NEW YORK AND NEW JERSEY HARBOR NAVIGATION STUDY

BIOLOGICAL MONITORING PROGRAM
1998-1999

VOLUME I of II

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TABLE OF CONTENTS

VOLUME I: BIOLOGICAL MONITORING REPORT

LIST OF TABLES ii
LIST OF FIGURES v

1.0 INTRODUCTION 1-1

1.1 BACKGROUND 1-1
1.2 PURPOSE 1-1

2.0 PREVIOUS BIOLOGICAL SAMPLING PROGRAMS 2-1

2.1 FISH SAMPLING PROGRAMS 2-1
2.2 SHELLFISH SAMPLING PROGRAMS 2-4
2.3 BENTHIC MACROINVERTEBRATE SAMPLING PROGRAMS 2-4

3.0 MATERIALS AND METHODOLOGY 3-1

3.1 FISHERIES SURVEYS 3-1
3.2 BENTHIC MACROINVERTEBRATE SURVEYS 3-2
3.3 HARBORWIDE SAMPLING PROGRAM 3-3
3.4 SITE-SPECIFIC SAMPLING PROGRAM 3-5

4.0 RESULTS AND DISCUSSION 4-1

4.1 BOTTOM TRAWL SURVEY 4-1
4.2 HYDROACOUSTIC SURVEY 4-5
4.3 SEASONAL ICHTHYOPLANKTON SURVEY 4-6
4.4 BENTHIC INVERTEBRATE SURVEY 4-7
4.5 CRAB DREDGE SURVEY 4-10

REFERENCES R-1

VOLUME II: APPENDICES

A – BOTTOM TRAWL CPUE
B – BOTTOM TRAWL LENGTH-FREQUENCY DISTRIBUTION
C – HYDROACOUSTIC TRACKED ECHO TARGET AND BOTTOM PROFILES
D – HYDROACOUSTIC TRACKED TARGET STRENGTH DISTRIBUTION
E – EPIBENTHIC SLED ICHTHYOPLANKTON DENSITY
F – BENTHIC GRAB MACROINVERTEBRATE DENSITY
G – CRAB DREDGE CPUE

LIST OF TABLES

2-1 Inventory of Fish Species Collected from Various Sampling Programs Conducted in the Project Area.

2-2 Newark Bay Aquatic Sampling Program 1995 – 1996 Shoal Station Catch Per Ten Minutes of 30-ft Bottom Trawl Effort.

2-3 Newark Bay Aquatic Sampling Program 1995 – 1996 Channel Station Catch Per Ten Minutes of 30-ft Bottom Trawl Effort.

2-4 Number of Fish and Megainvertebrates Collected With An 4.9-Motor Trawl At Shoal Stations In Newark Bay, May 1993 – April 1994.

2-5 Number of Fish and Megainvertebrates Collected With An 8.5-M Otter Trawl At Channel Stations In Newark Bay, May 1993 – April 1994.

2-6 Macroinvertebrate Taxa Collected From Newark Bay, Arthur Kill, and Kill Van Kull, 1995-1996.

2-7 Macroinvertebrate Taxa Collected From Kill Van Kull, 1995-1996.

2-8 Macroinvertebrate Taxa Collected From Newark Bay, 1995-1996.

2-9 Macroinvertebrate Taxa Collected From Arthur Kill, 1995-1996.

2-10 Newark Bay/Kill Van Kull Benthos Survey – 1985.

2-11 Benthic Fauna Identified In Newark Bay in 1993-1994.

2-12 Benthic Invertebrate Taxa Collected From Newark Bay, 1995 – 1996.

2-13 Benthic Invertebrate Taxa Collected From Newark Bay, Arthur Kill, and Kill Van Kull, 1995-1996.

2-14 Benthic Invertebrate Taxa Collected from the Arthur Kill, 1995-1996.

2-15 Benthic Invertebrate Taxa Collected From Kill Van Kull Area, 1995-1996.

2-16 Benthic Invertebrate Taxa Collected From the Goethals Bridge and Old Place Creek Study Area, 1994.

3-1 Biological Monitoring Program Gear Specifications.

3-2 Harborwide Survey Station Locations.

LIST OF TABLES (CONT'D)

3-3 Harborwide Sampling Program Survey Schedule October 1998 –September 1999.

3-4 Site-Specific Survey Station Locations.

3-5 Site-specific Sampling Program Survey Schedule October 1998 – September 1999.

4-1 Average Bottom Trawl CPUE.

4-2 Percent composition of Finfish Species collected in the Study Area – All Stations Combined, October 1998 – September 1999.

4-3 Average Bottom Trawl CPUE in the Study Area – All Stations Combined, October 1998 – September 1999.

4-4 Percent Composition of Finfish Species Collected at Channel Stations – All Areas Combined, October 1998 – September 1999.

4-5 Average Bottom Trawl CPUE at Channel Stations – All Areas Combined, October 1998 – September 1999.

4-6 Percent Composition of Finfish Species Collected at Shoal/Interpier Stations – All Areas Combined, October 1998 – September 1999.

4-7 Monthly Average Bottom Trawl CPUE at Shoal/Interpier Stations – All Areas Combined, October 1998 – September 1999.

4-8 Rank of the most Common Icthyoplankton Species Collected in Recent Studies.

4-9 Average Icthyoplankton Density in the Study Area – All Stations Combined, February – June 1999.

4-10 Average Icthyoplankton Density at Channel Stations – All Areas combined, February – June 1999.

4-11 Average Icthyoplankton Density at Shoal/Interpier Stations – All Areas Combined, February – June 1999.

4-12 Average Benthic Invertebrate Densities Collected at Channel Stations Among Sample Areas, November 1998 – September 1999.

4-13 Average Benthic Invertebrate Densities Collected at Interpier/Shoal Areas, November 1998 – September 1999.

4-14 Average Macroinvertebrate Densities Collected at Channel Stations November 1998, February 1999, May 1999, August 1999.

LIST OF TABLES (CONT'D)

4-15 Average Macroinvertebrate Densities Collected at Shoal Staions November 1998, February 1999, May 1999, August 1999.

4-16 Average Benthic Invertebrate Densities Collected at Shallow-water (<20 ft MLW) Stations, November 1998 – September 1999.

4-17 Average Benthic Invertebrate Densities Collected at 30 - 40 ft (MLW) Stations, November 1998 – September 1999.

4-18 Average Benthic Invertebrate Densities Collected at Mid-depths (shallow channel) Stations, November 1998 – September 1999.

4-19 Average Benthic Invertebrate Densities Collected at Deep-water (> 20 ft MLW) Stations, November 1998 – September 1999.

4-20 Crab Dredge CPUE at Channel Stations February – April 1999.

4-21 Crab Dredge CPUE at Shoal/Interpier Stations February 1999 – April 1999.

4-22 Estimated Bottom Trawl Crab CPUE at Channel Stations October 1998 – September 1999.

4-23 Estimated Bottom Trawl Crab CPUE at Shoal/Interpier Stations October 1998 – September 1999.

LIST OF FIGURES

3-1 Harborwide and Site-Specific Station Locations October 1998 – September 1999.

4-1 Average Bottom Trawl CPUE of the 10 most dominant fish species October 1998 – September 1999.

4-2 Average Bottom Trawl CPUE of all species combined, October 1998 – September 1999.

4-3 Percent Contribution, based on average density, of benthic invertebrate species November 1998, February 1999, May 1999 and August 1999.

4-4 Average Crab Dredge CPUE of blue crab, February – April 1999.

4-5 Average bottom trawl CPUE of blue crab, October 1998 – September 1999.

4-6 Total Crab Dredge CPUE of blue crab February – April 1999.

4-7 Average Crab Dredge CPUE of blue crab at shoal and shallow depth stations February – April 1999.

4-8 Average Crab Dredge CPUE (no./5-min.tow) of blue crab at channel stations February – April 1999.

CHAPTER 1

1.0 INTRODUCTION

1.1 BACKGROUND

The U.S. Army Corps of Engineers-New York District (USACE-NYD) was authorized by Congress in the 1996 Water Resources Development Act (WRDA) to conduct a comprehensive study on the navigation needs of the Port of New York and New Jersey. The study includes the evaluation of the deepening of existing channels to depths of 50 ft or greater and upgrading existing select Port facilities, including anchorages and berthing areas.

Potential environmental impacts associated with navigational channel improvements will be evaluated in a Feasibility Report and a National Environmental Policy Act (NEPA) Environmental Impact Statement (EIS) prepared by the USACE-NYD. Biological information on finfish, shellfish and macroinvertebrate species distribution, community structure, and seasonal use patterns is important in identifying potential environmental impacts and evaluating project alternatives in the EIS.

1.2 PURPOSE

A comprehensive review of literature concerning biological resources in the New York and New Jersey Harbor indicated there have been few comprehensive synoptic harbor wide studies that could be used to evaluate the relative importance of aquatic habitats, including navigation channels, among the water bodies comprising the Harbor (USACE-NYD 1998). Results of previous biological sampling programs conducted in the study area are summarized and discussed in Chapter 2.

Information on the seasonal distribution of resident and migrant finfish species, shellfish and benthic macroinvertebrates specific to project alternative areas was supplemented through a biological sampling program. The year-long sampling program was initiated in October 1998 and continued through September 1999 (USACE-NYD 1999). The program was designed to obtain information on the seasonal use and distribution patterns of aquatic populations in the project area navigation channels, shoals, and berthing areas. The program includes seasonal sampling of finfish, ichthyoplankton, and benthic macroinvertebrates at fixed sampling stations within the project area.

The biological program consists of two separate surveys, a harborwide survey and a site-specific survey. Harborwide sampling was conducted to obtain information on seasonal use of the Harbor's navigation channels by aquatic populations. Site-specific sampling was conducted to collect information on the seasonal use and distribution of resident and migrant fish and other aquatic organisms in specific channel, shoal and marine terminal areas representative of Harbor facilities and shoal areas. Survey stations are located in navigation channels (i.e., Harborwide stations) or near harbor berthing areas and marine

terminals (i.e., site-specific stations). Survey sampling methodologies, station locations, and survey schedule information is provided in Chapter 3.0

Results of the harborwide survey and the site-specific survey are discussed in Chapter 4. Data tables and figures for the harborwide survey and the site-specific survey are provided in report Appendices A through G (Volume II, separate submission).

CHAPTER 2

2.0 PREVIOUS BIOLOGICAL SAMPLING PROGRAMS

Several biological investigations have characterized the seasonal distribution and composition of the fish, shellfish and macroinvertebrate community in various habitats and areas of the New York and New Jersey Harbor estuary. Biological sampling programs conducted within the study area are summarized and discussed here to provide a background and comparison to the more recent USACE-NYD sponsored program results.

2.1 Fish Sampling Programs

Fish sampling was conducted in the Arthur Kill, Kill Van Kull, and Newark Bay in 1984-1985 (USACE 1987) and from April 1995 to March 1996 (LMS 1996). Sampling specific to Newark Bay was conducted in 1987-1988 (Will and Houston 1992) and from May 1993 to April 1994 (NMFS 1994). From March 1994 to February 1995, sampling was conducted in the Arthur Kill in the vicinity of the Goethals Bridge (USCG 1995). An extensive sampling program was conducted including both channel and shoal areas of Raritan, Lower New York Bay and Sandy Hook Bay between January 1992 and December 1997 (Wilk et al. 1998). These studies have also been used to characterize the abundance and seasonal occurrence of blue crabs and other shellfish.

The fish sampling programs presented above provide an inventory of fish species that may occur in the project area (Table 2-1). The combined list includes the results of the recent USACE-NYD sponsored program and shows the occurrence of 92 species representing 45 families. Most species listed are seasonal residents in the project area, however the list includes some freshwater and marine species that represent unique or uncharacteristic catches. A limited number of species dominate the fish community, with the vast majority of species occurring in very low numbers. Many of the marine species are semitropical, moving north along the Atlantic coast during summer.

Twenty fish species were collected in combined samples of shoal and channel areas during the 1994-1995 studies conducted in the vicinity of Goethals Bridge (USCG 1995). The species assemblage included common species that have historically occurred in the Arthur Kill on a frequent basis (EA 1989a,b). Most of the species found in the Arthur Kill occur in very low numbers and generally only for a short time on a seasonal basis. The greatest abundance of fishes were collected during December and January. Winter flounder dominated these catches, making up 81% and 76% of the December and January catches, respectively. Overall, winter flounder accounted for 60% of the total fish collected during the study, followed by striped bass (8.9%), Atlantic tomcod (6.4%), and grubby (5.9%).

In order to describe the species composition and relative abundance of fishes in shoal areas of Newark Bay, trawl samples were collected there from April 1995 to March 1996

(LMS 1996). Four shoal areas in Newark Bay and two channel stations near the Bayonne and Goethals bridges were sampled to provide information on the fish community in shoal and deep water. The Goethals Bridge station was the same station used during the 1994-1995 studies (USCG 1995).

Twenty-seven species of fish were collected in 1995-1996 in the combined shoal and deepwater stations (Table 2-2 and 2-3). Five species – butterfish, grubby, scup, spot, and cunner - were collected only in the channel stations. Grubby was the dominate species, comprising over 30% of all fish collected during all months at each station. Most species occurred infrequently, and in very low numbers during the 12-month long study.

Fish collected at shoal stations were dominated by relatively few species, with bay anchovy, striped bass, winter flounder and Atlantic silverside the most abundant species collected. Bay anchovy dominated the overall catch of the 12-month study, accounting for over 80% of all fish collected at shoal stations. Bay anchovy were present at shoal stations from May through December, with abundance highest during September. Striped bass and Atlantic silverside were the second and third most abundant species collected, accounting for 5.6 and 4.2% of all fish collected at shoal stations, respectively. Winter flounder were collected during all months except January and February. Most species occurred infrequently, and in very low numbers during the 12-month long study.

There was a consistent seasonal pattern for fishes among the shoal stations. Fish were relatively abundant from April through October but much less abundant from November through March. During the period when fish were most abundant only four species - striped bass, winter flounder, summer flounder, and bay anchovy - occurred during each month.

NMFS undertook a major fish sampling program in Newark Bay as part of an evaluation of a flood control project for the Passaic River Basin (NMFS 1994). This study provides additional information on habitat preference of species, namely, channel versus shoal areas. Monthly fish sampling was conducted from May 1993 through April 1994. Juvenile and adult fish were sampled with bottom trawls and gill nets. Larval fish were sampled with two different mesh sizes of plankton nets.

Twenty-eight species of fish were collected with a bottom trawl from seven shoal stations on the east side (relative to main channel) of Newark Bay in 1993-1994 (Table 2-4). Six species (striped bass, winter flounder, bay anchovy, Atlantic herring, Atlantic tomcod, and Atlantic silverside) accounted for 1% or more of the total number collected at the shoal stations combined. Two of these species, Atlantic herring and Atlantic tomcod, were collected only in May and June. Combined, both species accounted for over 80% of the catch in June.

Bay anchovy was the overall dominant species collected, occurring at shoal stations from April through September and again in December. Bay anchovy abundance was highest during September, with over 750 individuals collected at all seven stations combined.

Winter flounder and striped bass were the fourth and fifth most abundant species, respectively. Both species were relatively common in trawl samples collected at Newark Bay shoal stations in 1993-1994, occurring during most months sampled. Winter flounder was collected from April though January, with abundance highest during late-spring and early summer (i.e., May through July). Striped bass was present from May through December and accounted for almost 5% of all fish collected.

Forty-three species of fish were collected at the 10 Newark Bay channel stations in 1993-1994 (Table 2-5). Twelve species made up at least 1% of the catch for all channel stations combined: alewife, gizzard shad, bay anchovy, rainbow smelt, Atlantic tomcod, spotted hake, grubby, white perch, striped bass, weakfish, summer flounder, and winter flounder. Among the major species, striped bass, white perch, Atlantic tomcod, weakfish, and winter flounder were the most abundant. Among the species that accounted for less than 1% of the annual combined catch, only windowpane flounder occurred in all months. The other less abundant species occurred infrequently.

There was a distinct difference in the seasonal occurrence of fish between channel and shoal stations. Unlike shoal stations, striped bass was the overall dominant species collected at channel stations, accounting for almost 32% of all fish collected. Striped bass was most abundant from November through April. White perch abundance followed a similar pattern. Atlantic tomcod was the second most abundant species collected. Unlike shoal stations, Atlantic tomcod was present at channel stations throughout the 12-month study. Abundance was highest during June and July. With the exception of winter flounder and grubby, the seasonal abundance of the 10 most abundant species at the channel stations is shown below.

Seasonal Abundance at Channel Stations in Newark Bay 1993 – 1994

Species	Season	Species	Season
Alewife	Fall	Spotted hake	Late spring and early summer
Gizzard shad	Fall and Winter	White perch	Late Fall and Winter
Bay anchovy	Summer	Striped bass	Late Fall to early Spring
Rainbow smelt	Winter	Weakfish	Summer through Fall
Atlantic tomcod	Summer	Summer flounder	Summer

Fish were abundant in every month at the channel stations, while they were nearly absent from the shoals from November through April. Striped bass and white perch were particularly abundant at channel stations during the winter months. Similar to shoal stations, winter flounder was present at channel stations throughout the 12-month study. Winter flounder were abundant during July and August and again from October through December.

2.2 Shellfish Sampling Programs

In addition to finfish, blue crabs and other invertebrates collected in bottom trawl sampling gear used during the NMFS Passaic River Basin study (NMFS 1994) were reported. Blue crab was the overwhelmingly dominate species collected at both shoal and channel stations, accounting for over 98% of the megainvertebrates collected in both areas. Male blue crabs outnumbered females in channel stations by 1.25 to 1, while females outnumbered males in shoal areas by 2 to 1. Males and females were collected in greatest abundance from June through October at both shoal and channel stations. Other invertebrate species collected and reported include rock crab, spider crab, horseshoe crab, longfin squid, mantis shrimp and eastern oyster. The eastern oyster was collected only at shoal stations and was the only other invertebrate species reported there.

A recent survey of macroinvertebrates and shellfish was conducted in Newark Bay, Kill Van Kull, and Arthur Kill (LMS 1996). Data from this survey showed at least 19 species of macroinvertebrates in these three areas (Table 2-6). The most abundant species in the Newark Bay area were the dwarf surfclam (*Mulinia lateralis*) (66.95% of total) and softshell clam (*Mya arenaria*) (33.36% of total). The three other taxa present in appreciable numbers were the tellinids (*Tellina* sp.), gammarid amphipods (*Gammarus* spp.), and the sea grape (*Molgula manhattensis*). These three taxa accounted for 5.29%, 4.35%, and 1.79% of the individuals collected, respectively.

When considered separately, the Kill Van Kull had the highest diversity (16 species), followed by Newark Bay (11 species) and the Arthur Kill (7 species) (Table 2-7 through 2-9). Patterns of abundance were similar to the overall Bay area, with the exception of sea grape abundance in the Kill Van Kull and gammarid amphipod abundance in Newark Bay. In the Kill Van Kull, the common slipper shell (*Crepidula fornicata*) replaced the sea grape as the fifth most abundant species, while in Newark Bay, the solitary paper shell (*Haminoea solitaria*) replaced gammarid amphipods as the fourth most abundant species.

2.3 Benthic Macroinvertebrate Sampling Programs

The benthic fauna of Newark Bay was surveyed during 1985, with samples collected at 30 stations throughout the western and southern half (the northern limit was Port Newark) and the Kill Van Kull in the vicinity of Shooters Island (USACE-NYD 1987). Benthic sampling was conducted during the spring (Cerrato 1985) and summer (Chezik 1985) months, and included an equal number of sampling stations from shallow-water (7-18 ft) and deeper-water (33-40 ft) stations. A listing of benthic fauna by sampling month identified in the Newark Bay samples, along with the dominant species designated, is presented in Table 2-10. In general, greater numbers of organisms and species were recorded during the summer sampling program, with a significant difference ($\alpha = 0.5$) noted for the shallow-water-depth stations.

Overall benthic organism abundance in Newark Bay was classified as moderate. The Newark Bay benthic community was dominated by polychaete worms, which are habitat generalists and exhibit high tolerance to environmentally stressful conditions such as low DO levels. Two polychaete worms, *Streblospio benedicti* and *Sabellaria vulgaris*, as well as softshell clam were dominant during both the spring and summer periods. Three polychaete worm species, *Scolecolepides viridis, Nereis succinea*, and *Polydora ligni*, were dominant in the spring, being replaced by *Spio setosa* (polychaete), *Balanus improvisus* (barnacle), and *Molgula manhattensis* (tunicate) during the summer. There was a high degree of variability in individual species abundance levels between the shallow- and deep-water stations; however, no significant difference was detected in abundance or species representation between the two habitat types. Physical and chemical parameters measured during these studies included water temperature, salinity, and DO. All three parameters were similar at the shallow- and deep-water stations, and it was concluded that none of the three was limiting to the development of the benthic community. Stations characterized by finer-grained sediments in the center of the Bay exhibited lower species numbers and lower overall abundance. The moderate organism abundance and generally low species diversity in the benthos suggest that Newark Bay is a stressed environment that restricts the development of the benthic community (USACE-NYD 1987).

Twenty-five stations (18 channel stations and seven shallow-water stations) located in the northern and central sections of Newark Bay were sampled for benthic macroinvertebrates during 1993 and 1994 (NOAA 1994). Bottom sediments at the northern end of the Bay in the vicinity of the mouth of the Passaic River consisted primarily of soft, black, silty clay; north of the two bridges the bottom sediments were soft, with varying amounts of gravel, shell, sand, silt, and clay. South of the bridges the bottom sediments in both the channel and shoal stations were light, soft silt and clay, with some shell fragments. Channel stations located opposite Elizabeth Marine terminal usually contained lumps of thick, hard, red clay. Benthic fauna collected, including designation of dominant species, is presented in Table 2-11. As noted for the benthic study conducted during 1985, the benthos at both shallow-water and channel stations were similar in species composition (dominated by polychaete worms) and exhibited similar seasonal abundance patterns. It was determined that the Newark Bay benthic community had lower overall abundance and lower species diversity when compared to the benthos of Upper New York Bay.

Lawler, Matusky & Skelly Engineers LLP (LMS) conducted a Newark Bay benthic sampling program for PANYNJ from April 1995 through March 1996 (LMS 1996). Seven stations were sampled: five of the stations were in Newark Bay and included stations in the immediate vicinity of the proposed Newark Bay Combined Disposal Facility (NBCDF) site. Two of the stations were outside Newark Bay, one near the Bayonne Bridge (Kill Van Kill) and the other near the Goethals Bridge (Arthur Kill). Total abundance by species for the five Newark Bay stations is presented in Table 2-12, and monthly abundance by species for all stations combined over the 12-month study period is presented in Table 2-13.

Polychaetes dominated the benthos collected at the Newark Bay stations. Six species of polychaete worms were among the ten most abundant benthic invertebrate species identified in the Bay samples. The dominant species collected was the polychaete worm *Scoloplos* sp., which accounted for 28.5% of the total. The five other polychaetes found in the most abundant 10 benthic invertebrate species were *S. benedicti* (rank = 2, 23.7% of the total), the family Paraonidae (rank = 4, 7.0% of the total), the family Phyllodocidae (rank = 8, 1.7% of the total), *Glycera* sp. (rank = 9, 1.7% of the total), and *P. ligni* (rank = 10, 1.6% of the total). The other species rounding out the top 10 benthic invertebrate species by abundance included two bivalves, *Mulinia lateralis* (rank = 3, 15.4% of the total), and *M. arenaria* (rank = 6, 4.4% of the total); the estuarine isopod *Cyathura polita* (rank = 5, 5.8% of the total); and the cumacean *Oxyurostylis smithii* (rank = 7, 1.9% of the total). Species composition and abundance patterns were similar among the five Newark Bay stations (LMS 1996).

Similar trends were observed in the benthic samples from the Arthur Kill and Kill Van Kull stations (Table 2-14 and 2-15, respectively). Of the ten taxa that were numerically abundant at the Arthur Kill site, six were polychaetes. The polychaete *S. benedicti* accounted for 79% of the total number of organisms collected. The other five abundant polychaetes were Phyllodocidae (rank = 2, 4.77% of total), *Scoloplos* sp. (rank = 3, 3.62% of total), Paraonidae (rank = 5, 1.99% of total), Oligochaeta (rank = 6, 1.64% of total) and *P. ligni* (rank = 7, 1.09% total). The other benthic species in the top ten in abundance at the Arthur Kill site included two bivalve mollusks, *M. arenaria* (rank = 4, 2.08% of total) and *M. lateralis* (rank = 8, 0.84% of total), the cumacean *Leucon americanus* (rank = 9, 0.78% of total), and the isopod *Edotea triloba* (rank = 10, 0.68% of total) (LMS 1996).

At the Kill Van Kull site, seven of the ten most abundant taxa were polychaetes. Of these polychaetes, *S. benedicti* accounted for 49.14% of the total number of organisms collected. The remaining six were *S. vulgaris* (rank = 2, 29.47% of total), Paraonidae (rank = 3, 5.56% of total), *Scoloplos* sp. (rank = 5, 1.71% of total), Phyllodocidae (rank = 7, 1.57% of total), Oligochaeta (rank = 9, 1.10% of total), and *N. succinea* (rank = 10, 0.73% of total). The remaining benthic species that were among the ten most abundant taxa at the Kill Van Kull site included two bivalve mollusks, *M. lateralis* (rank = 4, 1.82% of total) and *M. arenaria* (rank = 6, 1.67% of total), and the amphipod Aoridae (rank = 8, 1.42% of total) (LMS 1996).

As noted for the Newark Bay sampling programs, where water depths and sediment types are similar, polychaete worms dominated this Arthur Kill benthic community. Among the more abundant polychaete taxa were *S. benedicti*, *Scoloplos* sp., and *Phyllodoce arenae* (USCG 1995). Oligochaete worms were found to be the second most abundant group, followed by burrowing cumacean shrimp. In Old Place Creek, polychaetes were also the dominant group and oligochaetes were found in most samples. However, more bivalves and isopods were found, as the sediments are firmer with more sand, bits of brick-like material, and clay. The benthic invertebrate taxa collected are presented in

Table 2-16. The shallow-water benthic community in the soft sediments near the Goethals Bridge was similar to Newark Bay in terms of species types and seasonal abundance patterns. Temporal and spatial variability, primarily related to reproduction patterns, was noted in the seasonal collections. However, a stable community dominated by detritivores was found throughout the sampling area.

Intricate flow patterns between the Hudson River estuary, the East River, Kill Van Kull, and the Atlantic Ocean through The Narrows complicate the sediment patterns of Upper New York Bay (Coch 1986). Coarse-grained facies, such as gravelly silty sand, silty gravelly sand, clayey silty sand, and silty sandy gravel, underlie the central part of the northern portion of the Upper Bay. The intense bottom currents indicative of this area cause this complex pattern. In contrast, sandy clayey silts underlie the shallower and calmer areas along the New Jersey, Queens, and Brooklyn shorelines. Clayey silty sand was found on the bottom of the central portion of Upper New York Bay and into the mouth of the Kill Van Kull. These sediments grade into a sand facies toward The Narrows and are bordered in The Narrows by silty sands on the east and west sides. Gravelly sands bordered on the west by sandy clayey silts and on the east by clayey silty sands underlie the channel south of The Narrows. These facies grade into the coarse-grained sands of the northern portion of the Lower Bay.

Benthos samples were collected from August 1975 to June 1976 in the vicinity of Liberty State Park in the Upper New York Bay Harbor (TI 1976). The polychaete worm *S. benedicti* strongly dominated the benthos by representing 57.0% of the annual mean total number of organisms per square meter collected, while other polychaetes accounted for 5.7%. Tubificid worms made up an additional 31.3% of the benthos, leaving a mere 6.0% of the community to be made up by other taxa. There was a distinct variation in the structure of the benthic community in relation to the distance from sewer outfalls, waterfowl concentrations, and a nutrient-rich *Spartina* marsh. The areas around sewer outfalls exhibited very low benthic abundance in the summer, but showed an increase in numbers with the buildup of DO concentrations during the winter. Fecal contamination from waterfowl seemed to have a similar effect on the benthos, but to a lesser degree. The increased availability of nutrients from the marsh created an increase in the numbers of benthic organisms near the marsh shoreline.

Coch (1986) noted that Lower New York Bay contained three distinct regions of sediments separated by narrow gradational facies. The three regions were the apex of the New York Bight in the north and northeast, Sandy Hook Bay in the south, and Raritan Bay in the west. Sands with aprons of gravelly sands and patches of sandy gravel covered most of the bottom of the northern portion of Lower New York Bay. These facies graded into the sands covering the apex of the New York Bight to the east and southeast. Silty sands underlay Sandy Hook Bay and graded into sands along the shoreline of New Jersey and Sandy Hook. Sandy clayey silt covered Raritan Bay and extended into the Raritan River estuary to the west and into the Arthur Kill to the northwest. These sediments graded into the sands of the northern Lower New York Bay to the northeast and the sands along the New Jersey coast to the southeast.

A regional study of the benthos in Lower New York Bay was done seasonally in 1986-87 (Cerrato, et al. 1989). Eighty-four sites were sampled extending from Raritan Bay across to Sandy Hook, up to Rockaway Point, and across to the Verrazano Narrows. The sediments were variable, ranging from 100% sand and gravel to silty clay. The amphipod *Ampelisca abdita* accounted for 55.8% of the total number of organisms collected, and the blue mussel ranked second at 18.6%. Other abundant species included the polychaetes *Asabellides oculata* and *Heteromastus filiformis*, the softshell clam, the slipper shell *Crepidula fornicata* and the amphipods *Corophium tuberculatum* and *Elasmopus levis.*

Benthic studies of lower New York Bay/Raritan Bay area were carried out in 1989 as part of an environmental study related to expanding and deepening the Raritan Bay anchorages (USACE-NYD 1994a; 1994b). Anchorage sites in the study area are composed of 65% silt with varying amounts of sand and clay. The average sand:silt:clay ratio is 16:65:19. A diverse benthic community was found to be present in Raritan Bay/Lower New York Bay. The benthos was dominated by *A. abdita*, a tube-dwelling amphipod (55.8% of all individuals collected). Polychaete worms ranked fourth in overall abundance.

TABLE 2-1 (page 1 of 6)

Inventory of Fish Species Collected from Various Sampling Programs Conducted in the Project Area

Family Genus Species	Common Name	A 1988	B 1991	C 1991-1992	D 1993-1994	E 1994	F 1995-1996	G 1992-1997	H 1998-1999
Carcharhinidae	**Requiem Sharks**								
Mustelus canis	Smooth dogfish		X						
Rajidae	**Skates**								
Raja eglanteria	Clearnose skate							X	
Raja erinacea	Little skate			X	X			X	X
Raja ocellata	Winter skate							X	
Acipenseridae	**Sturgeons**								
Acipenser oxyrhyncus	Atlantic sturgeon		X		X				
Anguillidae	**Freshwater Eels**								
Anguilla rostrata	American eel	X	X	X	X	X			X
Ophichthidae	**Snake eels**								
Myrophis punctatus	Speckled worm eel			X					
Congridae	**Conger Eels**								
Conger oceanicus	Conger eel			X	X				X
Clupeidae	**Herrings**								
Alosa aestivalis	Blueback herring		X	X	X		X	X	X
Alosa pseudoharengus	Alewife	X	X	X	X	X	X	X	X
Alosa sapidissima	American shad	X	X	X	X	X	X		X
Alosa mediocris	Hickory shad		X	X		X			X
Brevoortia tyrannus	Atlantic menhaden		X	X	X				X
Clupea harengus	Atlantic herring		X		X		X	X	X
Dorosoma epedianum	Gizzard shad		X	X	X		X		X
Engraulidae	**Anchovies**								
Anchoa mitchilli	Bay anchovy	X	X	X	X	X	X	X	X
Anchoa hepsetus	Striped anchovy		X				X		X
Osmeridae	**Smelts**								
Osmerus mordax	Rainbow smelt				X				X
Synodontidae	**Lizardfishes**								
Synodus foetens	Inshore lizardfish		X	X					X

TABLE 2-1 (page 2 of 6)

Inventory of Fish Species Collected from Various Sampling Programs Conducted in the Project Area

Family Genus Species	Common Name	A 1988	B 1991	C 1991-1992	D 1993-1994	E 1994	F 1995-1996	G 1992-1997	H 1998-1999
Gadidae	**Cods**								
Merluccius bilinearis	Silver hake		X	X		X		X	X
Microgadus tomcod	Atlantic tomcod	X	X	X	X		X		X
Urophycis chuss	Red hake	X	X	X	X	X		X	X
Urophycis regia	Spotted hake	X	X		X		X	X	X
Urophycis tenuis	White hake	X	X						
Gadus morhua	Atlantic cod	X							
Enchelyopus cimbrius	Fourbeard rockling			X					
Pollachius virens	Pollock		X	X					X
Ophidiidae	**Cusk-eels**								
Lepophidium cervinum	Fawn cusk-eel		X						
Ophidion marginatum	Striped cusk-eel			X					X
Batrarchoididae	**Toadfishes**								
Opsanus tau	Oyster toadfish		X	X					X
Belonidae	**Needlefishes**								
Strongylura marina	Atlantic needlefish			X					
Cyprinodontidae	**Killifishes**								
Fundulus heteroclitus	Mummichog	X		X		X			
Fundulus majalis	Striped killifish	X		X	X	X			
Fundulus diaphanus	Banded killifish			X					
Atherinidae	**Silversides**								
Menidia beryllina	Inland silverside		X						
Menidia peninsulae	Tidewater silverside			X					
Menidia menidia	Atlantic silverside		X		X		X		X
Gasterosteidae	**Sticklebacks**								
Gasterosteus aculeatus	Threespine stickleback			X	X				
Apeltes quadracus	Fourspine stickleback		X	X					
Syngnathidae	**Pipefishes**								
Hippocampus erectus	Lined seahorse		X	X	X				X
Syngnathus fuscus	Northern pipefish	X	X	X		X	X		X

TABLE 2-1 (page 3 of 6)

Inventory of Fish Species Collected from Various Sampling Programs Conducted in the Project Area

Family Genus Species	Common Name	A 1988	B 1991	C 1991-1992	D 1993-1994	E 1994	F 1995-1996	G 1992-1997	H 1998-1999
Triglidae	**Searobins**								
Prionotus carolinus	Northern searobin		X	X				X	X
Prionotus evolanis	Striped searobin	X	X	X				X	X
Cottidae	**Sculpins**								
Myoxocephalus octodecemspinosus	Longhorn sculpin		X						
Myoxocephalus aenaeus	Grubby		X	X		X	X		X
Percichthyidae	**Temperate Basses**								
Morone americana	White perch			X	X	X	X		X
Morone saxatilis	Striped bass		X	X	X	X	X	X	X
Serranidae	**Sea Basses**								
Centropristis striata	Black sea bass		X	X				X	X
Centrarchidae	**Sunfishes**								
Pomoxis nigromaculatus	Black crappie			X					
Lepomis macrochirus	Bluegill		X						
Micropterus salmoides	Largemouth bass			X					
Pomoxis annularis	White crappie			X					
Pomatomidae	**Bluefishes**								
Pomatomus saltatrix	Bluefish	X	X	X		X	X	X	X
Carangidae	**Jacks**								
Caranx hippos	Crevalle jack		X		X		X		X
Trachurus lathami	Rough scad		X						
Selene vomer	Lookdown		X	X					X
Selene setapinnis	Atlantic moonfish		X	X					X
Lutjanidae	**Snappers**								
Lutjanus griseus	Grey snapper		X						
Sparidae	**Porgies**								
Stenotomus chrysops	Scup		X	X	X		X	X	X
Sciaenidae	**Drums**								
Cynoscion regalis	Weakfish	X	X	X	X	X	X	X	X
Leiostomus xanthurus	Spot	X	X	X	X	X	X	X	X

TABLE 2-1 (page 4 of 6)

Inventory of Fish Species Collected from Various Sampling Programs Conducted in the Project Area

Family Genus Species	Common Name	A 1988	B 1991	C 1991-1992	D 1993-1994	E 1994	F 1995-1996	G 1992-1997	H 1998-1999
Sciaenidae (cont.)	**Drums**								
Menticirrhus saxatilis	Northern kingfish		X	X	X		X		X
Bairdiella chryosura	Silver perch			X	X				
Micropogon undulatas	Atlantic croaker						X		
Chaetodontidae	**Butterflyfishes**								
Chaetodon ocellatus	Spotfin butterflyfish		X	X					
Mugilidae	**Mullets**								
Mugil cephalus	Striped mullet		X	X					
Labridae	**Wrasses**								
Tautoga onitis	Tautog		X	X	X	X			X
Tautogolabrus adspersus	Cunner		X	X	X	X	X		X
Pholidae	**Gunnels**								
Pholis gunnellus	Rock gunnel		X	X	X				X
Uranoscopidae	**Stargazers**								
Astroscopus guttatus	Northern stargazer		X	X					X
Blenniidae	**Combtooth Blennies**								
Hypsoblennius hentz	Feather blenny			X					X
Ammodytidae	**Sand Lances**								
Ammodytes americanus	American sand lance		X	X		X			X
Gobiidae	**Gobies**								
Gobiosoma bosc	Naked goby		X	X					X
Gobiosoma ginsburgi	Seaboard goby		X	X					
Scombridae	**Mackerels**								
Scomberomorus maculatus	Spanish mackerel			X					
Scomber japonicus	Chub mackerel				X				
Scomber scombrus	Atlantic mackerel		X						X
Stromateidae	**Butterfishes**								
Peprilus triacanthus	Butterfish		X		X		X	X	X

TABLE 2-1 (page 5 of 6)

Inventory of Fish Species Collected from Various Sampling Programs Conducted in the Project Area

Family Genus Species	Common Name	A 1988	B 1991	C 1991-1992	D 1993-1994	E 1994	F 1995-1996	G 1992-1997	H 1998-1999
Bothidae	**Lefteye Flounder**								
Etropus microstomus	Smallmouth flounder		X	X	X				X
Paralichthys dentatus	Summer flounder		X	X	X		X	X	X
Scopthalmus aquosus	Windowpane		X	X				X	X
Paralicthys oblongus	Fourspot flounder		X		X				X
Pleuronectidae	**Righteye Flounders**								
Hippoglossoides platessoides	American plaice			X		X			
Pleuronectes americanus	Winter flounder		X		X		X	X	X
Soleidae	**Soles**								
Trinectes maculatus	Hogchoker		X	X	X				
Symphurus plagiusa	Blackcheek tonguefish			X					
Balistidae	**Leatherjackets**								
Cantherhines pullus	Orangespotted filefish			X					
Monacanthus hispidus	Planehead filefish				X				
Ostraciidae	**Boxfishes**								
Lactophrys quadricornis	Scrawled cowfish			X					
Tetraodontidae	**Puffers**								
Sphoeroides maculatus	Northern puffer		X	X					X
Chilomycterus schoepfi	Striped burrfish			X					
Mullidae	**Goatfishes**								
Pseudupeneus maculatus	Spotted goatfish								X

TABLE 2-1 (page 6 of 6)

Inventory of Fish Species Collected from Various Sampling Programs Conducted in the Project Area

Source	Study Location	Reference
A	Arthur Kill and Old Place Creek	Louis Berger & Associates, Inc. (LBA). 1992. Staten Island Bridges Program Environmental Report. Submittal to the Port Authority of New York/New Jersey.
B	Raritan Bay and Sandy Hook Bay Trawls	Woodhead, P.M.J. 1991. *Inventory and Assessment of Habitat and Fish Resources and Assessment of Information on Toxic Effects in the New York/New Jersey Harbor Estuary.* New York/New Jersey Harbor Estuary Program. Marine Sciences Research Center, State University of New York, Stony Brook, New York.
C	Arthur Kill Generating Station	Lawler, Matusky & Skelly Engineers (LMS). 1993. Arthur Kill Impingement and Entrainment Report, September 1991-September 1992. Report to Consolidated Edison Company of New York, Inc.
D	Newark Bay	National Marine Fisheries Service. Undated. Results of a Biological and Hydrological Characterization of Newark Bay, New Jersey, May 1993-April 1994.
E	Arthur Kill and Old Place Creek	U.S. Coast Guard (USCG). 1995. Draft Environmental Impact Statement/Draft Section 4(f) Statement. Staten Island Bridges Program, Modernization and Capacity Enhancement Project.
F	Newark Bay	Lawler, Matusky & Skelly Engineers LLP (LMS). 1996. Newark Bay Biological Monitoring Program April 1995-March 1996. Report prepared for the Port Authority of NY/NJ.
G	Hudson-Raritan Estuary	Wilk, S.J.; Pikanowski, R.A.; McMillan, D.G.; MacHaffie, E.M. 1998. Seasonal Distribution and Abundance of 26 Species of Fish and Megainvertebrates Collected in the Hudson-Raritan Estuary, January 1992- December 1997. *Northeast Fish. Sci. Cent. Ref. Doc.* 98-10; 145 p.
H	New York Harbor, Arthur Kill, Kill van Kull, and Newark Bay	U.S. Army Corps of Engineers (USACE). 1999. New York New Jersey Harbor Navigation Study – Biological Monitoring Program. USACE New York District.

TABLE 2-2

Newark Bay Aquatic Sampling Program 1995 – 1996
Shoal Station Catch Per Ten Minutes of 30-ft Bottom Trawl Effort

	NEWARK BAY (4 stations combined)													
Species Collected	1995 APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	1996 JAN	FEB	MAR	TOTAL	% COMP.
Alewife							1.00						1.00	0.03
American shad			1.00			9.00	3.00						13.00	0.40
Atlantic croaker					1.00				1.00				2.00	0.06
Atlantic herring		4.00											4.00	0.12
Atlantic silverside						78.00	50.00	7.00					135.00	4.18
Atlantic tomcod		2.00											2.00	0.06
Bay anchovy		4.00	23.50	147.00	787.00	1703.00	10.00	2.00					2676.50	82.97
Blueback herring			2.00	1.00									3.00	0.09
Bluefish					5.00	33.00	7.00						45.00	1.39
Butterfish														
Crevalle jack						4.00							4.00	0.12
Cunner														
Gizzard shad										1.00			1.00	0.03
Grubby														
Northern Puffer					1.00								1.00	0.03
Northern kingfish						15.00							15.00	0.46
Northern pipefish		3.00	1.00	4.00									8.00	0.25
Scup														
Spot														
Spotted hake		7.00											7.00	0.22
Striped anchovy							1.00						1.00	0.03
Striped bass	63.50	69.00	17.00	13.00		1.00	15.00				2.00		180.50	5.60
Summer flounder		5.00	7.25	7.00	8.00	2.00							29.25	0.91
Weakfish		1.00		5.00		1.00							7.00	0.22
White perch	1.00	1.00				5.00		1.00	1.00				9.00	0.28
Windowpane				1.00									1.00	0.03
Winter flounder	9.75	15.00	8.00	7.00	2.00	15.00	9.00	8.00			3.00	4.00	80.75	2.50

SOURCE: LMS 1996

TABLE 2-3

Newark Bay Aquatic Sampling Program 1995 – 1996
Channel Station Catch Per Ten Minutes of 30-ft Bottom Trawl Effort

	NEWARK BAY (2 stations combined)													
Species Collected	1995 APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	1996 JAN	FEB	MAR	TOTAL	% COMP.
Alewife														
American shad														
Atlantic croaker														
Atlantic herring														
Atlantic silverside														
Atlantic tomcod		2.5		48.3					2.5				53.3	11.5
Bay anchovy					20.0		3.3						23.3	5.0
Blueback herring														
Bluefish														
Butterfish					2.5								2.5	0.5
Crevalle jack														
Cunner						2.5	2.5						5.0	1.1
Gizzard shad														
Grubby		12.5	3.3	16.7					17.5	32.5		5.0	87.5	18.8
Northern puffer														
Northern kingfish														
Northern pipefish														
Scup		5.0											5.0	1.1
Spot			3.3				2.5						5.8	1.3
Spotted hake		45.0						2.9					47.9	10.3
Striped anchovy														
Striped bass						3.3			20.0	13.3	3.3	10.0	50.0	10.7
Summer flounder														
Weakfish						3.3	7.5						10.8	2.3
White perch		2.5				3.3			9.2	6.7		10.0	31.7	6.8
Windowpane				3.3						3.3			6.7	1.4
Winter flounder		2.5	46.7	40.0	13.3	6.7		3.3	6.7	13.3		3.3	135.8	29.2

SOURCE LMS 1996

TABLE 2-4

Number of Fish and Megainvertebrates Collected with an 4.9-M Otter Trawl at Shoal Stations in Newark Bay, May 1993 – April 1994

Common Name	Scientific Name	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Species Total	% Comp.
Blueback herring	*Alosa aestivalis*	-	-	-	-	-	-	2	7	-	-	-	-	9	0.32
Alewife	*Alosa pseudoharengus*	2	-	-	1	-	-	-	2	-	-	-	-	5	0.18
American shad	*Alosa sapidissima*	1	-	-	3	2	-	-	2	-	-	-	-	8	0.29
Atlantic herring	*Clupea harengus*	50	616	-	-	-	-	-	-	-	-	-	-	666	23.88
Bay anchovy	*Anchoa mitichilli*	1	79	171	398	750	-	-	8	-	-	-	1	1408	50.48
Rainbow smelt	*Osmerus Mordax*	-	-	-	-	-	-	-	-	-	-	1	-	1	0.04
Altantic tomcod	*Microgadus tomcod*	48	246	-	-	-	-	-	-	-	-	-	-	294	10.54
Spotted hake	*Urophycis regia*	-	2	-	-	-	-	-	-	-	-	-	-	2	0.07
Atlantic silverside	*Menidia menidia*	-	-	-	-	-	30	3	8	1	-	2	-	44	1.58
Threespine stickleback	*Gasterosteus aculeatus*	-	-	-	-	-	-	-	-	-	-	2	-	2	0.07
Lined seahorse	*Hippocampus erectus*	-	1	-	-	-	-	-	-	-	-	-	-	1	0.04
Northern pipefish	*Syngnathus fuscus*	1	3	4	1	1	-	-	-	-	-	-	-	10	0.36
Northern searobin	*Prionotus carolinus*	1	-	-	-	-	-	-	-	-	-	-	-	1	0.04
Striped searobin	*Prionitus evolans*	-	-	-	2	1	-	-	-	-	-	-	-	3	0.11
Grubby	*Myoxocephalus aenaeus*	-	-	-	-	-	-	1	-	-	-	-	-	1	0.04
White perch	*Morone americana*	-	-	-	-	-	-	-	8	-	-	2	-	10	0.36
Striped bass	*Morone saxatilis*	6	1	8	23	33	37	1	23	-	-	-	-	132	4.73
Bluefish	*Pomatomus saltatrix*	-	-	2	4	9	-	-	-	-	-	-	-	15	0.54
Weakfish	*Cynoscion regalis*	-	-	-	3	-	3	-	-	-	-	-	-	6	0.22
Spot	*Leiostomus xanthurus*	-	-	-	1	-	-	-	-	-	-	-	-	1	0.04
Northern kingfish	*Menticirrhus saxatilis*	-	-	-	2	-	-	-	-	-	-	-	-	2	0.07
Goby	*Gobiidae sp.*	-	1	-	-	-	-	-	-	-	-	-	-	1	0.04
Butterfish	*Peprilus triacanthus*	-	-	-	-	-	1	-	-	-	-	-	-	1	0.04
Smallmouth flounder	*Etropus microstomus*	-	-	-	-	2	-	1	-	-	-	-	-	3	0.11
Summer flounder	*Paralichthys dentatus*	1	5	9	6	-	-	-	-	-	-	-	-	21	0.75
Windowpane	*Scophthalmus aquosus*	-	-	4	-	-	-	-	-	-	-	-	-	4	0.14
Winter flounder	*Pleuronectes americanus*	25	53	21	14	1	8	6	5	1	-	-	3	137	4.91
Northern puffer	*Sphoeroides maculatus*	-	-	-	-	1	-	-	-	-	-	-	-	1	0.04
Easter oyster	*Crassostrea virginica*	-	1	-	-	-	-	-	-	-	-	-	-	1	
Blue crab (M)	*Callinectes sapidus*	2	13	51	27	13	17	-	-	-	3	11	-	137	
Blue crab (F)	*Callinectes sapidus*	-	4	41	6	5	8	1	1	-	-	1	1	68	
Blue crab (U)	*Callinectes sapidus*	-	1	-	-	-	-	-	-	-	-	-	-	1	

NOTES A dash (-) indicates no catch, U = unclassified to sex, M=Male, and F=Female
SOURCE NMFS 1994.

