
	10	4900
	11	4620
	12	4100
	13	3580
	14	3580
2. 1951:	Oct. 15	2360
	16	2280
	17	1960
	18	1770
	19	3250
	20	2170
	21	1770
	22	1830
	23	1890
	24	1960
	25	2150
	26	2860
	27	3420
	28	3670
	29	3840
	30	3260
	31	2860
3. 1952:	Jan. 9	12800
	10	11600
	11	10500
	12	9990
	13	9510
	14	11400
	15	13200
	16	8320
	17	4980
	18	4540
	19	5170
	20	4360
	21	5410
	22	5040
	23	5030
	24	6930
	25	5360
	26	5080
	27	4980
	28	5260
	29	6730
	30	6730
	31	5740

* Reference 19

Appendix C.2. (cont)

Discharge at Augusta (cfs)

Survey	Date	Discharge	Survey	Date	Discharge	Survey	Date	Discharge
4. 1952:	May 5	9990	6. 1955:	Aug 24	5170	8. 1960:	May 23	5570
	6	9990		25	5080		24	6010
	7	9270		26	4900		25	6890
	8	9270		27	4900		26	6010
	9	9870		28	4900		27	6890
	10	8030		29	5260		28	5900
	11	7590		30	5170		29	5790
	12	8360		31	4980		30	5790
	13	7480		Sept 1	4900		31	6120
	14	7590		2	4980		June 1	7880
	15	6310		3	5460		2	7550
	16	4540		4	4980		3	7770
	17	4360		5	4980		4	6120
	18	4360		6	5170			
	19	4540		7	5170	9. 1960:	Aug 31	7990
	20	4900					Sept 1	7990
	21	4620	7. 1956:	May 6	4980		2	8100
	22	4540		7	5910		3	6010
				8	7100		4	5790
5. 1954:	Aug 15	5460		9	7260		5	5790
	16	5550		10	6630		6	5790
	17	5640		11	5930		7	6560
	18	5640		12	5840		8	7770
	19	5640		13	5170		9	7220
	20	5640		14	6420		10	6120
	21	5640		15	6790		11	5900
	22	5640		16	5930		12	5790
	23	5640		17	5260		13	5900
	24	5550		18	5080		14	6670
	25	5550		19	5840		15	7220
	26	5550		20	5360			
	27	5640		21	6260			
	28	5840		22	7590			
	29	5740						
	30	5740						

Appendix C.2. (cont)

Discharge at Augusta (cfs)

Survey	Date	Discharge	Survey	Date	Discharge	Survey	Date	Discharge
10. 1965:	May 30	6550	13. 1968	Aug 24	8230	16. 1976:	Aug 10	6900
	31	6780		25	6900		11	7430
	June 1	6960		26	6870		12	7650
	2	6900		27	7040		13	7630
	3	6640		28	7100		14	7850
	4	6620		29	7300		15	7640
	5	6600		30	7770		16	6930
	6	6560		31	7520			
	7	6530		Sept 1	6890			
	8	7070		2	6810			
11. 1965:	Sept 21	6460	14. 1972:	May 22	9610			
	22	6530		23	14700			
	23	7240		24	17100			
	24	7120		25	16500			
	25	6900		26	13700			
	26	6650		27	9940			
	27	6580		28	7440			
	28	6490		29	7320			
	29	7150		30	7250			
	30	6890		31	7310			
				June 1	7530			
12. 1968:	May 27	6750		2	7500			
	28	6670						
	29	6650	15. 1972:	Sept 13	6850			
	30	6650		14	7020			
	31	6700		15	9170			
	June 1	6480		16	7520			
	2	6730		17	7110			
	3	6860		18	6970			
	4	6840		19	6660			
	5	6570		20	7060			
				21	7090			
				22	7190			

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