TABLE 2-5 (page 1 of 2)

Number of Fish and Megainvertebrates Collected with an 8.5-M Otter Trawl at Channel Stations in Newark Bay, May 1993 – April 1994

Common Name	Scientific Name	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Species Total	% Comp.
Little skate	*Raja erinacea*	-	-	-	-	-	-	1	-	-	-	-	1	2	0.01
Altantic sturgeon	*Acipenser oxyrhynchus*	-	1	-	-	-	-	-	-	-	-	-	-	1	0.00
American eel	*Anguilla rostrata*	1	1	-	1	-	-	2	1	2	1	-	1	10	0.05
Conger eel	*Congridae sp.*	-	-	-	-	-	-	-	-	1	-	-	-	1	0.00
Blueback herring	*Alosa aestivalis*	-	-	-	-	-	-	-	1	-	-	-	1	2	0.01
Alewife	*Alosa pseudoharengus*	1	2	31	3	3	31	161	2	9	-	-	9	252	1.25
American shad	*Alosa sapidissima*	-	1	-	-	-	-	5	-	-	-	-	2	8	0.04
Altantic menhaden	*Brevoortia tyrannus*	2	8	68	7	2	2	2	-	-	-	-	-	91	0.45
Atlantic herring	*Clupea harengus*	-	3	-	-	-	-	2	-	-	-	1	1	7	0.03
Gizzard shad	*Dorosoma cepedianum*	-	-	-	2	-	13	196	18	47	1	-	-	277	1.37
Bay anchovy	*Anchoa mitichilli*	-	16	282	11	8	2	5	1	-	-	-	-	325	1.61
Rainbow smelt	*Osmerus Mordax*	1	-	-	-	-	-	-	5	313	25	27	2	373	1.85
Altantic tomcod	*Microgadus tomcod*	167	852	1226	684	15	91	276	110	9	8	7	102	3547	17.60
Red hake	*Urophycis chuss*	45	33	1	-	-	-	-	13	3	-	1	3	99	0.49
Spotted hake	*Urophycis regia*	288	450	31	-	-	17	20	15	-	-	-	26	847	4.20
Striped killfish	*Fundulus majalis*	-	-	-	-	-	-	-	-	1	1	-	-	2	0.01
Threespine stickleback	*Gasterosteus aculeatus*	-	-	-	-	-	-	-	-	1	6	11	-	18	0.09
Northern pipefish	*Syngnathus fuscus*	-	-	-	-	1	-	-	-	-	-	-	1	2	0.01
Northern searobin	*Prionotus carolinus*	-	9	7	10	-	2	-	-	-	-	-	-	28	0.14
Striped searobin	*Prionitus evolans*	2	5	3	7	44	25	7	-	-	-	-	-	93	0.46
Grubby	*Myoxocephalus aenaeus*	13	28	13	8	-	4	5	23	66	44	54	13	271	1.34
White perch	*Morone americana*	3	1	-	-	-	1	507	264	244	737	666	354	2777	13.78
Striped bass	*Morone saxatilis*	22	22	323	23	-	41	1742	181	215	1021	1844	1006	6440	31.95
Bluefish	*Pomatomus saltatrix*	-	-	-	1	2	2	-	-	-	-	-	-	5	0.02
Crevalle jack	*Caranx hippos*	-	-	-	-	1	-	-	-	-	-	-	-	1	0.00
Scup	*Stenotomus chrysops*	1	1	-	-	-	1	-	-	-	-	-	-	3	0.01
Silver perch	*Bairdiella chrysoura*	-	-		-	-	8	13	-	-	-	-	-	21	0.10
Weakfish	*Cynoscion regalis*	5	14	9	804	1128	735	104	4	-	-	-	-	2803	13.91
Spot	*Leiostomus xanthurus*	-	-	-	2	2	1	-	-	-	-	-	-	5	0.02
Northern kingfish	*Menticirrhus saxatilis*	-	-	-	1	-	-	-	-	-	-	-	-	1	0.00
Atlantic croaker	*Micropogonias undulatus*	-	-	-	7	3	4	5	3	-	-	-	-	22	0.11
Tautog	*Tautoga onitis*	-	-	-	1	-	-	3	1	-	-	-	1	6	0.03
Cunner	*Tautogolabrus adspersus*	-	1	-	-	-	-	-	-	1	-	2	2	6	0.03

TABLE 2-5 (page 2 of 2)

Number of Fish and Megainvertebrates Collected with an 8.5-M Otter Trawl at Channel Stations in Newark Bay, May 1993 – April 1994

Common Name	Scientific Name	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Species Total	% Comp.
Rock gunnel	*Pholis gunnellus*	-	-	-	-	-	-	-	-	-	-	-	1	1	0.00
Butterfish	*Peprilus triacanthus*	-	-	-	42	18	19	1	-	-	-	-	-	80	0.40
Smallmouth flounder	*Etropus microstomus*	-	-	-	-	-	-	2	2	-	-	-	1	5	0.02
Summer flounder	*Paralichthys dentatus*	28	52	80	40	10	1	-	-	-	-	-	8	219	1.09
Fourspots flounder	*Paralichthys oblongus*	-	1	-	-	-	-	-	-	-	-	-	-	1	0.00
Windowpane	*Scophthalmus aquosus*	1	2	9	4	2	19	19	5	1	2	4	10	78	0.39
Winter flounder	*Pleuronectes americanus*	17	59	161	271	53	108	365	164	51	33	57	69	1408	6.99
Hogchoker	*Trinectes maculatus*	1	2	1	2	7	-	-	2	-	-	1	1	17	0.08
Planehead filefish	*Monacanthus hispidus*	-	-	-	-	-	1	-	-	-	-	-	-	1	0.00
Northern puffer	*Sphoeroides maculatus*	-	-	-	1	-	-	-	-	-	-	-	-	1	0.00
Soft clam	*Mya arenaria*	-	-	-	-	-	-	-	-	2	5	5	29	45	0.78
Longfin squid	*Loligo pealei*	-	-	1	-	-	-		-	-	-	-	-	1	0.02
Horseshoe crab (U)	*Limulus polyphemus*	1	1	-	1	-	1	-	-	2	1	-	1	8	0.14
Mantis shrimp	*Squilla empusa*	-	-	-	-	2	11	2	-	6	-	-	-	21	0.36
Spider crab (U)	*Libina emarginata*	-	-	-	-	-	-	-	-	-	1	1	-	2	0.03
Atlantic rock crab (U)	*Cancer irroratus*	-	-	-	-	-	-	-	1	-	-	-	-	1	0.02
Atlantic rock crab (M)	*Cancer irroratus*	-	1	-	-	-	-	-	-	3	-	1	-	5	0.09
Lady crab (F)	*Ovalipes acellatus*	-	-	-	-	-	-	-	1	-	-	-	-	1	0.02
Blue crab (M)	*Callinectes sapidus*	336	876	894	163	171	368	100	69	30	54	75	23	3159	54.75
Blue crab (F)	*Callinectes sapidus*	228	647	1093	147	199	62	64	32	13	9	17	16	2527	43.80

NOTES: A dash (-) indicates no catch, U = unclassified to sex, M=Male, and F=Female.
SOURCE: NMFS 1994.

TABLE 2-6

Macroinvertebrate Taxa Collected From Newark Bay, Arthur Kill, and Kill Van Kull, 1995– 1996 (Number/ 0.56 Square Feet)

	Monthly Total For All Stations (5 Newark Bay Sites; 2 Channel Sites)													
Species	**1995 Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**1996 Jan**	**Feb**	**Mar**	**Total**	**%**
Bivalvia														
Mercenaria mercenaria		1											1	0.08
Mya arenaria	91	180	55	6	6	2	1		3	3	13	69	429	33.36
Mulinia lateralis	10	14	1	1	39	137	96	51	122	152	151	87	861	66.95
Tellina sp.	7	17	18	11			1	11				3	68	5.29
Lyonsia hyalina	1												1	0.08
Mytilus edulis	1	1											2	0.16
Macoma sp.												2	2	0.16
Gastropoda														
Crepidula fornicata						2	1				1		4	0.31
Crepidula plana						9	1			1	1		12	0.93
Retusa sp.		1											1	0.08
Haminoea solitaria		1	1			4	1	3	5				15	1.17
Epitonium sp.											1		1	0.08
Arthropoda														
Gammaridae	2	4	5		1					1	3	40	56	4.35
Crangon septemspinosus		2						2		1	2		7	0.54
Callinectes sapidus									1			2	3	0.23
Rhithropanopeus harrisii		2				1			1			1	5	0.39
Neopanope texana sayi												1	1	0.08
Eurypanopeus depressus											1		1	0.08
Chordata														
Molgula manhattensis	15				1	3			1		1	2	23	1.79
Total	127	223	80	18	47	158	101	67	133	158	174	207	1286	100.00

Source: LMS 1996.

TABLE 2-7

Macroinvertebrate Taxa Collected From Kill Van Kull, 1995 – 1996
(Number /0.05 Square Meter)

Station	BBN													
Approx. Depth at MLW	42-44'													
Species	1995 Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	1996 Jan	Feb	Mar	Total	%
Bivalvia														
Mercenaria mercenaria		1											1	0.28
Mya arenaria	21	8	14		6	2	1		1	2	2	69	126	35.80
Mulinia lateralis	7		1		31	2	24	14	9	34	8	7	137	38.92
Tellina sp.		3	3					8					14	3.98
Mytilus edulis	1	1											2	0.57
Macoma sp.												2	2	0.57
Gastropoda														
Crepidula fornicata						2	1				1		4	1.14
Crepidula plana						9	1			1	1		12	3.41
Epitonium sp.											1		1	0.28
Arthropoda														
Gammaridae			1									40	41	11.65
Crangon septemspinosus								2					2	0.57
Callinectes sapidus												1	1	0.28
Rhithropanopeus harrisii						1						1	2	0.57
Neopanope texana sayi												1	1	0.28
Eurypanopeus depressus											1		1	0.28
Chordata														
Molgula manhattensis						3					1	1	5	1.42
Total	29	13	19	0	37	19	27	24	10	37	15	122	352	100.0

Source: LMS 1996.

TABLE 2-8

Macroinvertebrate Taxa Collected From Newark Bay, 1995 – 1996
(Number/0.05 Square Meter)

	Total (April 1995-March 1996)						
Station **Approx. Depth at MLW**	**NBSW (N)** **1-2'**	**NBSW (S)** **1-2'**	**NBSW (W)** **1-4'**	**NBSW (E)** **1-3'**	**NBSW (E)** **1-2'**	**All NBS Total**	**%**
Species							
Bivalvia							
Mya arenaria	55	66	63	4	8	196	20.23
Mulinia lateralis	7	8	50	85	531	681	70.28
Tellina sp.	6	21	4	10	10	51	5.26
Lyonsia hyalina		1				1	0.10
Gastropoda							
Retusa sp.				1		1	0.10
Haminoea solitaria		2	10	1	1	14	1.44
Arthropoda							
Gammaridae	1	1	2	6		10	1.03
Crangon septemspinosus		2			1	3	0.31
Callinectes sapidus			2			2	0.21
Rhithropanopeus harrisii					3	3	0.31
Chordata							
Molgula manhattensis			5	1	1	7	0.72
Total	69	101	136	108	555	969	100.00

Source: LMS 1996.

TABLE 2-9

Macroinvertebrate Taxa Collected From Arthur Kill, 1995 – 1996
(Number/0.05 Square Meter)

Station	GWB													
Approx. Depth at MLW	38-40'													
Species	1995 Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	1996 Jan	Feb	Mar	Total	%
Bivalvia														
Mercenaria mercenaria											1		107	62.21
Mya arenaria	20	84		2										
Mulinia lateralis	3	13				8	1	8	3	3	3	1	43	25.00
Tellina sp.	1	1						1					3	1.74
Gastropoda														
Haminoea solitaria								1					1	0.58
Arthropoda														
Gammaridae		3	2										5	2.91
Crangon septemspinosus		2											2	1.16
Chordata														
Molgula manhattensis	10											1	11	6.40
Total	34	103	2	2	0	8	1	10	3	3	4	2	172	100.0

Source: LMS 1996.

TABLE 2-10 (page 1 of 3)

Newark Bay / Kill Van Kull Benthos Survey – 1985

TAXONOMIC LISTING	MAY	AUGUST
CNIDARIA		
ANTHOZOA		
METRIDIIDAE		
Metridium senile	X	X
HYDROZOA		
HYDRACTINIIDAE		
Hydractinia sp.		X
TUBULARIIDAE		
Tubularia sp.		X
ASCHELMINTHES		
Nematoda sp.	X	X
RHYNCHOCOELA		
Nemertea sp.	X	
ANNELIDA		
OLIGOCHAETA		
Oligochaeta sp.		X
POLYCHAETA		
AMPHARETIDAE		
Asabellides oculata	X	
CAPITELLIDAE		
Capitella capitata		X
Capitellidae sp.	X	X
CIRRATULIDAE		
Tharyx acutus	X	X
GLYCERIDAE		
Glycera americana		X
Glycera capitata	X	
Glycera dibranchiata	X	X
Glycera sp.	X	X
MAGELONIDAE		
Magelona rioja	X	
MALDANIDAE		
Clymenella sp.	X	X
Maldanidae sp.	X	X
NEPHTYIDAE		
Nephtys incisa		X
Nephtys sp.		X
NEREIDAE		
*Nereis succinea**	X	X
Nereis sp.		X
PECTINARIIDAE		
Pectinaria gouldii	X	X
PHYLLODOCIDAE		
Eteone heteropoda	X	X

TABLE 2-10 (page 2 of 3)

Newark Bay / Kill Van Kull Benthos Survey – 1985

TAXONOMIC LISTING	MAY	AUGUST
POLYNOIDAE		
Harmothoe extenuata	X	
Lepidonotus squamatus	X	X
Polynoidae sp.		X
SABELLARIIDAE		
*Sabellaria vulgaris**	X	X
SABELLIDAE		
Fabricia sabella		X
SERPULIDAE		
Hydroides dianthus		X
SPIONIDAE		
*Polydora ligni**	X	X
Scolelepis squamata	X	
*Scolecolepides viridis**	X	X
*Spio setosa**		X
*Streblospio benedicti**	X	X
ARTHROPODA		
CRUSTACEA		
CIRRIPEDIA		
BALANIDAE		
*Balanus improvisus**		X
Balanus sp.	X	X
CAPRELLIDEA		
CAPRELLIDAE		
Caprella sp.		X
CUMACEA		
Oxyurostylis smithi	X	X
AMPHIPODA		
AORIDAE		
Lembos smithi	X	
Unciola irrorata	X	
CHOROPHIIDAE		
Corophium acherusicum	X	X
Corophium sp.		X
Erichthonius brasiliensis	X	
MELITIDAE		
Melita nitida	X	X
Melitidae sp.	X	X
ISOPODA		
ANTHURIDAE		
Cyathura polita	X	X
IDOTEIDAE		
Edotea montosa	X	X
MYSIDACEA		
MYSIDAE		
Neomysis americana		X

TABLE 2-10 (page 3 of 3)

Newark Bay / Kill Van Kull Benthos Survey – 1985

TAXONOMIC LISTING	MAY	AUGUST
DECAPODA		
CRANGONIDAE		
Crangon septemspinosa		X
XANTHIDAE		
Rhithropanopeus harrisii	X	X
MOLLUSCA		
GASTROPODA		
CALYPTRAEIDAE		
Crepidula plana		X
NASSARIIDAE		
Ilyanassa obsoleta		X
Nassarius trivittata	X	
BIVALVIA		
MACTRIDAE		
Mulinia lateralis	X	X
Spisula solidissima		X
MYIDAE		
*Mya arenaria**	X	X
MYTILIDAE		
Mytilus edulis	X	X
OSTREIDAE		
Crassostrea virginica		X
SOLENIDAE		
Ensis directus		X
TELLINIDAE		
Tellina agilis	X	X
ECTOPROCTA		
GYMNOLAEMATA		
CHEILOSTOMATA		
CALLOPORIDAE		
Callopora sp.		X
ELECTRIDAE		
Electra sp.		X
MEMBRANIPORIDAE		
Conopeum reticulum	X	X
Membranipora tenuis		X
CTENOSTOMATA		
VESICULARIDAE		
Bowerbankia sp.		X
CHORDATA		
ASCIDIACEA		
PLEUROGONA		
MOLGULIDAE		
*Molgula manhattensis**	X	X

Note: * Indicates dominant species. Source USACE-NYD (1987)

TABLE 2-11

Benthic Fauna Identified In Newark Bay in 1993-1994

CNIDARIA
- *Anthozoa*

RHYNCHOCOELA
- *Rhynchocoela*

POLYCHAETA
- *Lepidonotus squamatus*
- *Lepidonotus sublevis*
- *Hypereteone heteropoda*
- *Hypereteone foliosa*
- *Paranaitis speciosa*
- *Eumida sanguinea*
- *Podarkeopsis levifuscina*
- *Microphthalmus sczelkowii*
- *Proceraea cornuta*
- *Streptosyllis pettiboneae*
- Nereidae
- *Neanthes succinea*
- *Nephtys incisa*
- *Glycera spp.*
- *Glycera americana*
- *Leitoscoloplos* sp.
- *Leitoscoloplos robustus**
- *Polydora spp.*
- *Polydora cornuta**
- *Spio setosa*
- *Pygospio elegans*
- *Streblospio benedicti**
- *Marenzelleria viridis*
- *Tharyx sp. A**
- *Heteromastus filiformis*
- *Mediomastus ambiseta**
- *Sabellaria vulgaris**
- *Pectinaria gouldii*
- Ampharetidae
- *Asabellides oculata*
- Sabellidae
- *Polychaete fragments*

OLIGOCHAETA
- Oligochaeta*

MOLLUSCA
- Gastropoda
- *Epitonium sp.*
- *Odostomia* sp.*
- *Rictaxis punctostriatus*
- *Cylichnella bidentata*
- *Doradella obscura*
- *Mytilus edulis*
- *Mulinia lateralis**
- *Ensis directus*
- *Macoma balthica*
- *Tellina agilis*
- *Mya arenaria**
- *Barnea truncata*
- Bivalve siphons

CRUSTACEA
- *Balanus improvisus*
- *Neomysis americana*
- *Leucon americanus**
- *Oxyurostylis smithi*
- *Cyathura polita*
- *Sphaeroma quadridentata*
- *Edotea triloba*
- *Ampelisca* spp.
- *Ampelisca abdita*
- *Microdeutopus* spp.
- *Microdeutopus gryllotalpa*
- *Corophium* spp.
- *Corophium acutum*
- *Unciola serrata*
- *Elasmopus laevis*
- *Melita nitida*
- *Monoculodes* sp. I
- *Parapleustes aestuarius*
- *Paracaprella tenuis*
- *Crangon septemspinosa*
- *Cancer irroratus*
- Xanthidae
- *Rhithropanopeus harrisii*

INSECTA
- Chironomidae

ECHINODERMATA
- Asteroidea
- Echinoidea

ASCIDIACEA
- *Molgula manhattensis*

Note: Asterisk (*) indicates dominate species.
Source: NMFS 1994.

TABLE 2-12 (page 1 of 2)

Benthic Invertebrate Taxa Collected From Newark Bay, 1995 – 1996
(Number/0.05 Square Meter)

Station Approx. Depth at MLW	Total (April 1995-March 1996)					TOTAL	%
	NBSW (N) 1-2'	NBSW (S) 1-2'	NBNW 1-4'	NBSE 1-3'	NBNE 1-2'		
Taxa							
Rhynchocoela							
Nemertea	15	7	5	8	21	56	1.30
Annelida							
Oligochaeta	6	1			3	10	0.23
Polychaeta							
Phyllodocidae	12	13	28	9	15	77	1.78
Glycera sp.	24	11	9	20	9	73	1.69
Glycera dibranchiata	1	2	1		1	5	0.12
Goniadidae	3	1	1			5	0.12
Pectinaria gouldii	2	2	5	9	8	26	0.60
Nereis succinea	8	14	15	3	13	53	1.23
Opheliidae	12					12	0.28
Paraonidae	45	38	156	38	31	308	7.13
Scolecolepidis viridis		1	1		1	3	0.07
Streblospio benedicti	105	268	442	161	73	1049	24.27
Polydora ligni	17	5	8	36	3	69	1.60
Scoloplos sp.	297	464	196	157	147	1261	29.18
Capitella capitata	1					1	0.02
Ampharetidae				2		2	0.05
Sabella sp.					1	1	0.02
Cirratulidae					2	2	0.05
Mollusca							
Bivalves							
Mya arenaria	55	66	63	4	8	196	4.53
Mulinia lateralis	7	8	50	85	531	681	15.76
Tellina sp.	6	21	4	10	10	51	1.18
Lyonsia hyalina		1				1	0.02

TABLE 2-12 (page 2 of 2)

Benthic Invertebrate Taxa Collected From Newark Bay, 1995 – 1996
(Number/0.05 Square Meter)

Station Approx. Depth at MLW	Total (April 1995-March 1996)					TOTAL	%
	NBSW (N) 1-2'	NBSW (S) 1-2'	NBNW 1-4'	NBSE 1-3'	NBNE 1-2'		
Taxa							
Gastropods							
Retusa sp.				1		1	0.02
Haminoea solitaria		2	10	1	1	14	0.32
Arthropoda							
Isopods							
Cyathura polita	45	73	30	50	56	254	5.88
Edotea triloba			2		2	4	0.09
Cumacids							
Leucon americanus	13		24	10	1	48	1.11
Amphipoda	1				3	4	0.09
Ampelisca sp.	2		1	2		5	0.12
Ampelisca abdita	2	4		15	1	22	0.51
Gammarus sp.	1	1	2	4		8	0.19
Gammarus mucronatus				2		2	0.05
Unciola dissimilis					1	1	0.02
Balanus sp.					2	2	0.05
Crangon septemspinosa		2			1	3	0.07
Callinectes sapidus			2			2	0.05
Rhithropanopeus harrisii					3	3	0.07
Chordata							
Molgula manhattensis			5	1	1	7	0.16
Total	680	1005	1060	628	949	4322	100.00

Source: LMS 1996.

TABLE 2-13 (page 1 of 4)

Benthic Invertebrate Taxa Collected From Newark Bay, Arthur Kill, and Kill Van Kull, 1995 – 1996
(Number/0.05 Square Meter)

Taxa	Monthly Total For All Stations (5 Newark Bay; 2-Channel Site)												Total	%
	1995 Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	1996 Jan	Feb	Mar		
Rhynchocoela														
Nemertea	4	33	6	1		3	1	3		2	1	6	60	0.35
Annelida														
Oligochaeta	18	31		32			2	14	6		25	49	177	1.04
Polychaeta														
Phyllodocidae	161	164	2	3		9	3	8	13	5	13	59	440	2.59
Phyllodoce mucosa	1												1	0.01
Glyceridae												5	5	0.03
Glycera sp.		16	18	8		13	25	21	19	13			133	0.78
Glycera dibranchiata	2				3								5	0.03
Goniadidae	12	2			2	9	1						26	0.15
Pectinaria gouldii	1				1	16	6	2	9	1	5	10	51	0.30
Nereis succinea	15	31	13	1		15	4		9	4	4	35	131	0.77
Opheliidae		17		12									29	0.17
Paraonidae	88	141	61	91	4	55	37	17	37	12	133	153	829	4.88
Spionidae		1											1	0.01
Scolecolepidis viridis	5	35	3			1					1		45	0.26
Streblospio benedicti	2298	3614	88	102		46	77	186	476	168	648	1104	8807	51.83
Polydora ligni	20	36	9	4		34	5	2	19	12	8	13	162	0.95
Spiophanes bombyx	1												1	0.01
Scoloplos sp.	244	336	174	206	31	97	50	46	88	119	93	92	1576	9.28

TABLE 2-13 (page 2 of 4)

Benthic Invertebrate Taxa Collected From Newark Bay, Arthur Kill, and Kill Van Kull, 1995 – 1996
(Number/0.05 Square Meter)

Taxa	Monthly Total For All Stations (5 Newark Bay; 2-Channel Site)												Total	%
	1995 Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	1996 Jan	Feb	Mar		
Sabellaria vulgaris						417	18			44	26	1721	2226	13.10
Diopatra cuprea									10	9	1	3	23	0.14
Eunice norvegica					2	10	6		1				19	0.11
Nephtys sp.								1					1	0.01
Capitella capitata						7							7	0.04
Ampharetidae						2						12	14	0.08
Hypaniola grayi									1				1	0.01
Sabella sp.						7			1				8	0.05
Sabella micropthalma												3	3	0.02
Cirratulidae									2				2	0.01
Podarke sp.						2							2	0.01
Lepidonotus squamatus							1				1		2	0.01
Mollusca														
Bivalves														
Mercenaria mercenaria		1											1	0.01
Mya arenaria	91	180	55	6	6	2	1		3	3	13	69	429	2.52
Mulinia lateralis	10	14	1	1	39	137	96	51	122	152	151	87	861	5.07
Tellina sp.	7	17	18	11			1	11				3	68	0.40
Lyonsia hyalina	1												1	0.01

TABLE 2-13 (page 3 of 4)

Benthic Invertebrate Taxa Collected From Newark Bay, Arthur Kill, and Kill Van Kull, 1995 – 1996
(Number/0.05 Square Meter)

Taxa	Monthly Total For All Stations (5 Newark Bay; 2-Channel Site)												Total	%
	1995 Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	1996 Jan	Feb	Mar		
Mytilus edulis	1	1										2	2	0.01
Macoma sp.												2	2	0.01
Gastropods														
Crepidula fornicata						2	1				1		4	0.02
Crepidula plana						9	1			1	1		12	0.07
Retusa sp.		1											1	0.01
Haminoea solitaria		1	1			4	1	3	5				15	0.09
Epitonium sp.											1		1	0.01
Arthropoda														
Isopods														
Cyathura polita	51	83	25	25	11	8	18	7	9	8	11	7	263	1.55
Edotea triloba	22	16				2	4	3	12	1	4	4	68	0.40
Limnoria lignorum						1					1	1	3	0.02
Cumacids														
Leucon americanus	48	18	1				1	6	2		20	7	103	0.61
Oxyurostylis smithii	2	2											4	0.02
Amphipoda	6	47											53	0.31
Ampeliscidae												3	3	0.02
Ampelisca sp.								3	2				5	0.03

TABLE 2-13 (page 4 of 4)

Benthic Invertebrate Taxa Collected From Newark Bay, Arthur Kill, and Kill Van Kull, 1995 – 1996
(Number/0.05 Square Meter)

Taxa	Monthly Total For All Stations (5 Newark Bay; 2-Channel Site)												Total	%
	1995 Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	1996 Jan	Feb	Mar		
Ampelisca *abdita*	13	7	1					1		6	9	1	38	0.22
Corophiidae				6									6	0.04
Corophium sp.		1							17	1	4		23	0.14
Gammaridae		3										40	43	0.25
Gammarus sp.		1	5		1					1	3		11	0.06
Gammarus m*ucronatus*	2												2	0.01
Aoridae	0	107											107	0.63
Unciola dissimilis	1												1	0.01
Melita sp.							4						4	0.02
Melita nitida						10	2		3				15	0.09
Balanus sp.									2		9		11	0.06
Crangon septemspinosa		2						2		1	2		7	0.04
Callinectes sapidus									1			2	3	0.02
Xanthidae												4	4	0.02
Rhithropanopeus harrisii		2				1			1			1	5	0.03
Neopanope texana sayi												1	1	0.01
Eurypanopeus depressus											1		1	0.01
Chordata														
Molgula manhattensis	15				1	3			1		1	2	23	0.14
Total	3140	4961	481	509	101	922	366	387	871	563	1191	3499	16991	100.00

Source: LMS 1996.

TABLE 2-14 (page 1 of 2)

Benthic Invertebrate Taxa Collected from the Arthur Kill, 1995 – 1996
(Number/0.05 Square Meter)

Station	GBW													
Approx. Depth at MLW	38-40'													
Taxa	1995 Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	1996 Jan	Feb	Mar	Total	%
Annelida														
Oligochaeta	5	4		27			1	14			21	12	84	1.64
Polychaeta														
Phyllodocidae	105	126						5		2	5	2	245	4.77
Phyllodoce mucosa	1												1	0.02
Glycera sp.		4	4	4		2	1	1	2				18	0.35
Pectinaria gouldii	1					2	1		6	1			11	0.21
Nereis succinea	1	9		1		4	1			4	3		23	0.45
Opheliidae		17											17	0.33
Paraonidae	2	5	4	80			1	3	3		2	2	102	1.99
Scolecolepidis viridis		13	1								1		15	0.29
Streblospio benedicti	1249	1987	6	100		2	32	142	3	95	266	173	4055	79.00
Polydora ligni	12	31		4						3	4	2	56	1.09
Scoloplos sp.	45	19	17		9	6	1	23		4	26	36	186	3.62
Sabellaria vulgaris											1	4	5	0.10
Diopatra cuprea										9	1	3	13	0.25
Eunice norvegica					2	10	6		1				19	0.37
Mollusca														
Mya arenaria	20	84		2							1		107	2.08
Mulinia lateralis	3	13				8	1	8	3	3	3	1	43	0.84
Tellina sp.	1	1						1					3	0.06
Haminoea solitaria								1					1	0.02
Arthropoda														
Cyathura polita	1	1								1			3	0.06
Edotea triloba	15	7					4	3		1	2	3	35	0.68
Limnoria lignorum											1		1	0.02

TABLE 2-14 (page 2 of 2)

Benthic Invertebrate Taxa Collected from the Arthur Kill, 1995 – 1996
(Number/0.05 Square Meter)

Station Approx. Depth at MLW	GBW 38-40'													
Taxa	1995 Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	1996 Jan	Feb	Mar	Total	%
Leucon americanus	25						1	6			6	2	40	0.78
Oxyurostylis smithi	2	2											4	0.08
Ampelisca abdita	4	5	1					1					11	0.21
Corophiidae				6									6	0.12
Corophium sp.										1			1	0.02
Gammaridae		3											3	0.06
Gammarus sp.			2										2	0.04
Melita nitida							2						2	0.04
Balanus sp.											8		8	0.16
Crangon septemspinosa		2											2	0.04
Chordata														
Molgula manhattensis	10											1	11	0.21
Total	1502	2333	35	224	11	34	52	208	18	124	351	241	5133	100.00

Source: LMS 1996.

TABLE 2-15 (page 1 of 3)

Benthic Invertebrate Taxa Collected From Kill Van Kull Area, 1995 – 1996
(Number/0.05 Square Meter)

Station	BBN													
Approx. Depth at MLW	42-44'													
Taxa	1995 Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	1996 Jan	Feb	Mar	Total	%
Rhynchocoela														
Nemertea												4	4	0.05
Annelida														
Oligochaeta	12	27					1		4		3	36	83	1.10
Polychaeta														
Phyllodocidae	16	18		2		8	3		10	1	4	56	118	1.57
Glyceridae												5	5	0.07
Glycera sp.		10	8	2			9	7	3	3			42	0.56
Goniadidae	10				2	9							21	0.28
Pectinaria gouldii					1	3	4	1	1		3	1	14	0.19
Nereis succinea	1	2				9	1		7		1	34	55	0.73
Paraonidae	64	104	39			33	18	5	2	4	9	141	419	5.56
Spionidae		1											1	0.01
Scolecolepidis viridis	5	21				1							27	0.36
Streblospio benedicti	729	1524	79	1		36	21	3	445	7	58	800	3703	49.14
Polydora ligni	7	4	9				1		11			5	37	0.49
Spiophanes bombyx	1												1	0.01
Scoloplos sp.	15	9	33	26	3		3	7	17		2	14	129	1.71
Sabellaria vulgaris						417	18			44	25	1717	2221	29.47
Diopatra cuprea									10				10	0.13
Nephtys sp.								1					1	0.01
Capitella capitata						6							6	0.08
Ampharetidae												12	12	0.16
Hypaniola grayi									1				1	0.01
Sabella sp.						7							7	0.09

TABLE 2-15 (page 2 of 3)

Benthic Invertebrate Taxa Collected from the Kill Van Kull , 1995 – 1996
(Number/0.05 Square Meter)

Station	BBN													
Approx. Depth at MLW	42-44'													
Taxa	1995 Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	1996 Jan	Feb	Mar	Total	%
Sabella micropthalma												3	3	0.04
Podarke sp.						2							2	0.03
Lepidonotus squamatus							1				1		2	0.03
Mollusca														
Bivalves														
Mercenaria mercenaria		1											1	0.01
Mya arenaria	21	8	14		6	2	1		1	2	2	69	126	1.67
Mulinia lateralis	7		1		31	2	24	14	9	34	8	7	137	1.82
Tellina sp.		3	3					8					14	0.19
Mytilus edulis	1	1											2	0.03
Macoma sp.												2	2	0.03
Gastropods														
Crepidula fornicata						2	1				1		4	0.05
Crepidula plana						9	1			1	1		12	0.16
Epitonium sp.											1		1	0.01
Arthropoda														
Isopods														
Cyathura polita	4											2	6	0.08
Edotea triloba	6	7				2			11		2	1	29	0.38
Limnoria lignorum						1						1	2	0.03
Cumacids														
Leucon americanus	15												15	0.20
Amphipoda	2	47											49	0.65
Ampeliscidae												3	3	0.04
Ampelisca abdita	3	2											5	0.07

TABLE 2-16 (page 2 of 4)

Benthic Invertebrate Taxa Collected From the Goethals Bridge and Old Place Creek Study Area, 1994

PHYLUM Class Order Family *Genus species*	Common Name
Streblospio benedicti	Barred-gilled mud worms
Polydora ligni	Whip mud worms
Spiophanes bombyx	Mud worms
Ariciida	
Orbiniidae	Orbiniid worms
Scoloplos sp.	
Eunicida	
Onuphidae	
Diopatra cuprea	Plumed worms
MOLLUSCA	
Bivalvia	
Heterodonta	
Veneridae	
Mercenaria mercenaria	Hard-shelled clams
Gemma gemma	Gem venus clams
Myidae	
Mya arenaria	Soft-shelled clams
Mactridae	
Mulinia lateralis	Little surf clams
Tellinidae	
Tellina sp.	Tellins
Eudesmodontida	
Lyonsidae	
Lyonsia hyalina	Glassy lyonsia
Gastropoda	Snails and slugs
Cephalaspidea	
Atyidae	
Haminoea solitaria	Solitary glassy bubbles
Mesogastropoda	
Hydrobiidae	
Hydrobia minuta	Swamp hydrobia

TABLE 2-16 (page 3 of 4)

Benthic Invertebrate Taxa Collected From the Goethals Bridge and Old Place Creek Study Area, 1994

PHYLUM Class Order Family *Genus species*	Common Name
ARTHROPODA	
Crustacea	Crustaceans
Subclass Pterygota	
Diptera	Flies
Subclass Ostracoda	
Subclass Cirrepedia	
Thoracia	
Balanidae	
Subclass Malacostraca	
Isopoda	Isopods
Anthuridae	
Cyathura polita	Slender isopods
Idoteidae	
Edotea triloba	Mounded-back isopods
Cumacea	Cumacean shrimp
Leuconidae	
Leucon americanus	
Diastylidae	
Oxyurostylis smithi	Sharp-tailed cumacean
Amphipoda	
Ampeliscida	
Ampelisca abdita	Four-eyed amphipods
Corophiidae	
Corophium sp.	Slender tubemakers
Gammaridae	Scuds
Gammarus sp.	
Gammarus mucronatus	Spine-backed scuds
Gammarus daiberi	
Melita nitida	

TABLE 2-16 (page 4 of 4)

Benthic Invertebrate Taxa Collected From the Goethals Bridge and Old Place Creek Study Area, 1994

PHYLUM Class Order Family *Genus species*	Common Name
Pleustidae	
Stenopleustes sp.	
Decapoda	Decapods
Infraorder Caridea	Caridean shrimp
Crangonidae	
Crangon septemspinosa	Sand shrimp
Infraorder Brachyura	True crabs
Xanthidae	Mud crabs
Rhithropanopeus harrisii	White-fingered mud crabs
Portunidae	Swimming crabs
Callinectes sapidus	Blue crabs
CHORDATA	
Infraorder Ascidiacea	
Pleurogona	
Molgulidae	
Molgula manhattensis	Sea grapes

Source: USCG (1995)

CHAPTER 3

3.0 MATERIALS AND METHODOLOGY

The primary purpose of the biological monitoring program was to obtain information on seasonal use patterns and distribution trends of the Harbor's navigation channels, berthing areas, marine terminals and adjacent habitats by aquatic populations. Sampling gear-types and seasonal surveys reflect the focus of the biological monitoring program on two specific aquatic communities, demersal (i.e., bottom orientated) fish and benthic macroinvertebrates. Both communities were considered the primary receptors of potential aquatic impacts associated with proposed channel deepening alternatives.

A summary of the biological monitoring program methodology and materials is provided below. Additional details on sampling procedures, analysis and quality assurance/quality control (QA/QC) procedures are provided in the standard operating procedures (SOP) (USACE 1999).

3.1 FISHERIES SURVEYS

Seasonal use patterns and distribution trends of fisheries populations in the project area were sampled using several gear types, including: bottom trawls; epibenthic sled mounted ichthyoplankton nets; and a hydroacoustic echo sounder.

3.1.1 Bottom Trawl and Hydroacoustic Survey

Bottom trawl surveys were conducted to evaluate the seasonal use of demersal fishes within navigation channels, shoals and interpier areas. Bottom trawl surveys were conducted using a 30-foot (9.1 m) otter trawl, typical of previous biological monitoring programs conducted in the New York/ New Jersey Harbor area. Bottom trawl surveys were conducted against the prevailing current at an adjusted speed over the bottom of 4.9 ft/sec (150 cm/sec) for ten minutes. Tow velocities and duration were adjusted accordingly to account for obstructions, limited distances, and commercial traffic. A minimum 5:1 tow cable length to maximum station depth ratio was maintained to ensure trawl contact with the bottom. All samples were collected during daylight hours. Bottom trawl specifications are shown in Table 3-1.

Bottom trawl samples were analyzed for all fish collected. Fish analysis included species identification, enumeration, and fish length. The total length of up to 100 specimens was measured for each species for each bottom trawl sample. Numbers of fish collected were adjusted for tow duration and reported as catch-per-unit-effort (CPUE) for a 10-minute tow.

Hydroacoustic surveys were conducted to obtain information on fish population in the water column above the navigation channel bottom. Hydroacoustic surveys were conducted simultaneously with bottom trawl surveys using an HTI Model 241

hydroacoustic system. A 200 MHz 15° beam width transducer was mounted in a towfin and towed off the side of the boat. Hydroacoustic system specifications are shown in Table 3-1.

Results of each hydroacoustic survey (i.e., station track or tow) were recorded in discrete database files along with station sampling information. Station bottom depth (m), tracked target (i.e., acoustic echo) strengths (dB), and tracked target depths (m) were recorded during each survey.

3.1.2 Ichthyoplankton Survey

A seasonal ichthyoplankton survey was conducted to obtain distribution information on demersal egg and larval stages of fish populations in the project area. Ichthyoplankton surveys were conducted using an epibenthic sled mounted 0.5-m plankton net towed against the prevailing current at an adjusted speed over the bottom of 3.3 ft/sec (100 cm/sec). Tow duration was ten minutes. Tow velocities and duration were adjusted accordingly to account for obstructions, limited distances, and commercial traffic. A minimum 5:1 tow cable length to maximum station depth ratio was maintained to ensure sled contact with the bottom. A General Oceanics Model 2030R digital flowmeter mounted in the mouth of the sled-mounted plankton net was used to calculate sample volume. All samples were collected during daylight hours. The epibenthic sled and 0.5-m plankton net specifications are shown in Table 3-1.

Ichthyoplankton samples were transferred to sample containers filled with 5% buffered formalin and the vital stain rose bengal. Sample containers were returned to the laboratory for analysis. All fish larvae and eggs collected were identified to the lowest practical taxonomic level, assigned a life stage (egg, yolk sac larvae, post-yolk sac larvae, or juvenile) based on morphometric characteristics and enumerated. Samples containing large numbers of fish eggs or larvae were split prior to analysis using a Folsom plankton splitter. Actual egg and larval counts were adjusted for subsampling (i.e., splitting) and reported as egg or larval densities (no./ 1000 cubic meters) based on sample volume.

3.2 BENTHIC MACROINVERTEBRATE SURVEYS

Benthic macroinvertebrate surveys were conducted to evaluate seasonal use patterns and distribution trends of shellfish (primarily blue crab) and benthic invertebrate populations in navigation channels, shoals and interpier regions of the project area. Benthic macroinvertebrate surveys were conducted using both a commercial style crab dredge and a Smith-McIntrye sediment grab sampler.

3.2.1 Benthic Macroinvertebrate Survey

A Smith-McIntrye sediment sampler (mouth area of 0.1 square meters) was used to collect quantitative benthic macroinvertebrate samples. Replicate grab samples were

collected at each sample station. The Smith-McIntrye sediment sampler specifications are shown in Table 3-1.

Sediment grab samples were rinsed using a 1000μ sieve and transferred to sample containers filled with 5% buffered formalin and the vital stain phloxine B. Sample containers were returned to the laboratory for analysis. Samples containing excessive sand and detritus, or organisms in significant number, were split using a Caton Macroinvertebrate Subsampler. Following sorting and subsampling, organisms were identified to the lowest practical taxonomic level and enumerated. Organism counts were adjusted to sample size (i.e., area) and recorded as macroinvertebrate densities (no./0.1 square meter). Replicate grab samples were averaged and reported for each station.

3.2.2 Crab Dredge Survey

A seasonal crab dredge survey was conducted to evaluate the use of navigation channels, shoals and interpier regions as overwintering areas for crabs (primarily blue crabs) and other large macroinvertebrates. Crab dredge surveys were conducted using a commercial style 48-in steel knife edge crab dredge towed at an adjusted speed over the bottom of 5.0 ft/sec (152 cm/sec). Tow duration varied between a minimum of 2 minutes and a maximum of 5 minutes due to obstructions, limited distances, and commercial traffic. Crab dredge specifications are provided in Table 3-1.

All blue crabs collected were enumerated. The presence of other crab species (e.g., green crab, rock crab) were noted. The sex and carapice width (spine-tip to spine-tip) of each blue crab collected was recorded. Blue crab counts were adjusted for tow duration and reported as CPUE for a 5-minute tow.

3.3 HARBORWIDE SAMPLING PROGRAM

The primary purpose of the harborwide sampling program was to determine the seasonal use of the Harbor's navigation channels by demersal fish and benthic macroinvertebrate populations. Sampling locations and sampling frequency for both fisheries and macroinvertebrate surveys are described below.

3.3.1 Sampling Locations

Harborwide sampling locations were selected to distribute sampling effort evenly among several navigation channels and different water bodies within the project area. The original sampling methodology specified eight fixed sampling stations to be sampled seasonally (depending on gear type) beginning in October 1998. One station was located in each of the following areas: Lower Harbor (HW-1); Red Hook (HW-3); Kill Van Kull (HW-5); and Newark Bay (HW-8). Two stations were located in the Upper Harbor (HW-2 and HW-4), as well as in the Arthur Kill (HW-6 and HW-7). All stations were located within navigation channels (Figure 3-1).

Sampling stations were located using Global Positioning System (GPS) coordinates as well as aids to navigation, soundings, bottom type, and landmarks. Station locations (GPS coordinates) and nominal depths are listed in Table 3-4. Starting points for bottom trawl, ichthyoplankton, and crab dredge surveys were located at either end of a station transect, depending on current and tide patterns. Benthic macroinvertebrate grab samples were located at the approximate mid-point of each station transect.

3.4.2 Sampling Frequency

The site-specific sampling program was conducted over a 12-month period, beginning in October 1998 and continuing through September 1999. Sampling surveys were conducted bi-monthly, quarterly or seasonally, depending on gear type (Table 3-5).

3.4.2.1 ***Bottom Trawl and Hydroacoustic Survey.*** Beginning in October 1998, bottom trawl surveys were conducted monthly at stations SB-1 through SB-4 and PJ-1 through PJ-5. Hydroacoustic surveys, conducted simultaneously with bottom trawl surveys, began in December 1998 and continued through September 1999. One bottom trawl sample (i.e., one tow) was collected at each station.

Station PJ-6 was added to the site-specific sampling program in February 1999. Bottom trawl and hydroacoustic surveys were conducted at PJ-6 monthly through September 1999.

3.4.2.2 ***Ichthyoplankton Survey.*** Seasonal ichthyoplankton surveys were conducted monthly at all site-specific stations beginning in February 1999. Monthly surveys continued through June 1999 (Table 3-5).

3.4.2.3 ***Benthic Macroinvertebrate Survey.*** Benthic macroinvertebrate surveys were conducted every three months (i.e., quarterly) at stations SB-1 through SB-4 and PJ-1 through PJ-5 beginning in November 1998 (Table 3-5). Station PJ-6 was not added to the site-specific sampling program until February 1999. Benthic macroinvertebrate surveys were conducted at PJ-6 during February, May and August 1999.

3.4.2.4 ***Crab Dredge Survey.*** Seasonal crab dredge surveys were conducted monthly at all site-specific stations from February through April 1999 (Table 3-5).

TABLE 3-1

Biological Monitoring Program Gear Specifications

Survey	Gear Specifications	
Bottom Trawl	Headrope	25.9 ft. (7.9 m)
30-ft Otter trawl (9.1 m)	Footrope	27.9 ft. (8.5 m)
	Wing height	3.6 ft. (1.1 m)
	Total length	35.1 ft. (10.7)
	Wing mesh (square)	2.0 in. (5.1 cm)
	Body mesh (square)	2.0 in. (5.1 cm)
	Cod end mesh (square)	0.75 in. (1.9 cm)
	Cod end liner mesh (square)	0.25 in. (0.6 cm)
	Trawl doors	32.0 x 17.0 x 0.75 in. (79.2 x 39.6 x 3.1 cm)
	Tow line length	5 times maximum station water depth
Hydroacoustic survey	HTI Model 241-2 Split beam digital echo sounder	
Digital echo sounder	HTI Model 5445-200 Split beam transducer 200 kHz 15°	
	Model 624 towfin	
	Digital audio tape recorder	
	Dual channel oscilloscope (20 Mhz)	
Ichthyoplankton tow	Mouth diameter	0.5 m
Epibenthic sled mounted	Overal length	3.0 m
0.5-m plankton net	Mesh size	0.5 mm
	Cod end diameter	10.1 cm
	Code end mesh	0.5 mm (PVC cod end bucket)
	Epibenthic sled	Constructed of PVC pipe
Benthic	Smith-McIntyre sediment sampler	
macroinvertebrate grab	Grab (jaw) sample area	0.1 square meter
Crab dredge	Mouth opening	2.0 in. (6.1 cm) x 48 in. (121.5 cm)
	Mesh	2.0 in (5.1 cm) nylon/steel
	Steel knife edge	

Note: Additional gear specifications provided in the standard operating procedures (SOP) (USACE 1999).

TABLE 3-2 (page 1 of 2)

Harborwide Survey Station Locations

Survey	Harbor Area	Station	Location	Depth (Ft)	GPS Coordinates (deg., min., sec.) Start	N W	End	N W
BOTTOM TRAWL	Lower Harbor	HW-1	Ambrose Channel North	51	40 33 54 74 01 55		40 33 20 74 01 43	
	Upper Harbor	HW-2	Anchorage Channel South	50	40 38 49 74 03 16		40 38 14 74 02 58	
	Red Hook	HW-3	Red Hook Channel	43	40 40 38 74 01 20		40 40 10 74 01 16	
	Upper Harbor	HW-4	Anchorage Channel North	51	40 40 57 74 01 52		40 40 29 74 02 08	
	Kill Van Kull	HW-5	Bergen Point East Reach/ Constable Hook Reach	43	40 38 46 74 06 30		40 38 42 74 06 52	
	Arthur Kill	HW-6	North of Shooter Island Reach	40	40 38 48 74 10 29		40 38 47 74 09 55	
	Arthur Kill	HW-7	Elizabeth Reach	38	40 38 22 74 11 31		40 38 35 74 11 16	
	Newark Bay	HW-8	Middle Reach	41	40 40 23 74 07 58		40 40 50 74 07 50	
	Newark Bay	HW-9	Newark Bay South Reach	45	40 39 43 74 08 24		40 39 20 74 08 38	
	Newark Bay	HW-10	Newark Bay/Port Elizabeth	41	40 40 06 74 08 10		40 39 44 74 08 24	
ICHTHYOPLANKTON	Lower Harbor	HW-1	Ambrose Channel North	51	40 33 54 74 01 55		40 33 20 74 01 43	
	Upper Harbor	HW-2	Anchorage Channel South	50	40 38 49 74 03 16		40 38 14 74 02 58	
	Red Hook	HW-3	Red Hook Channel	43	40 40 38 74 01 20		40 40 10 74 01 16	
	Upper Harbor	HW-4	Anchorage Channel North	51	40 40 57 74 01 52		40 40 29 74 02 08	
	Kill Van Kull	HW-5	Bergen Point East Reach/ Constable Hook Reach	43	40 38 46 74 06 30		40 38 42 74 06 52	
	Arthur Kill	HW-6	North of Shooter Island Reach	40	40 38 48 74 10 29		40 38 47 74 09 55	
	Arthur Kill	HW-7	Elizabeth Reach	38	40 38 22 74 11 31		40 38 35 74 11 16	
	Newark Bay	HW-8	Middle Reach	41	40 40 23 74 07 58		40 40 50 74 07 50	
	Newark Bay	HW-9	Newark Bay South Reach	45	40 39 65 74 08 44		40 40 16 74 08 13	
	Newark Bay	HW-10	Newark Bay/Port Elizabeth	41	40 40 06 74 08 19		40 39 75 74 08 40	

TABLE 3-2 (page 2 of 2)

Harborwide Survey Station Locations

Survey	Harbor Area	Station	Location	Depth (Ft)	GPS Coordinates (deg., min., sec.) Start	N W	End	N W
BENTHIC MACROINVERTEBRATE GRAB	Lower Harbor	HW-1	Ambrose Channel North	51	40 33 51 74 01 50			
	Upper Harbor	HW-2	Anchorage Channel South	50	40 38 20 74 03 03			
	Red Hook	HW-3	Red Hook Channel	43	40 40 12 74 01 23			
	Upper Harbor	HW-4	Anchorage Channel North	51	40 40 44 74 01 47			
	Kill Van Kull	HW-5	Bergen Point East Reach/ Constable Hook Reach	43	40 38 40 74 06 56			
	Arthur Kill	HW-6	North of Shooter Island Reach	40	40 38 48 74 10 04			
	Arthur Kill	HW-7	Elizabeth Reach	38	40 38 18 74 11 25			
	Newark Bay	HW-8	Middle Reach	41	40 40 31 74 07 54			
	Newark Bay	HW-9	Newark Bay South Reach	45	40 39 28 74 08 30			
	Newark Bay	HW-10	Newark Bay/Port Elizabeth	41	40 39 52 74 08 18			
CRAB DREDGE	Lower Harbor	HW-1	Ambrose Channel North	51	40 33 30 74 01 49		40 33 38 74 01 58	
	Upper harbor	HW-2	Anchorage Channel South	50	40 38 41 74 03 14		40 38 26 74 03 10	
	Red Hook	HW-3	Red Hook Channel	43	40 40 11 74 01 20		40 40 29 74 01 27	
	Upper Harbor	HW-4	Anchorage Channel North	51	40 40 36 74 02 13		40 40 25 74 02 19	
	Kill Van Kull	HW-5	Bergen Point East Reach/ Constable Hook Reach	43	40 38 41 74 06 59		40 38 45 74 06 45	
	Arthur Kill	HW-6	North of Shooter Island Reach	40	40 38 51 74 09 45		40 38 51 74 10 01	
	Arthur Kill	HW-7	Elizabeth Reach	38	40 38 29 74 11 25		40 38 23 74 11 30	
	Newark Bay	HW-8	Middle Reach	41	40 40 38 74 07 54		40 40 24 74 07 59	
	Newark Bay	HW-9	Newark Bay South Reach	45	40 39 39 74 08 27		40 39 32 74 08 32	
	Newark Bay	HW-10	Newark Bay/Port Elizabeth	41	40 40 07 74 08 09		40 40 06 74 08 10	

Note: Hydroacoustic surveys conducted simultaneously with bottom trawl surveys at same sample locations.
All stations located in navigation channels

TABLE 3-3 (page 1 of 2)

Harborwide Sampling Program Survey Schedule October 1998 – September 1999

Survey	Station	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
Bottom trawl	HW-1	X		X		X		X		X		X	
	HW-2	X		X		X		X		X		X	
	HW-3	X		X		X		X		X		X	
	HW-4	X		X		X		X		X		X	
	HW-5	X		X		X	X	X		X	X	X	X
	HW-6	X		X		X		X		X		X	
	HW-7	X		X		X		X		X		X	
	HW-8	X		X		X		X		X		X	
	HW-9						X	X		X		X	
	HW-10						X	X		X			
Ichthyoplankton	HW-1					X	X	X	X	X			
	HW-2					X	X	X	X	X			
	HW-3					X	X	X	X	X			
	HW-4					X	X	X	X	X			
	HW-5					X	X	X	X	X			
	HW-6					X	X	X	X	X			
	HW-7					X	X	X	X	X			
	HW-8						X	X	X	X			
	HW-9						X	X	X	X			
	HW-10												

TABLE 3-3 (page 2 of 2)

Harborwide Sampling Program Survey Sampling Schedule October 1998 – September 1999

Survey	Station	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
Benthic grab	HW-1		X			X			X			X	
	HW-2		X			X			X			X	
	HW-3		X			X			X			X	
	HW-4		X			X			X			X	
	HW-5		X			X			X			X	
	HW-6		X			X			X			X	
	HW-7		X			X			X			X	
	HW-8		X			X			X			X	
	HW-9								X			X	
	HW-10								X			X	
									X			X	
Crab dredge	HW-1					X	X	X					
	HW-2					X	X	X					
	HW-3					X	X	X					
	HW-4					X	X	X					
	HW-5					X	X	X					
	HW-6					X	X	X					
	HW-7					X	X	X					
	HW-8					X	X	X					
	HW-9						X	X					
	HW-10						X	X					

Note: Months and stations shaded were not sampled.
Hydroacoustic surveys conducted simultaneously with bottom trawl surveys beginning in December 1998.
Replicate benthic grab samples collected at all stations sampled.

TABLE 3-4 (page 1 of 2)

Site-Specific Survey Station Locations

Survey	Harbor Area	Station	Location	Depth (Ft)	GPS Coordinates (deg., min., sec.) START	N W	END	N W
BOTTOM TRAWL	South Brooklyn	SB-1	Gowanus Bay Interpier South	26	40 38 40	74 01 40	40 38 47	74 01 56
	South Brooklyn	SB-2	Gowanus Bay Interpier	24	40 39 05	74 01 25	40 39 35	74 01 06
	South Brooklyn	SB-3	Gowanus Bay Interpier North	29	40 39 37	74 00 28	40 39 44	74 00 41
	South Brooklyn – Channel	SB-4	Bay Ridge Channel	41	40 39 22	74 01 20	40 38 01	74 02 02
	Port Jersey	PJ-1	Jersey Flats	14	40 40 10	74 03 31	40 39 52	74 03 48
	Port Jersey	PJ-2	Pierhead Channel	26	40 40 20	74 03 37	40 39 59	74 0353
	Port Jersey	PJ-3	Constable Hook	9	40 39 47	74 04 47	40 39 33	74 04 37
	Port Jersey – Channel	PJ-4	Port Jersey Channel	42	40 40 26	74 05 19	40 40 08	74 04 43
	Port Jersey	PJ-5	Global Marine Terminal	16	40 40 28	74 04 31	40 40 17	74 03 57
	Port Jersey	PJ-6	Claremont Terminal Channel	29	40 40 38	74 03 50	40 40 28	74 03 34
ICHTHYOPLANKTON	South Brooklyn	SB-1	Gowanus Bay Interpier South	26	40 38 40	74 01 40	40 38 47	74 01 56
	South Brooklyn	SB-2	Gowanus Bay Interpier	24	40 39 05	74 01 25	40 39 35	74 01 06
	South Brooklyn	SB-3	Gowanus Bay Interpier North	29	40 39 37	74 00 28	40 39 44	74 00 41
	South Brooklyn – Channel	SB-4	Bay Ridge Channel	41	40 39 22	74 01 20	40 38 01	74 02 02
	Port Jersey	PJ-1	Jersey Flats	14	40 40 10	74 03 31	40 39 52	74 03 48
	Port Jersey	PJ-2	Pierhead Channel	26	40 40 20	74 03 37	40 39 59	74 0353
	Port Jersey	PJ-3	Constable Hook	9	40 39 47	74 04 47	40 39 33	74 04 37
	Port Jersey – Channel	PJ-4	Port Jersey Channel	42	40 40 26	74 05 19	40 40 08	74 04 43
	Port Jersey	PJ-5	Global Marine Terminal	16	40 40 28	74 04 31	40 40 17	74 03 57
	Port Jersey	PJ-6	Claremont Terminal Channel	29	40 40 38	74 03 48	40 40 31	74 03 35

TABLE 3-4 (page 2 of 2)

Site-Specific Survey Station Locations

Survey	Site	Station	Location	Depth (Ft)	GPS Coordinates (deg., min., sec.) START N W	GPS Coordinates (deg., min., sec.) END N W
BENTHOS	South Brooklyn	SB-1	Gowanus Bay Interpier South	26	40 38 44 74 01 52	
	South Brooklyn	SB-2	Gowanus Bay Interpier	24	40 39 08 74 01 31	
	South Brooklyn	SB-3	Gowanus Bay Interpier North	29	40 39 42 74 00 35	
	South Brooklyn – Channel	SB-4	Bay Ridge Channel	41	40 39 11 74 01 48	
	Port Jersey	PJ-1	Jersey Flats	14	40 39 56 74 03 40	
	Port Jersey	PJ-2	Pierhead Channel	26	40 39 58 74 03 51	
	Port Jersey	PJ-3	Constable Hook	9	40 39 32 74 04 29	
	Port Jersey – Channel	PJ-4	Port Jersey Channel	42	40 40 02 74 04 25	
	Port Jersey	PJ-5	Global Marine Terminal	16	40 40 23 74 04 05	
	Port Jersey	PJ-6	Claremont Terminal Channel	29	40 40 34 74 03 42	
CRAB DREDGE	South Brooklyn	SB-1	Gowanus Bay Interpier South	26	40 38 44 74 01 49	40 38 49 74 01 56
	South Brooklyn	SB-2	Gowanus Bay Interpier	24	40 39 29 74 00 56	40 39 34 74 01 05
	South Brooklyn	SB-3	Gowanus Bay Interpier North	29	40 39 41 74 00 39	40 39 46 74 00 47
	South Brooklyn – Channel	SB-4	Bay Ridge Channel	41	40 39 08 74 01 42	40 39 01 74 01 50
	Port Jersey	PJ-1	Jersey Flats	14	40 39 52 74 03 40	40 40 01 74 03 28
	Port Jersey	PJ-2	Pierhead Channel	26	40 39 59 74 03 53	40 40 04 74 03 47
	Port Jersey	PJ-3	Constable Hook	9	40 39 42 74 04 50	40 39 31 74 04 36
	Port Jersey – Channel	PJ-4	Port Jersey Channel	42	40 40 16 74 04 60	40 40 12 74 04 49
	Port Jersey	PJ-5	Global Marine Terminal	16	40 40 27 74 04 15	40 40 19 74 03 59
	Port Jersey	PJ-6	Claremont Terminal Channel	29	40 40 41 74 03 51	40 40 30 74 03 31

Note: Hydroacoustic surveys conducted simultaneously with bottom trawl surveys at same sample locations.
Station SB-4 and PJ-4 located in marine terminal approach channels.

TABLE 3-5 (page 1 of 2)

Site-specific Sampling Program Survey Schedule October 1998 – September 1999

Survey	Station	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
Bottom trawl	SB-1	X	X	X	X	X	X	X	X	X	X	X	X
	SB-2	X	X	X	X	X	X	X	X	X	X	X	X
	SB-3	X	X	X	X	X	X	X	X	X	X	X	X
	SB-4	X	X	X	X	X	X	X	X	X	X	X	X
	PJ-1	X	X	X	X	X	X	X	X	X	X	X	X
	PJ-2	X	X	X	X	X	X	X	X	X	X	X	X
	PJ-3	X	X	X	X	X	X	X	X	X	X	X	X
	PJ-4	X	X	X	X	X	X	X	X	X	X	X	X
	PJ-5	X	X	X	X	X	X	X	X	X	X	X	X
	PJ-6					X	X	X	X	X	X	X	X
Ichthyoplankton	SB-1					X	X	X	X	X			
	SB-2					X	X	X	X	X			
	SB-3					X	X	X	X	X			
	SB-4					X	X	X	X	X			
	PJ-1					X	X	X	X	X			
	PJ-2					X	X	X	X	X			
	PJ-3					X	X	X	X	X			
	PJ-4					X	X	X	X	X			
	PJ-5					X	X	X	X	X			
	PJ-6					X	X	X	X	X			

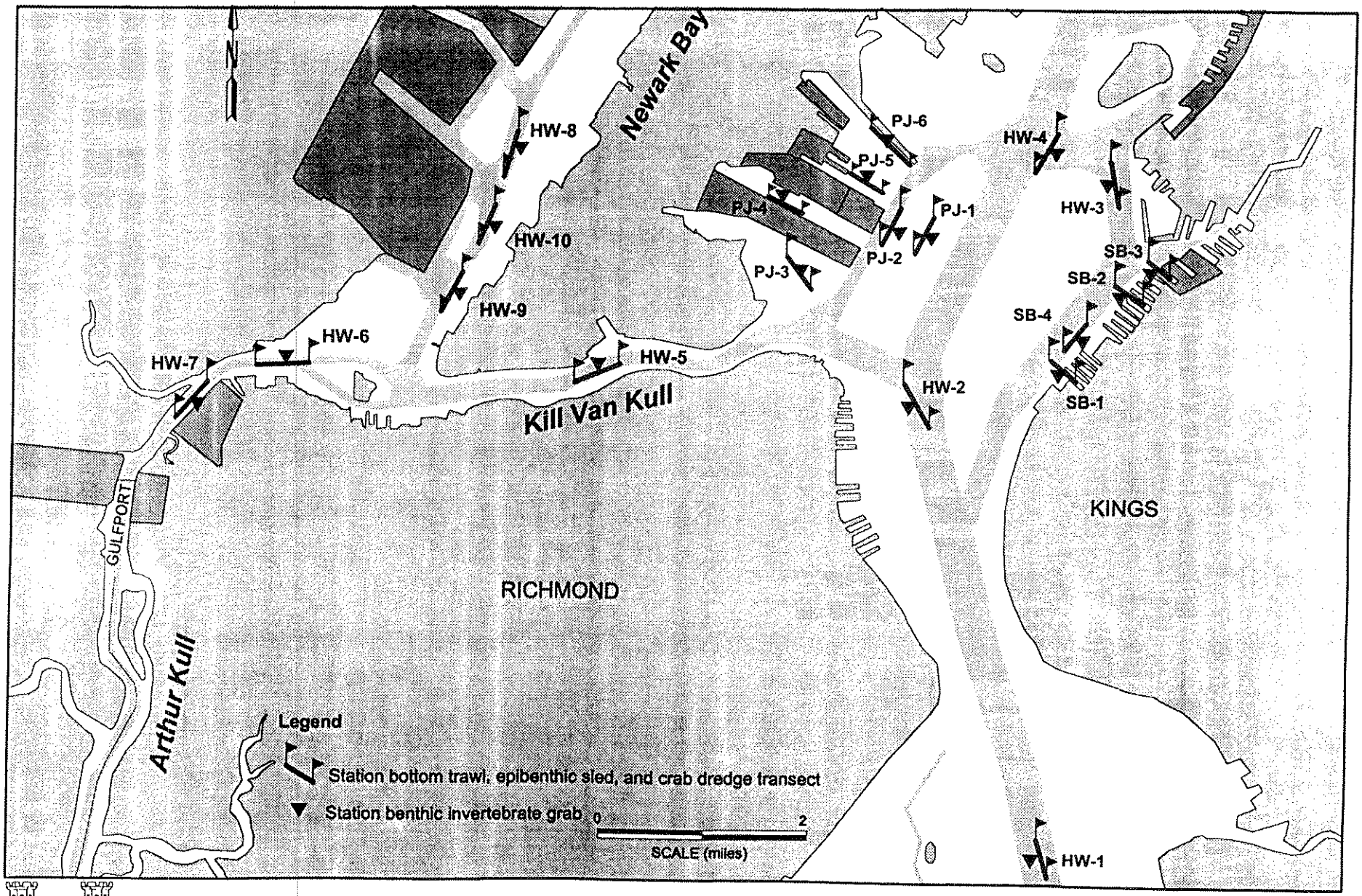


Figure 3-1.
Harborwide and site-specific station locations October 1998 - September 1999

CHAPTER 4

4.0 RESULTS AND DISCUSSION

Results of the biological monitoring program are discussed below. Gear-specific surveys (e.g., bottom trawl) conducted during both the harborwide and site-specific sampling programs are discussed together to provide comparisons among different waterbodies, aquatic habitats and navigation channels in the project area.

Station results were divided among two general aquatic habitats types for discussion and comparison purposes. These aquatic habitats were navigation channels (including site-specific approach channels) and marine terminal interpier / neashore shoal areas. The seasonal distribution and abundance of blue crab and other macroinvertebrates collected in bottom trawl samples is discussed in Section 4.4 with the results of the crab dredge survey.

Data tables and figures are provided in Appendices A through G (Volume II, separate submission). Summary tables and figures are provided at the end of Chapter 4.0.

4.1 BOTTOM TRAWL SURVEY

A combined total of 164 bottom trawl samples were collected during the biological monitoring program. Between October 1998 and September 1999, 54 species of fish were collected at all stations combined. Species composition was similar to previous sampling programs conducted in the project area (see Chapter 2, Table 2-1). Clownfish, a tropical species which had not been collected in previous sampling programs, was collected in October at South Brooklyn. A common aquarium pet, this species was most likely abandoned in the area or may have been an odd itinerant to the project area. This species was not included in catch summaries or statistics.

Bay anchovy, striped bass and weakfish were the dominate species collected during the bottom trawl survey. Average CPUE of bay anchovy was 34.4 among all stations sampled (Table 4-1). Striped bass and weakfish CPUE were similar, averaging 29.8 and 27.5, respectively. Average CPUE was less than 0.2 fish per 10-minture tow for more than half of the species collected.

Overall CPUE (all species combined) declined from October through January (Figure 4-1). CPUE increased steadily beginning in February and peaked in July at approximately 14 fish per 10-minute tow. Species diversity (i.e., number of species collected) followed a similar pattern, with the fewest number of species collected during winter months (January, 6 species) and the largest number collected during summer (August, 32 species) (Table 4-2).

Overall seasonal abundance in the project area varied, with bay anchovy and weakfish accounting for over 80% of the fish collected in October, while November and December

were dominated by relatively large catches of striped bass, white perch and American shad.

Atlantic silverside and Atlantic herring accounted for over 90% of the fish collected in January 1999. White perch dominated bottom trawl catches during December (29.1%), February (52.8%) and March (36.6%), but were not collected in appreciable numbers during any other period.

Distinct changes in species abundance during March and April reflect the seasonal movement of winter flounder, striped bass and spotted hake in the project area. Catch composition of winter flounder rose from 4.8% during February to almost 30% in March. Although CPUE remained relatively high compared to other months, winter flounder were collected in relatively fewer numbers during April, accounting for 11.8% of the fish collected. Striped bass and spotted hake were also dominate in bottom trawl collections during this period. Monthly percent composition of striped bass in bottom trawl samples averaged over 22% during February, March and April. Spotted hake CPUE peaked during April, averaging over 25 fish per 10-minute tow, before declining in May and June (Table 4-3).

Atlantic tomcod, bay anchovy and blueback herring were the dominate species collected during May, accounting for almost 75% of all fish collected. Relatively large catches of alewife and blueback herring during April and May, respectively, reflect the movement of these anadromous herring through the project area to upstream spawning areas.

Bay anchovy dominated overall catch composition from June through September, averaging over 40% of the fish collected each month. Bay anchovy CPUE steadily increased during this period, averaging over 180 fish per 10-minute tow in September. The steady increase in bay anchovy CPUE likely represents young-of-year recruitment to the bottom trawl (i.e., growth to a catchable size). The length frequency distribution of bay anchovy during this period was bimodal (peaks near 40 and 65 mm), representing the abundance of young-of-year and yearling and older fish, respectively (Appendix B). Weakfish, striped bass, Atlantic silverside, alewife and butterfish were also collected in relatively large numbers during this period.

4.1.1 Navigation Channels

Species composition in bottom trawl samples collected at channel stations was generally similar to the overall seasonal abundance in the project area. However, some differences in seasonal abundance were evident during several months, most often during those periods when site-specific channel (i.e., approach channel) stations (SB-4 and PJ-5) only were sampled.

Similar to the overall seasonal abundance in the project area, bay anchovy and weakfish dominated species composition of bottom trawl collections in October, accounting for over 80% of fish collected (Table 4-4). The majority of these fish were collected in

Newark Bay and the Arthur Kill (Appendix A, Figure 4-2). Striped bass, however, were noticeably absent at approach-channel stations during October and November. American shad and blueback herring comprised the majority of fish collected in November, accounting for 80% of the fish collected. CPUE of American shad peaked during this period, averaging 31.5 per 10-minute tow during November (Table 4-5).

Although no fish were collected at channel stations sampled during January, bottom trawl catch composition in December, February and March reflects the seasonal abundance of white perch and striped bass in harbor navigation channels during winter months. Striped bass and white perch comprised over 60% of the fish collected each month during this period. The majority of these fish, of both species, were collected in Newark Bay (Appendix A). Previous biological sampling programs conducted in Newark Bay and the Arthur Kill have noted the abundance of striped bass and white perch in deep-water navigation channels during this same period (NMFS 1994, LMS 1996).

Striped bass continued to comprise a large percentage of fish collected at channel stations during April, however, winter flounder, white perch and spotted hake accounted for the majority of fish collected. A clear increase in winter flounder CPUE between February and March reflects the movement of winter flounder into the project area, primarily Newark Bay. CPUE was highest at Newark Bay stations, averaging over 80 fish per 10-minute tow. Sampling was not conducted during March in the Lower Harbor, Upper Harbor, Red Hook and Arthur Kill areas. Average CPUE was less than 2 fish per tow at all other stations sampled. During April, winter flounder were collected in all navigation channel areas except the Port Jersey Channel area (PJ-4); CPUE was highest in Newark Bay (33.3 fish per 10-min tow) and South Brooklyn Channel (33.0 fish per 10-min tow) areas.

Spotted hake was the dominant species collected at navigation channel areas during both April and May. Summer flounder and windowpane replaced winter flounder as other dominant species during May, each accounting for 13.6% of all fish collected. Winter flounder CPUE dropped in May to less than 3 fish per 10-minute tow, but increased in June to over 13 fish per 10-minute tow. Bottom trawl sampling was limited to only the Port Jersey Channel and South Brooklyn Channel areas during May. No bottom trawl sampling was conducted in Newark Bay during this time. Winter flounder were collected in all navigation channel areas except the Lower Harbor area in June, accounting for almost 20% of all fish collected. Previous bottom sampling conducted in Newark Bay navigation channels in 1993-1994 (NMFS 1994) indicated an increase in winter flounder CPUE beginning in June and lasting through August. During the current study, winter flounder CPUE decreased steadily from June through September.

Bay anchovy appeared in bottom trawl samples collected in navigation channel areas in June, comprising 18.8% of the monthly catch. Although bay anchovy was generally common throughout June through September, large catches of weakfish dominated bottom trawl CPUE during this period. Weakfish accounted for over 75% of the fish collected at both approach-channel stations during July, averaging over 290 fish per 10-

minute tow. CPUE was largest in the Kill Van Kull (494 fish per 10-min tow) and Port Jersey Channel (297 fish per 10-min tow), with most fish ranging between 40 and 100 mm in length (Appendix B). Young-of-year weakfish generally range in length from about 4 to 16 cm in early fall (Able and Fahay 1998). Bottom trawl sampling was conducted only in the Kill Van Kull, Port Jersey Channel and South Brooklyn Channel during July. Weakfish were present in bottom trawl samples collected during July in the Arthur Kill and Newark Bay in previous studies (USCG 1995, NMFS 1994).

American shad and blueback herring accounted for 40% of the fish collected at navigation channel locations during September. Individual fish of both species ranged between 80 and 120 mm in length.

4.1.2 Marine Terminal Interpier and Shoal Areas

Species composition in bottom trawl samples collected at marine terminal interpier and adjacent shoal areas was markedly different from that of channel stations during late-fall and early winter sampling. Unlike samples collected in navigation channels, winter flounder was the dominate species, accounting for 20% of the fish collected (Table 4-6). Black seas bass, bay anchovy and striped bass were also relatively abundant. Both striped bass and black sea bass were absent from bottom trawls collected at navigation channel stations.

Similar differences in species composition between navigation channel and shoal/ interpier areas species composition were also apparent in November and December. Striped bass were absent from bottom trawls at approach-channel stations (SB-4 and PJ-4) during November, but accounted for over 60% of the fish collected at shoal/interpier areas. Striped bass CPUE averaged more than 40 fish per 10-minute tow during this time (Table 4-7). The majority of these fish were collected at interpier stations at South Brooklyn and ranged between 70 and 130 mm in length, corresponding to known length intervals for young-of-year striped bass (LMS 1995). Young-of-year striped bass from the Hudson River generally move downstream from spawning areas and spend their first winter in the lower Hudson River Estuary (McKown 1991) and have been found in and around pier pilings and deep interpier habitats in the (Able and Studholme 1994).

Overall CPUE dropped considerably at shoal/interpier areas from December through March. The total number of species collected also dropped during this period. Although winter flounder and Atlantic silverside were the dominate species, CPUE for both species was relatively low compared to other months. Winter flounder CPUE was below 2 fish per 10-minute tow for each month from December through March.

Overall CPUE and the number of species collected at shoal stations increased in April and May, with large catches of striped bass and anadromous herring, primarily alewife and blueback herring. CPUE was greater than 50 fish per 10-minute tow for both striped bass and alewife.

Similar to bottom trawl samples in navigation channels, bay anchovy was ubiquitous at shoal/interpier stations from early summer through September; however, striped bass and weakfish dominated species composition during July, accounting for more than 70% of the fish collected. The majority of striped bass were collected at South Brooklyn interpier stations, all ranging between 30 and 70 mm in length. Weakfish were collected predominately at Port Jersey, at pierhead and berthing areas (PJ-2, PJ-5, and PJ-6). Relatively fewer weakfish were collected at Port Jersey shoal stations (PJ-1 and PJ-3).

Bay anchovy dominated catches in August and September, comprising over 70% of the fish collected and averaging over 230 fish per 10-minute tow during both months. Atlantic silverside, alewife, scup and butterfish were also collected in large numbers during this period.

4.2 HYDROACOUSTIC SURVEY

Hydroacoustic surveys were conducted simultaneously with bottom trawl surveys, beginning in December 1998. Hydroacoustic surveys were conducted to obtain information on abundance, distribution, and size (i.e., length) of fish in the water column above the navigation channel bottom.

Results of each hydroacoustic survey was generally comparable to the corresponding bottom trawl survey with regards to relative abundance of targets (i.e., acoustic echoes) or fish tracked each month. Differences between bottom trawl and hydroacoustic surveys were noted among most stations and months during periods of high fish abundance. Differences between bottom trawl surveys are expected due to differences in sampling area (bottom vs. water column) and gear recruitment (i.e., ability to sample a given size fish). Relatively small echoes (-50 to -60 dB) comprise the majority of targets observed during periods of high abundance, primarily late-spring through early fall. Target strength to fish length conversion tables (Appendix D, Table D-1) indicate the majority of these echoes were likely fish less than 55 mm in length.

4.2.1 Navigation Channels

Hydroacoustic surveys conducted in navigation channel areas revealed a seasonal change in target depth distribution and abundance at most stations. Tracked echo targets were generally distributed throughout the water column during periods of high abundance. Notable examples of this ubiquitous distribution were observed in the Lower Harbor and Arthur Kill areas (HW-1 and HW-6) during August (Appendix C). Bay anchovy and other small, pelagic forage species are often present at this time in large numbers. Target strength distribution in these areas confirmed the majority of tracked echoes were small, approximately 30 to 40 mm in length (Appendix D).

During winter months, echo target distribution was generally stratified. Targets were distributed toward the bottom of the navigation channel at most stations.

4.2.2 Marine Terminal Interpier and Shoal Areas

Hydroacoustic surveys conducted in marine terminal interpier and shoal areas reflected the seasonal abundance of fish in the study area. Large numbers of echo targets were recorded during summer and fall months, while winter months were generally characterized by fewer targets.

Similar to hydroacoustic surveys in navigation channels, target depth distribution changed seasonally. Tracked echo targets were generally distributed in both lower and upper strata of the water column during periods of high abundance, primarily summer months; however, the overall depth distribution revealed echo targets were generally orientated toward bottom strata. Targets were often seen concentrated near sharp changes in bottom depth and at slope bottoms. Clear examples of this distribution were observed at a number of South Brooklyn interpier stations, most noticeably SB-3 during November and SB-1 during March (Appendix C). Target strength distribution in these areas during these months revealed the majority of tracked echoes were small, approximately 30 to 40 mm in length (Appendix D).

4.3 SEASONAL ICHTHYOPLANKTON SURVEY

Seasonal ichthyoplankton samples were collected at navigation channel and marine terminal interpier/ shoal areas from February through June 1999. A combined total of 48 epibenthic sled ichthyoplankton samples were collected.

A total of 19 species and four lifestages were collected . Species and lifestages were generally similar to recent biological sampling programs conducted in Newark Bay (Table 4-8). Unlike previous studies, weakfish was the most abundant species collected, followed by tautog and Atlantic menhaden. Bay anchovy, the normally predominate species among recent studies in Newark Bay, was ranked fourth. Other species collected in relative abundance were fourspot flounder, hogchoker, and winter flounder.

Eggs were the dominate lifestage collected in epibenthic ichthyoplantkon surveys. Average densities were highest during May and June (Table 4-9). Post-yolk sac larvae were also most abundant during this period.

4.3.1 Navigation Channels

Ichthyoplankton abundance and species composition followed a seasonal pattern. Post yolk-sac larvae of Atlantic herring and American sand lance were collected during February. Yolk sac larvae of winter flounder were also collected, although at low densities (Table 4-10).

Eggs were first collected in ichthyoplankton samples in navigation channel areas during March. The majority of these were fourbeard rockling, winter flounder, and sculpins

(e.g., grubby, stargazer). Winter flounder egg densities peaked in April, averaging 123 eggs per cubic meter. Atlantic menhaden eggs were also collected during this period.

Atlantic menhaden egg density increased in April, averaging over 1400 per 1000 cubic meters. Atlantic menhaden eggs were collected at all navigation channel areas, but were found in highest densities in the Lower Harbor (HW-1), Upper Harbor (HW-2 and HW-4) and Red Hook (HW-3). Weakfish and tautog egg densities replaced Atlantic menhaden and winter flounder as the dominant egg species during May and June. Weakfish egg density was highest in the Red Hook area (HW-3), at over 10,000 eggs per cubic meter (Appendix E).

Post yolk-sac larvae were collected in highest densities during May and June. Atlantic menhaden were collected in greatest densities, followed by windowpane flounder and bay anchovy in May and June, respectively. The average density of Atlantic menhaden yolk-sac larvae was highest at the Red Hook area during May (328 larvae per 1000 cubic meters) and in the Arthur Kill in June (1044 larvae per 1000 cubic meters). Windowpane flounder yolk-sac larvae densities were highest in the Upper Harbor area, averaging 82 larvae per 1000 cubic meter.

4.3.2 Marine Terminal Interpier and Shoal Areas

Species composition at interpier/shoal stations was similar to channel area stations (Table 4-11). Ichthyoplankton densities were also similar, except during May, when average densities were greater at shoal / interpier stations for all lifestages.

Species composition and relative abundance (i.e., rank) was similar within each month. Tautog egg density was slightly higher than weakfish egg density during May. Average tautog egg density was greater than 2000 eggs per 1000 cubic meters at Port Jersey and South Brooklyn. Tautog egg densities were also over 2000 eggs per 1000 cubic meters at approach channel stations (SB-4 and PJ-4) and at Red Hook (HW-3) during this time.

Post yolk-sac larval densities were highest during May and June, influenced by large densities of Atlantic menhaden. Atlantic menhaden post yolk-sac larvae were collected at both South Brooklyn and Port Jersey.

4.4 BENTHIC INVERTEBRATE SURVEY

A combined total of 71 benthic grab samples was collected during the biological monitoring program. Results of the benthic grab survey were divided into two categories for discussion: benthic invertebrate taxon and macroinvertebrate taxon. Benthic invertebrate taxon included all species collected in benthic grab samples, while macroinvertebrate collections focused on hard-bodied shellfish greater than 0.5-in overall length.

4.4.1 Benthic Invertebrates

Species diversity and seasonal abundance was generally similar to that collected in previous biological sampling programs. Species collected and average densities at navigation channel and interpier/shoal areas are provided in Tables 4-12 and 4-13, respectively.

4.4.1.1 ***Navigation Channels.*** Benthic invertebrate collections during November were dominated by the polychaete worms *S. viridis* and *S. benedicti*, accounting for 40% of the organisms collected (Figure 4-3). *S. benedicti* was collected in all navigation channel areas except the Lower Harbor and Port Jersey and South Brooklyn approach channels (Appendix F). *S. viridis* was collected only in the Kill Van Kull. The bivalve mollusk *M. lateralis* was also abundant at most stations, comprising 28% of the organisms collected.

Average density of *M. lateralis* increased in February to 132 organisms per 0.1 square meter, accounting for over 60% of the organisms collected at navigation channel areas. Average densities were highest in the Upper Harbor and Red Hook areas, as well as in the South Brooklyn approach channel. Both *S. viridis* and *S. benedicti* remained relatively abundant during Febraury compared to other species collected. Similar to November samples *S. viridis* was collected only in the Kill Van Kull. The bivalve mollusk *Tellina* sp. was also abundant.

Although the relative abundance of benthic invertebrate species was different during May collections, the dominant species remained the same. The bivalve mollusk *M. lateralis* and *Tellina* sp. comprised 36% of the invertebrates collected, while *S. viridis* and *S. benedicti* accounted for 20% of the invertebrates collected. Members of the family Ampharetidae, also a polychaete worm, comprised 4% of the organisms collected. Average densities of Ampharetidae invertebrates were highest in the Lower Harbor, Upper Harbor, and Red Hook areas of the Harbor.

S. viridis accounted for over half of the organisms collected during August samples collected in navigation channel areas. Once again, *S. viridis* was collected only in the Kill Van Kull at high densities. Although *S. viridis* was collected in previous sampling programs conducted in the Arthur Kill and Kill Van Kull during 1995-1996 (LMS 1996), it was not considered a dominant species. *S. viridis* is known to inhabit deeper, brackish waters of estuaries (Gosner 1971).

4.4.1.2 ***Marine Terminal Interpier and Shoal Areas.*** Similar to channel area stations, benthic invertebrate collections during November were dominated by a few species of polychaete worms, primarily *S. benedicti*. The polychaete worms *Nereis* spp. and members of the family Paraonidae were also abundant. Oligochaetes and the bivalve mollusk *Lacuna vincta* were the remaining dominant species. Polychaete worms continued to dominate benthic invertebrate collections at shoal and interpier areas during February, accounting for 44% of the organisms collected.

C. fornicata; and the polychaete worms Phyllodocidae, *Glycera* sp., *Nereis* sp., and Orbiniidae.

Stations located in the 30 to 40 ft depth range are listed in Table 4-17. The bivalve mollusk, *M. lateralis* accounted for 33.3% of the total number of organisms collected at these stations. The next three most abundant species were the polychaete worms, *S. viridis* (13.3% of total), *S. benedicti* (12.2% of total), and *L. fragilis* (4.3% of total). The species fifth in abundance was the bivalve mollusk, *Tellina* sp. The gammarid amphipod, *A. abdita*, and a polychaete worm (Orbiniidae) were ranked sixth and seventh in abundance, respectively. The polychaete worms *Nephtys* sp., and *Glycera* sp. were both ranked eighth.

Middle depths consisted of stations at Port Jersey Pierhead Channel, Claremont Terminal Channel, and Gowanus Bay Interpier (3 sites) (Table 4-18). The two most abundant species in these locations were the bivalve mollusks, *M. edulis* (29.5% of total) and *M. lateralis* (29.3% of total). The third most abundant species was the polychaete worm, *S. benedicti* (10.9% of total). The polchaete worm *Nereis* sp. was fourth most abundant and the bivalve mollusk, *Tellina* sp. was fifth most abundant. The polychaete worm *L. fragilis* was fifth most abundant. The remaining species amongst the top ten in abundance were the gastropod mollusk *A. canaliculata*, the amphipod, *A. abdita*, the polychaete worm, *Glycera* sp., the gastropod mollusk, *C. plana* and a gammarid amphipod.

Very deep depth stations were located in Ambrose Channel North, and at two locations in Anchorage channel (Table 4-19). The three most abundant species in this area were bivalve mollusks, *M. lateralis* (49.3% of total), *Tellina* sp. (11.1% of total), and *M. edulis* (5.6%). Polychaete worms were among the next three species in highest abundance. These were *Nephtys* sp., *S. benedicti*, and Ampharetidae. The remaining species among the top ten in abundance were: the polychaete *P. gouldii*; the amphipod *A. abdita*; a sea urchin (Strongylocentrotidae); the polychaetes *Glycera* sp., Spionidae, Paraonidae, and Phyllodocidae, and a gammarid amphipod.

Data from these surveys show a high level of shellfish diversity throughout the Harbor regardless of depth. These data suggest that polychaete worms account for a great deal of the benthos throughout the Harbor area. Together with bivalve mollusks and gammarid amphipods, polychaete worms accounted for the top ten species in abundance at all of the sites sampled.

4.5 CRAB DREDGE SURVEY

A total of 58 crab dredge samples was collected during the biological monitoring program. Seven species of crabs were collected in sampling efforts from February 1999 through April 1999 (Table 4-20 and 4-21). Species diversity was highest during February and April (six species collected each month), while overall abundance was highest during March. Rock crab dominated the overall abundance during this month.

Shellfish collected in bottom trawl samples were also identified and enumerated during the biological monitoring program. Species diversity in bottom trawl samples was similar to crab dredge collections (Table 4-22 and 4-23). The seasonal distribution and abundance of crab species collected in bottom trawl and crab dredge samples is described below.

4.5.1 Navigation Channels

The seasonal abundance of crab species collected in crab dredge and bottom trawl samples varied, reflecting the general movement of crab species between shallow water and deep water areas, as well as differences in seasonal behavior (e.g., burrowing).

Crab Dredge

Overall abundance in crab dredge collections during February were low compared to other months. The two most abundant species were rock crab and blue crab. Although rock crab was the most abundant species collected, it was found at only three areas, the Upper Harbor, Red Hook and South Brooklyn approach channel. Blue crab was the most common species collected, found at all navigation channel areas except the Lower Harbor and Kill Van Kull.

Overall abundance in crab dredge collections increased in March, due primarily to large catches of rock crab in the Red Hook and South Brooklyn approach channel. CPUE was over 200 crabs per 5-minute tow at both areas. Blue crab CPUE in crab dredge samples also increased during March, likely reflecting overwintering behavior (i.e., burrowing) and recruitment to the crab dredge. Blue crab CPUE was highest in Port Jersey and the South Brooklyn approach channel (Figure 4-4).

Bottom Trawl

Blue crab were collected in bottom trawl samples at all navigation channel areas except the Lower Harbor and the Kill Van Kull during April. Blue crab CPUE was highest in the Port Jersey approach channel and the Arthur Kill, averaging 14 and 12 crabs per 10-minute tow, respectively. Blue crab were not as abundant in crab dredge samples collected in these areas during this same period. Green crab, collected only at Red Hook, and rock crab, collected primarily in the Lower Harbor, were also abundant in bottom trawl samples.

Crab species diversity was relatively high in bottom trawl samples collected during October compared to late-fall and winter months (i.e., November through January). Five species of crab were collected, including blue crab, green crab, lady crab rock crab, and spider crab. Overall abundance was highest in the Arthur Kill and Kill Van Kull. CPUE at both areas averaged over 20 crabs per 10-min tow. Blue crab was the only species collected in the Arthur Kill.

There was a clear drop in CPUE during November, December and January. Blue crab was the only species collected in navigation channel areas. Blue crabs were collected in the Arthur Kill, Newark Bay, and Port Jersey approach channel. Blue crab abundance in bottom trawls was generally low in these areas. Blue crab CPUE was greater than 5 crabs per 10-min tow only Newark Bay.

Overall abundance of crabs in bottom trawls increased in February, although abundance remained relatively low compared to other months. Although green crab and blue crab were similar in overall abundance, green crab were only collected in the Red Hook area. Blue crab abundance remained low in bottom trawl samples in February and March. Blue crab dredge CPUE was relatively high compared to bottom trawl samples during this period. Overwintering blue crab burrow into sediments and are not as susceptible to capture in bottom trawl samples as crab dredge samples.

Blue crab CPUE in bottom trawl samples increased dramatically during May and June. CPUE at Port Jersey and South Brooklyn was over 40 blue crabs per 10-minute tow (Figure 4-5). No bottom samples were collected at other navigation channel areas during May. Blue crab CPUE in bottom trawl samples peaked in June, with large catches of blue crab at Red Hook, Arthur Kill and Newark Bay. Blue crab were collected at all areas except the Lower Harbor. Other crab species collected in relative abundance during this period included horseshoe crab, mud crab and rock crab.

Blue crab remained relatively common in bottom trawl samples collected during July, August and September as compared to other months. Similar to May and June, blue crab were collected at all areas sampled during this period except the Lower Harbor. Blue crab CPUE was generally lowest at the Port Jersey approach channel (among those stations where blue crab was present) and highest in the Kill Van Kull.

4.5.2 Marine Terminal Interpier and Shoal Areas

Species diversity and abundance in bottom trawl samples collected at marine terminal interpier and shoal area stations was generally similar to navigation channel stations. Some exceptions were horseshoe crab and mud crab, which were collected more often at interpier/shoal stations, and fiddler crab, which was collected only at interpier/shoal stations. Rock crab and green crab were generally less abundant at interpier/shoal areas than at navigation channel areas.

Crab Dredge

Average blue crab CPUE in Port Jersey crab dredge samples collected during February and March was noticeably higher than bottom trawl samples. This difference likely reflects the overwintering behavior of blue crabs to burrow into soft sediments and the efficiency of the crab dredge to sample burrowing crabs. This difference between gears was not apparent among South Brooklyn interpier samples. Blue crab CPUE in crab

dredge sample decreased at both South Brooklyn and Port Jersey in April, while blue crab CPUE in bottom trawl samples increased.

Bottom Trawl

October bottom trawl samples were dominated by blue crab, averaging over 24 crabs per 10-minute tow at both South Brooklyn and Port Jersey. Mud crab were also abundant, primarily at South Brooklyn.

Similar to bottom trawl samples collected at navigation channel areas, species diversity in bottom trawl samples decreased during late-fall and winter months. Blue crab was the dominant species each month. Between December 1998 and February 1999, blue crab CPUE in bottom trawl samples ranged from an average 0.7 crabs per 10-minute tow at South Brooklyn during December to 15.1 crabs per 10-minute tow at Port Jersey, also during December.

Similar to bottom trawl samples collected at navigation channel areas, blue crab CPUE in bottom trawl samples increased dramatically during May. Crab species diversity also increased. Horseshoe crab and fiddler crab were among the other species of crab collected. Average blue crab CPUE continued to increase at Port Jersey during June, reaching almost 80 crabs per 10-minute tow. Blue crab CPUE remained relatively high compared to CPUE at Port Jersey and South Brooklyn approach channels during August and September.

4.5.3 **Station Depths**

Survey stations were located at several depths in both shoal/interpier and navigation channel areas. The survey stations were separated by depth into four categories; shallow stations (0 to 15 ft), intepier stations (30 to 40 ft), middle-depth and approach channels, and deep (>40 ft). The results of the survey utilizing these depth categories are discussed below.

Overall CPUE was highest at non-channel sites during February and March. The number of overwintering crabs was lowest in April, regardless of depth. Crabs were present in very low numbers in the deepest-water stations located in the Ambrose and Anchorage channels (Figure 4-6).

The average CPUE in shoal and shallow channel sites was generally higher than in deep channel sites (Figures 4-7 and 4-8). All shoal and shallow channel sites, with the exception of the South Brooklyn interpier site (SB-1), had an average CPUE of over 5 crabs, while the deep channel sites had an average CPUE of less than 5 crabs. This may indicate a preference for relatively sheltered areas during overwintering. A comparison of shoal and shallow channel sites indicates that the South Brooklyn interpier area (SB-3) and Global Marine Terminal sites have the highest average CPUEs (Figure 4-7).

Overall results of the sampling program indicate the blue crab's preference for non-channel areas for overwintering. The lowest number of blue crabs was collected in the deeper Ambrose and Anchorage channels and the greatest number were collected at the shallow-water stations located at Port Jersey and the South Brooklyn interpier stations.

TABLE 4-1 (page 1 of 2)

Average Bottom Trawl CPUE (number per 10-minute tow)

		Highest Annual CPUE		Highest Monthly CPUE	
Species	**Avg CPUE**	**Area**	**CPUE**	**Month**	**CPUE**
Bay anchovy	34.4	PJ	75.8	SEP	182.7
Striped bass	29.8	SB	107.9	JUL	329.8
Weakfish	27.5	KVK	59.3	JUL	292.5
Alewife	6.3	PJ	15.1	JUL	34.5
Winter flounder	5.5	NB	25.0	MAR	17.9
Atlantic silverside	4.4	PJ	9.0	JUL	52.1
Atlantic tomcod	4.1	PJ-C	9.6	MAY	47.0
Spotted hake	4.0	NB	21.7	APR	25.6
Butterfish	3.4	LH	10.3	JUL	24.4
White Perch	3.1	NB	35.6	MAR	23.3
Scup	2.9	SB	7.7	JUL	16.3
Windowpane	1.8	LH	10.7	APR	5.5
Blueback herring	1.7	PJ	4.3	MAY	17.5
Striped searobin	1.5	SB	3.6	JUL	11.7
American shad	1.2	SB-C	6.6	NOV	11.0
Summer flounder	1.1	LH	1.7	MAY	5.1
Atlantic herring	0.9	SB	3.0	MAY	10.9
Striped anchovy	0.7	UH	2.5	SEP	7.1
Atlantic menhaden	0.5	PJ-C	2.4	AUG	2.7
Silver hake	0.4	UH	1.3	APR	2.0
Black sea bass	0.3	SB	0.6	OCT	1.5
Grubby	0.2	AK	0.8	MAR	0.5
Lookdown	0.2	PJ-C	2.4	OCT	2.0
Northern pipefish	0.2	KVK	0.6	JUL	1.0
Bluefish	0.2	AK	0.3	SEP	1.2
Cunner	0.2	UH	0.8	MAY	0.4
Tautog	0.1	UH	0.6	SEP	0.5
Smallmouth flounder	0.1	KVK	0.3	OCT	0.6
Atlantic moonfish	0.1	PJ-C	0.8	SEP	1.1
Pollock	0.1	PJ	0.3	MAY	1.8
Northern kingfish	0.1	PJ	0.1	OCT	0.8
Northern searobin	0.1	UH	0.7	JUN	0.4
Spot	0.1	PJ-C	0.6	JUN	0.4
Little skate	0.1	UH	0.3	APR	0.3
Inshore lizardfish	0.1	KVK	0.1	SEP	0.6
Gizzard Shad	< 0.1	NB	0.3	DEC	0.3
Red hake	< 0.1	PJ-C	0.3	NOV	0.2
American eel	< 0.1	RH	0.3	JUN	0.2
Oyster toadfish	< 0.1	AK	0.2	JUN	0.2
Fourspot flounder	< 0.1	PJ-C	0.2	OCT	0.2
American sandlance	< 0.1	PJ	0.1	OCT	0.2
Rainbow smelt	< 0.1	SB	0.1	JUL	0.3
Northern puffer	< 0.1	PJ-C	0.1	JUL	0.2
Lined seahorse	< 0.1	SB-C	0.1	APR	0.1
Rock gunnel	< 0.1	RH	0.2	JUL	0.1
Spotted goatfish	< 0.1	SB	0.1	JUL	0.2
Hickory shad	< 0.1	KVK	0.1	OCT	0.1
Naked goby	< 0.1	PJ	<0.1	NOV	0.1
Conger eel	< 0.1	AK	0.1	AUG	0.1
Atlantic mackerel	< 0.1	PJ	< 0.1	JUN	0.1
Striped cusk-eel	< 0.1	SB-C	0.1	APR	0.1

TABLE 4-1 (page 2 of 2)

Average Bottom Trawl CPUE (number per 10-minute tow)

		Highest Annual CPUE		Highest Monthly CPUE	
Species	**Avg CPUE**	**Area**	**CPUE**	**Month**	**CPUE**
Crevalle jack	< 0.1	PJ	< 0.1	SEP	0.1
Feather blenny	< 0.1	UH	0.1	JUN	0.1
Northern stargazer	< 0.1	KVK	0.1	JUL	0.1

Note: Not all stations sampled each month, see sampling schedule for actual months and stations sampled. Avg CPUE and highest monthly CPUE based on all stations combined.

Stations: LH - Lower Harbor (HW 1), UH - Upper Harbor (HW 2,4), RH - Red Hook (HW 3) KVK - Kill Van Kull (HW 5), AK – Arthur Kill (HW 6-7), NB - Newark Bay (HW 8-10), PJ-C Port Jersey Channel (PJ 4), SB-C South Brooklyn Channel (SB 4), PJ - Port Jersey (PJ 1-3, 5-6), SB – South Brooklyn (SB 1-3)

TABLE 4-2

Percent Composition of Finfish Species Collected in the Study Area – All Stations Combined, October 1998 – September 1999

October		November		December		January	
Bay anchovy	52.8	Striped bass	50.8	White Perch	29.1	Atlantic silverside	74.4
Weakfish	25.6	American shad	16.4	Striped bass	24.1	Atlantic herring	16.7
Winter flounder	3.8	Atlantic silverside	16.3	Alewife	9.9	Striped bass	5.1
Butterfish	3.3	Blueback herring	7.8	American shad	7.7	Other	3.8
Other	14.5	Winter flounder	3.3	Bay anchovy	7.4		
		Other	5.3	Winter flounder	6.5		
				Weakfish	4.0		
				Smallmouth flounder	3.1		
				Other	8.0		
February		**March**		**April**		**May**	
White Perch	52.8	White Perch	36.6	Striped bass	31.1	Atlantic tomcod	38.4
Atlantic silverside	11.3	Winter flounder	28.2	Spotted hake	24.5	Bay anchovy	21.9
Striped bass	11.3	Striped bass	26.4	Alewife	21.7	Blueback herring	14.3
American shad	4.8	Other	8.9	Winter flounder	11.8	Atlantic herring	8.9
Winter flounder	4.8			Windowpane	5.2	Summer flounder	4.2
Silver hake	4.4			Other	5.7	Spotted hake	3.8
Other	10.5					Other	8.5
June		**July**		**August**		**September**	
Bay anchovy	30.5	Striped bass	41.1	Bay anchovy	50.7	Bay anchovy	76.3
Atlantic tomcod	19.1	Weakfish	36.4	Weakfish	24.8	Scup	5.7
Winter flounder	18.4	Atlantic silverside	6.5	Striped bass	6.2	Alewife	3.6
Spotted hake	9.6	Alewife	4.3	Butterfish	3.6	Butterfish	3.2
Summer flounder	6.2	Butterfish	3.0	Scup	3.3	Striped anchovy	3.0
Windowpane	5.7	Bay anchovy	3.0	Alewife	3.0	Weakfish	2.5
Other	10.5	Other	11.7	Other	8.4	Other	5.8

Note: Percent composition based on bottom trawl CPUE (number per 10-min tow)
Stations: October HW 1-8, SB 1-4, PJ 1-5; November SB 1-4, PJ 1-5; December HW 1-8, SB 1-4, PJ 1-5; January SB 1-4, PJ 1-5
February SB 1-4, PJ 1-6; March HW 5, HW 8-10, SB 1-4, PJ 1-6; April HW 1-10, SB 1-4, PJ 1-6; May SB 1-4, PJ 1-6
June HW 1-10, SB 1-4, PJ 1-6; July HW 5, SB 1-4, PJ 1-6; August HW 1-10, SB 1-4, PJ 1-6; September HW 5, SB 1-4, PJ 1-6

TABLE 4-3 (page 1 of 2)

Average Bottom Trawl CPUE (number per 10-minute tow) in the Study Area – All Stations Combined, October 1998 – September 1999

October		November		December		January		February		March	
Bay anchovy	45.6	Striped bass	34.0	White Perch	5.5	Atlantic silverside	6.4	White Perch	7.3	White Perch	23.3
Weakfish	22.1	American shad	11.0	Striped bass	4.6	Atlantic herring	1.4	Atlantic silverside	1.6	Winter flounder	17.9
Winter flounder	3.3	Atlantic silverside	10.9	Alewife	1.9	Striped bass	0.4	Striped bass	1.6	Striped bass	16.8
Butterfish	2.8	Blueback herring	5.2	American shad	1.5	Bay anchovy	0.1	American shad	0.7	Atlantic herring	1.3
Lookdown	2.0	Winter flounder	2.2	Bay anchovy	1.4	Windowpane	0.1	Winter flounder	0.7	Spotted hake	1.2
Black sea bass	1.5	Butterfish	1.0	Winter flounder	1.2	Winter flounder	0.1	Silver hake	0.6	American shad	1.1
Windowpane	1.5	Bay anchovy	0.8	Weakfish	0.8			Spotted hake	0.3	Grubby	0.5
Striped bass	1.1	Weakfish	0.7	Smallmouth flounder	0.6			Windowpane	0.3	Silver hake	0.4
Striped searobin	0.9	Striped searobin	0.3	Butterfish	0.3			Cunner	0.2	Windowpane	0.4
Bluefish	0.8	Alewife	0.2	Gizzard Shad	0.3			Atlantic menhaden	0.2	Alewife	0.2
Northern kingfish	0.8	Red hake	0.2	Spotted hake	0.2			Alewife	0.1	Atlantic silverside	0.1
Scup	0.8	Atlantic menhaden	0.1	Windowpane	0.2			Grubby	0.1	Blueback herring	0.1
Smallmouth flounder	0.6	Naked goby	0.1	Atlantic silverside	0.1			Northern pipefish	0.1	Cunner	0.1
Grubby	0.3	Smallmouth flounder	0.1	Grubby	0.1			Atlantic herring	0.1	Gizzard Shad	0.1
Tautog	0.3			Atlantic menhaden	0.1			Little skate	0.1	Red hake	0.1
American sandlance	0.2			Atlantic tomcod	0.1						
Fourspot flounder	0.2			Black sea bass	0.1						
Summer flounder	0.2			Little skate	0.1						
American shad	0.1			Silver hake	0.1						
Atlantic menhaden	0.1			Striped searobin	0.1						
Northern pipefish	0.1										
Alewife	0.1										
American eel	0.1										
Atlantic silverside	0.1										
Cunner	0.1										
Hickory shad	0.1										
Little skate	0.1										
Northern searobin	0.1										

TABLE 4-3 (page 2 of 2)

Average Bottom Trawl CPUE (number per 10-minute tow) in the Study Area – All Stations Combined, October 1998 – September 1999

April		May		June		July		August		September	
Striped bass	32.5	Atlantic tomcod	47.0	Bay anchovy	18.7	Striped bass	329.8	Bay anchovy	116.9	Bay anchovy	182.7
Spotted hake	25.6	Bay anchovy	26.8	Atlantic tomcod	11.7	Weakfish	292.5	Weakfish	57.3	Scup	13.5
Alewife	22.7	Blueback herring	17.5	Winter flounder	11.3	Atlantic silverside	52.1	Striped bass	14.2	Alewife	8.6
Winter flounder	12.4	Atlantic herring	10.9	Spotted hake	5.9	Alewife	34.5	Butterfish	8.3	Butterfish	7.6
Windowpane	5.5	Summer flounder	5.1	Summer flounder	3.8	Butterfish	24.4	Scup	7.5	Striped anchovy	7.1
Silver hake	2.0	Spotted hake	4.7	Windowpane	3.5	Bay anchovy	24.0	Alewife	7.0	Weakfish	6.0
American shad	1.3	Winter flounder	2.3	Atlantic herring	1.0	Scup	16.3	Striped searobin	5.1	Blueback herring	2.5
Blueback herring	0.9	Pollock	1.8	Weakfish	1.0	Striped searobin	11.7	Winter flounder	2.9	Atlantic menhaden	1.8
Grubby	0.5	Windowpane	1.2	Blueback herring	0.6	Windowpane	4.8	Atlantic menhaden	2.7	Atlantic silverside	1.6
Northern pipefish	0.5	Striped bass	0.9	Striped searobin	0.5	Winter flounder	4.5	Striped anchovy	2.7	American shad	1.5
Little skate	0.3	Butterfish	0.8	Northern searobin	0.4	Summer flounder	3.8	Windowpane	1.5	Bluefish	1.2
White Perch	0.2	Scup	0.8	Spot	0.4	Blueback herring	1.4	Summer flounder	1.2	Atlantic moonfish	1.1
Bay anchovy	0.1	Silver hake	0.7	Cunner	0.4	Northern pipefish	1.0	Black sea bass	0.7	Black sea bass	0.6
Cunner	0.1	Cunner	0.4	Tautog	0.3	Atlantic menhaden	0.5	Atlantic moonfish	0.3	Inshore lizardfish	0.6
Atlantic tomcod	0.1	Tautog	0.4	Scup	0.3	American shad	0.3	Cunner	0.3	Tautog	0.5
Fourspot flounder	0.1	Weakfish	0.4	Black sea bass	0.2	Rainbow smelt	0.3	Grubby	0.3	Winter flounder	0.5
Lined seahorse	0.1	Northern pipefish	0.3	Grubby	0.2	Atlantic tomcod	0.2	American shad	0.3	Summer flounder	0.5
Striped cusk-eel	0.1	Alewife	0.2	Northern pipefish	0.2	Grubby	0.2	Atlantic tomcod	0.3	Striped searobin	0.4
Striped searobin	0.1	Little skate	0.2	Alewife	0.2	Northern puffer	0.2	Bluefish	0.3	Lookdown	0.3
Summer flounder	0.1			American eel	0.2	Spot	0.2	Northern pipefish	0.3	Gizzard Shad	0.2
				Butterfish	0.2	Spotted goatfish	0.2	Atlantic silverside	0.2	Striped bass	0.2
				Oyster toadfish	0.2	Atlantic moonfish	0.1	American eel	0.1	Crevalle jack	0.1
				Red hake	0.2	Cunner	0.1	Inshore lizardfish	0.1	Cunner	0.1
				Striped bass	0.2	Northern stargazer	0.1	Northern searobin	0.1	Northern kingfish	0.1
				Bluefish	0.1	Oyster toadfish	0.1	Spotted hake	0.1	Windowpane	0.1
				American shad	0.1	Rock gunnel	0.1	Tautog	0.1		
				Atlantic mackerel	0.1			Atalntic menhaden	0.1		
				Feather blenny	0.1			Blueback herring	0.1		
				Rock gunnel	0.1			Conger eel	0.1		
				Silver hake	0.1			Lined seahorse	0.1		
								Red hake	0.1		
								Smallmouth flounder	0.1		

Note Not all stations sampled each month, see sampling schedule for actual months and stations sampled

TABLE 4-4

Percent Composition of Finfish Species Collected at Channel Stations – All Areas Combined, October 1998 – September 1999

October		November		December		January	
Bay anchovy	58.3	American shad	67.0	White Perch	34.2		
Weakfish	27.9	Blueback herring	13.8	Striped bass	26.5		
Butterfish	3.6	Bay anchovy	7.4	Alewife	11.6		
Lookdown	2.6	Butterfish	7.4	American shad	8.4		
Winter flounder	1.8	Alewife	2.1	Bay anchovy	6.5		
Windowpane	1.4	Atlantic menhaden	1.1	Weakfish	3.6		
Bluefish	1.1	Weakfish	1.1	Winter flounder	3.3		
Other	3.4			Gizzard Shad	1.8		
				Smallmouth flounder	1.1		
				Other	2.9		
February		**March**		**April**		**May**	
White Perch	63.3	White Perch	37.3	Spotted hake	44.6	Spotted hake	30.5
Striped bass	13.5	Winter flounder	27.8	Winter flounder	18.2	Summer flounder	13.6
Silver hake	5.3	Striped bass	26.9	Striped bass	17.3	Windowpane	13.6
American shad	4.8	Spotted hake	1.9	Windowpane	9.3	Silver hake	11.9
Winter flounder	3.9	American shad	1.8	Alewife	4.1	Winter flounder	8.5
Spotted hake	2.9	Atlantic herring	1.5	Silver hake	2.6	Atlantic tomcod	3.4
Windowpane	1.9	Other	2.6	Other	4.0	Butterfish	3.4
Cunner	1.0					Cunner	3.4
Grubby	1.0					Little skate	3.4
Northern pipefish	1.0					Northern pipefish	3.4
Other	1.4					Tautog	3.4
						Scup	1.7
June		**July**		**August**		**September**	
Atlantic tomcod	25.9	Weakfish	75.4	Weakfish	53.3	Bay anchovy	24.7
Winter flounder	19.7	Atlantic silverside	6.5	Bay anchovy	22.9	American shad	21.9
Bay anchovy	18.8	Alewife	4.9	Butterfish	5.7	Blueback herring	20.5
Spotted hake	14.1	Bay anchovy	3.8	Scup	3.4	Atlantic moonfish	9.6
Summer flounder	6.4	Scup	2.2	Alewife	3.4	Scup	5.5
Windowpane	4.9	Summer flounder	1.8	Winter flounder	2.8	Weakfish	4.1
Weakfish	1.7	Winter flounder	1.4	Atlantic menhaden	1.8	Alewife	2.7
Striped searobin	1.1	Windowpane	1.1	Striped anchovy	1.6	Butterfish	1.4
Atlantic herring	1.0	Butterfish	1.0	Striped bass	1.0	Cunner	1.4
Northern searobin	1.0	Other	1.9	Other	4.2	Striped anchovy	1.4
Other	5.4					Striped searobin	1.4
						Summer flounder	1.4
						Tautog	1.4
						Windowpane	1.4
						Winter flounder	1.4

Note: Percent composition based on bottom trawl CPUE (10 min tow) Not all stations sampled each month, see sampling schedule for actual months and stations sampled
Channel Stations - HW-1 through HW-10, PJ-4, and SB-4

TABLE 4-5 (page 1 of 2)

Average Bottom Trawl CPUE (number per 10-minute tow) at Channel Stations – All Areas Combined, October 1998 – September 1999

October		November		December		January		February		March	
Bay anchovy	75.5	American shad	31.5	White Perch	9.4			White Perch	13.1	White Perch	54.3
Weakfish	36.1	Blueback herring	6.5	Striped bass	7.3			Striped bass	2.8	Winter flounder	40.5
Butterfish	4.7	Bay anchovy	3.5	Alewife	3.2			Silver hake	1.1	Striped bass	39.2
Lookdown	3.4	Butterfish	3.5	American shad	2.3			American shad	1.0	Spotted hake	2.8
Winter flounder	2.3	Alewife	1.0	Bay anchovy	1.8			Winter flounder	0.8	American shad	2.7
Windowpane	1.8	Atlantic menhaden	0.5	Weakfish	1.0			Spotted hake	0.6	Atlantic herring	2.2
Bluefish	1.4	Weakfish	0.5	Winter flounder	0.9			Windowpane	0.4	Grubby	1.2
Striped searobin	1.2			Gizzard Shad	0.5			Cunner	0.2	Windowpane	1.0
Scup	0.7			Smallmouth flounder	0.3			Grubby	0.2	Silver hake	0.7
Smallmouth flounder	0.6			Spotted hake	0.2			Northern pipefish	0.2	Alewife	0.3
Black sea bass	0.3			Windowpane	0.2			Alewife	0.1	Blueback herring	0.2
Summer flounder	0.3			Atlantic menhaden	0.1			Atlantic herring	0.1	Cunner	0.2
Atlantic menhaden	0.2			Atlantic silverside	0.1			Little skate	0.1	Gizzard Shad	0.2
Fourspot flounder	0.2			Butterfish	0.1					Red hake	0.2
Alewife	0.1			Striped searobin	0.1						
American eel	0.1										
American shad	0.1										
Cunner	0.1										
Hickory shad	0.1										
Little skate	0.1										
Northern kingfish	0.1										
Northern searobin	0.1										
Tautog	0.1										

TABLE 4-5 (page 2 of 2)

Average Bottom Trawl CPUE (number per 10-minute tow) at Channel Stations – All Areas Combined, October 1998 – September 1999

April		May		June		July		August		September	
Spotted hake	39.2	Spotted hake	9.0	Atlantic tomcod	17.3	Weakfish	292.0	Weakfish	84.6	Bay anchovy	6.0
Winter flounder	16.0	Summer flounder	4.0	Winter flounder	13.2	Atlantic silverside	25.3	Bay anchovy	36.4	American shad	5.3
Striped bass	15.2	Windowpane	4.0	Bay anchovy	12.6	Alewife	19.0	Butterfish	9.0	Blueback herring	5.0
Windowpane	8.2	Silver hake	3.5	Spotted hake	9.4	Bay anchovy	14.7	Scup	5.4	Atlantic moonfish	2.3
Alewife	3.6	Winter flounder	2.5	Summer flounder	4.3	Scup	8.3	Alewife	5.3	Scup	1.3
Silver hake	2.3	Atlantic tomcod	1.0	Windowpane	3.3	Summer flounder	7.0	Winter flounder	4.4	Weakfish	1.0
American shad	0.8	Butterfish	1.0	Weakfish	1.2	Winter flounder	5.3	Atlantic menhaden	2.8	Alewife	0.7
Grubby	0.7	Cunner	1.0	Striped searobin	0.8	Windowpane	4.3	Striped anchovy	2.5	Butterfish	0.3
Northern pipefish	0.6	Little skate	1.0	Atlantic herring	0.7	Butterfish	4.0	Striped bass	1.6	Cunner	0.3
Little skate	0.4	Northern pipefish	1.0	Northern searobin	0.7	Striped searobin	2.3	Striped searobin	1.5	Striped anchovy	0.3
Blueback herring	0.3	Tautog	1.0	Spot	0.6	Striped bass	1.7	Summer flounder	1.1	Striped searobin	0.3
White Perch	0.3	Scup	0.5	Cunner	0.5	American shad	1.0	Windowpane	1.0	Summer flounder	0.3
Cunner	0.2			Tautog	0.5	Atlantic tomcod	0.7	Grubby	0.5	Tautog	0.3
Atlantic tomcod	0.1			Grubby	0.3	Atlantic menhaden	0.3	Atlantic tomcod	0.4	Windowpane	0.3
Bay anchovy	0.1			American eel	0.3	Atlantic moonfish	0.3	Cunner	0.3	Winter flounder	0.3
Striped cusk-eel	0.1			Butterfish	0.3	Northern puffer	0.3	Northern pipefish	0.3		
Striped searobin	0.1			Oyster toadfish	0.3	Northern stargazer	0.3	American eel	0.2		
Summer flounder	0.1			Red hake	0.3	Oyster toadfish	0.3	American shad	0.2		
				Alewife	0.2			Atlantic moonfish	0.2		
				Black sea bass	0.1			Bluefish	0.2		
				Bluefish	0.1			Northern searobin	0.2		
				Feather blenny	0.1			Spotted hake	0.2		
				Rock gunnel	0.1			Atalntic menhaden	0.1		
				Silver hake	0.1			Black sea bass	0.1		
				Striped bass	0.1			Blueback herring	0.1		
								Conger eel	0.1		
								Inshore lizardfish	0.1		
								Lined seahorse	0.1		
								Red hake	0.1		
								Tautog	0.1		

Note Not all stations sampled each month, see sampling schedule for actual months and stations sampled. Channel Stations – HW-1 through HW-10, PJ-4, and SB-4

TABLE 4-6

Percent Composition of Finfish Species Collected at Shoal / Interpier Stations – All Areas Combined, October 1998 – September 1999

October		November		December		January	
Winter flounder	20.1	Striped bass	60.2	Winter flounder	25.0	Atlantic silverside	74.4
Black sea bass	14.0	Atlantic silverside	19.3	Smallmouth flounder	14.6	Atlantic herring	16.7
Bay anchovy	12.8	American shad	7.1	Bay anchovy	12.5	Striped bass	5.1
Striped bass	11.6	Blueback herring	6.7	Striped bass	10.4	Bay anchovy	1.3
Weakfish	9.1	Winter flounder	3.9	Butterfish	8.3	Windowpane	1.3
Northern kingfish	7.3	Weakfish	1.0	Weakfish	6.3	Winter flounder	1.3
Windowpane	4.3	Striped searobin	0.6	American shad	4.2		
Scup	3.7	Butterfish	0.4	Grubby	4.2		
Grubby	3.0	Red hake	0.4	Atlantic silverside	2.1		
Smallmouth flounder	3.0	Naked goby	0.2	Atlantic tomcod	2.1		
American sandlance	2.4	Smallmouth flounder	0.2	Black sea bass	2.1		
Striped searobin	2.4			Little skate	2.1		
Tautog	2.4			Silver hake	2.1		
Northern pipefish	1.2			Spotted hake	2.1		
Other	2.4			Windowpane	2.1		
February		**March**		**April**		**May**	
Atlantic silverside	68.3	Winter flounder	44.4	Striped bass	45.1	Atlantic tomcod	40.2
Winter flounder	9.8	Atlantic herring	27.8	Alewife	39.6	Bay anchovy	23.0
Atlantic menhaden	7.3	Atlantic silverside	11.1	Winter flounder	5.3	Blueback herring	15.0
American shad	4.9	Silver hake	11.1	Spotted hake	4.1	Atlantic herring	9.4
Cunner	4.9	Alewife	5.6	American shad	1.6	Summer flounder	3.7
Alewife	2.4			Blueback herring	1.4	Spotted hake	2.5
Windowpane	2.4			Silver hake	1.2	Pollock	1.5
				Windowpane	1.1	Winter flounder	1.5
				Other	0.6	Other	3.2
June		**July**		**August**		**September**	
Bay anchovy	52.7	Striped bass	47.2	Bay anchovy	70.2	Bay anchovy	77.8
Winter flounder	15.8	Weakfish	30.5	Striped bass	9.8	Scup	5.7
Windowpane	7.3	Atlantic silverside	6.5	Weakfish	4.8	Alewife	3.6
Atlantic tomcod	6.1	Alewife	4.2	Scup	3.1	Butterfish	3.2
Summer flounder	5.9	Butterfish	3.3	Striped searobin	3.1	Striped anchovy	3.0
Atlantic herring	2.6	Bay anchovy	2.9	Alewife	2.8	Weakfish	2.5
Blueback herring	2.6	Scup	2.0	Butterfish	2.1	Other	4.2
Scup	1.2	Striped searobin	1.6	Other	4.0		
Weakfish	1.2	Other	1.8				
Other	4.5						

Note: Percent composition based on bottom trawl CPUE (10 min tow) Not all stations sampled each month, see sampling schedule for actual months and stations sampled
Shoal / Interpier Stations – PJ-1 through PJ-3, PJ-5 and PJ-6, and SB-1 through SB-3

TABLE 4-7 (page 1 of 2)

Monthly Average Bottom Trawl CPUE (number per 10-minute tow) at Shoal / Interpier Stations – All Areas Combined, October 1998 – September 1999

October		November		December		January		February		March	
Winter flounder	4.7	Striped bass	43.7	Winter flounder	1.7	Atlantic silverside	8.3	Atlantic silverside	3.5	Winter flounder	1.0
Black sea bass	3.3	Atlantic silverside	14.0	Smallmouth flounder	1.0	Atlantic herring	1.9	Winter flounder	0.5	Atlantic herring	0.6
Bay anchovy	3.0	American shad	5.1	Bay anchovy	0.9	Striped bass	0.6	Atlantic menhaden	0.4	Atlantic silverside	0.3
Striped bass	2.7	Blueback herring	4.9	Striped bass	0.7	Bay anchovy	0.1	American shad	0.3	Silver hake	0.3
Weakfish	2.1	Winter flounder	2.9	Butterfish	0.6	Windowpane	0.1	Cunner	0.3	Alewife	0.1
Northern kingfish	1.7	Weakfish	0.7	Weakfish	0.4	Winter flounder	0.1	Alewife	0.1		
Windowpane	1.0	Striped searobin	0.4	American shad	0.3			Windowpane	0.1		
Scup	0.9	Butterfish	0.3	Grubby	0.3						
Grubby	0.7	Red hake	0.3	Atlantic silverside	0.1						
Smallmouth flounder	0.7	Naked goby	0.1	Atlantic tomcod	0.1						
American sandlance	0.6	Smallmouth flounder	0.1	Black sea bass	0.1						
Striped searobin	0.6			Little skate	0.1						
Tautog	0.6			Silver hake	0.1						
Northern pipefish	0.3			Spotted hake	0.1						
American shad	0.1			Windowpane	0.1						
Atlantic silverside	0.1										
Butterfish	0.1										
Fourspot flounder	0.1										

TABLE 4-8

Rank of the Most Common Ichthyoplankton Species Collected in Recent Studies

Source	Current Study	LMS (1996)	NOAA (1995)	Versar (1989)
Year(s)	1998-1999	1995-1996	1993-1994	1986
Weakfish	1	3	NC	8
Tautog	2	2	6	2
Atlantic menhaden	3	NC	10	NC
Bay anchovy	4	1	1	1
Fourspot flounder	5	NC	9	NC
Hogchoker	6	NC	8	NC
Winter flounder	7	7	3	5
Fourbeard rockling	8	NC	NC	NC
Sculpins	9	8	4	NC
Windowpane	10	NC	10	NC

Note: NC – Not collected.

TABLE 4-9

Average Ichthyoplankton Density (no./ 1000 cubic meters) in the Study Area – All Stations Combined, February – June 1999

Lifestage: Egg

February		March		April		May		June	
Fourbeard rockling	< 1	Fourbeard rockling	114	Atlantic menhaden	1409	Weakfish	2401	Weakfish	1698
		Winter flounder	73	Winter flounder	117	Tautog	1938	Tautog	792
		Sculpins	44	Fourbeard rockling	106	Fourspot flounder	525	Bay anchovy	640
		Atlantic menhaden	8			Bay anchovy	459	Hogchoker	277
		Pollock	1			Hogchoker	336	Fourspot flounder	117
						Atlantic menhaden	150	Unidentified	1

Lifestage: Yolk-sac larvae

February		March		April		May		June	
Sculpins	4	Sculpins	16	Sculpins	11	Atlantic menhaden	21		
Winter flounder	1	Winter flounder	4	Winter flounder	1				

Lifestage: Post yolk-sac larvae

February		March		April		May		June	
American sand lance	5	Sculpins	50	Winter flounder	157	Atlantic menhaden	204	Atlantic menhaden	291
Atlantic herring	4	Atlantic herring	5	Sculpins	30	Windowpane	25	Bay anchovy	82
Sculpins	2	Winter flounder	1			Winter flounder	5	Weakfish	39
		American sand lance	1			Tautog	< 1	Gobiidae	14
						Northern pipefish	< 1	Unidentified	8
								Northern pipefish	7
								Windowpane	5
								Searobins	1
								Northern puffer	1
								Tautog	< 1
								Goosefish	< 1

Lifestage: Juvenile

February		March		April		May		June	
						Atlantic tomcod	1	Northern pipefish	4
						Windowpane	< 1	Winter flounder	< 1

Notes: All samples collected with epibenthic sled. Not all stations sampled each month, see sampling schedule for actual months and stations sampled.

TABLE 4-10

Average Ichthyoplankton Density (no./ 1000 cubic meters) at Channel Stations – All Areas Combined, February – June 1999

Lifestage: Egg

February		March		April		May		June	
		Fourbeard rockling	113	Atlantic menhaden	1470	Weakfish	2464	Weakfish	1706
		Winter flounder	75	Winter flounder	123	Tautog	1970	Tautog	777
		Sculpins	26	Fourbeard rockling	111	Fourspot flounder	548	Bay anchovy	660
		Atlantic menhaden	8			Bay anchovy	466	Hogchoker	285
		Pollock	2			Hogchoker	354	Fourspot flounder	118
						Atlantic menhaden	99	Unidentified	1

Lifestage: Yolk-sac larvae

February		March		April		May		June	
Sculpins	4	Sculpins	16	Sculpins	9	Atlantic menhaden	16		
Winter flounder	1	Winter flounder	5	Winter flounder	1				

Lifestage: Post yolk-sac larvae

February		March		April		May		June	
American sand lance	5	Sculpins	51	Winter flounder	125	Atlantic menhaden	165	Atlantic menhaden	284
Atlantic herring	5	Atlantic herring	5	Sculpins	28	Windowpane	24	Bay anchovy	86
Sculpins	3	Winter flounder	1			Winter flounder	5	Weakfish	41
		American sand lance	1			Tautog	< 1	Gobiidae	15
						Northern pipefish	< 1	Unidentified	8
								Northern pipefish	7
								Windowpane	5
								Searobins	1
								Northern puffer	1
								Tautog	< 1
								Goosefish	< 1

Lifestage: Juvenile

February		March		April		May		June	
						Atlantic tomcod	1	Northern pipefish	4
						Windowpane	< 1	Winter flounder	< 1

Notes: All samples collected with epibenthic sled. Not all stations sampled each month, see sampling schedule for actual months and stations sampled.
Channel Stations – HW-1 through HW-10, PJ-4, and SB-4

TABLE 4-11

Average Ichthyoplankton Density (no./ 1000 cubic meters) at Shoal/ Interpier Stations – All Areas Combined, February – June 1999

Lifestage: Egg

February		March		April		May		June	
Fourbeard rockling	1	Fourbeard rockling	152	Atlantic menhaden	2008	Tautog	3291	Weakfish	2626
		Winter flounder	55	Winter flounder	250	Weakfish	3285	Bay anchovy	868
		Sculpins	47	Fourbeard rockling	202	Fourspot flounder	935	Tautog	832
		Atlantic menhaden	9			Bay anchovy	757	Hogchoker	382
		Pollock	1			Atlantic menhaden	288	Fourspot flounder	170
						Hogchoker	48	Unidentified	3

Lifestage: Yolk-sac larvae

February		March		April		May		June	
Sculpins	4	Sculpins	17	Sculpins	16	Atlantic menhaden	40		
Winter flounder	1	Winter flounder	1	Winter flounder	3				

Lifestage: Post yolk-sac larvae

February		March		April		May		June	
American sand lance	4	Sculpins	52	Winter flounder	158	Atlantic menhaden	414	Atlantic menhaden	235
Atlantic herring	4	Atlantic herring	4	Sculpins	37	Windowpane	19	Bay anchovy	68
Sculpins	1	Winter flounder	1			Winter flounder	3	Gobiidae	15
						Tautog	1	Unidentified	15
								Northern pipefish	9
								Weakfish	8
								Northern puffer	1
								Tautog	1

Lifestage: Juvenile

February		March		April		May		June	
						Atlantic tomcod	1	Northern pipefish	3
						Windowpane	1		

Notes: All samples collected with epibenthic sled. Not all stations sampled each month, see sampling schedule for actual months and stations sampled.
Shoal/ Interpier Stations – PJ-1 through 3, PJ-5 and 6, and SB-1 through 3

TABLE 4-12 (page 1 of 4)

Average Benthic Invertebrate Densities (number / 0.1 m^2) Collected at Channel Stations Among Sample Areas, November 1998 - September 1999

Taxonomic Listing	LH	UH	RH	KVK	NB	AK	SB	PJ	Total	%
CNIDARIA										
ANTHOZOA										
ACTINIARIANS			0.2	0.5		0.1			0.8	<0.1
ASCHELMINTHES										
NEMATODES	0.8		0.2						1.0	<0.1
PLATYHELMINTHES		0.1	0.5						0.6	<0.1
RHYNCHOCOELA										
NEMERTEANS	0.5	0.1	0.5		<0.1	0.9			2.0	0.2
ANNELIDA										
OLIGOCHAETES		1.2	3.2		<0.1	1.2	0.2	0.2	6.0	0.6
POLYCHAETES										
Ampharetidae	2.2	5.5	5.2		25.2	5.0	1.8		44.9	4.3
Capitellidae	0.2					0.1			0.3	<0.1
Cirratulidae		0.2	0.2			0.2			0.6	<0.1
Pherusa sp.	0.2	0.1	0.2						0.5	<0.1
Glycera sp.	0.8	2.2	4.5	3.8	2.2	0.4	0.8		14.7	1.4
Lumbrinereidae	0.2								0.2	<0.1
Magelona rosea	1.2	0.1							1.3	0.1
Nephtys sp.	7.0	6.2	2.0	6.0	0.5	0.4	4.8	2.0	28.9	2.8
Nereis sp.	0.8		0.8	2.8	0.4	0.2	0.2	0.2	5.4	0.5
Diopatra cuprea		0.2			0.7	0.6			1.5	0.1
Orbiniidae		0.4	4.5	0.2	4.3	0.8			10.2	1.0
Haploscoloplos robustus					0.2				0.2	<0.1
Leitoscoloplos fragilis		1.7	9.8		8.2	4.5	0.2	0.8	25.2	2.4
Paraonidae	0.5	1.8	4.2	3.0	0.5	1.0			11.0	1.1
Aricidea sp.	0.5								0.5	<0.1
Pectinaria gouldii		3.4	3.0	0.2	2.3	0.4	1.2	0.2	10.7	1.0
Phyllodocidae	1.8	0.8	1.5	7.2	0.9	1.6			13.8	1.3
Sabellidae			0.2						0.2	<0.1
Polynoidae		0.2	0.2						0.4	<0.1
Harmothoe sp.	0.5								0.5	<0.1
Lepidametria commensalis	0.2								0.2	<0.1
Lepidonotus sp.	0.2	0.1							0.3	<0.1

TABLE 4-12 (page 2 of 4)

Average Benthic Invertebrate Densities (number / 0.1 m^2) Collected at Channel Stations Among Sample Areas, November 1998 - September 1999

Taxonomic Listing	LH	UH	RH	KVK	NB	AK	SB	PJ	Total	%
ANNELIDA (cont.)										
Lepidonotus squamatus			0.2	0.2					0.4	<0.1
Sigalionidae	0.2								0.2	<0.1
Sabellariadae						0.1			0.1	<0.1
Sabellaria vulgaris				0.5	0.3	0.4			1.2	0.1
Spionidae	3.8	0.8	0.2		<0.1	1.1			5.9	0.6
Streblospio benedicti	2.0	5.9	27.8	37.5	6.2	21.5	0.5	0.2	101.6	9.8
Polydora ligni	0.2	0.5	0.5			0.6	0.2		2.0	0.2
Scolecolepides viridis		0.2	0.2	138.8		0.1			139.3	13.5
Spiophanes bombyx		0.1							0.1	>0.1
Syllidae	2.0	0.4		1.0	0.7		0.2		4.3	0.4
ARTHROPODA										
AMPHIPODS										
Caprellidae		0.1							0.1	<0.1
Gammaridea	1.2	1.1	3.8	6.2	0.8	0.1			13.2	1.3
Ampelisca abdita		3.1	13.8		2.1	0.6	0.8		20.4	2.0
Unciola sp.		0.1							0.1	<0.1
Unciola dissimilis		0.1							0.1	<0.1
Corophium sp.	0.2	0.6	0.5		0.2	0.2			1.7	0.2
Erichthonius braziliensis		0.2							0.2	<0.1
Gammarus sp.	0.5	0.2	0.2		1.7	0.1			2.7	0.3
Melitidae		0.1							0.1	<0.1
Melita sp.	0.5	0.5	2.0		0.5		0.2		3.7	0.4
Paraphoxus spinosus		0.1							0.1	<0.1
Phoxocephalus holbolli	0.8								0.8	<0.1
Protohaustorius sp.	1.0								1.0	<0.1
Trichophoxus epistomus		0.2							0.2	<0.1
CUMACIDS					0.2				0.2	<0.1
Diastylis quadrispinosa		0.4	0.2	0.2	0.7	0.1			1.6	0.2
Leucon americanus		0.1			4.0	8.8			12.9	1.2
DECAPODS										
Pagurus sp.	3.0	0.4							3.4	0.3

TABLE 4-12 (page 3 of 4)

Average Benthic Invertebrate Densities (number / 0.1 m^2) Collected at Channel Stations Among Sample Areas, November 1998 – September 1999

Taxonomic Listing	LH	UH	RH	KVK	NB	AK	SB	PJ	Total	%
ARTHROPODA (cont.)										
Pinnixa sayana		0.1							0.1	<0.1
Libinia sp.			0.5						0.5	<0.1
Callinectes sapidus					<0.1				<0.1	<0.1
Ovalipes ocellatus	0.2	0.1							0.3	<0.1
Cancer sp.		0.1							0.1	<0.1
Cancer irroratus	0.5								0.5	<0.1
Xanthidae		0.2	0.2						0.4	<0.1
Hexapanopeus angustifrons		0.1							0.1	<0.1
Crangon septemspinosa	0.2	0.1	0.2	0.5	<0.1		0.2		1.2	0.1
Upogebiidae					<0.1				<0.1	<0.1
MYSIDS										
Neomysis americana						0.1			0.1	<0.1
ECHINOIDS										
Strongylocentrotidae	5.5								5.5	0.5
ISOPODS										
Cyathura polita				1.8					1.8	0.2
Idoteidae					<0.1				<0.1	<0.1
Idotea baltica		0.1							0.1	<0.1
Idotea metallica					0.2	0.1			0.3	<0.1
Edotea triloba		0.8	2.0	0.2	0.8		0.2		4.0	0.4
OSTRACODS		0.4	0.8		0.2			0.2	1.6	0.2
MOLLUSCA										
BIVALVES	0.2			1.5			0.5		2.2	0.2
Lyonsia hyalina		0.5	1.0		1.3		0.2		3.0	0.3
Mulinia lateralis	1.2	105.0	61.0	1.2	22.6	2.6	202.8	9.2	405.6	39.2
Mya arenaria	0.5	1.4	0.5	1.0	2.3	1.5	0.5	0.5	8.2	0.8
Mytilidae		0.1	0.2						0.3	<0.1
Mytilus edulis	0.5	11.6	3.5	0.2	0.7				16.5	1.6
Yoldia sp.					0.3		1.0		1.3	0.1
Solenidae	0.2								0.2	<0.1
Ensis directus	0.2	0.2							0.4	<0.1
Siliqua costata	1.0	0.1							1.1	0.1

TABLE 4-12 (page 4 of 4)

Average Benthic Invertebrate Densities (number / 0.1 m^2) Collected at Channel Stations Among Sample Areas, November 1998 – September 1999

Taxonomic Listing	LH	UH	RH	KVK	NB	AK	SB	PJ	Total	%
MOLLUSCA (cont.)										
Solen viridis		0.5	0.2						0.7	<0.1
Tellinidae						0.1			0.1	<0.1
Tellina sp.	8.5	19.5	16.0	4.0	3.2	0.4	1.8	0.2	53.6	5.2
Mercenaria mercenaria	0.5	1.0	0.5		0.2				2.2	0.2
GASTROPODS		0.2							0.2	<0.1
Crepidula fornicata	0.2	1.2	1.0		0.2				2.6	0.3
Crepidula plana	0.8	1.1	1.5		0.2				3.6	0.3
Lacuna vincta		0.4			0.2	0.1	1.2	3.2	5.1	0.5
Ilyanassa trivittata	1.0	1.2	1.8				0.2	0.5	4.7	0.5
Acteocina canaliculata		1.0	1.0		0.6		1.2	2.8	6.6	0.6
CHORDATA										
Molgula manhattensis		0.1	0.2		0.2	0.2			0.7	<0.1
TOTAL	54.2	186.6	182.4	218.5	96.0	56.2	220.9	20.2	1035.0	

Notes:
1. Average density is the station average of monthly replicates.
2. Months sampled: November (HW-9 & HW-10 not sampled),, February (HW-9 & HW-10 not sampled), May, and August.
3. Sample Areas: LH – Ambrose Channel (HW-1), UH – Anchorage Channel (HW-2, HW-4), RH – Red Hook (HW-3), KVK – Kill Van Kull (HW-5), NB – Newark Bay (HW-8, HW-9, HW-10), AK – Arthur Kill (HW-6, HW-7), SB – South Brooklyn (SB-4), PJ – Port Jersey (PJ-4)
4. Organisms that appear at family level, or higher, were identified to the lowest possible taxon.

TABLE 4-13 (page 1 of 3) Average Benthic Invertebrate Densities (number / 0.1 m^3) Collected at Interpier / Shoal Areas, November 1998 – September 1999				
Taxonomic Listing	**SB**	**PJ**	**Total**	**%**
ASCHELMINTHES				
NEMATODES		<0.1	<0.1	<0.1
PLATYHELMINTHES		<0.1	<0.1	<0.1
RHYNCHOCOELA				
NEMERTEANS		<0.1	<0.1	<0.1
ANNELIDA				
OLIGOCHAETES	3.6	3.4	7.0	3.3
POLYCHAETES				
Ampharetidae	<0.1	0.8	0.8	0.4
Capitellidae	1.3		1.3	0.6
Flabelligeridae	<0.1		<0.1	<0.1
Pherusa sp.		<0.1	<0.1	<0.1
Glycera sp.	0.3	4.0	4.3	2.0
Maldanidae	<0.1		<0.1	<0.1
Nephtys sp.	0.8	1.2	2.0	0.9
Nereis sp.	4.0	5.6	9.6	4.5
Diopatra cuprea	0.1	0.1	0.2	<0.1
Orbiniidae	0.7	3.2	3.9	1.8
Leitoscoloplos fragilis	2.5	11.0	13.5	6.4
Paraonidae	<0.1	7.8	7.8	3.7
Pectinaria gouldii		1.4	1.4	0.7
Phyllodocidae	0.5	4.0	4.5	2.1
Harmothoe sp.		<0.1	<0.1	<0.1
Lepidonotus squamatus		0.1	0.1	<0.1
Sabellaria vulgaris		<0.1	<0.1	<0.1
Sabellidae		0.3	0.3	0.1
Sabella sp.	0.1		0.1	<0.1
Spionidae		0.1	0.1	<0.1
Streblospio benedicti	13.1	27.8	40.9	19.3
Polydora ligni	<0.1	0.3	0.3	0.1
Scolecolepides viridis	0.3		0.3	0.1
Syllidae		0.9	0.9	0.4
ARTHROPODA				
AMPHIPODS				
Caprellidea		<0.1	<0.1	<0.1
Caprellidae		<0.1	<0.1	<0.1
Gammaridea	<0.1	2.5	2.5	1.2
Ampelisca abdita	0.3	2.6	3.9	1.8
Aoridae		0.1	0.1	<0.1
Unciola sp.		<0.1	<0.1	<0.1
Unciola irrorata		0.3	0.3	0.1

TABLE 4-13 (page 2 of 3)
Average Benthic Invertebrate Densities (number / 0.1 m^2) Collected at Interpier / Shoal Areas, November 1998 – September 1999

Taxonomic Listing	SB	PJ	Total	%
ARTHROPODA (cont.)				
Corophiidae	<0.1	<0.1	<0.1	<0.1
Corophium sp.		0.3	0.3	0.1
Erichthonius rubricornis		0.1	0.1	<0.1
Gammarus sp.	0.3	0.3	0.6	0.3
Melitidae		0.4	0.4	0.2
Melita sp.		0.8	0.8	0.4
Paraphoxus spinosus		<0.1	<0.1	<0.1
Phoxocephalidae		<0.1	<0.1	<0.1
Trichophoxus epistomus		0.1	0.1	<0.1
CUMACIDS		<0.1	<0.1	<0.1
Diastylis quadrispinosa		0.6	0.6	0.3
Leucon americanus	0.2	0.1	0.3	0.1
DECAPODS				
Pagurus sp.	<0.1	<0.1	<0.1	<0.1
Brachyura	<0.1		<0.1	<0.1
Callinectes sapidus		<0.1	<0.1	<0.1
Libinia emarginata		<0.1	<0.1	<0.1
Xanthidae		0.5	0.5	0.2
Dyspanopeus sayi	<0.1	0.1	0.1	<0.1
Panopeus herbstii		<0.1	<0.1	<0.1
Crangon septemspinosa		0.1	0.1	<0.1
Upogebia affinis	0.1	<0.1	0.1	<0.1
ECHINOIDS				
Strongylocentrotidae	<0.1		<0.1	<0.1
ISOPODS				
Edotea triloba		0.3	0.3	0.1
Cyathura polita		1.0	1.0	0.5
OSTRACODS	<0.1	0.4	0.4	0.2
MOLLUSCA				
BIVALVES				
Anomia simplex		<0.1	<0.1	<0.1
Astarte sp.		<0.1	<0.1	<0.1
Lyonsia hyalina		0.8	0.8	0.4
Mulinia lateralis	2.4	43.2	45.6	21.6
Mya arenaria	0.3	1.5	1.8	0.9
Mytilidae	<0.1	0.2	0.2	<0.1
Mytilus edulis		23.9	23.9	11.3
Yoldia sp.		0.1	0.1	<0.1
Solenidae		<0.1	<0.1	<0.1
Ensis directus		<0.1	<0.1	<0.1
Solen viridis		0.1	0.1	<0.1

TABLE 4-13 (page 3 of 3)
Average Benthic Invertebrate Densities (number / 0.1 m^2) Collected at Interpier / Shoal Areas, November 1998 – September 1999

Taxonomic Listing	SB	PJ	Total	%
MOLLUSCA (cont.)				
Tellina sp.	0.1	4.0	4.1	1.9
Gemma gemma		0.4	0.4	0.2
Mercenaria mercenaria		0.5	0.5	0.2
GASTROPODS				
Haminoea solitaria		0.5	0.5	0.2
Crepidula fornicata		3.5	3.5	1.7
Crepidula plana	0.2	4.5	4.7	2.2
Lacuna vincta	0.4	2.6	3.0	1.4
Ilyanassa obsoleta	0.3		0.3	0.1
Ilyanassa trivittata	0.2	0.4	0.6	0.3
Acteocina canaliculata	0.5	2.7	3.2	1.5
NUDIBRANCHS		<0.1	<0.1	<0.1
CHORDATA				
Molgula manhattensis		6.3	6.3	3.0
TOTAL	33.6	177.4	211.4	

Notes:
1. Average density is the station average of monthly replicates.
2. Months sampled: November (PJ-6 not sampled), February, May, and August.
3. Sample Areas: South Brooklyn (SB-1, SB-2, SB-3), Port Jersey (PJ-1, PJ-2, PJ-3, PJ-5, PJ-6)
4. Organisms that appear at family level, or higher, were identified to the lowest possible taxon.

TABLE 4-14 (page 1 of 2)

Average Macroinvertebrate Densities (number / 0.1 m^2) Collected at Channel Stations
November 1998, February 1999, May 1999, August 1999

Taxonomic Listing	LH	UH	RH	KVK	NB	AK	SB	PJ	Total	%
Bivalves	0.2			1.5			0.5		2.2	0.4
Lyonsia hyalina		0.5	1.0		1.3		0.2		3.0	0.6
Mulinia lateralis	1.2	105.0	61.0	1.2	22.6	2.6	202.8	9.2	405.6	75.8
Mya arenaria	0.5	1.4	0.5	1.0	2.5	1.5	0.5	0.5	8.4	1.6
Mytilidae		0.1	0.2						0.3	<0.1
Mytilus edulis	0.5	11.6	3.5	0.2	0.7				16.5	3.1
Yoldia sp.					0.3		1.0		1.3	0.2
Solenidae	0.2								0.2	<0.1
Ensis directus	0.2	0.2							0.4	<0.1
Siliqua costata	1.0	0.1							1.1	0.2
Solen viridis		0.5	0.2						0.7	0.1
Tellinidae						0.1			0.1	<0.1
Tellina sp.	8.5	19.5	16.0	4.0	3.2	0.4	1.5	0.2	53.3	10.0
Mercenaria mercenaria	0.5	1.0	0.5		0.2				2.2	0.4
Gastropods		0.2							0.2	<0.1
Crepidula fornicata	0.2	1.2	1.0		0.2				2.6	0.5
Crepidula plana	0.8	1.1	1.5		0.2				3.6	0.7
Ilyanassa trivittata	1.0	1.2	1.8				0.2	0.5	4.7	0.9
Arthropods										
Gammaridea	1.2	1.1	3.8	6.2	0.8	0.1			13.2	2.5
Gammarus sp.	0.5	0.2	0.2		1.7	0.1			2.7	0.5
Melitidae		0.1							0.1	<0.1
Melita sp.	0.5	0.5							1.0	0.2
Pagurus sp.	3.0	0.4							3.4	0.6
Brachyura					0.2				0.2	<0.1
Libinia sp.			0.5						0.5	<0.1
Callinectes sapidus					<0.1				<0.1	<0.1
Ovalipes ocellatus	0.2	0.1							0.3	<0.1
Crangon septemspinosa	0.2	0.1	0.2	0.5	<0.1				1.0	0.2
Upogebiidae					<0.1				<0.1	<0.1
Neomysis americana						0.1			0.1	<0.1

TABLE 4-14 (page 2 of 2)

Average Macroinvertebrate Densities (number / 0.1 m^2) Collected at Channel Stations
November 1998, February 1999, May 1999, August 1999

Taxonomic Listing	LH	UH	RH	KVK	NB	AK	SB	PJ	Total	%
Echinoderms										
Strongylocentrotidae	5.5								5.5	1.0
Chordates										
Molgula manhattensis			0.2		0.3	0.2			0.7	0.4
TOTAL	25.9	146.1	92.1	14.6	34.2	5.1	206.7	10.4	535.1	

Notes:
1. Average density is the station average of monthly replicates.
2. Months sampled: November (HW-9 & HW-10 not sampled),, February (HW-9 & HW-10 not sampled), May, and August.
3. Sample Areas: LH – Ambrose Channel (HW-1), UH – Anchorage Channel (HW-2, HW-4), RH – Red Hook (HW-3), KVK – Kill Van Kull (HW-5), NB – Newark Bay (HW-8, HW-9, HW-10), AK – Arthur Kill (HW-6, HW-7), SB – South Brooklyn (SB-4), PJ – Port Jersey (PJ-4)
4. Organisms that appear at family level, or higher, were identified to the lowest possible taxon.

TABLE 4-15

Average Macroinvertebrate Densities (number / 0.1 m^2) Collected at Shoal Stations November 1998, February 1999, May 1999, August 1999

Taxonomic Listing	SB	PJ	Total	%
Bivalves				
Anomia simplex		<0.1	<.1	<0.1
Astarte sp.		<0.1	<.1	<0.1
Lyonsia hyalina		0.8	0.8	0.9
Mulinia lateralis	2.4	43.2	45.6	49.3
Mya arenaria	0.2	1.5	1.7	1.8
Mytilidae	0.1	0.2	1.3	1.4
Mytilus edulis		23.9	23.9	25.8
Solenidae		<0.1	<0.1	<0.1
Ensis directus		<0.1	<0.1	<0.1
Solen viridis		0.1	0.1	0.1
Tellina sp.	0.1	4.0	4.1	4.4
Gemma gemma		0.4	0.4	0.4
Mercenaria mercenaria		0.5	0.5	0.5
Gastropods				
Haminoea solitaria		0.5	0.5	0.5
Crepidula fornicata		4.0	4.0	4.3
Crepidula plana	0.2	4.5	4.7	5.1
Ilyanassa obsoleta	0.3		0.3	0.3
Ilyanassa trivittata	0.2	0.2	0.4	0.4
Arthropods				
Gammaridea	0.1	2.4	2.5	2.7
Gammarus sp.	0.3	0.3	0.6	0.6
Pagurus sp.		<0.1	<0.1	<0.1
Brachyura	0.1		0.1	0.1
Callinectes sapidus		<0.1	<0.1	<0.1
Xanthidae		0.5	0.5	0.5
Dyspanopeus sayi	0.1	0.1	0.2	0.2
Panopeus herbstii		<0.1	<0.1	<0.1
Crangon septemspinosa		0.1	0.1	0.1
Neomysis americana		0.2	0.2	0.2
Upogebia affinis	0.1	<0.1	0.1	0.1
Nudibranchs		<0.1	<0.1	<0.1
TOTAL	4.2	87.4	91.6	

Notes:
1. Average density is the station average of monthly replicates.
2. Months sampled: November, February, May, and August.
3. Sample Areas: South Brooklyn (SB-1, SB-2, SB-3), Port Jersey (PJ-1, PJ-2, PJ-3, PJ-5, PJ-6)
4. Organisms that appear at family level, or higher, were identified to the lowest possible taxon.

TABLE 4-16 (page 1 of 2)
Average Benthic Invertebrate Densities (number / 0.1 m^2) Collected at Shallow-water (< 20 ft MLW) Stations, November 1998 – September 1999

Species	PJ-1	PJ-3	PJ-5	Total	%
ASCHELMINTHES					
NEMATODES	0.2			0.2	<0.1
PLATEHELMINTHES	0.2			0.2	<0.1
ANNELIDA					
OLIGOCHAETES	12.0	0.5	0.2	12.7	2.6
POLYCHAETES					
Ampharetidae	1.5	0.5	0.2	2.2	0.4
Glycera sp.	9.5	5.0	0.5	15.0	3.0
Nephtys sp.		0.5	1.8	2.3	0.5
Nereis sp.	26.0	0.5		26.5	5.3
Diopatra cuprea	0.2			0.2	<0.1
Orbiniidae	3.8	10.3	0.5	14.6	2.9
Leitoscoloplos fragilis	13.0	37.8	2.0	52.8	10.6
Paraonidae	37.5	0.2		37.7	7.8
Pectinaria gouldii	2.8			2.8	0.6
Phyllodocidae	17.5	0.5		18.0	3.6
Lepidonotus squamatus	0.5			0.5	0.1
Sabellidae	1.2			1.2	0.2
Spionidae	0.2			0.2	<0.1
Streblospio benedicti	121.5	2.0	1.8	125.3	25.2
Polydora ligni	0.5		0.2	0.7	0.1
Syllidae	1.0			1.0	0.2
ARTHROPODA					
AMPHIPODS					
Caprellidea		0.2		0.2	<0.1
Caprellidae	0.2			0.2	<0.1
Gammaridea	8.2			8.2	1.6
Ampelisca abdita	3.5	1.0	0.8	5.3	1.1
Aoridae	0.5			0.5	0.1
Unciola irrorata	1.5			1.5	0.3
Corophium sp.	0.8	0.2		1.0	0.2
Gammarus sp.	1.5		0.2	1.7	0.3
Melitidae	1.8			1.8	0.4
Melita sp.	3.5			3.5	0.7
Paraphoxus spinosus	0.2			0.2	<0.1
Phoxocephalidae	0.2			0.2	<0.1
Trichophoxus epistomus	0.5			0.5	0.1
CUMACIDS	0.2			0.2	<0.1
Diastylis quadrispinosa	1.5	0.2		1.7	0.3
DECAPODS					
Callinectes sapidus	0.2			0.2	<0.1
Libinia emarginata	0.2			0.2	<0.1
Xanthidae	2.5			2.5	0.5
Panopeus herbstii	0.2			0.2	<0.1
Dispanopeus sayi	0.2			0.2	<0.1

TABLE 4-16 (page 2 of 2)
Average Benthic Invertebrate Densities (number / 0.1 m^2) Collected at Shallow-water (< 20 ft MLW) Stations, November 1998 – September 1999

Species	PJ-1	PJ-3	PJ-5	Total	%
ARTHROPODA (cont.)					
Crangon septemspinosa	0.2	0.5		0.7	0.1
ISOPODS					
Cyathura polita	4.8			4.8	1.0
MYSIDS					
Neomysis americana	1.0			1.0	0.2
OSTRACODS	0.8			0.8	0.2
MOLLUSCA					
BIVALVES					
Anomia simplex	0.2			0.2	<0.1
Astarte sp.		0.2		0.2	<0.1
Lyonsia hyalina	1.8		0.2	2.0	0.4
Mulinia lateralis	4.8	27.5	11.8	44.1	8.9
Mya arenaria	3.8	0.5		4.3	0.9
Mytilidae	1.2			1.2	0.2
Mytilus edulis	0.2			0.2	<0.1
Yoldia sp.	0.5			0.5	0.1
Solen viridis	0.5			0.5	0.1
Tellina sp.	8.2	0.5	0.2	8.9	1.8
Mercenaria mercenaria	2.0	0.2		2.2	0.4
GASTROPODS					
Haminoea solitaria		2.5		2.5	0.5
Crepidula fornicata	14.5			14.5	2.9
Crepidula plana	17.5			17.5	3.5
Lacuna vincta		8.8	2.8	11.6	2.3
Ilyanassa trivittata		0.2		0.2	<0.1
Acteocina canaliculata	0.2	2.8	2.2	5.2	1.0
NUDIBRANCHS			0.2	0.2	<0.1
CHORDATA					
Molgula manhattensis	30.5			30.5	6.1
TOTAL	369.2	103.1	25.6	497.9	100.0

Notes: 1. Average density is the station average of monthly replicates.
2. Months sampled: November, February, May, and August.
3. Organisms that appear at family level, or higher, were identified to the lowest possible taxon.

TABLE 4-17 (page 1 of 3)
Average Benthic Invertebrate Densities (number / 0.1 m^2) Collected at 30 – 40 ft (MLW) Stations, November 1998 – September 1999

Species	SB-4	PJ-4	HW-3	HW-5	HW-6	HW-7	HW-8	HW-9	HW-10	Total	%
CNIDARIA											
ANTHOZOA											
ACTINIARIANS			0.2	0.5		0.2				0.9	<0.1
ASCHELMINTHES											
NEMATODES			0.2							0.2	<0.1
PLATYHELMINTHES			0.5							0.5	<0.1
RHYNCHOCOELA											
NEMERTEANS			0.5		0.8	1.0	0.2			2.5	0.2
ANNELIDA											
OLIGOCHAETES	0.2	0.2	3.2		0.8	1.5	0.2			6.1	0.6
POLYCHAETES											
Ampharetidae	1.8		5.2		7.8	2.2	11.0	40.5	24.0	92.5	8.9
Capitellidae					0.2					0.2	<0.1
Cirratulidae			0.2		0.2	0.2				0.6	<0.1
Pherusa sp.			0.2							0.2	<0.1
Glycera sp.	0.8		4.5	3.8	0.5	0.2	1.2	4.0	1.5	16.5	1.6
Nephtys sp.	4.8	2.0	2.0	6.0	0.5	0.2	0.5	0.5	0.5	17.0	1.6
Nereis sp.	0.2	0.2	0.8	2.8		0.5	0.2	0.5	0.5	5.7	0.5
Diopatra cuprea					0.8	0.5	0.2	1.0	1.0	3.5	0.3
Orbiniidae			4.5	0.2	0.5	1.0	4.8	4.0	4.0	19.0	1.8
Haploscoloplos robustus							0.5			0.5	<0.1
Leitoscoloplos fragilis	0.2	0.8	9.8		5.5	3.5	6.2	8.0	10.5	44.5	4.3
Paraonidae			4.2	3.0	1.2	0.8	1.0	0.5		10.7	1.0
Pectinaria gouldii	1.2	0.2	3.0	0.2	0.2	0.5		6.0	1.0	12.3	1.2
Phyllodocidae			1.5	7.2	1.0	2.2	0.2	2.5		14.6	1.4
Polynoidae			0.2							0.2	<0.1
Sabellidae			0.2							0.2	<0.1
Lepidonotus squamatus			0.2	0.2						0.4	<0.1

TABLE 4-17 (page 2 of 3)
Average Benthic Invertebrate Densities (number / 0.1 m^2) Collected at 30 – 40 ft (MLW) Stations, November 1998 – September 1999

Species	SB-4	PJ-4	HW-3	HW-5	HW-6	HW-7	HW-8	HW-9	HW-10	Total	%
ANNELIDA (cont.)											
Sabellariidae					0.2					0.2	<0.1
Sabellaria vulgaris				0.5		0.8		1.0		2.3	0.2
Spionidae			0.2		1.2	1.0	0.2			2.6	0.2
Streblospio benedicti	0.5	0.2	27.8	37.5	25.8	17.2	2.0	15.0	1.5	127.5	12.2
Polydora ligni	0.2		0.5			1.2				1.9	0.2
Scolecolepides viridis			0.2	138.8	0.2					139.2	13.3
Syllidae	0.2			1.0			0.2	2.0		3.4	0.3
ARTHROPODA											
AMPHIPODS											
Gammaridea			3.8	6.2		0.2		2.0	0.5	12.7	1.2
Ampelisca abdita	0.8		13.8		1.0	0.2	0.2	5.0	1.0	22.0	2.1
Corophium sp.			0.5			0.5		0.5		1.5	0.1
Gammarus sp.			0.2		0.2			1.0	4.0	5.4	0.5
Melita sp.	0.2		2.0					1.5		3.7	0.4
CUMACIDS									0.5	0.5	<0.1
Diastylis quadrispinosa			0.2	0.2		0.2	0.2	1.5	0.5	2.8	0.3
Leucon americanus					6.5	11.0	2.5	4.0	5.5	29.5	2.8
DECAPODS											
Callinectes sapidus							0.2			0.2	<0.1
Libinia sp.			0.5							0.5	<0.1
Xanthidae			0.2							0.2	<0.1
Crangon septemspinosa	0.2		0.2	0.5			0.2			1.1	0.1
Upogebiidae							0.2			0.2	<0.1
ISOPODS											
Cyathura polita				1.8						1.8	0.2
Idoteidae							0.2			0.2	<0.1
Idotea metallica						0.2		0.5		0.7	<0.1
Edotea triloba	0.2		2.0	0.2			0.5	1.5	0.5	4.9	0.5

TABLE 4-17 (page 3 of 3)
Average Benthic Invertebrate Densities (number / 0.1 m^2) Collected at 30–40 ft (MLW) Stations, November 1998 – September 1999

Species	SB-4	PJ-4	HW-3	HW-5	HW-6	HW-7	HW-8	HW-9	HW-10	Total	%
ARTHROPODA (cont.)											
MYSIDS											
Neomysis americana					0.2					0.2	<0.1
OSTRACODA		0.2	0.8				0.2	0.5		1.7	0.2
MOLLUSCA											
BIVALVES	0.5			1.5						2.0	0.2
Lyonsia hyalina	0.2		1.0				0.5	2.5	1.0	5.2	0.5
Mulinia lateralis	202.8	9.2	61.0	1.2	4.2	1.0	8.8	10.5	48.5	347.2	33.3
Mya arenaria	0.5	0.5	0.5	1.0	2.0	1.0	1.5	0.5	5.0	12.5	1.2
Mytilidae			0.2							0.2	<0.1
Mytilus edulis			3.5	0.2				2.0		5.7	0.5
Yoldia sp.	1.0							0.5	0.5	2.0	0.2
Solen viridis			0.2							0.2	<0.1
Tellinidae						0.2				0.2	<0.1
Tellina sp.	1.8	0.2	16.0	4.0	0.2	0.5	0.5	9.0		32.2	3.1
Mercenaria mercenaria			0.5				0.2	0.5		1.2	0.1
GASTROPODS											
Crepidula fornicata			1.0					0.5		1.5	0.1
Crepidula plana			1.5					0.5		2.0	0.2
Lacuna vincta	1.2	3.2				0.2		0.5		5.1	0.5
Ilyanassa trivittata	0.2	0.5	1.8							2.5	0.2
Acteocina canaliculata	1.2	2.8	1.0				0.8	0.5	0.5	6.8	0.7
CHORDATA											
Molgula manhattensis			0.2			0.5		0.5		1.2	0.1
TOTAL	220.9	20.2	182.4	218.5	61.7	50.4	45.3	131.5	112.5	1,043	100.0

Notes: 1. Average density is the station average of monthly replicates.
2. Months sampled: November, February, May, and August.
3. Organisms that appear at family level, or higher, were identified to the lowest possible taxon.
4. HW-9 and HW-10 were not sampled in November or February.

TABLE 4-18 (page 1 of 2)
Average Benthic Invertebrate Densities (number / 0.1 m^2) Collected at Mid-depths (shallow channel) Stations, November 1998 – September 1999

Species	PJ-2	PJ-6	SB-1	SB-2	SB-3	Total	%
ASCHELMINTHES							
NEMATODES	0.2					0.2	0.1
PLATYHELMINTHES	0.2					0.2	
RHYNCHOCOELA							
NEMERTEANS	0.2					0.2	
ANNELIDA							
OLIGOCHAETES	0.2	4.0	6.8	0.8	3.2	15.0	0.9
POLYCHAETES							
Ampharetidae	0.2	1.7		0.2		2.1	0.1
Capitellidae			4.0			4.0	1.0
Flabelligeridae			0.2			0.2	0.1
Pherusa sp.	0.2					0.2	0.1
Glycera sp.	5.2		0.2	0.5	0.2	6.1	1.6
Maldanidae				0.2		0.2	0.1
Nephtys sp.	0.2	3.3	0.2	1.0	1.0	5.7	0.9
Nereis sp.	1.5		7.0	2.0	3.0	13.5	3.4
Diopatra cuprea	0.5			0.2	0.2	0.9	0.2
Orbiniidae	1.2		1.2	0.2	0.8	3.4	0.9
Leitoscoloplos fragilis	2.0	0.3	5.2	0.8	1.5	9.8	2.3
Paraonidae	0.8	0.3			0.2	1.3	0.2
Pectinaria gouldii	3.8	0.3				4.1	1.0
Phyllodocidae	1.8	0.3	0.8	0.8		3.7	0.8
Harmothoe sp.	0.2					0.2	0.1
Lepidonotus squamatus	0.2					0.2	0.1
Sabellaria vulgaris	0.2					0.2	0.1
Sabellidae	0.5					0.5	0.1
Sabella sp.				0.2	0.2	0.4	0.1
Spionidae	0.5					0.5	0.1
Polydora ligni	0.2	0.7		0.2		1.1	
Streblospio benedicti	7.5	6.0	15.2	4.5	19.5	52.7	10.9
Scolecolepides viridis				1.0		1.0	0.3
Syllidae	3.5					3.5	0.9
ARTHROPODA							
AMPHIPODS							
Gammaridea	4.0		0.2			4.2	1.2
Ampelisca abdita	6.5	1.0	0.8	0.5	2.5	11.3	1.9
Unciola sp.	0.2					0.2	
Corophiidae	0.2		0.2			0.4	0.1
Corophium sp.	0.5					0.5	0.2
Erichthonius rubricornis	0.5					0.5	0.1
Gammarus sp.				0.8		0.8	0.2
Melita sp.	0.5					0.5	
CUMACIDS							
Diastylis quadrispinosa	1.0	0.3				1.3	0.2
Leucon americanus		0.7		0.5		1.2	0.2

TABLE 4-18 (page 2 of 2)
Average Benthic Invertebrate Densities (number / 0.1 m^2) Collected at Mid-depths (shallow channel) Stations, November 1998 – September 1999

Species	PJ-2	PJ-6	SB-1	SB-2	SB-3	Total	%
ARTHROPODA (cont.)							
DECAPODS							
Pagurus sp.	0.2			0.2		0.4	0.1
Brachyura				0.2		0.2	0.1
Callinectes sapidus	0.2					0.2	
Xanthidae	0.2					0.2	0.1
Dyspanopeus sayi	0.5			0.2		0.7	0.2
Upogebia affinis	0.2		0.2	0.2		0.6	0.1
ECHINOIDS							
Strongylocentrotidae					0.2	0.2	0.1
ISOPODS							
Edotea triloba	1.5					1.5	0.4
OSTRACODS	1.0	0.3			0.2	1.5	0.2
MOLLUSCA							
BIVALVES							
Lyonsia hyalina	1.5	0.3				1.8	0.4
Mulinia lateralis	124.2	47.7	0.5	5.8	0.8	179.0	29.3
Mya arenaria	1.8	1.3		0.8		3.9	0.7
Mytilidae					0.2	0.2	
Mytilus edulis	119.5					119.5	29.5
Solenidae	0.2					0.2	0.1
Ensis directus	0.2					0.2	0.1
Tellina sp.	11.0	0.3	0.2	0.2		11.7	2.6
Gemma gemma	2.2					2.2	0.6
Mercenaria mercenaria		0.3				0.3	0.1
GASTROPODS							
Crepidula fornicata	3.2					3.2	0.7
Crepidula plana	5.2			0.5		5.7	1.4
Lacuna vincta		1.3	0.2	0.8	0.2	2.5	0.6
Ilyanassa obsoleta					0.8	0.8	0.2
Ilyanassa trivittata	1.0	0.7	0.2	0.2	0.2	2.3	0.4
Acteocina canaliculata	3.2	5.0	0.2	0.5	0.8	9.7	2.0
CHORDATA							
Molgula manhattensis	1.0					1.0	
TOTAL	322.4	76.1	43.5	24.0	35.7	501.7	100.0

Notes: 1. Average density is the station average of monthly replicates.
2. Months sampled: November (PJ-6 not sampled), February, May, and August.
3. Organisms that appear at family level, or higher, were identified to the lowest possible taxon.

TABLE 4-19 (page 1 of 3)
Average Benthic Invertebrate Densities (number / 0.1 m^2) Collected at Deep-water (> 20 ft MLW) Stations, November 1998 – September 1999

Species	HW-1	HW-2	HW-4	Total	%
ASCHELMINTHES					
NEMATODES	0.8			0.8	0.2
PLATYHELMINTHES			0.2	0.2	<0.1
RHYNCHOCOELA					
NEMERTEANS	0.5	0.2		0.7	0.2
ANNELIDA					
OLIGOCHAETES			2.5	2.5	0.6
POLYCHAETES					
Ampharetidae	2.2	0.2	10.8	13.2	3.1
Capitellidae	0.2			0.2	<0.1
Cirratulidae			0.5	0.5	0.1
Pherusa sp.	0.2		0.2	0.4	<0.1
Glycera sp.	0.8	0.2	4.2	5.2	1.2
Lumbrinereidae	0.2			0.2	<0.1
Magelona rosea	1.2	0.2		1.4	0.3
Nephtys sp.	7.0	10.8	1.5	19.3	4.5
Nereis sp.	0.8			0.8	0.2
Diopatra cuprea		0.5		0.5	0.1
Orbiniidae			0.8	0.8	0.2
Leitoscoloplos fragilis		0.2	3.2	3.4	0.8
Paraonidae	0.5		3.5	4.0	0.9
Aricidea sp.	0.5			0.5	0.1
Pectinaria gouldii			6.8	6.8	1.6
Phyllodocidae	1.8		1.5	3.3	0.8
Polynoidae			0.5	0.5	0.1
Harmothoe sp.	0.5			0.5	0.1
Lepidametria commensalis	0.2			0.2	<0.1
Lepidonotus sp.	0.2	0.2		0.4	<0.1
Sigalionidae	0.2			0.2	<0.1
Spionidae	3.8	0.5	1.0	5.3	1.2
Streblospio benedicti	2.0		11.8	13.8	3.2
Polydora ligni	0.2	0.2	0.8	1.2	0.3
Scolecolepides viridis			0.5	0.5	0.1
Spiophanes bombyx		0.2		0.2	<0.1
Syllidae	2.0		0.8	2.8	0.7
ARTHROPODA					
AMPHIPODS					
Caprellidae			0.2	0.2	<0.1
Gammaridea	1.2	0.2	2.0	3.4	0.8
Ampelisca abdita		0.2	6.0	6.2	1.4
Unciola sp.		0.2		0.2	<0.1
Unciola dissimilis		0.2		0.2	<0.1
Corophium sp.	0.2	0.8	0.5	1.5	0.4
Erichthonius braziliensis		0.5		0.5	0.1
Gammarus sp.	0.5	0.2	0.2	0.9	0.2
Melitidae		0.2		0.2	<0.1

TABLE 4-19 (page 2 of 3)
Average Benthic Invertebrate Densities (number / 0.1 m^2) Collected at Deep-water (> 20 ft MLW) Stations, November 1998 – September 1999

Species	HW-1	HW-2	HW-4	Total	%
ARTHROPODA (cont.)					
Melita sp.	0.5	0.2	0.8	1.5	0.4
Paraphoxus spinosus		0.2		0.2	<0.1
Phoxocephalus holbolli	0.8			0.8	0.2
Protohaustorius sp.	1.0			1.0	0.2
Trichophoxus epistomus		0.5		0.5	0.1
CUMACIDS					
Diastylis quadrispinosa			0.8	0.8	0.2
Leucon americanus			0.2	0.2	<0.1
DECAPODS					
Pagurus sp.	3.0	0.5	0.2	3.7	0.9
Pinnixa sayana			0.2	0.2	<0.1
Cancer sp.		0.2		0.2	<0.1
Cancer irroratus	0.5			0.5	0.1
Xanthidae			0.5	0.5	0.1
Hexapanopeus angustifrons			0.2	0.2	<0.1
Ovalipes ocellatus	0.2	0.2		0.4	<0.1
Crangon septemspinosa	0.2	0.2		0.4	<0.1
ECHINOIDS					
Strongylocentrotidae	5.5			5.5	1.3
ISOPODS					
Edotea triloba		0.2	1.5	1.7	0.4
Idotea baltica		0.2		0.2	<0.1
OSTRACODS			0.8	0.8	0.2
MOLLUSCA					
BIVALVES	0.2			0.2	<0.1
Lyonsia hyalina			1.0	1.0	0.2
Mulinia lateralis	1.2	0.2	209.8	211.2	49.3
Mya arenaria	0.5	1.5	1.2	3.2	0.7
Mytilidae		0.2		0.2	<0.1
Mytilus edulis	0.5	1.5	21.8	23.8	5.6
Solenidae	0.2			0.2	<0.1
Ensis directus	0.2	0.2	0.2	0.6	0.1
Siliqua costata	1.0	0.2		1.2	0.3
Solen viridis		0.5	0.5	1.0	0.2
Tellina sp.	8.5	5.8	33.2	47.5	11.1
Mercenaria mercenaria	0.5		2.0	2.5	0.6
GASTROPODS			0.5	0.5	0.1
Crepidula fornicata	0.2		2.5	2.7	0.6
Crepidula plana	0.8	0.2	2.0	3.0	0.7
Lacuna vincta			0.8	0.8	0.2
Ilyanassa trivittata	1.0	0.8	1.5	3.3	0.8
Acteocina canaliculata			2.0	2.0	0.5

TABLE 4-19 (page 3 of 3)
Average Benthic Invertebrate Densities (number / 0.1 m^2) Collected at Deep-water (> 20 ft MLW) Stations, November 1998 – September 1999

Species	HW-1	HW-2	HW-4	Total	%
CHORDATA					
Molgula manhattensis			0.2	0.2	<0.1
TOTAL	54.2	29.4	344.4	428.0	100.0

Notes: 1. Average density is the station average of monthly replicates.
2. Months sampled: November, February, May, and August.
3. Organisms that appear at family level, or higher, were identified to the lowest possible taxon.

TABLE 4-20

Crab Dredge CPUE (number / 5-min tow) at Channel Stations
February – April 1999

Sample Area	LH	UH	RH	KVK	AK	NB	SB-C	PJ-C
Month	**February**							
Number of Stations	1	2	1	1	2	1	1	1
Blue crab (*Callinectes sapidus*)		0.5			2.0	1.0	1.0	6.0
Green crab (*Carcinus maenus*)			1.0					
Horseshoe crab (*Limulus polyphemus*)	1.0	1.0	1.0					1.0
Mud crab (Xanthidae)				1.0				
Rock crab (*Cancer* sp.)		10.0	2.0				1.0	
Spider crab (*Libinia* sp.)		1.0						
Month	**March**							
Number of Stations	1	2	1	1	2	3	1	1
Blue crab (*Callinectes sapidus*)			2.0		1.0	5.0	12.0	2.0
Horseshoe crab (*Limulus polyphemus*)			1.0				1.0	
Rock crab (*Cancer* sp.)	1.0		204.0				225.0	
Spider crab (*Libinia* sp.)			1.0					
Month	**April**							
Number of Stations	1	2	1	1	2	3	1	1
Blue crab (*Callinectes sapidus*)		0.5	1.0		2.0	0.67	1.0	1.0
Green crab (*Carcinus maenus*)			1.0					
Horseshoe crab (*Limulus polyphemus*)			1.0					2.0
Rock crab (*Cancer* sp.)	1.0	1.0					1.0	
Spider crab (*Libinia* sp.)		1.0	2.0					
Lady crab (*Ovalipes ocellatus*)	1.0							

Sample Areas: LH – Lower Harbor (HW 1), UH – Upper Harbor (HW 2, HW 4), RH – Red Hook (HW 3), KVK – Kill Van Kull (HW 5), AK – Arthur Kill (HW 6-7)
NB – Newark Bay (HW 8, HW 9, HW 10), SB-C South Brooklyn Channel (SB 4), PJ-C Port Jersey Channel (PJ 4)

TABLE 4-21

Crab Dredge CPUE (number / 5-min tow) at Shoal / Interpier Stations
February 1999 – April 1999

Month	**February**	
Sample Area	**SB**	**PJ**
Number of Samples	**3**	**5**
Blue crab (*Callinectes sapidus*)	8.0	14.2
Horseshoe crab (*Limulus polyphemus*)		0.4
Mud crab (Xanthidae)		1.4
Spider crab (*Libinia* sp.)		0.2
Month	**March**	
Number of Samples	**3**	**5**
Blue crab (*Callinectes sapidus*)	9.0	13.4
Rock crab (*Cancer* sp.)	0.3	
Horseshoe crab (*Limulus polyphemus*)		1.0
Month	**April**	
Number of Samples	**3**	**5**
Blue crab (*Callinectes sapidus*)	6.7	5.6
Horseshoe crab (*Limulus polyphemus*)	0.3	0.4
Rock crab (*Cancer* sp.)	0.3	
Lady crab (*Ovalipes ocellatus*)		0.6

Sample Areas: SB – South Brooklyn (SB 1, SB 2, SB 3), PJ – Port Jersey (PJ 1, PJ 2, PJ 3, PJ 5, PJ 6)

TABLE 4-22 (page 1 of 3)

Estimated Bottom Trawl Crab CPUE (number / 10-min tow) at Channel Stations
October 1998 – September 1999

Sample Area	LH	UH	RH	KVK	AK	NB	SB-C	PJ-C
Month	**October**							
Number of Stations	1	2	1	1	2	1	1	1
Blue crab (*Callinectes sapidus*)		7.0		9.0	27.0	7.0	2.0	4.0
Green crab (*Carcinus maenus*)				4.0				
Lady crab (*Ovalipes ocellatus*)		4.0		10.0				
Rock crab (*Cancer* sp.)	5.0							
Spider crab (*Libinia* sp.)	4.0							
Month	**November**							
Number of Stations	0	0	0	0	0	0	1	1
Blue crab (*Callinectes sapidus*)								2.0
Month	**December**							
Number of Stations	1	2	1	1	2	1	1	1
Blue crab (*Callinectes sapidus*)					1.0	14.0		
Month	**January**							
Number of Stations	0	0	0	0	0	0	1	1
Blue crab (*Callinectes sapidus*)								5.0
Month	**February**							
Number of Stations	1	2	1	1	2	1	1	1
Blue crab (*Callinectes sapidus*)	1.0		2.0		0.5	1.0	1.0	
Green crab (*Carcinus maenus*)			5.0					
Mud crab (Xanthidae)			2.0					
Month	**March**							
Number of Samples	0	0	0	1	0	3	1	1
Blue crab (*Callinectes sapidus*)						6.0		3.0
Green crab (*Carcinus maenus*)						0.3		
Lady crab (*Ovalipes ocellatus*)				1.0				
Mud crab (Xanthidae)						0.7		
Rock crab (*Cancer* sp.)							1.0	2.0

TABLE 4-22 (page 2 of 3)

Estimated Bottom Trawl Crab CPUE (number / 10-min tow) at Channel Stations
October 1998 – September 1999

Sample Area	LH	UH	RH	KVK	AK	NB	SB-C	PJ-C
Month	**April**							
Number of Samples	1	2	1	1	2	3	1	1
Blue crab (*Callinectes sapidus*)		0.5	3.0		12.0	6.3	3.0	14.0
Green crab (*Carcinus maenus*)			20.0					
Horseshoe crab (*Limulus polyphemus*)	4.0						2.0	2.0
Lady crab (*Ovalipes ocellatus*)	12.0			1.0				
Mud crab (Xanthidae)				1.0				2.0
Rock crab (*Cancer* sp.)	40.0	4.5					1.0	
Spider crab (*Libinia* sp.)			6.0					
Month	**May**							
Number of Samples	0	0	0	0	0	0	1	1
Blue crab (*Callinectes sapidus*)							45.0	46.7
Horseshoe crab (*Limulus polyphemus*)							8.0	
Rock crab (*Cancer* sp.)							2.0	
Spider crab (*Libinia* sp.)							1.0	
Month	**June**							
Number of Samples	1	2	1	1	2	3	1	1
Blue crab (*Callinectes sapidus*)		5.0	73.0	13.0	290.5	123.3	39.0	2.0
Green crab (*Carcinus maenus*)			2.0					
Lady crab (*Ovalipes ocellatus*)		0.5		6.0				
Mud crab (Xanthidae)		13.5		12.0	NE	NE	NE	
Rock crab (*Cancer* sp.)	3.0	6.0	6.0	4.0	NE			
Spider crab (*Libinia* sp.)		3.0	1.0			NE		
Month	**July**							
Number of Samples	0	0	0	1	0	0	1	1
Blue crab (*Callinectes sapidus*)				34.0			24.0	3.0
Lady crab (*Ovalipes ocellatus*)				NE				
Rock crab (*Cancer* sp.)				NE				
Spider crab (*Libinia* sp.)							NE	

TABLE 4-22 (page 3 of 3)

Estimated Bottom Trawl Crab CPUE (number / 10-min tow) at Channel Stations
October 1998 – September 1999

Sample Area	LH	UH	RH	KVK	AK	NB	SB-C	PJ-C
Month	**August**							
Number of Samples	**1**	**2**	**1**	**1**	**2**	**3**	**1**	**1**
Blue crab (*Callinectes sapidus*)		19.5	4.0	14.0	18.0	19.0	1.0	2.0
Lady crab (*Ovalipes ocellatus*)	NE			NE				
Mud crab (Xanthidae)					NE	NE		
Spider crab (*Libinia* sp.)	NE	NE	NE					3.0
Month	**September**							
Number of Samples	**0**	**0**	**0**	**1**	**0**	**0**	**1**	**1**
Blue crab (*Callinectes sapidus*)				14.7			10.0	1.0

Note: NE – Not enumerated (presence noted).
Sample Areas: LH – Lower Harbor (HW 1), UH – Upper Harbor (HW 2, HW 4), RH – Red Hook (HW 3), KVK – Kill Van Kull (HW 5), AK – Arthur Kill (HW 6-7)
NB – Newark Bay (HW 8, HW 9, HW 10), SB-C South Brooklyn Channel (SB 4), PJ-C Port Jersey Channel (PJ 4)

TABLE 4-23 (page 1 of 2)

Estimated Bottom Trawl Crab CPUE (number / 10-min. tow) at Shoal/ Interpier Stations October 1998 – September 1999

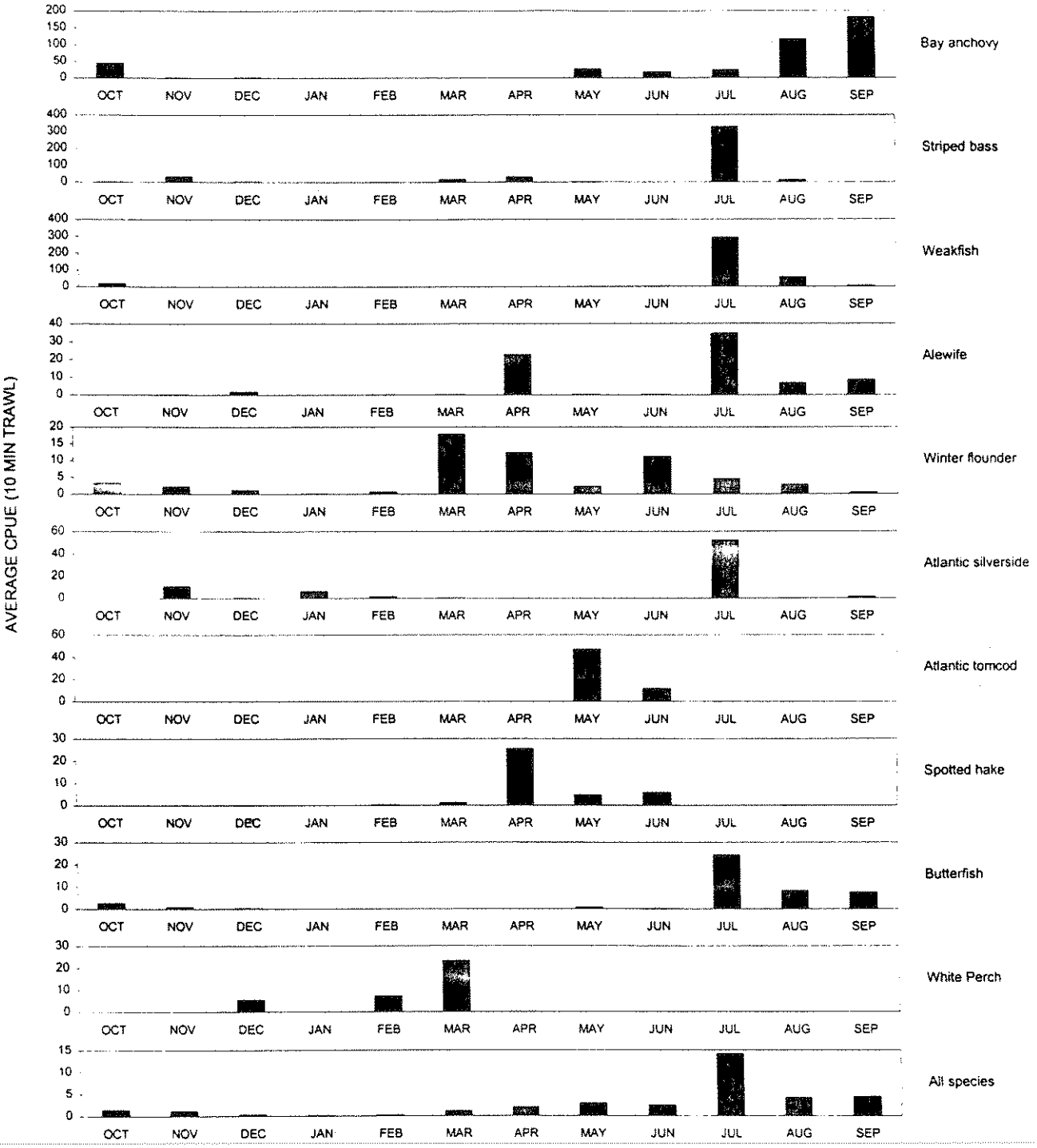
Month	**October**	
Sample Area	**SB**	**PJ**
Number of Samples	**3**	**4**
Blue crab (*Callinectes sapidus*)	24.9	24.3
Horseshoe crab (*Limulus polyphemus*)		0.4
Lady crab (*Ovalipes ocellatus*)		3.5
Mud crab (Xanthidae)	12.5	0.2
Spider crab (*Libinia* sp.)		1.7
Month	**November**	
Number of Samples	**3**	**4**
Blue crab (*Callinectes sapidus*)	42.2	12.2
Rock crab (*Cancer* sp.)		0.5
Month	**December**	
Number of Samples	**3**	**4**
Blue crab (*Callinectes sapidus*)	0.7	15.1
Green crab (*Carcinus maenus*)		0.2
Month	**January**	
Number of Samples	**3**	**4**
Blue crab (*Callinectes sapidus*)	4.4	6.6
Mud crab (Xanthidae)		1.1
Month	**February**	
Number of Samples	**3**	**5**
Blue crab (*Callinectes sapidus*)	9.1	8.7
Rock crab (*Cancer* sp.)	2.8	
Month	**March**	
Number of Samples	**3**	**5**
Blue crab (*Callinectes sapidus*)	7.8	3.9
Mud crab (Xanthidae)	4.0	
Spider crab (*Libinia* sp.)	1.0	
Month	**April**	
Number of Samples	**3**	**5**
Blue crab (*Callinectes sapidus*)	18.2	7.4
Horseshoe crab (*Limulus polyphemus*)	1.9	
Mud crab (Xanthidae)		2.6
Month	**May**	
Number of Samples	**3**	**5**
Blue crab (*Callinectes sapidus*)	32.7	52.1
Fiddler crab (*Uca* sp.)		1.5
Horseshoe crab (*Limulus polyphemus*)	1.7	0.3
Rock crab (*Cancer* sp.)		0.3
Spider crab (*Libinia* sp.)		1.0
Month	**June**	
Number of Samples	**3**	**5**
Blue crab (*Callinectes sapidus*)	18.8	79.9
Mud crab (Xanthidae)		NE
Spider crab (*Libinia* sp.)		1.0

TABLE 4-23 (page 2 of 2)

Estimated Bottom Trawl Crab CPUE (number / 10-min. tow) at Shoal/ Interpier Stations October 1998 – September 1999

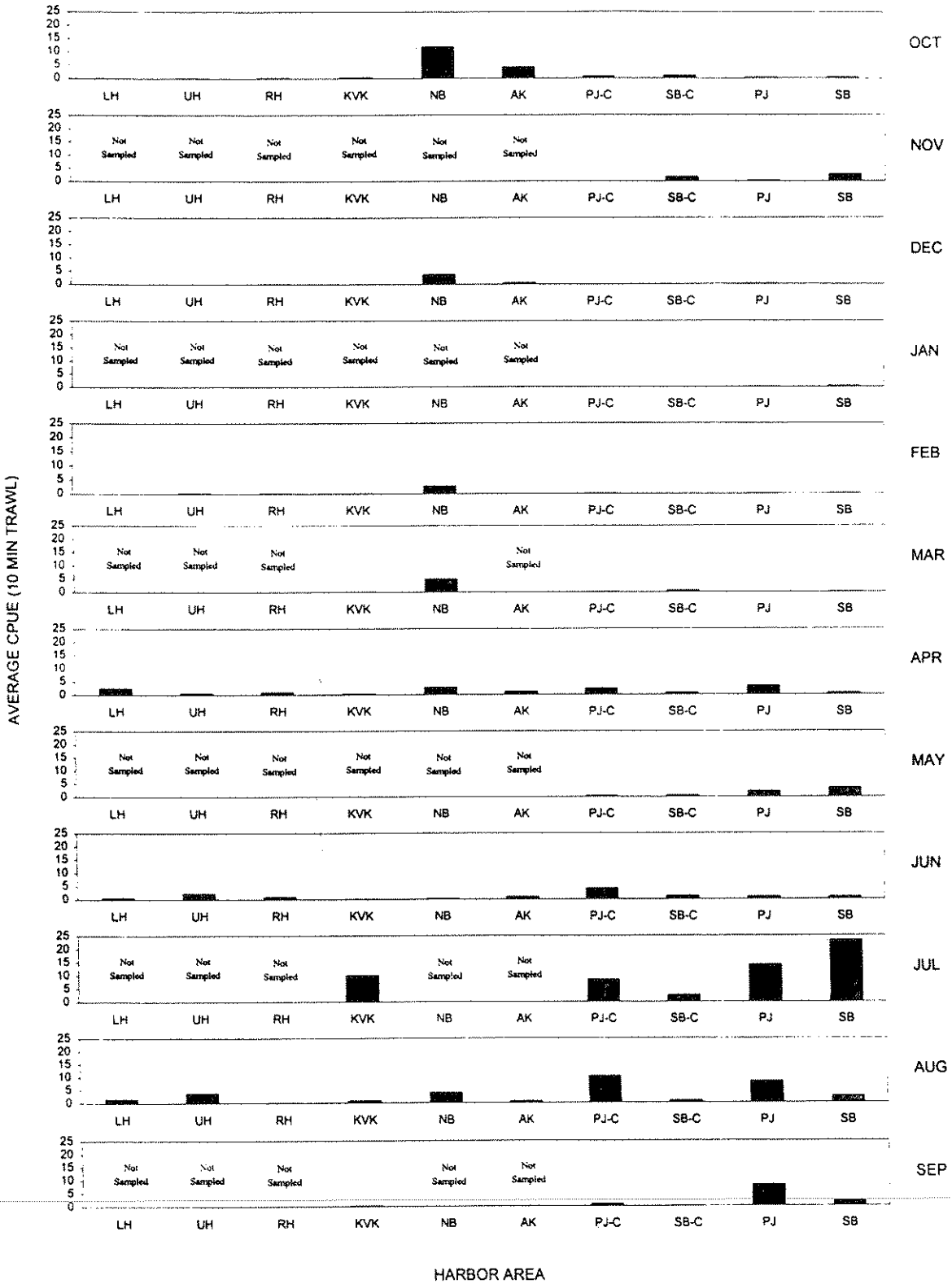
Month	**July**	
Number of Samples	**3**	**5**
Blue crab (*Callinectes sapidus*)	5.0	29.4
Mud crab (Xanthidae)		NE
Month	**August**	
Number of Samples	**3**	**5**
Blue crab (*Callinectes sapidus*)	8.9	6.6
Horseshoe crab (*Limulus polyphemus*)	1.0	
Lady crab (*Ovalipes ocellatus*)		NE
Spider crab (*Libinia* sp.)		NE
Month	**September**	
Number of Samples	**3**	**5**
Blue crab (*Callinectes sapidus*)	16.3	18.6
Mud crab (Xanthidae)		NE
Spider crab (*Libinia* sp.)	NE	

NE – Not enumerated (presence noted)
Sample Areas: SB – South Brooklyn (SB 1, SB 2, SB 3), PJ – Port Jersey (PJ 1, PJ 2, PJ 3, PJ 5, PJ 6)



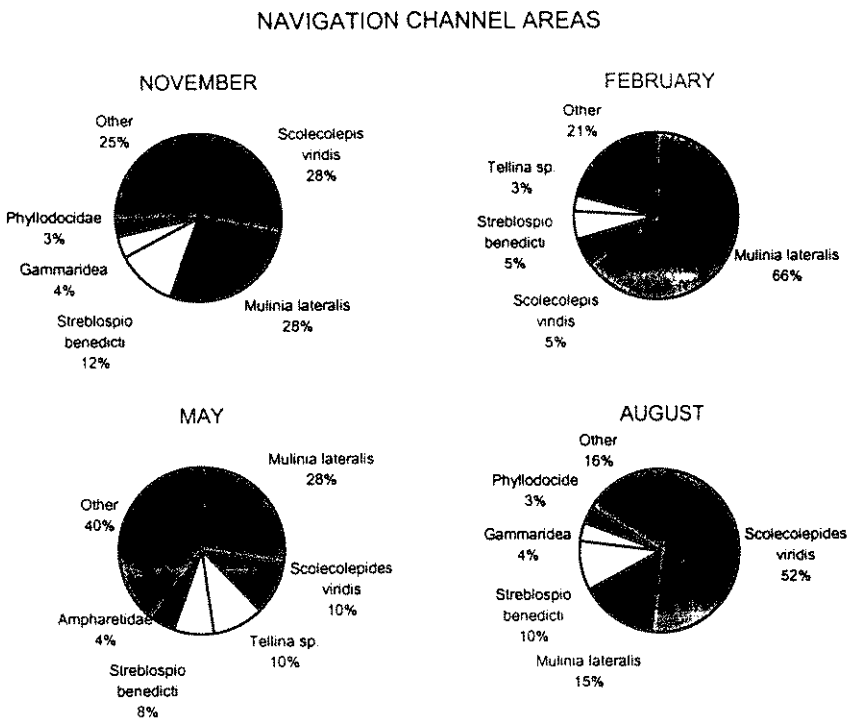
NOTES: Not all stations sampled each month, see sampling schedule for actual months and stations sampled.
All species includes all species collected.

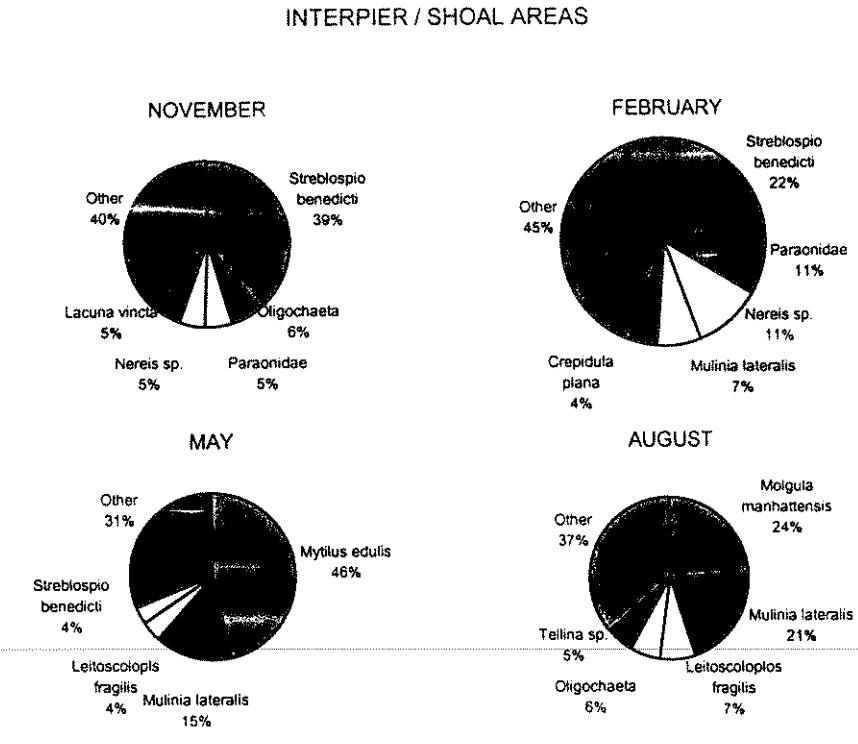
Figure 4-1. Average bottom trawl CPUE (10 min. tow) of the 10 most dominant fish species October 1998 - September 1999



NOTE: Not Sampled - Not all stations sampled each month, see sampling schedule for actual months and stations sampled.
LH - Lower Harbor (HW 1), UH - Upper Harbor (HW 2,4), RH - Red Hook (HW 3) KVK - Kill Van Kull (HW 5), AK - Arthur Kill (HW 6-7),
NB - Newark Bay (HW 8-10), PJ-C Port Jersey Channel (PJ 4), SB-C South Brooklyn Channel (SB 4), PJ - Port Jersey (PJ 1-3, 5-6), SB - South Brooklyn (SB 1-3)

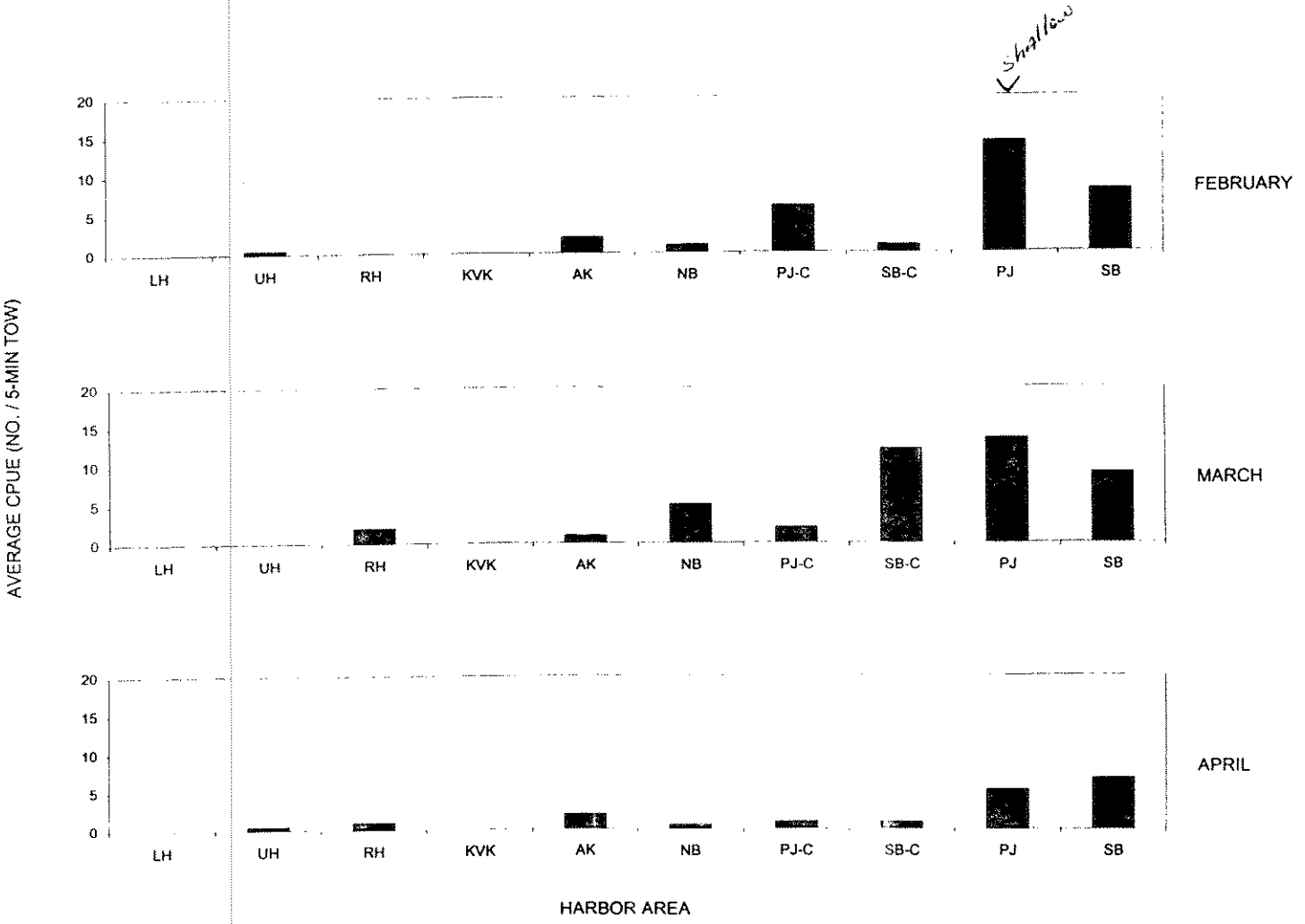
Figure 4-2. Average bottom trawl CPUE (10 min. tow) of all species combined, October 1998 - September 1999





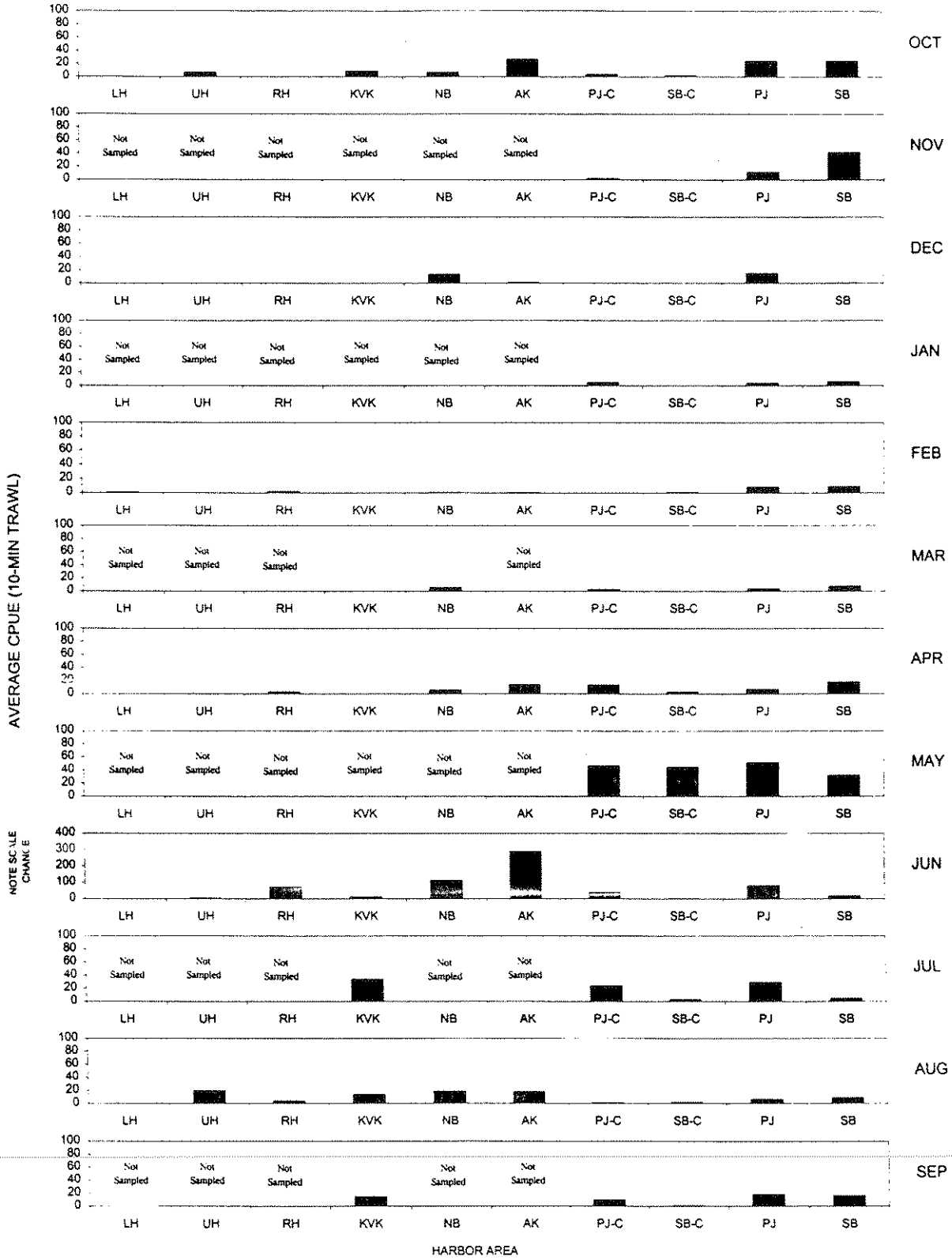
NOTE: Percent contribution based on the sum of average densities over all harbor areas.

Figure 4-3. Percent contribution, based on average density, of benthic invertebrate species November 1998, February 1999, May, 1999 and August 1999



Area: LH - Lower Harbor (HW 1), UH - Upper Harbor (HW 2,4), RH - Red Hook (HW 3) KVK - Kill Van Kull (HW 5), AK - Arthur Kill (HW 6-7), SB-C South Brooklyn Channel (SB 4), Port Jersey Channel (PJ 4), SB - South Brooklyn (SB 1-3), Port Jersey (PJ 1-3, 5-6), NB - Newark Bay (HW 8-10)

Figure 4-4. Average crab dredge CPUE (no. / 5-min. tow) of blue crab, February - April 1999



NOTES Not Sampled: Not all stations sampled each month, see sampling schedule for actual months and stations sampled.

STATIONS: LH - Lower Harbor (HW 1), UH - Upper Harbor (HW 2,4), RH - Red Hook (HW 3) KVK - Kill Van Kull (HW 5), AK - Arthur Kill (HW 6-7), SB-C South Brooklyn Channel (SB 4), Port Jersey Channel (PJ 4), SB - South Brooklyn (SB 1-3), Port Jersey (PJ 1-3, 5-6), NB - Newark Bay (HW 8-10)

Figure 4-5. Average bottom trawl CPUE (10-min. trawl) of blue crab, October 1998 - September 1999

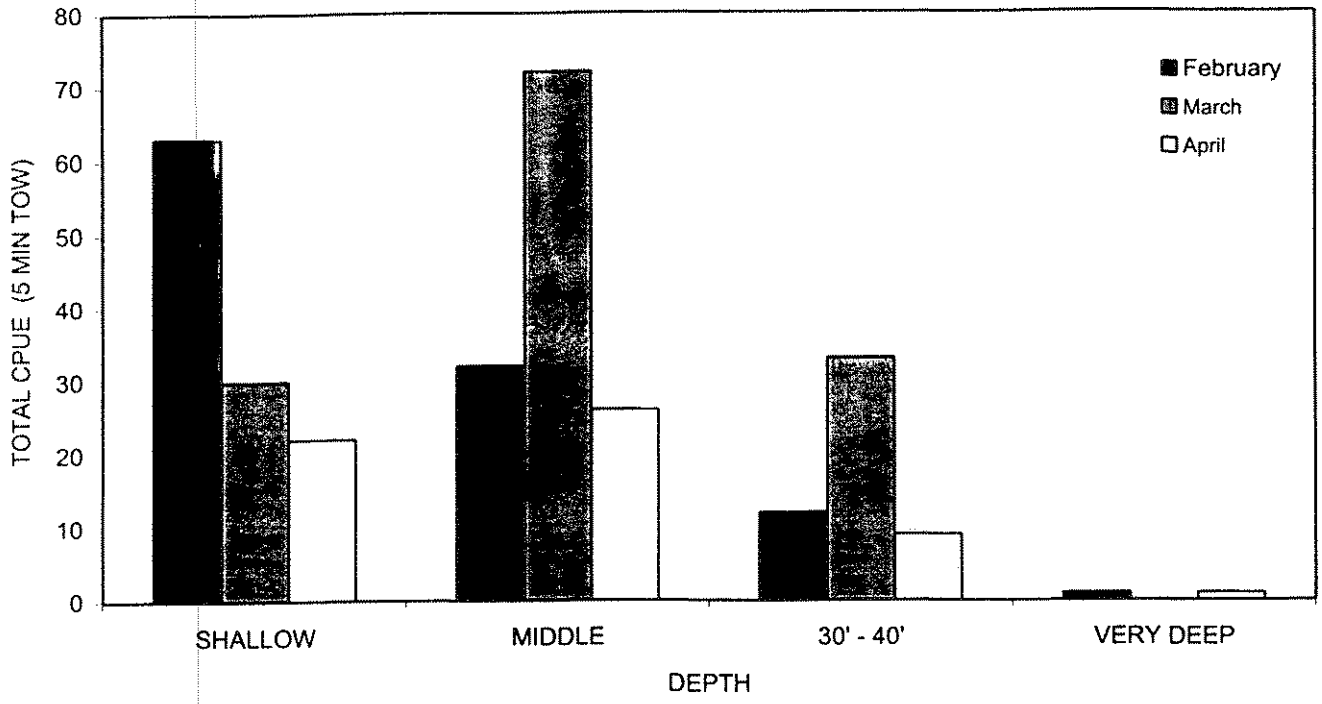


Figure 4-6. Total crab dredge CPUE (no. / 5-min. tow) of blue crab, February - April 1999

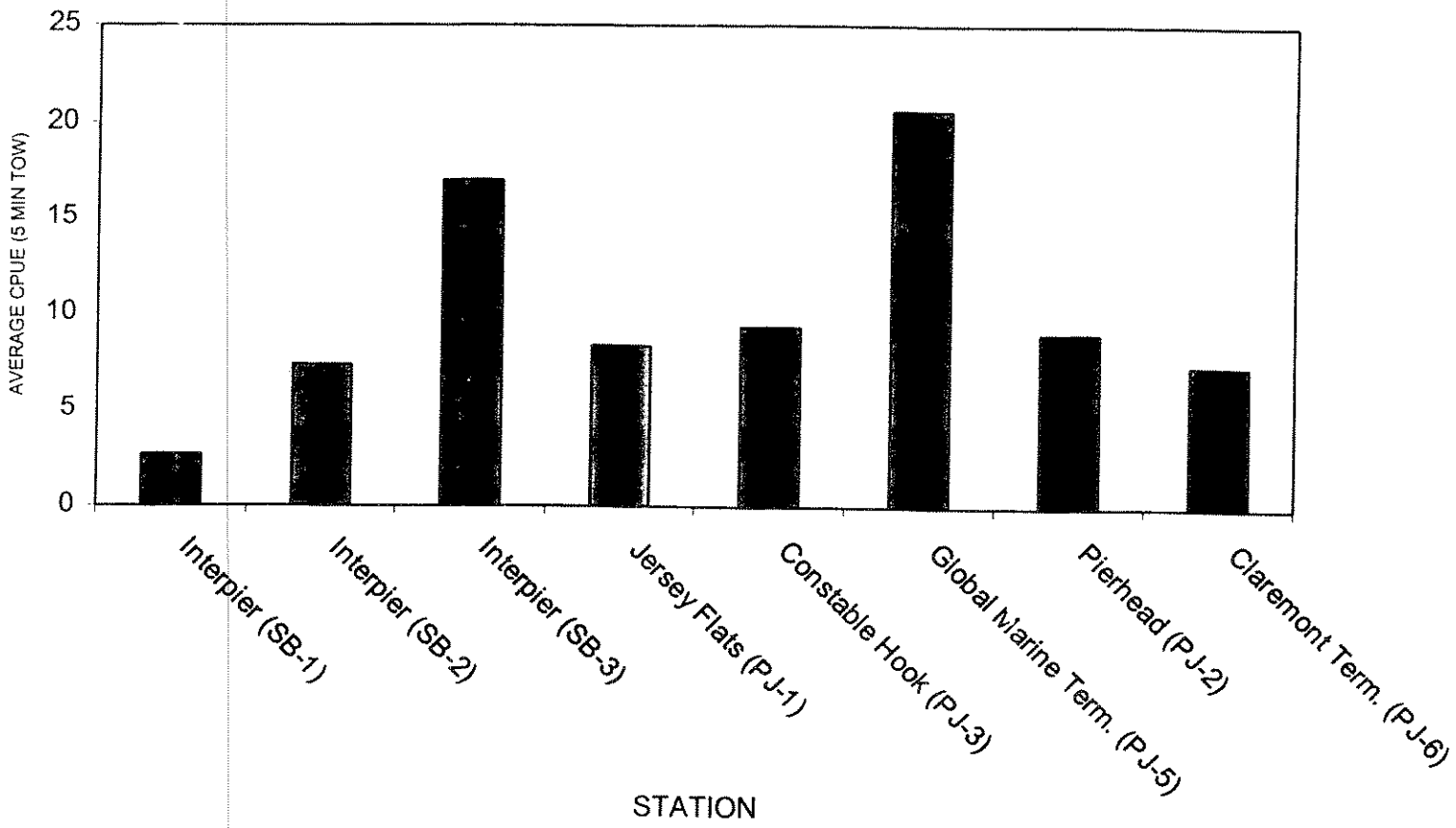


Figure 4-7. Average crab dredge CPUE (no. / 5-min tow) of blue crab at shoal and shallow depth stations February - April 1999

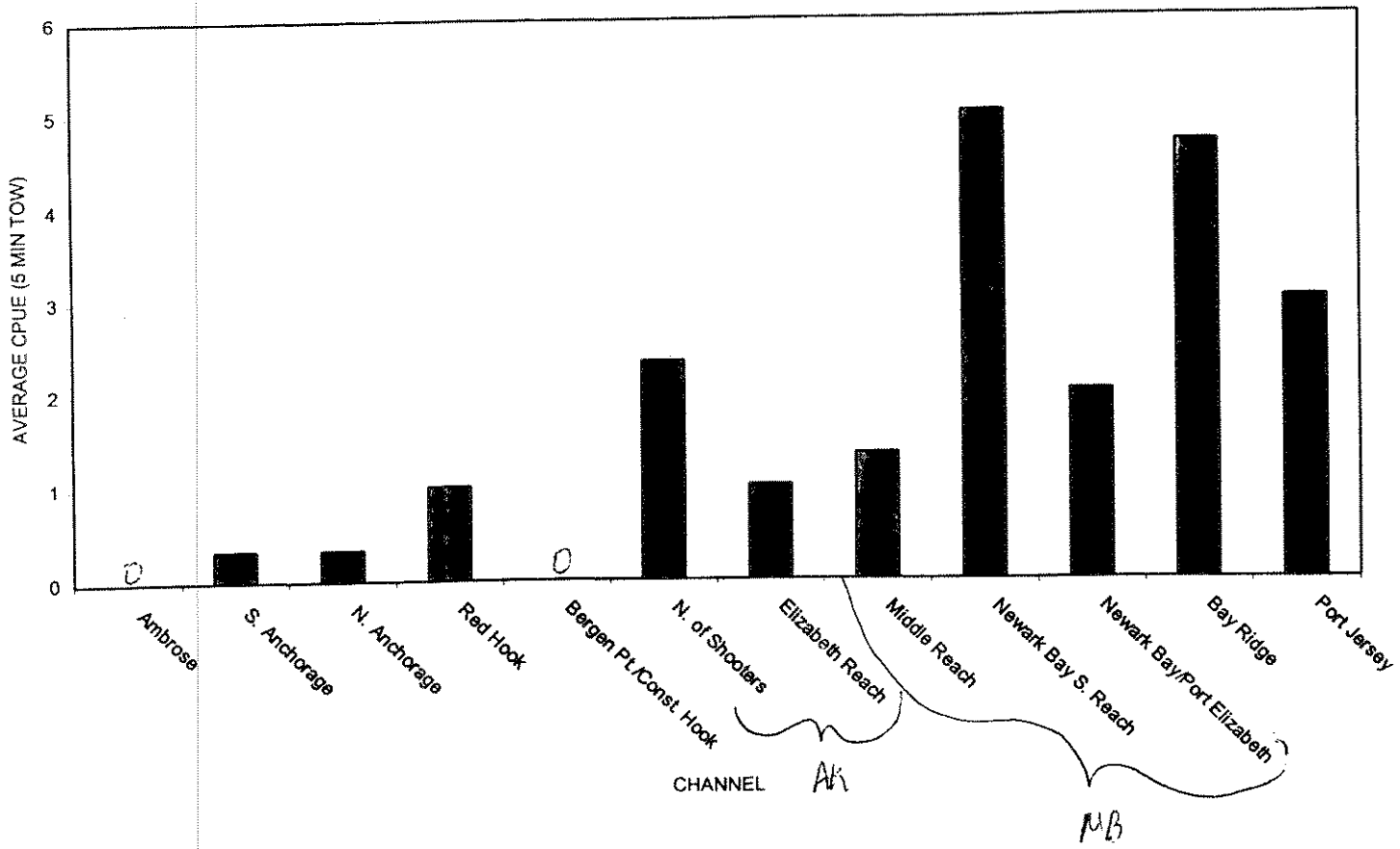


Figure 4-8. Average crab dredge CPUE (no. / 5-min. tow) of blue crab at channel stations February - April 1999

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NEW YORK AND NEW JERSEY HARBOR NAVIGATION STUDY

BIOLOGICAL MONITORING PROGRAM
1998-1999

VOLUME II of II

DECEMBER 1999

U.S. Army Corps Of Engineers – New York District
Planning Division
Jacob K. Javits Federal Building
26 Federal Plaza
New York, New York 10278-0090

TABLE OF CONTENTS

VOLUME I: BIOLOGICAL MONITORING REPORT

LIST OF TABLES ii
LIST OF FIGURES v

1.0 INTRODUCTION 1-1

1.1 BACKGROUND 1-1
1.2 PURPOSE 1-1

2.0 PREVIOUS BIOLOGICAL SAMPLING PROGRAMS 2-1

2.1 FISH SAMPLING PROGRAMS 2-1
2.2 SHELLFISH SAMPLING PROGRAMS 2-4
2.3 BENTHIC MACROINVERTEBRATE SAMPLING PROGRAMS 2-4

3.0 MATERIALS AND METHODOLOGY 3-1

3.1 FISHERIES SURVEYS 3-1
3.2 BENTHIC MACROINVERTEBRATE SURVEYS 3-2
3.3 HARBORWIDE SAMPLING PROGRAM 3-3
3.4 SITE-SPECIFIC SAMPLING PROGRAM 3-5

4.0 RESULTS AND DISCUSSION 4-1

4.1 BOTTOM TRAWL SURVEY 4-1
4.2 HYDROACOUSTIC SURVEY 4-5
4.3 SEASONAL ICHTHYOPLANKTON SURVEY 4-6
4.4 BENTHIC INVERTEBRATE SURVEY 4-7
4.5 CRAB DREDGE SURVEY 4-10

REFERENCES R-1

VOLUME II: APPENDICES

A – BOTTOM TRAWL CPUE
B – BOTTOM TRAWL LENGTH-FREQUENCY DISTRIBUTION
C – HYDROACOUSTIC TRACKED ECHO TARGET AND BOTTOM PROFILES
D – HYDROACOUSTIC TRACKED TARGET STRENGTH DISTRIBUTION
E – EPIBENTHIC SLED ICHTHYOPLANKTON DENSITY
F – BENTHIC GRAB MACROINVERTEBRATE DENSITY
G – CRAB DREDGE CPUE

LIST OF TABLES

2-1 Inventory of Fish Species Collected from Various Sampling Programs Conducted in the Project Area.

2-2 Newark Bay Aquatic Sampling Program 1995 – 1996 Shoal Station Catch Per Ten Minutes of 30-ft Bottom Trawl Effort.

2-3 Newark Bay Aquatic Sampling Program 1995 – 1996 Channel Station Catch Per Ten Minutes of 30-ft Bottom Trawl Effort.

2-4 Number of Fish and Megainvertebrates Collected With An 4.9-Motor Trawl At Shoal Stations In Newark Bay, May 1993 – April 1994.

2-5 Number of Fish and Megainvertebrates Collected With An 8.5-M Otter Trawl At Channel Stations In Newark Bay, May 1993 – April 1994.

2-6 Macroinvertebrate Taxa Collected From Newark Bay, Arthur Kill, and Kill Van Kull, 1995-1996.

2-7 Macroinvertebrate Taxa Collected From Kill Van Kull, 1995-1996.

2-8 Macroinvertebrate Taxa Collected From Newark Bay, 1995-1996.

2-9 Macroinvertebrate Taxa Collected From Arthur Kill, 1995-1996.

2-10 Newark Bay/Kill Van Kull Benthos Survey – 1985.

2-11 Benthic Fauna Identified In Newark Bay in 1993-1994.

2-12 Benthic Invertebrate Taxa Collected From Newark Bay, 1995 – 1996.

2-13 Benthic Invertebrate Taxa Collected From Newark Bay, Arthur Kill, and Kill Van Kull, 1995-1996.

2-14 Benthic Invertebrate Taxa Collected from the Arthur Kill, 1995-1996.

2-15 Benthic Invertebrate Taxa Collected From Kill Van Kull Area, 1995-1996.

2-16 Benthic Invertebrate Taxa Collected From the Goethals Bridge and Old Place Creek Study Area, 1994.

3-1 Biological Monitoring Program Gear Specifications.

3-2 Harborwide Survey Station Locations.

LIST OF TABLES (CONT'D)

3-3 Harborwide Sampling Program Survey Schedule October 1998 –September 1999.

3-4 Site-Specific Survey Station Locations.

3-5 Site-specific Sampling Program Survey Schedule October 1998 – September 1999.

4-1 Average Bottom Trawl CPUE.

4-2 Percent composition of Finfish Species collected in the Study Area – All Stations Combined, October 1998 – September 1999.

4-3 Average Bottom Trawl CPUE in the Study Area – All Stations Combined, October 1998 – September 1999.

4-4 Percent Composition of Finfish Species Collected at Channel Stations – All Areas Combined, October 1998 – September 1999.

4-5 Average Bottom Trawl CPUE at Channel Stations – All Areas Combined, October 1998 – September 1999.

4-6 Percent Composition of Finfish Species Collected at Shoal/Interpier Stations – All Areas Combined, October 1998 – September 1999.

4-7 Monthly Average Bottom Trawl CPUE at Shoal/Interpier Stations – All Areas Combined, October 1998 – September 1999.

4-8 Rank of the most Common Icthyoplankton Species Collected in Recent Studies.

4-9 Average Icthyoplankton Density in the Study Area – All Stations Combined, February – June 1999.

4-10 Average Icthyoplankton Density at Channel Stations – All Areas combined, February – June 1999.

4-11 Average Icthyoplankton Density at Shoal/Interpier Stations – All Areas Combined, February – June 1999.

4-12 Average Benthic Invertebrate Densities Collected at Channel Stations Among Sample Areas, November 1998 – September 1999.

4-13 Average Benthic Invertebrate Densities Collected at Interpier/Shoal Areas, November 1998 – September 1999.

4-14 Average Macroinvertebrate Densities Collected at Channel Stations November 1998, February 1999, May 1999, August 1999.

LIST OF TABLES (CONT'D)

4-15 Average Macroinvertebrate Densities Collected at Shoal Staions November 1998, February 1999, May 1999, August 1999.

4-16 Average Benthic Invertebrate Densities Collected at Shallow-water (<20 ft MLW) Stations, November 1998 – September 1999.

4-17 Average Benthic Invertebrate Densities Collected at 30 - 40 ft (MLW) Stations, November 1998 – September 1999.

4-18 Average Benthic Invertebrate Densities Collected at Mid-depths (shallow channel) Stations, November 1998 – September 1999.

4-19 Average Benthic Invertebrate Densities Collected at Deep-water (> 20 ft MLW) Stations, November 1998 – September 1999.

4-20 Crab Dredge CPUE at Channel Stations February – April 1999.

4-21 Crab Dredge CPUE at Shoal/Interpier Stations February 1999 – April 1999.

4-22 Estimated Bottom Trawl Crab CPUE at Channel Stations October 1998 – September 1999.

4-23 Estimated Bottom Trawl Crab CPUE at Shoal/Interpier Stations October 1998 – September 1999.

LIST OF FIGURES

3-1 Harborwide and Site-Specific Station Locations October 1998 – September 1999.

4-1 Average Bottom Trawl CPUE of the 10 most dominant fish species October 1998 – September 1999.

4-2 Average Bottom Trawl CPUE of all species combined, October 1998 – September 1999.

4-3 Percent Contribution, based on average density, of benthic invertebrate species November 1998, February 1999, May 1999 and August 1999.

4-4 Average Crab Dredge CPUE of blue crab, February – April 1999.

4-5 Average bottom trawl CPUE of blue crab, October 1998 – September 1999.

4-6 Total Crab Dredge CPUE of blue crab February – April 1999.

4-7 Average Crab Dredge CPUE of blue crab at shoal and shallow depth stations February – April 1999.

4-8 Average Crab Dredge CPUE (no./5-min.tow) of blue crab at channel stations February – April 1999.

APPENDIX A

BOTTOM TRAWL CATCH PER UNIT EFFORT (CPUE)
OCTOBER 1998 – SEPTEMBER 1999

APPENDIX A1

STATION CATCH PER UNIT EFFORT (CPUE)

TABLE A1-1

BOTTOM TRAWL CPUE (NUMBER PER 10-MIN TOW) AT STATION HW-1
OCTOBER 1998 - SEPTEMBER 1999

STATION	HW - 1 (Ambrose Channel North)											
MONTH SAMPLED	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
Alewife							36					
American shad							6					
Atlantic menhaden											5	
Bay anchovy									28		8	
Black sea bass	2											
Blueback herring							2					
Butterfish											62	
Little skate							1					
Lookdown	1											
Northern pipefish							1					
Silver hake							6					
Spotted hake							13					
Summer flounder							1		9			
Weakfish											14	
Windowpane	1						63					
Winter flounder							12					

NOTE: MARSH BIRDS WERE NOT SAMPLED.

TABLE A1-2

BOTTOM TRAWL CPUE (NUMBER PER 10-MIN TOW) AT STATION HW-2
OCTOBER 1998 - SEPTEMBER 1999

STATION	HW - 2 (Ambrose Channel South)											
MONTH SAMPLED	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
Alewife					1		1					
American shad					3							
Bay anchovy											3	
Butterfish											7	
Cunner							1					
Little skate	1				1		2					
Northern pipefish					1							
Scup											2	
Silver hake					11		5					
Smallmouth flounder	2											
Spotted hake					5		27				1	
Striped anchovy											30	
Summer flounder									1		2	
Tautog									1			
Weakfish											61	
Windowpane	3				3		13		1		3	
Winter flounder					1		4				3	

NOTE: M-SITE WATER WERE NOT SAMPLED.

TABLE A1-3

BOTTOM TRAWL CPUE (NUMBER PER 10-MIN TOW) AT STATION HW-3
OCTOBER 1998 - SEPTEMBER 1999

STATION	HW - 3 (Red Hook Channel)											
MONTH SAMPLED	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
Alewife			3						1			
American eel											2	
American shad					5							
Atalntic menhaden											1	
Atlantic tomcod							1		4			
Bay anchovy	6											
Cunner	1				2		1					
Grubby					1							
Little skate							1					
Rock gunnel									1			
Scup	4											
Spotted hake					1		28		9			
Striped bass					1		1					
Striped searobin									2			
Summer flounder									8			
Weakfish	3								5			
Windowpane	2						5		3			
Winter flounder	1				2		15		19		1	

NOTE: MONTHS SHADED WERE NOT SAMPLED.

TABLE A1-4

BOTTOM TRAWL CPUE (NUMBER PER 10-MIN TOW) AT STATION HW-4
OCTOBER 1998 - SEPTEMBER 1999

STATION	HW - 4 (Anchorage Channel North)											
MONTH SAMPLED	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
Atlantic tomcod									89		4	
Bay anchovy											2	
Black sea bass									1		1	
Cunner									6		3	
Feather blenny									1			
Grubby											6	
Northern searobin									7		1	
Oyster toadfish									1			
Red hake											1	
Scup											1	
Spotted hake							4		56		1	
Striped searobin									6		11	
Summer flounder									10		2	
Tautog									5		1	
Weakfish									1		230	
Windowpane									12		7	
Winter flounder							14		50		42	

DATE. MONTH CHANGED WHEN NOT SAMPLED.

TABLE A1-5

BOTTOM TRAWL CPUE (NUMBER PER 10-MIN TOW) AT STATION HW-5
OCTOBER 1998 - SEPTEMBER 1999

STATION	HW - 5 (Bergen Point East Reach/ Constable Hook Reach)											
MONTH SAMPLED	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
American eel	1											
Atlantic tomcod									1			
Bay anchovy	2									31		4
Blueback herring							1					
Bluefish	2										1	
Butterfish										1	4	
Cunner												1
Grubby					1		1					
Hickory shad	1											
Inshore lizardfish											1	
Northern pipefish					1		4					
Northern searobin	1											
Northern stargazer										1		
Oyster toadfish										1		
Scup											8	3
Smallmouth flounder	3											
Spotted hake						3	4		2			
Striped bass					2							
Striped searobin											1	1
Summer flounder										14		
Tautog												1
Weakfish	2									494	35	3
Windowpane	10				1	3	5			11		1
Winter flounder	3				2	1	1		1		1	

NOTE: MONTH NAMED WERE NOT SAMPLED.

TABLE A1-6

BOTTOM TRAWL CPUE (NUMBER PER 10-MIN TOW) AT STATION HW-6
OCTOBER 1998 - SEPTEMBER 1999

STATION	HW - 6 (North of Shooters Island Reach)											
MONTH SAMPLED	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
Alewife			13				1				2	
American shad			13		1							
Atlantic herring					1							
Atlantic menhaden	1		1									
Bay anchovy	292		11									
Bluefish	4											
Butterfish											1	
Grubby									3			
Gizzard shad			2									
Oyster toadfish									1			
Smallmouth flounder			1									
Spotted hake							2		8			
Striped bass			3				10					
Striped searobin	1											
Summer flounder	1								11			
Weakfish	139		1								2	
White Perch			17				2					
Windowpane			1				3		8			
Winter flounder	2		1		1		6		55			

NOTE: M NOT SHADED WERE NOT SAMPLED.

TABLE A1-7

BOTTOM TRAWL CPUE (NUMBER PER 10-MIN TOW) AT STATION HW-7
OCTOBER 1998 - SEPTEMBER 1999

STATION	HW - 7 (Elizabeth Reach)											
MONTH SAMPLED	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
Alewife			1									
Atlantic tomcod											1	
Conger eel											1	
Grubby							6		1			
Lookdown	1											
Oyster toadfish									1			
Scup											5	
Silver hake							1					
Spotted hake							89		19			
Striped bass							9				1	
Striped searobin	8										2	
Summer flounder	1								1		1	
Weakfish	28										61	
White Perch							1					
Windowpane							3					
Winter flounder							7		3		1	

NOTE: M STN - DAGED WERE NOT SAMPLED.

TABLE A1-8

BOTTOM TRAWL CPUE (NUMBER PER 10-MIN TOW) AT STATION HW-8
OCTOBER 1998 - SEPTEMBER 1999

STATION	HW - 8 (Middle Reach)											
MONTH SAMPLED	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
Alewife	1		15				1					
American eel									3			
American shad	1		10									
Atlantic menhaden	1										1	
Atlantic silverside			1									
Bay anchovy	452		7								1	
Bluefish	3											
Butterfish	20		1						1		1	
Gizzard Shad			3			1						
Lookdown	2											
Northern kingfish	1											
Northern pipefish							1					
Scup											3	
Silver hake						4	9					
Smallmouth flounder			2									
Spotted hake			2			3	175		2			
Striped bass			70		24	82	33		1			
Striped searobin	3		1				1					
Summer flounder	1								4		1	
Tautog	1											
Weakfish	173		9								112	
White Perch			77		131	132						
Windowpane	2		1						2			
Winter flounder	1		8			35	19		4			

NOTE: MONTHS SHADED WERE NOT SAMPLED.

TABLE A1-9

BOTTOM TRAWL CPUE (NUMBER PER 10-MIN TOW) AT STATION HW 9
OCTOBER 1998 - SEPTEMBER 1999

HW - 9 (Newark Bay South Reach)

STATION												
MONTH SAMPLED	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
Atlantic tomcod									1			
Cunner						1						
Grubby						7	1					
Northern searobin									1		1	
Scup											10	
Spotted hake				*		4	3		5			
Striped bass						78						
Striped searobin									1			
Summer flounder									1		2	
Weakfish											101	
White Perch						102						
Windowpane						2	2		1			
Winter flounder						117	5		9		4	

NOTE: M SCIP SHADED WERE NOT SAMPLED.

TABLE A1-10

BOTTOM TRAWL CPUE (NUMBER PER 10-MIN TOW) AT STATION HW-10
OCTOBER 1998 - SEPTEMBER 1999

STATION	HW - 10 (Newark Bay / Port Elizabeth)											
MONTH SAMPLED	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
Little skate							1					
Northern pipefish							1					
Scup											18	
Silver hake							6					
Spotted hake						7	122		3			
Striped bass						74	5					
Striped searobin											1	
Summer flounder									3		2	
Weakfish											390	
White Perch						92			1			
Windowpane							1					
Winter flounder						90	76		6		1	

NOTE: MONTH (MAY) WERE NOT SAMPLED.

TABLE A1-11

BOTTOM TRAWL CPUE (NUMBER PER 10-MIN TOW) AT STATION SB-1
OCTOBER 1998 - SEPTEMBER 1999

STATION	SB - 1 (Gowanus Bay Interpier South)											
MONTH SAMPLED	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
Alewife										3		
American shad		9			2							
Atlantic herring								109				
Atlantic silverside		98		53	25						3	
Atlantic tomcod								102				
Bay anchovy	21							36	28	53		
Black sea bass												3
Butterfish								4		20		
Lookdown												3
Northern kingfish	5											
Northern pipefish	2											
Scup										77		23
Spotted hake								7				
Striped bass	19	31					20			477	144	
Striped searobin											3	
Summer flounder								15	9			
Weakfish		2									3	
Windowpane							3					
Winter flounder	5	4				3	30	7				

NOTES: MONTH / HALFD WEEK NOT SAMPLED.

TABLE A1-12

BOTTOM TRAWL CPUE (NUMBER PER 10-MIN TOW) AT STATION SB-2
OCTOBER 1998 - SEPTEMBER 1999

SB - 2 (Gowanus Bay Interpier)

STATION												
MONTH SAMPLED	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
Alewife										7	13	
American shad		3										
Atlantic silverside				4								
Atlantic tomcod								167	3			97
Bay anchovy								40	27	13	13	
Black sea bass	9										7	
Blueback herring										10		
Butterfish										7		
Clown fish	9											3
Inshore lizardfish									3			
Northern pipefish										3		
Rainbow smelt								7		13	53	47
Scup							6					
Silver hake							34	13				70
Spotted hake												
Striped anchovy				4			17	7		687	27	
Striped bass		3								33	80	
Striped searobin		3						17		10	3	
Summer flounder										97	3	
Weakfish							3	3	10	10	17	
Windowpane								3	7	7		3
Winter flounder	9	7										

NOTE: MONTH SHADED WERE NOT SAMPLED.

TABLE A1-13

BOTTOM TRAWL CPUE (NUMBER PER 10-MIN TOW) AT STATION SB-3
OCTOBER 1998 - SEPTEMBER 1999

STATION	SB - 3 (Gowanus Bay Interpier North)											
MONTH SAMPLED	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
Alewife											22	18
American shad		14										
Atlantic silverside						2						18
Atlantic tomcod								20	4			
Bay anchovy								5	44	8		
Black sea bass												4
Blueback herring									10			2
Bluefish											2	2
Butterfish										40	8	6
Northern pipefish											2	
Scup										22	8	26
Silver hake						2						
Spot										2		
Spotted seatrout										2		
Spotted hake							3					
Striped bass		269							2	2168	8	
Striped searobin										12		
Tautog												2
Weakfish	2	2						3		12	5	6
Windowpane									2	8		
Winter flounder	2	2				2	3		2	8		2

NOTE: M.S.B. BAIRD WERE NOT SAMPLED.

TABLE A1-14

BOTTOM TRAWL CPUE (NUMBER PER 10-MIN TOW) AT STATION SB-4
OCTOBER 1998 - SEPTEMBER 1999

STATION	SB - 4 (Bay ridge Channel)											
MONTH SAMPLED	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
Alewife		2				2			1	19	6	1
American shad		63				16						
Atlantic herring						12						
Atlantic menhaden		1									1	
Atlantic moonfish								2				
Atlantic tomcod									49	4	6	7
Bay anchovy	3	7				1						
Bluefish		13										
Butterfish	4							2	1	8	8	
Little skate	27	7						2				
Lined seahorse											1	
Lookdown	1											
Red hake						1						
Scup	3							1		23	14	
Silver hake									1			
Smallmouth flounder	1											
Spotted hake							2	5	6			
Striped anchovy												1
Striped bass							2			3		
Striped cusk eel							1					
Striped searobin											2	
Summer flounder								8	1		1	
Weakfish	9	1							8	85	3	
Windowpane							3	6	2	1	1	
Winter flounder	11						33	5	2			

NOTE: MONTH SHADED WERE NOT SAMPLED.

TABLE A1-15

BOTTOM TRAWL CPUE (NUMBER PER 10-MIN TOW) AT STATION PJ-1
OCTOBER 1998 - SEPTEMBER 1999

STATION	PJ - 1 (Jersey Flats)											
MONTH SAMPLED	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
Alewife										6		
American shad	1	4										
Atlantic herring				6		1						
Atlantic tomcod									13			
Atlantic silverside										319		
Bay anchovy							1			111		1
Black sea bass	2										1	
Blueback herring										1		
Bluefish												1
Butterfish										7		
Cunner					2					1	1	
Grubby			2				1			2		
Inshore lizardfish												1
Northern kingfish	1											1
Northern pipefish									1			
Rock gunnel										1		
Scup	4								4	9	4	6
Silver hake			1									
Smallmouth flounder		1	7									
Spotted hake			1									
Striped anchovy											12	7
Striped bass		1								239	48	
Striped searobin												1
Weakfish										4		
Windowpane			1		1		3			2		
Winter flounder	2	6	1		3	3	11		4	2		

NOTE: MONTHS SHADED WERE NOT SAMPLED.

TABLE A1-16

BOTTOM TRAWL CPUE (NUMBER PER 10-MIN TOW) AT STATION PJ-2
OCTOBER 1998 - SEPTEMBER 1999

STATION	PJ - 2 (Pierhead Channel)											
MONTH SAMPLED	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
Alewife					1	1	8			46	40	
American shad		4	2				1				3	
Atlantic herring				7					1			
Atlantic menhaden					1						13	
Atlantic silverside	1		1							13		
Atlantic tomcod			1					1	1			
Bay anchovy			6	1					4	5	36	35
Black sea bass	10		1						1		4	
Blueback herring		34								2		
Bluefish												2
Butterfish	1									61	29	24
Cunner											2	
Fourspot flounder	1											
Grubby	1											
Lined seahorse							1					
Little skate			1									
Northern kingfish	1											
Northern pipefish							1					
Red hake		1										
Scup	2								1	28	7	21
Silver hake							4					
Smallmouth flounder	3											
Spotted hake							2		3			
Striped bass		2	5				119			2	10	
Striped searobin	4											2
Summer flounder								2	7		1	
Tautog	2										1	3
Weakfish	13		3					1		403	42	2
Windowpane	7						2	1	2	7		
Winter flounder	11		11				10	1	5	3	2	

NOTE: MONTHS SHADED WERE NOT SAMPLED.

TABLE A1-17

BOTTOM TRAWL CPUE (NUMBER PER 10-MIN TOW) AT STATION PJ-3
OCTOBER 1998 - SEPTEMBER 1999

STATION	PJ - 3 (Constable Hook)											
MONTH SAMPLED	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
American sandlance	4											
Atlantic tomcod								13	1			
Bay anchovy								159		1	100	
Black sea bass	2								2		1	
Blueback herring								157		2		
Bluefish									1		1	
Butterfish										24		
Crevalle jack												1
Grubby	4											
Inshore lizardfish											1	
Naked goby		1										
Northern kingfish	5											
Northern pipefish								1		3		
Pollock								16				
Red hake		1										
Scup												1
Smallmouth flounder	2								1			
Spot								4	1			
Spotted hake											11	
Striped anchovy										1	11	
Striped bass										46		
Striped searobin								9	4	1	3	1
Summer flounder										10		
Tautog	2								3	3	1	
Weakfish								7	30	7	2	
Windowpane												
Winter flounder	4	1		1								

NOTE: M WITH SHADED WEEK NOT SAMPLED

TABLE A1-18

BOTTOM TRAWL CPUE (NUMBER PER 10-MIN TOW) AT STATION PJ-4
OCTOBER 1998 - SEPTEMBER 1999

STATION	PJ - 4 (Port Jersey Channel)											
MONTH SAMPLED	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
Alewife							4			38	56	1
American shad					1		3			3	2	16
Atlantic herring						1			8			
Atlantic menhaden										1	28	
Atlantic moonfish										1	1	7
Atlantic silverside										76		
Atlantic tomcod									113	2		
Bay anchovy							1		74	9	417	7
Black sea bass	1											
Blueback herring											1	15
Bluefish	1								1		1	
Butterfish									1	3	25	1
Cunner								2				
Fourspot flounder	2											
Lookdown	29											
Northern pipefish								2			3	
Northern puffer										1		
Red hake									3			
Scup										2	4	1
Silver hake								7				
Spot									7			
Spotted hake							1	13	3			
Striped bass					1	1	122			2	18	
Striped searobin										7	1	
Summer flounder									2	7	2	
Tautog								2				
Weakfish	7									297	6	
Windowpane						1		2	9	1	1	1
Winter flounder	5				2				9	16		1

NOTE: MONTHS SHADED WERE NOT SAMPLED.

TABLE A1-19

BOTTOM TRAWL CPUE (NUMBER PER 10-MIN TOW) AT STATION PJ-5
OCTOBER 1998 - SEPTEMBER 1999

STATION	PJ - 5 (Global Marine Terminal)											
MONTH SAMPLED	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
Alewife												
American shad		2					143			121		2
Atlantic herring							10					
Atlantic menhaden						4			1			
Atlantic moonfish										2	4	2
Atlantic silverside				1	1							2
Atlantic tomcod								3	4	157		
Bay anchovy									27	4	402	42
Bluefish							9					
Butterfish		2	4							90	13	28
Cunner									1			
Inshore lizardfish										8		3
Northern pipefish							1			1		
Northern puffer											2	8
Scup							1					
Spotted hake							251			29		2
Striped bass										24		
Striped searobin									4	8		
Summer flounder		1								1322	13	3
Weakfish				1					11	3		
Windowpane					1		1		19	5		
Winter flounder												

NOTE: M 6TH JANUARY WEEK NOT SAMPLED.

TABLE A1-20

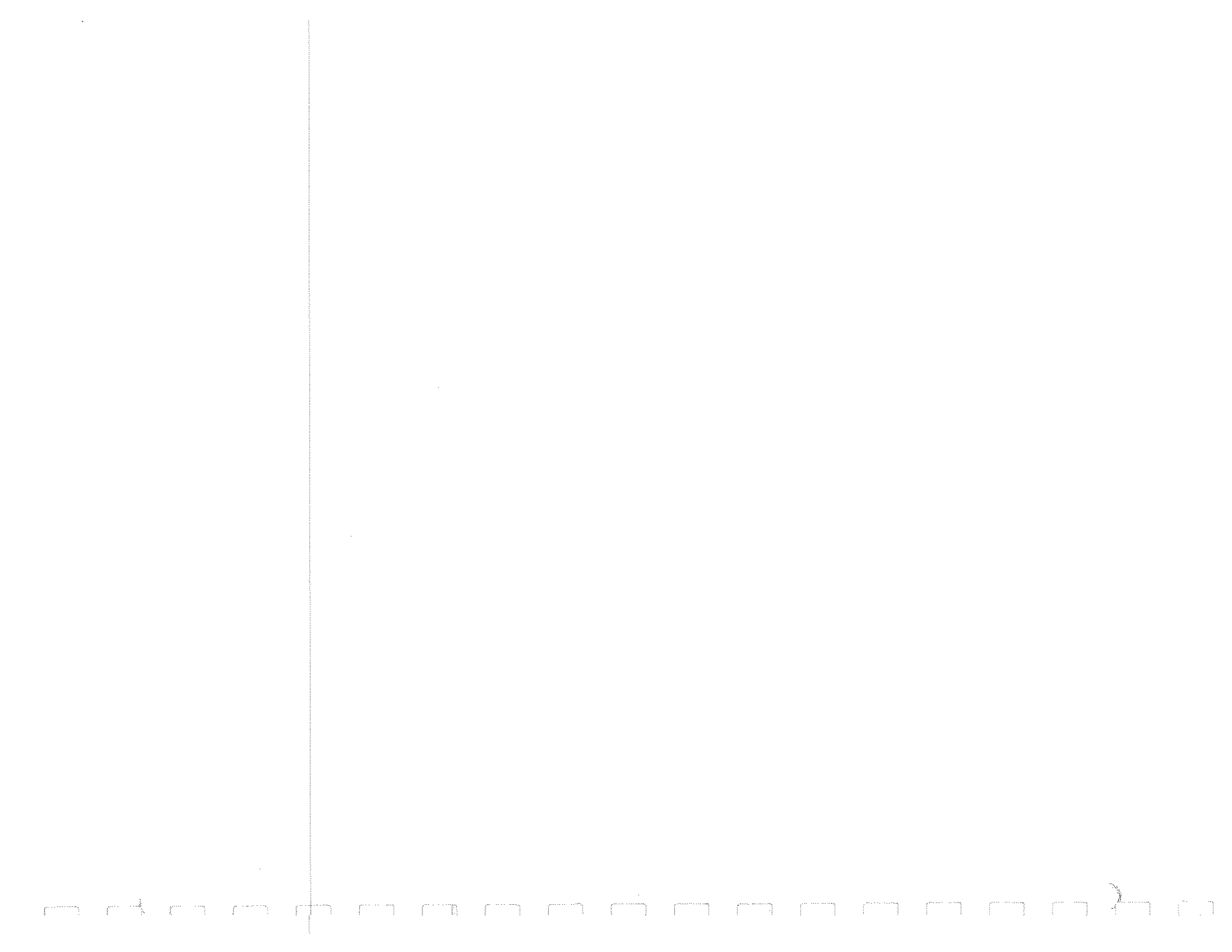
BOTTOM TRAWL CPUE (NUMBER PER 10-MIN TOW) AT STATION PJ-6
OCTOBER 1998 - SEPTEMBER 1999

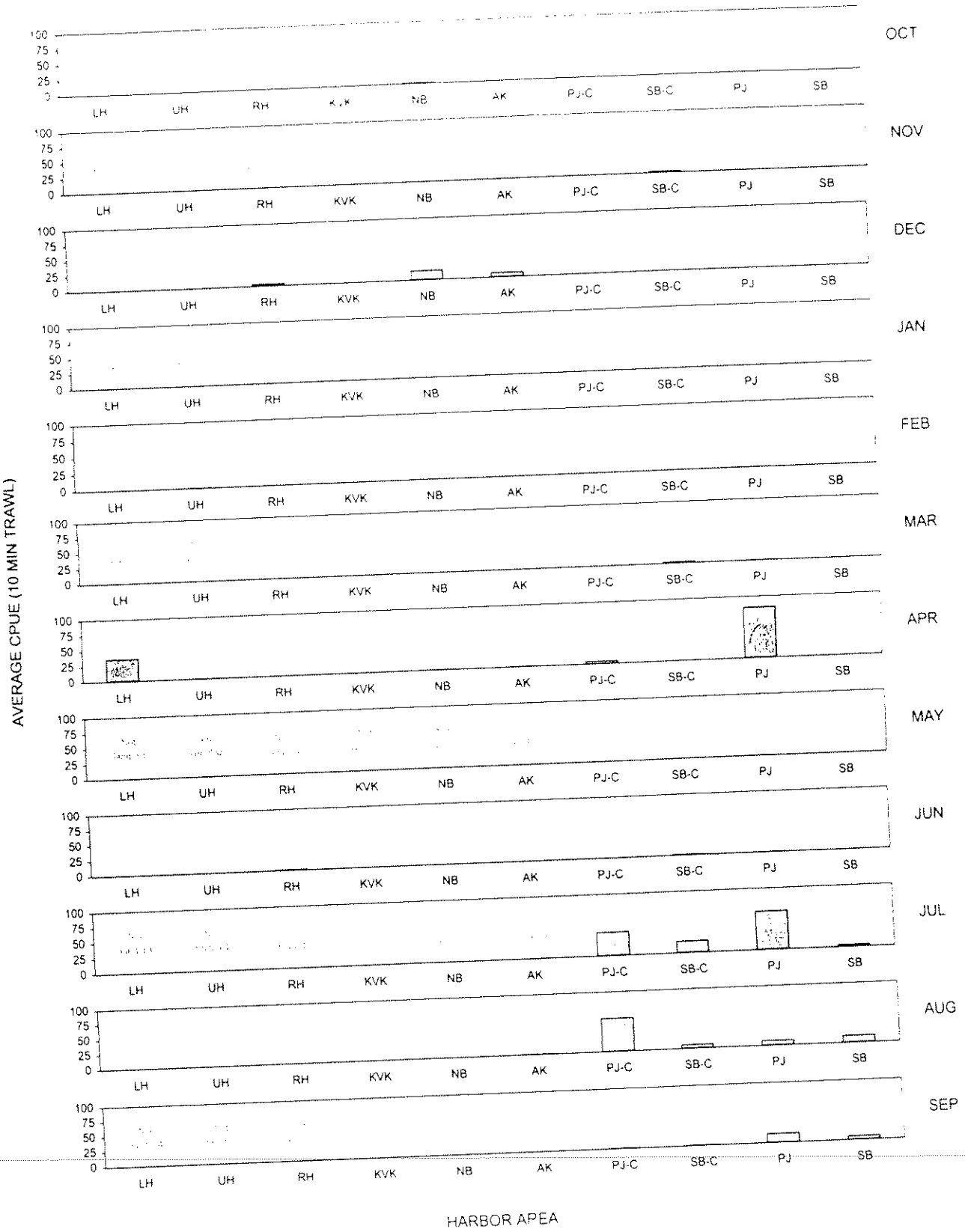
STATION	PJ - 6 (Claremont Terminal Channel)											
MONTH SAMPLED	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
Alewife							260	2	1	140		73
American shad							6		1			
Atlantic herring									9			
Atlantic mackerel									1			
Atlantic menhaden					2					3	3	18
Atlantic moonfish											4	3
Atlantic silverside					2					8		
Atlantic tomcod								162				
Bay anchovy								28	93	25	1349	1817
Blueback herring							6	18	1			10
Bluefish												5
Butterfish								2		7	8	25
Cunner								2				
Fourspot flounder							1					
Gizzard shad												2
Pollock								2				
Scup										5	11	13
Silver hake							2					
Smallmouth flounder											1	
Spotted hake							2	5				
Striped bass							61	2		20	17	
Striped searobin										7		
Summer flounder									1	2	3	3
Tautog								2				
Weakfish									5	493	64	53
Windowpane									3	7		
Winter flounder										2		

NOTE: MONTHS SHADED WERE NOT SAMPLED.

APPENDIX A2

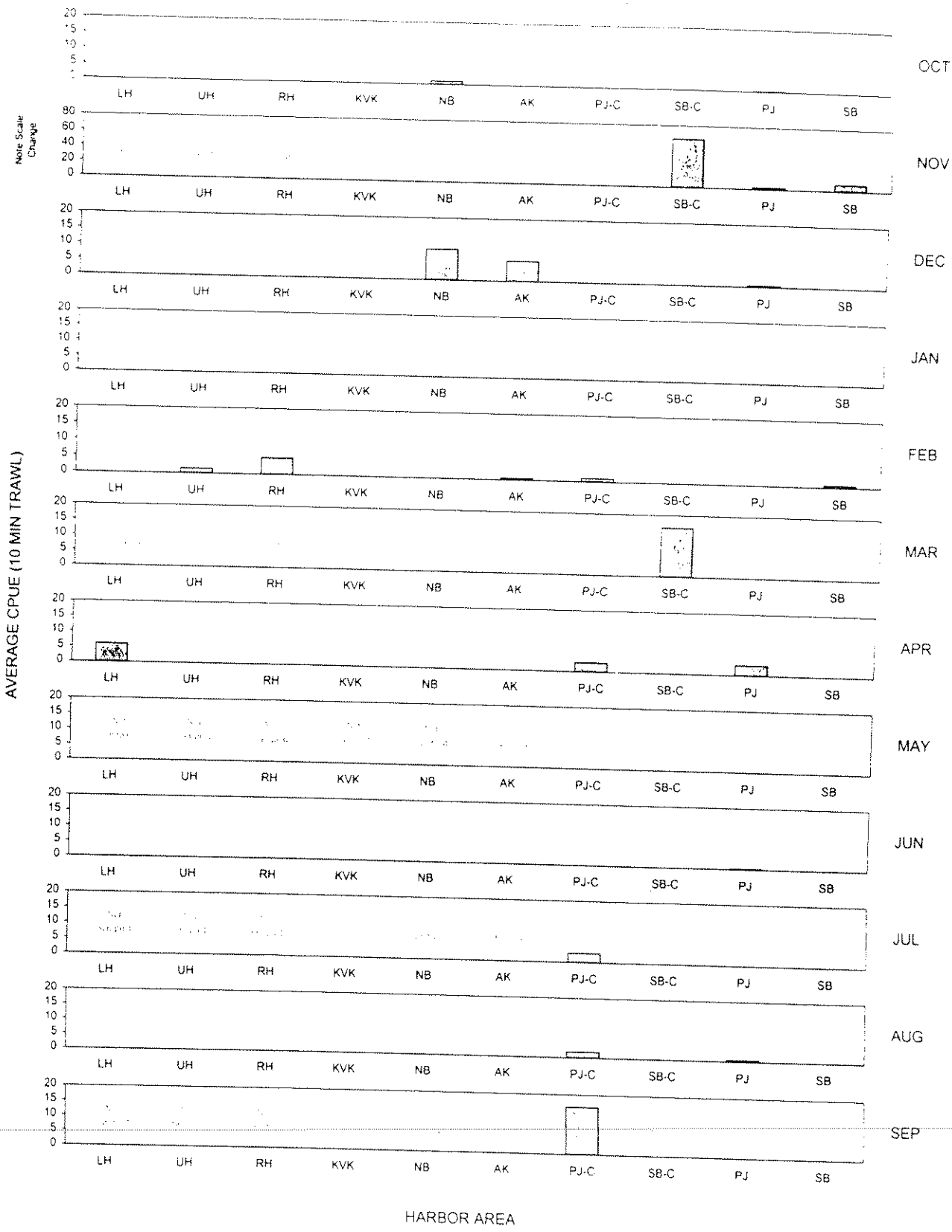
AVERAGE SPECIES CATCH PER UNIT EFFORT (CPUE)





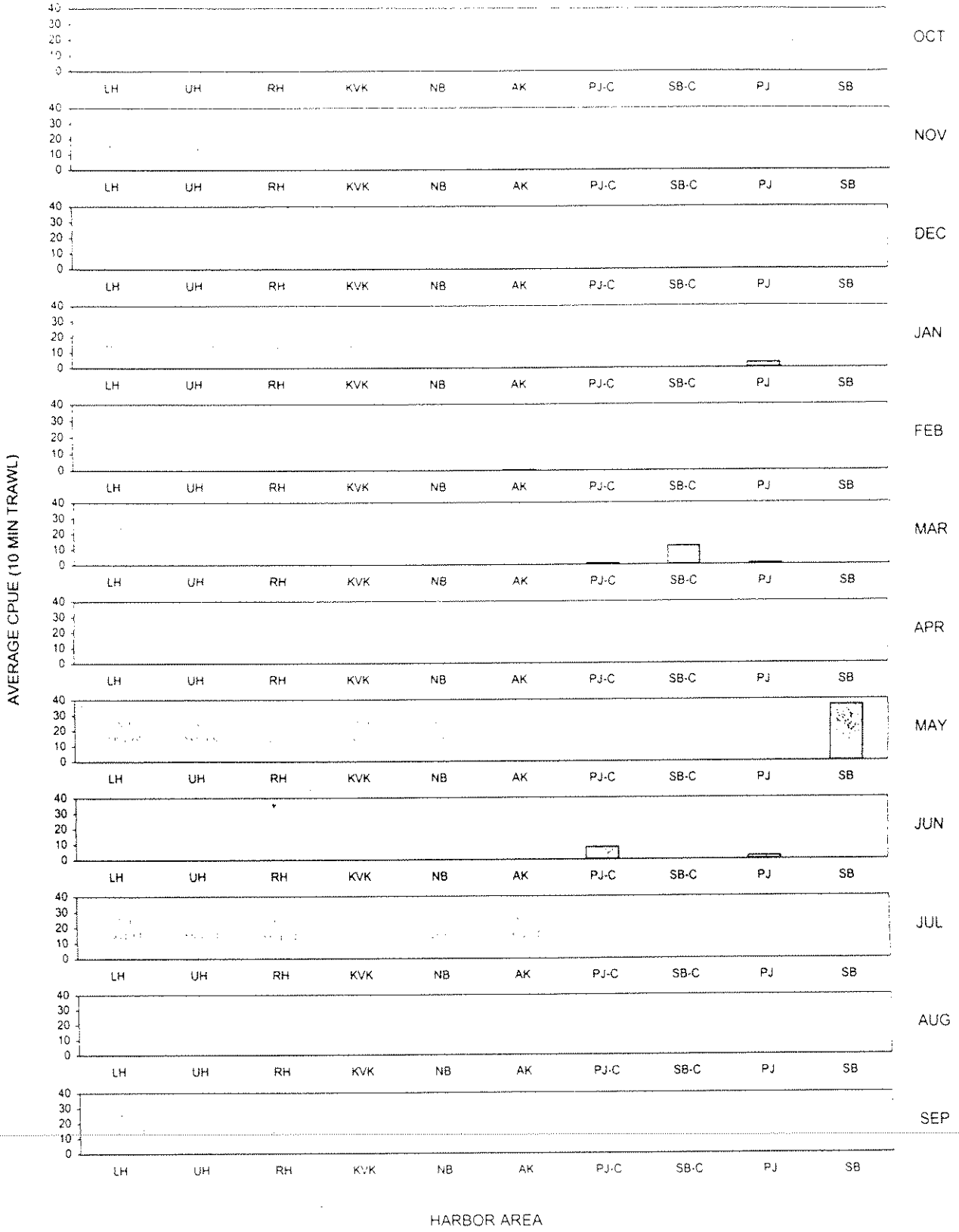
NOTE: Not Sampled - Not all stations sampled each month; see sampling schedule for actual months and stations sampled.
LH - Lower Harbor (HW 1); UH - Upper Harbor (HW 2-4); RH - Red Hook (HW 3); KVK - Kill Van Kull (HW 5); AK - Arthur Kill (HW 6-7);
NB - Newark Bay (HW 8-10); PJ-C Port Jersey Channel (PJ 4); SB-C South Brooklyn Channel (SB 4); PJ - Port Jersey (PJ [illegible]); SB - South Brooklyn (SB [illegible])

Figure A-1. Average Bottom Trawl CPUE (10 min. tow) of Alewife, October 1998 - September 1999



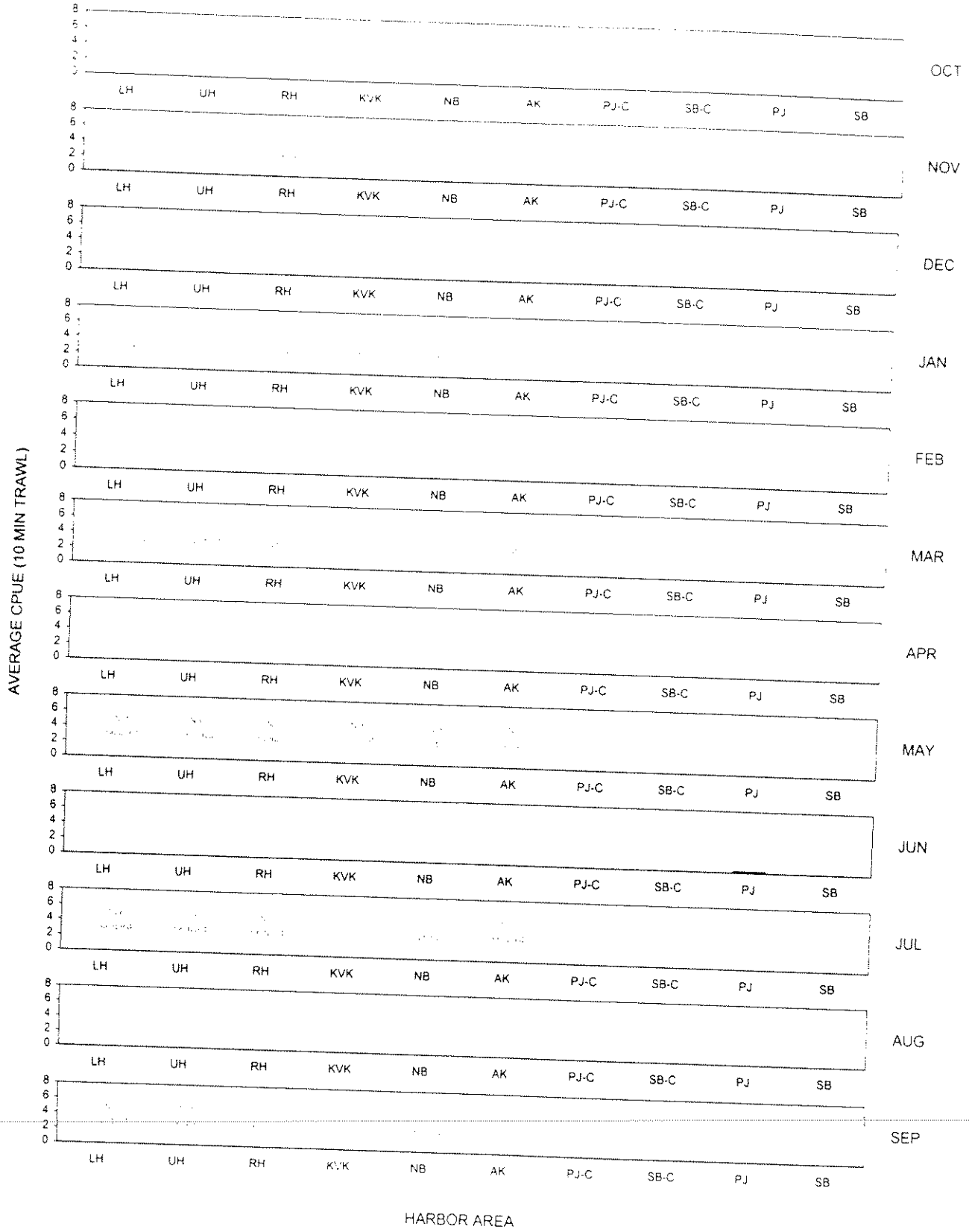
NOTE: Not Sampled - Not all stations sampled each month; see sampling schedule for actual months and stations sampled.
LH - Lower Harbor (HW 1); UH - Upper Harbor (HW 2,4); RH - Red Bank (HW 3); KVK - Kill Van Kull (HW 5); AK - Arthur Kill (HW 6,7);
NB - Newark Bay (HW 8,9); PJ-C Port Jersey Channel; PJ (HW 11); SB-C South Brooklyn Channel; SB (HW 12); PJ - Port Jersey; PJ - (HW 11); SB - South Brooklyn; SB - (HW 12).

Figure A-2. Average Bottom Trawl CPUE (10 min. tow) of American shad, October 1998 - September 1999



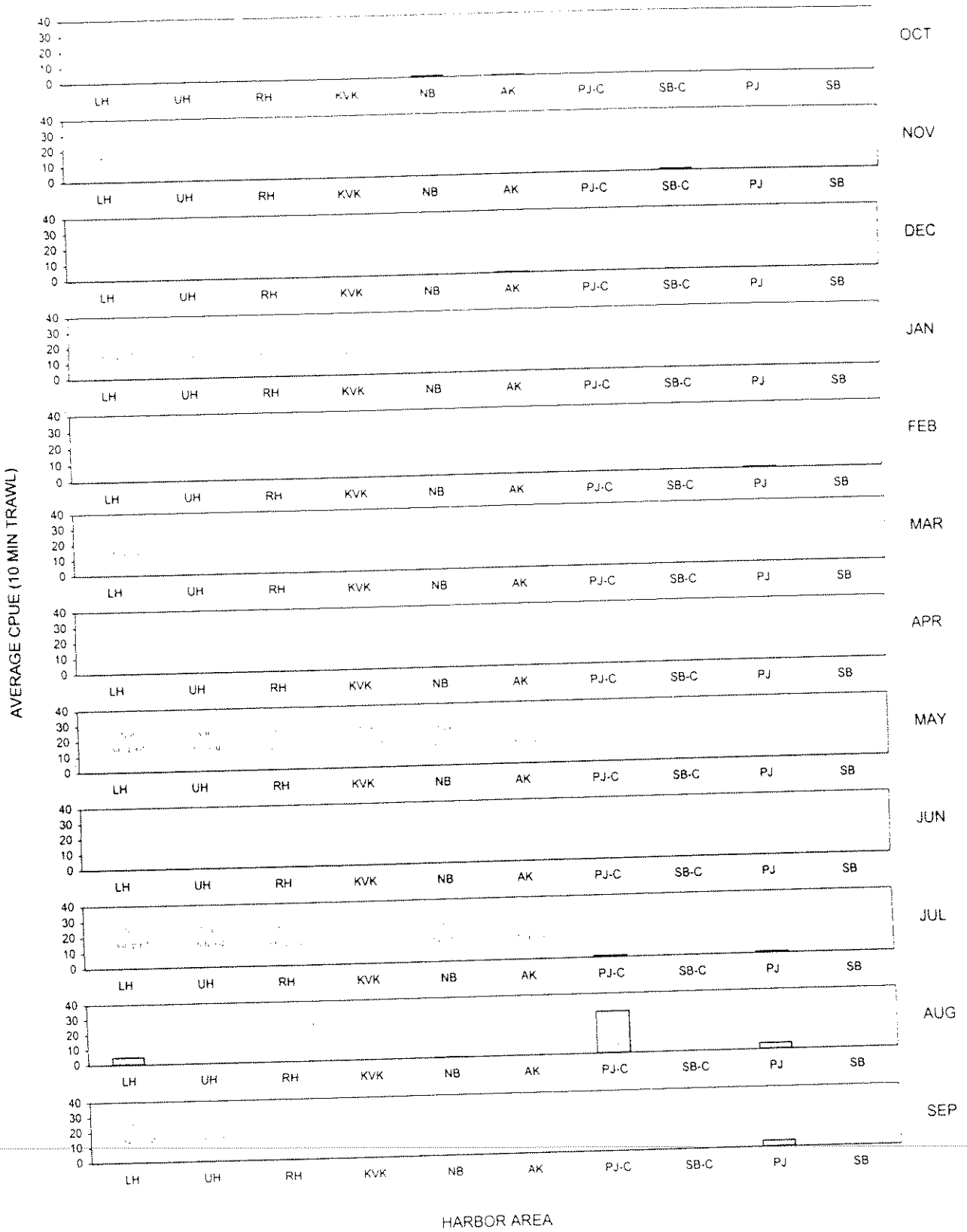
NOTE: Not Sampled - Not all stations sampled each month; see sampling schedule for actual months and stations sampled.
LH - Lower Harbor (HW 1); UH - Upper Harbor (HW 2-4); RH - Red Hook (HW 3); KVK - Kill Van Kull (HW 5); AK - Arthur Kill (HW 6-7);
NB - Newark Bay (HW 8-10); PJ-C Port Jersey Channel (PJ 4); SB-C South Brooklyn Channel (SB 4); PJ - Port Jersey (PJ 1-3, 5-6); SB - South Brooklyn (SB 1-3)

Figure A-3. Average Bottom Trawl CPUE (10 min. tow) of Atlantic herring, October 1998 - September 1999



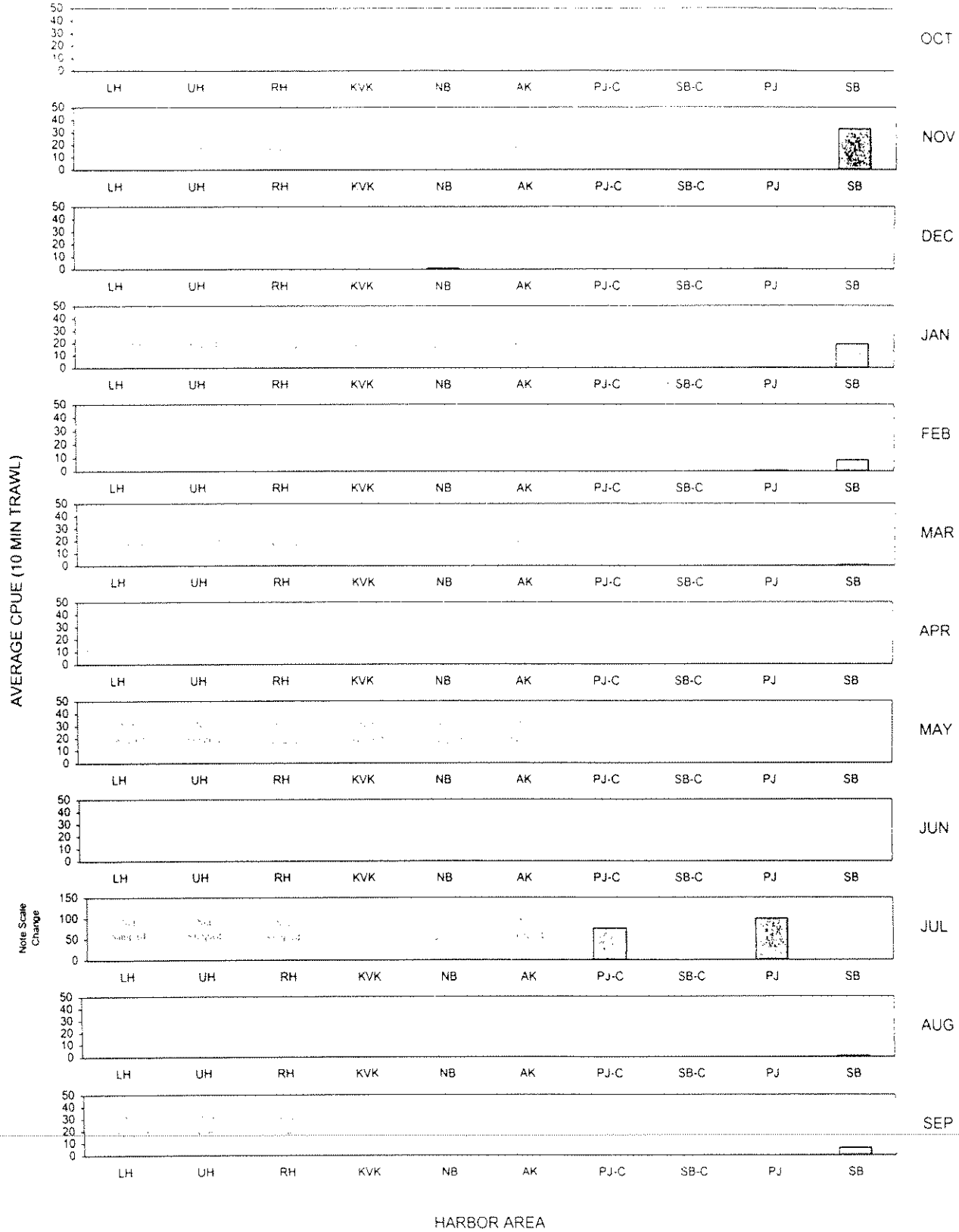
NOTE: Not Sampled - Not all stations sampled each month; see sampling schedule for actual months and stations sampled.
LH - Lower Harbor (HW 1); UH - Upper Harbor (HW 2,4); RH - Red Hook (HW 3); KVK - Kill Van Kull (HW 5); AK - Arthur Kill (HW 6,7);
NB - Newark Bay (HW 8-10); PJ-C Port Jersey Channel (PJ 4); SB-C South Brooklyn Channel (SB 4); PJ - Port Jersey (PJ 1, 3, 5-9); SB - South Brooklyn (SB 1-3)

Figure A-4. Average Bottom Trawl CPUE (10 min. tow) of Atlantic mackerel, October 1998 - September 1999



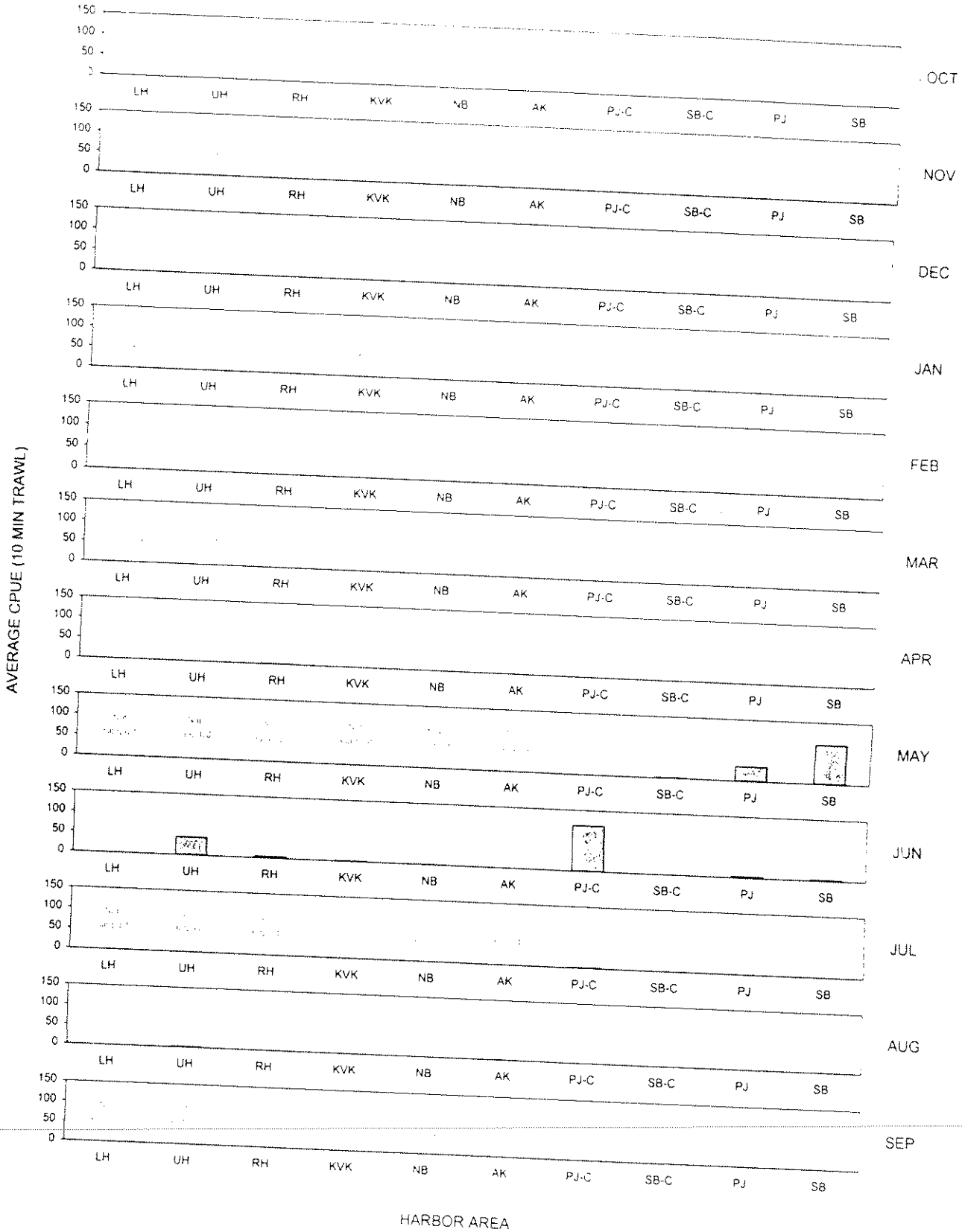
NOTE: Not Sampled - Not all stations sampled each month; see sampling schedule for actual months and stations sampled.
LH - Lower Harbor (HW 1); UH - Upper Harbor (HW 2-4); RH - Red Hook (HW 3); KVK - Kill Van Kull (HW 5); AK - Arthur Kill (HW 6-7);
NB - Newark Bay (HW 8-10); PJ-C Port Jersey Channel (PJ 4); SB-C South Brooklyn Channel (SB 4); PJ - Port Jersey (PJ 1-3, 5-6); SB - South Brooklyn (SB 1-3).

Figure A-5. Average Bottom Trawl CPUE (10 min. tow) of Atlantic menhaden, October 1998 - September 1999



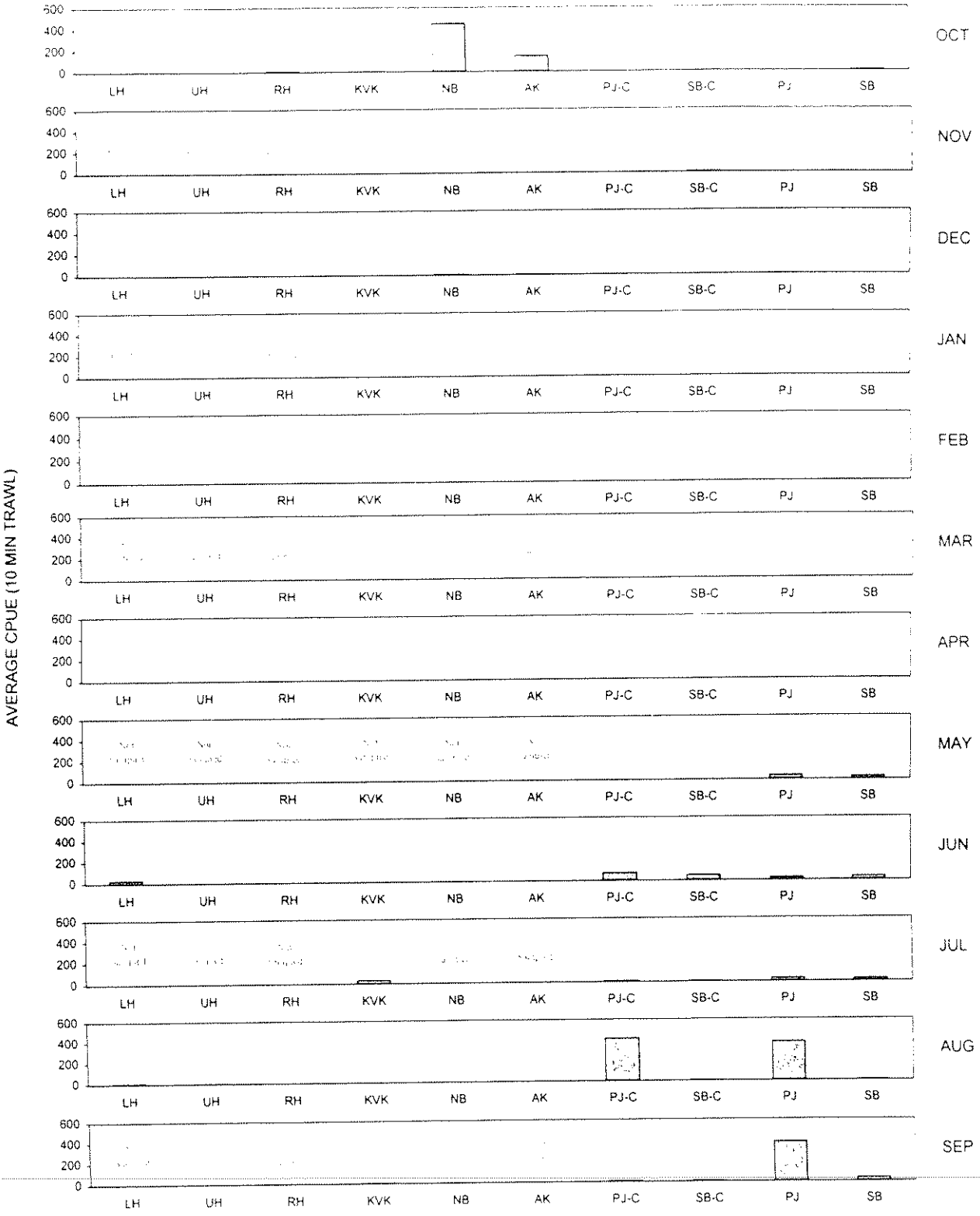
NOTE: Not Sampled - Not all stations sampled each month, see sampling schedule for actual months and stations sampled.
LH - Lower Harbor (HW 1); UH - Upper Harbor (HW 2-4); RH - Red Hook (HW 3); KVK - Kill Van Kull (HW 5); AK - Arthur Kill (HW 6-7);
NB - Newark Bay (HW 8-11); PJ-C Port Jersey Channel (PJ 4); SB-C South Brooklyn Channel (SB 4); PJ - Port Jersey (PJ 1-3, 5-6); SB - South Brooklyn (SB 1-3)

Figure A-6. Average Bottom Trawl CPUE (10 min. tow) of Atlantic silverside, October 1998 - September 1999



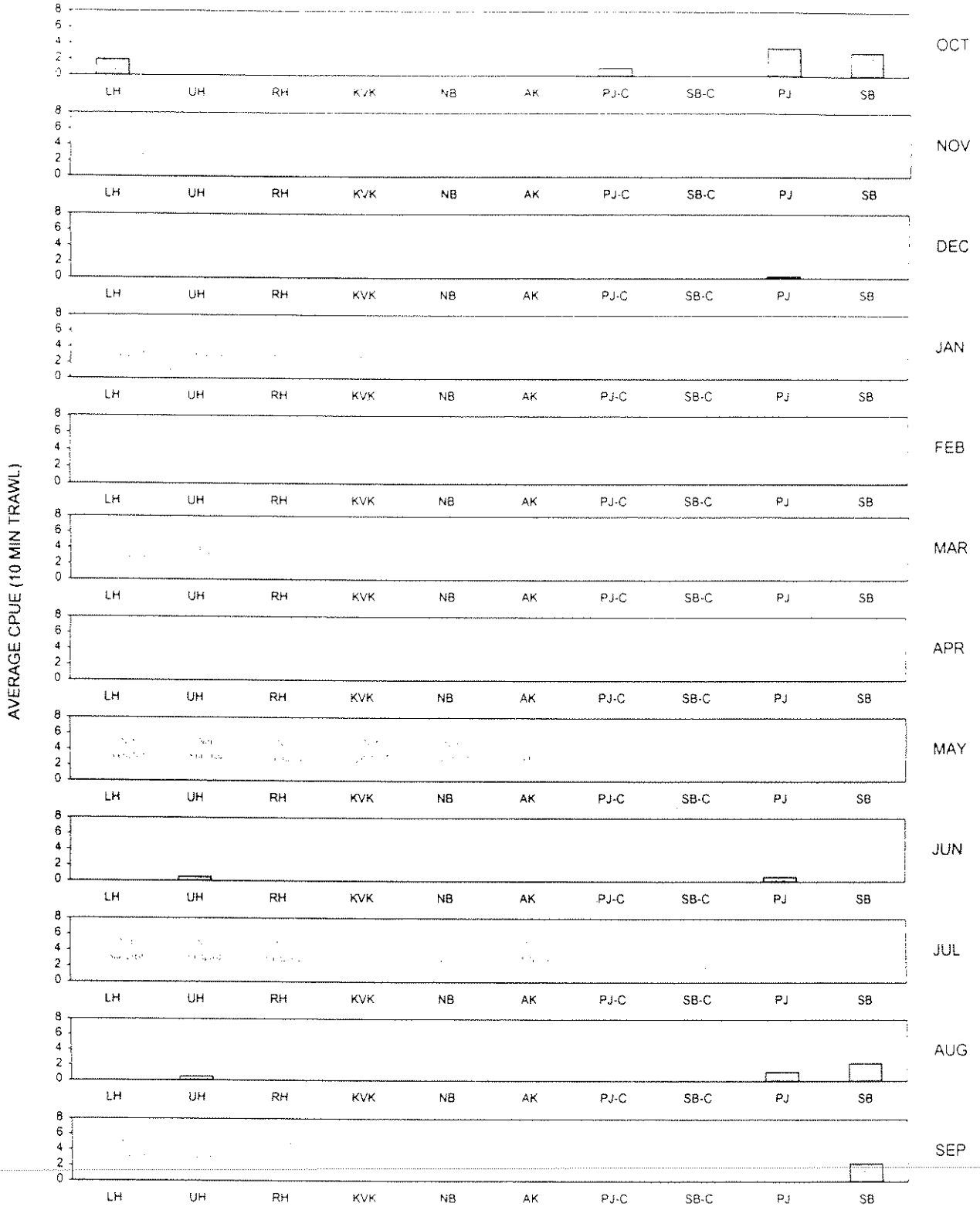
NOTE: Not Sampled - Not all stations sampled each month; see sampling schedule for actual months and stations sampled.
LH - Lower Harbor (HW 1); UH - Upper Harbor (HW 2-4); RH - Red Hook (HW 3); KVK - Kill Van Kull (HW 5); AK - Arthur Kill (HW 6-7);
NB - Newark Bay (HW 8-10); PJ-C Port Jersey Channel (PJ 4); SB-C South Brooklyn Channel (SB 4); PJ - Port Jersey (PJ 1-3, 5-6); SB - South Brooklyn (SB 1-3)

Figure A-7. Average Bottom Trawl CPUE (10 min. tow) of Atlantic tomcod, October 1998 - September 1999



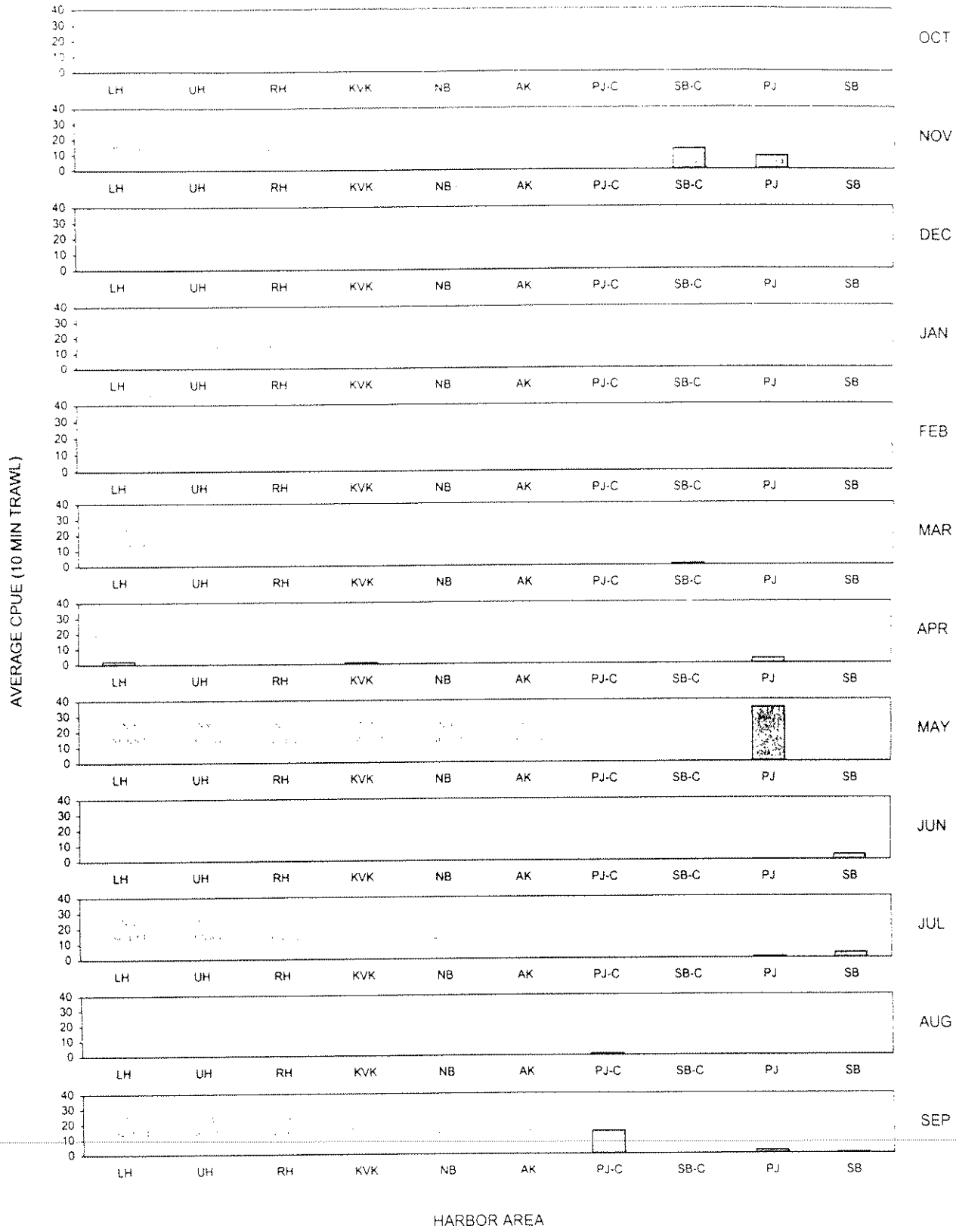
NOTE: Not Sampled. Not all stations sampled each month; see sampling schedule for actual months and stations sampled.
LH - Lower Harbor (HW 1); UH - Upper Harbor (HW 2,4); RH - Red Hook (HW 3); KVK - Kill Van Kull (HW 5); AK - Arthur Kill (HW 6,7)
NB - Newark Bay (HW 8-11); PJ-C Port Jersey Channel (PJ 4); SB-C South Brooklyn Channel (SB 4); PJ - Port Jersey (PJ 1,3,5,6); SB - South Brooklyn (SB 1,3)

Figure A-8. Average Bottom Trawl CPUE (10 min. tow) of Bay anchovy, October 1998 - September 1999



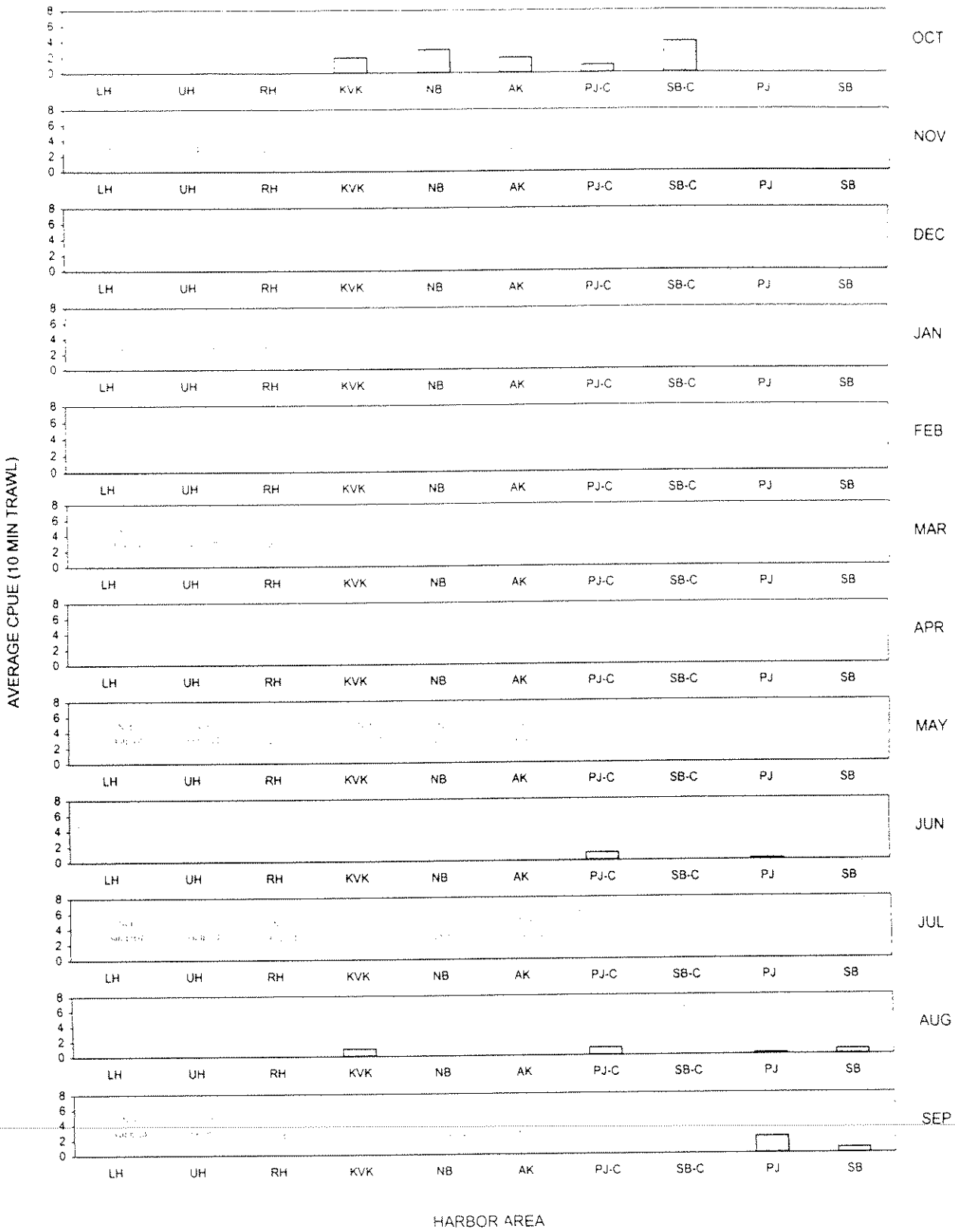
NOTE: Not Sampled - Not all stations sampled each month, see sampling schedule for actual months and stations sampled.
LH - Lower Harbor (HW 1), UH - Upper Harbor (HW 2,4), RH - Red Hook (HW 3), KVK - Kill Van Kull (HW 5), AK - Arthur Kill (HW 6,7)
NB - Newark Bay (HW 8-10), PJ-C Port Jersey Channel (PJ 4), SB-C South Brooklyn Channel (SB 4), PJ - Port Jersey (PJ 1,3,5,6), SB - South Brooklyn (SB 1,3)

Figure A-9. Average Bottom Trawl CPUE (10 min. tow) of Black sea bass, October 1998 - September 1999



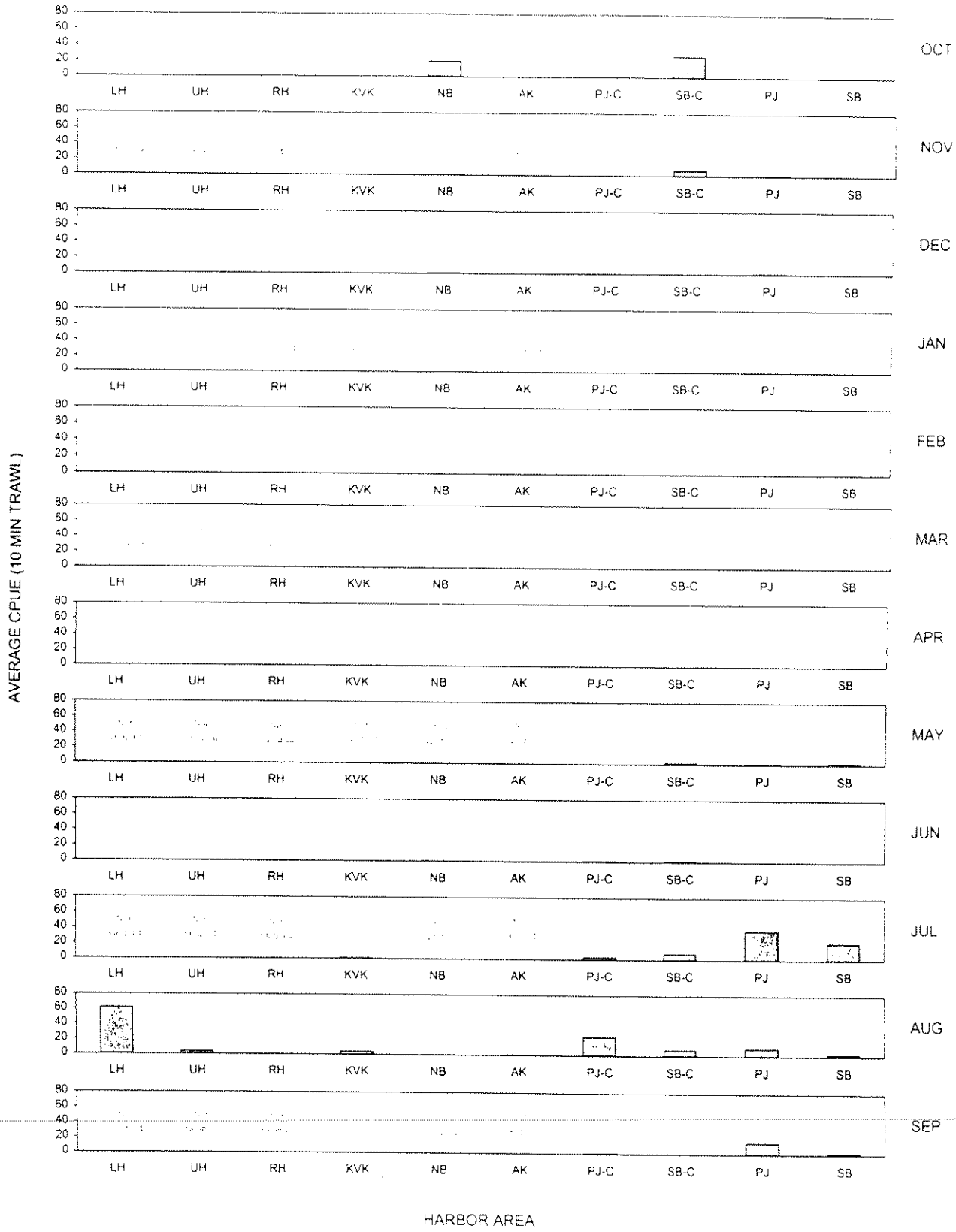
NOTE: Not Sampled - No stations sampled each month, see sampling schedule for actual months and stations sampled.
LH - Lower Harbor (BW 1); UH - Upper Harbor (BW 2 & 3); RH - Red Hook (BW 3); KVK - Kill Van Kull (BW 3); AK - Arthur Kill (BW 6 & 7);
NB - Newark Bay (BW 5 & 6); PJ-C - P. Jersey Channel (PJ 4); SB-C - South Brooklyn Channel (SB 4); PJ - P. Jersey (PJ 1, 2, 3 or 5); SB - South Brooklyn (SB 1, 2 or 3)

Figure A-10. Average Bottom Trawl CPUE (10 min. tow) of Blueback herring, October 1998 - September 1999



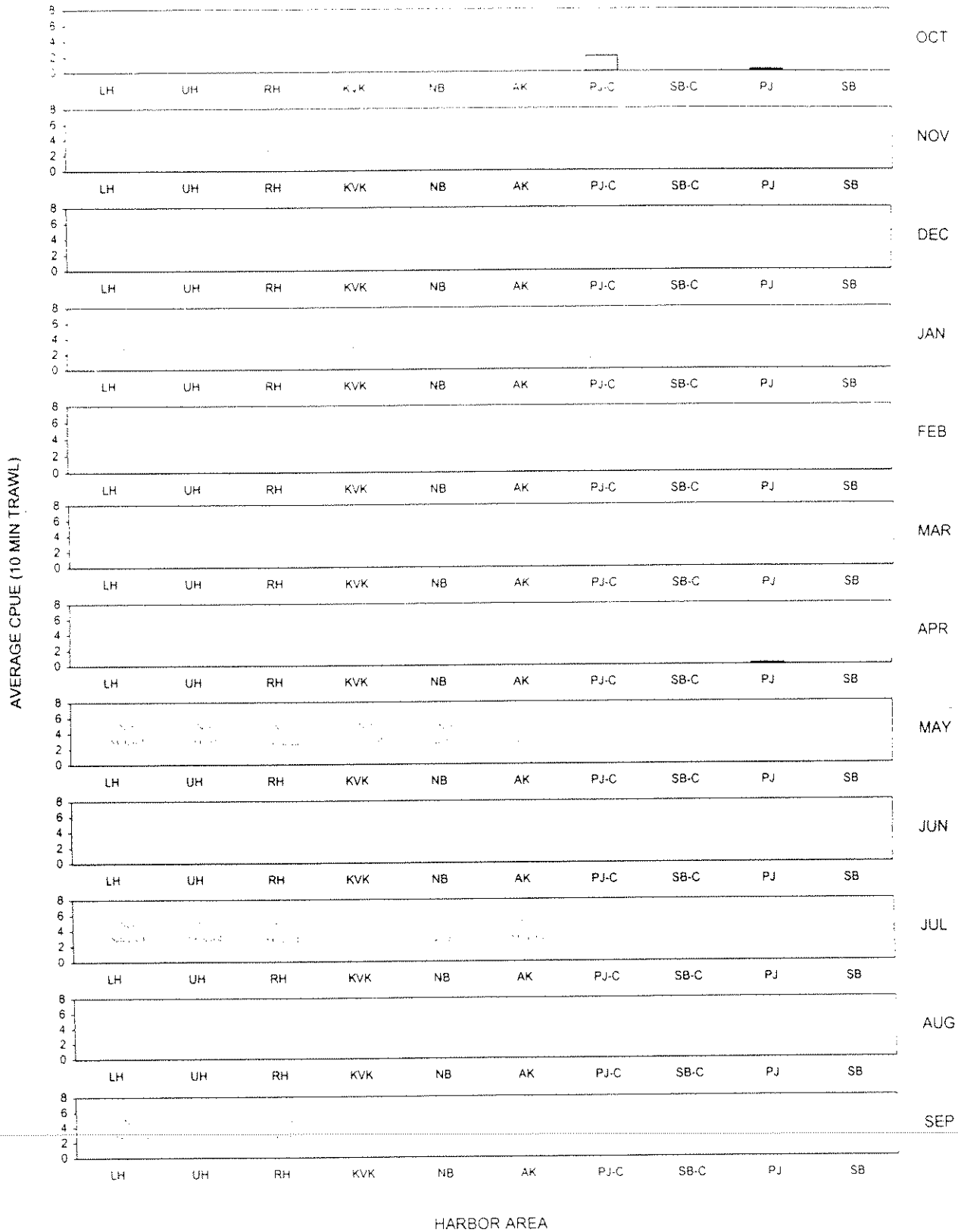
NOTE: Not Sampled. Not all stations sampled each month; see sampling schedule for actual months and stations sampled.
LH - Lower Harbor (HW 1); UH - Upper Harbor (HW 2,4); RH - Red Hook (HW 3); KVK - Kill Van Kull (HW 5); AK - Arthur Kill (HW 6-7)
NB - Newark Bay (HW 8-10); PJ-C Port Jersey Channel (PJ 4); SB-C South Brooklyn Channel (SB 4); PJ - Port Jersey (PJ 1-3, 5-6); SB - South Brooklyn (SB 1-3)

Figure A-11. Average Bottom Trawl CPUE (10 min. tow) of Bluefish, October 1998 - September 1999



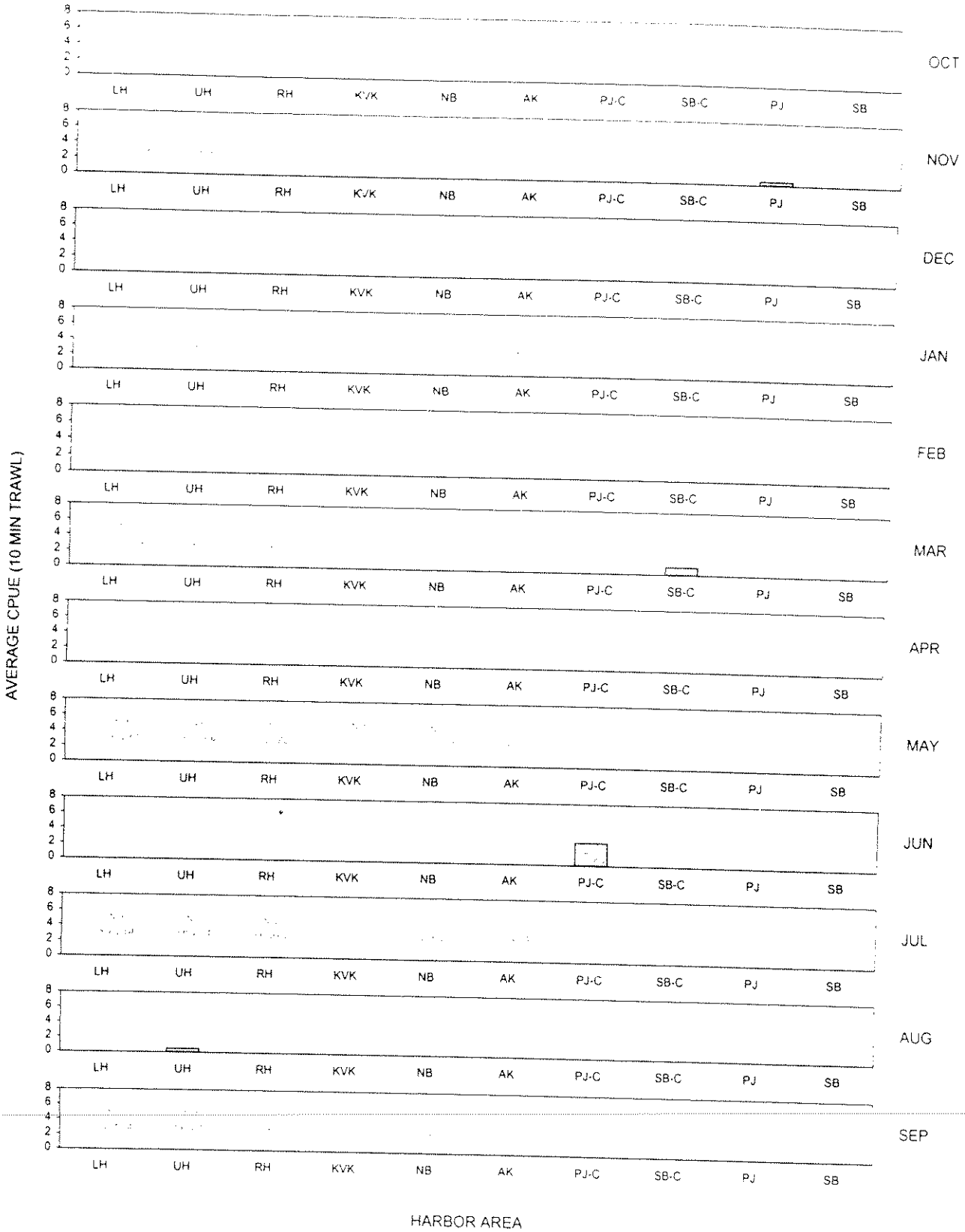
NOTE: Not Sampled - Not all stations sampled each month (see sampling schedule for actual months and stations sampled).
LH - Lower Harbor (HW 1); UH - Upper Harbor (HW 2,4); RH - Red Hook (HW 3); KVK - Kill Van Kull (HW 5); AK - Arthur Kill (HW 6,7);
NB - Newark Bay (HW 8,9,10); PJ-C Port Jersey Channel (PJ 4); SB-C South Brooklyn Channel (SB 4); PJ - Port Jersey (PJ 1,3,5,6); SB - South Brooklyn (SB 1,3).

Figure A-12. Average Bottom Trawl CPUE (10 min. tow) of Butterfish, October 1998 - September 1999



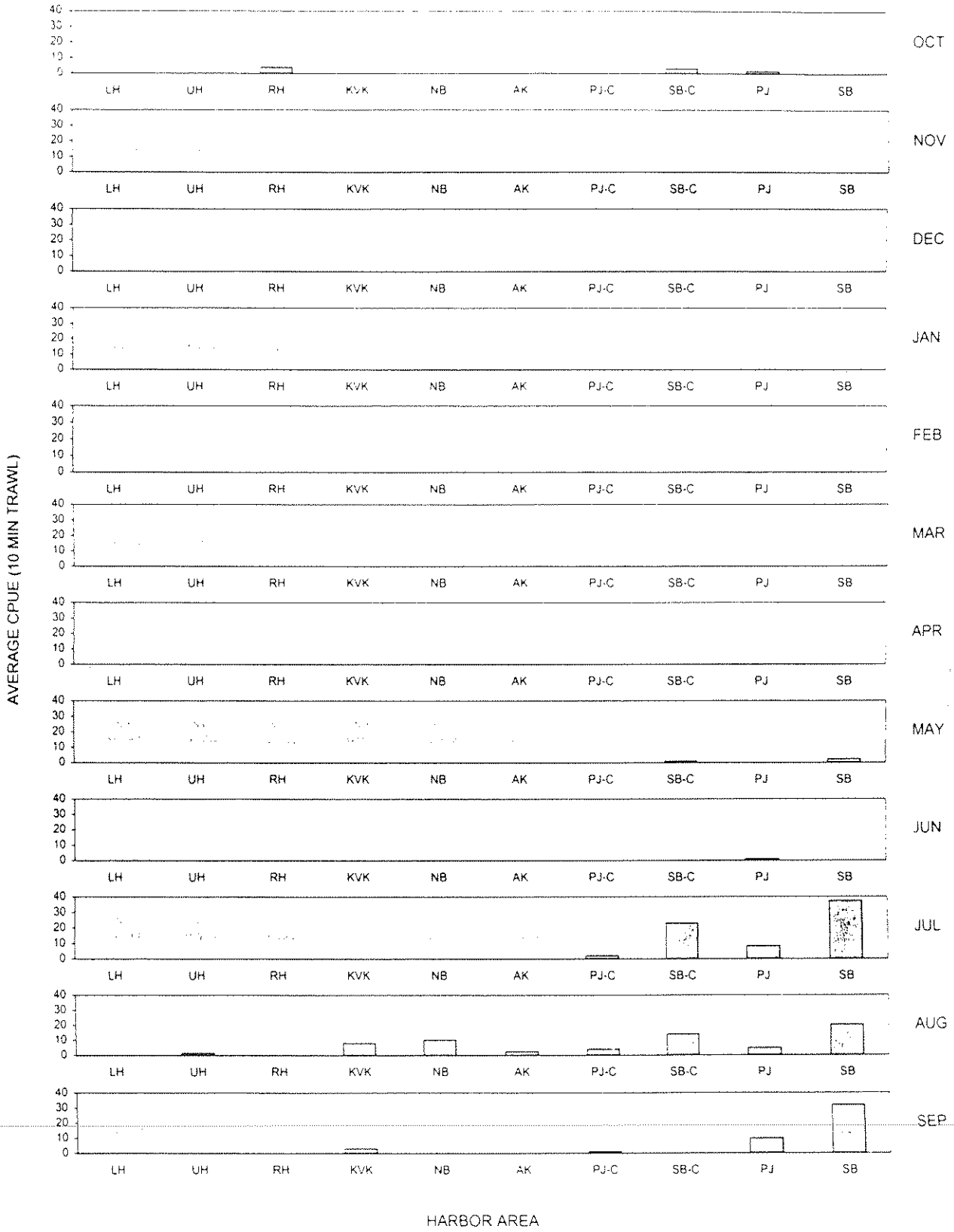
NOTE: Not Sampled. Not all stations sampled each month; see sampling schedule for actual months and stations sampled.
LH - Lower Harbor (HW 1); UH - Upper Harbor (HW 2,4); RH - Red Hook (HW 3); KVK - Kill Van Kull (HW 5); AK - Arthur Kill (HW 6-7)
NB - Newark Bay (HW 8-10); PJ-C Port Jersey Channel (PJ 4); SB-C South Brooklyn Channel (SB 4); PJ - Port Jersey (PJ [illegible]); SB - South Brooklyn (SB [illegible])

Figure A-13. Average Bottom Trawl CPUE (10 min. tow) of Fourspot flounder, October 1998 - September 1999



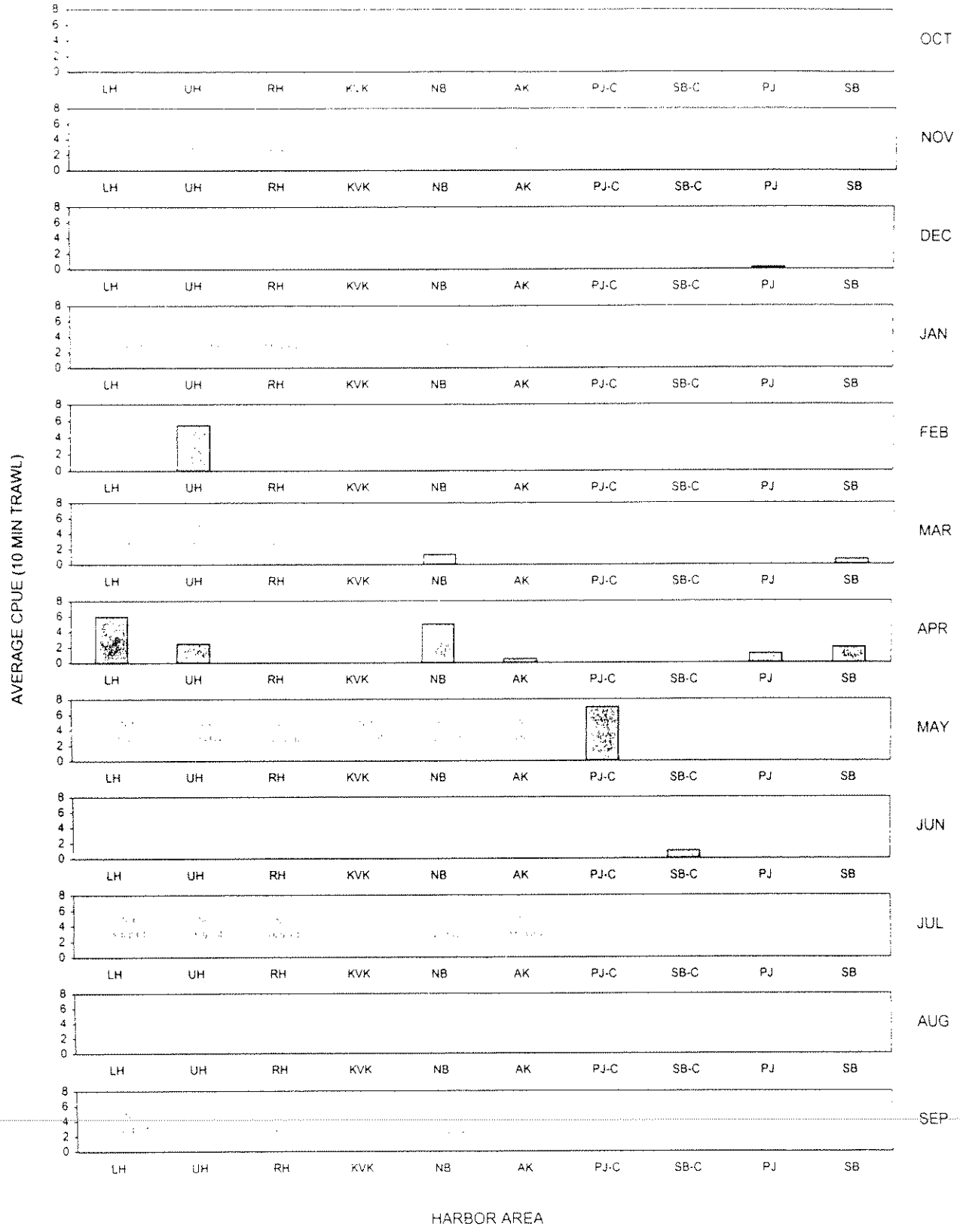
NOTE: Not Sampled - Not all stations sampled each month, see sampling schedule for actual months and stations sampled.
LH - Lower Harbor (HW 1); UH - Upper Harbor (HW 2,4); RH - Red Hook (HW 3); KVK - Kill Van Kull (HW 5); AK - Arthur Kill (HW 6,7);
NB - Newark Bay (HW 8,[illegible]); PJ-C Port Jersey Channel (PJ 4); SB-C South Brooklyn Channel (SB 4); PJ - Port Jersey (PJ 1,3,5,6); SB - South Brooklyn (SB [illegible]).

Figure A-14. Average Bottom Trawl CPUE (10 min. tow) of Red hake, October 1998 - September 1999



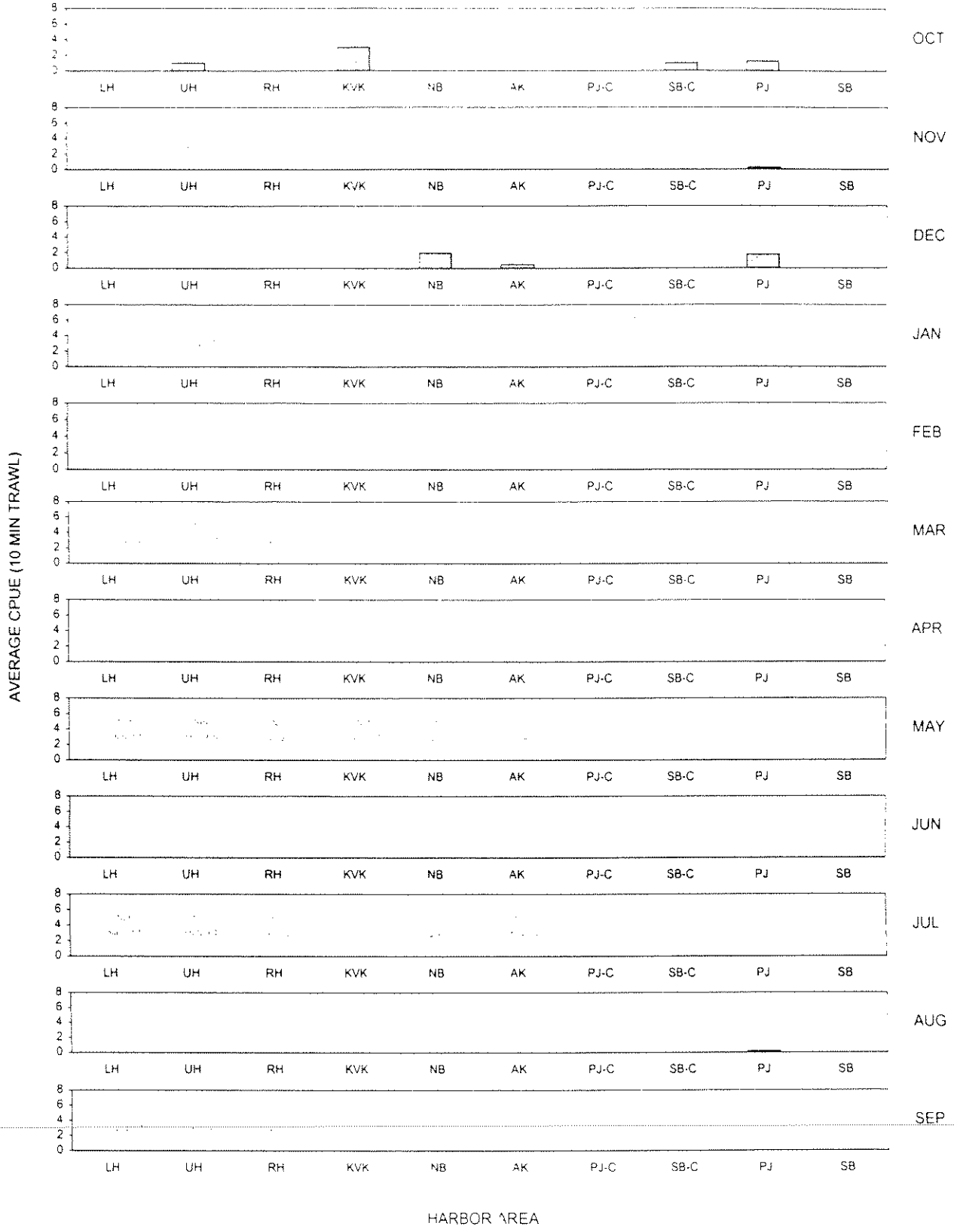
NOTE: Not Sampled. Not all stations sampled each month; see sampling schedule for actual months and stations sampled.
LH - Lower Harbor (HW 1); UH - Upper Harbor (HW 2-4); RH - Red Hook (HW 3); KVK - Kill Van Kull (HW 5); AK - Arthur Kill (HW 6-7);
NB - Newark Bay (HW 8-10); PJ-C - Port Jersey Channel (PJ 4); SB-C - South Brooklyn Channel (SB 4); PJ - Port Jersey (PJ 1-3, 5-6); SB - South Brooklyn (SB 1-3)

Figure A-15. Average Bottom Trawl CPUE (10 min. tow) of Scup, October 1998 - September 1999



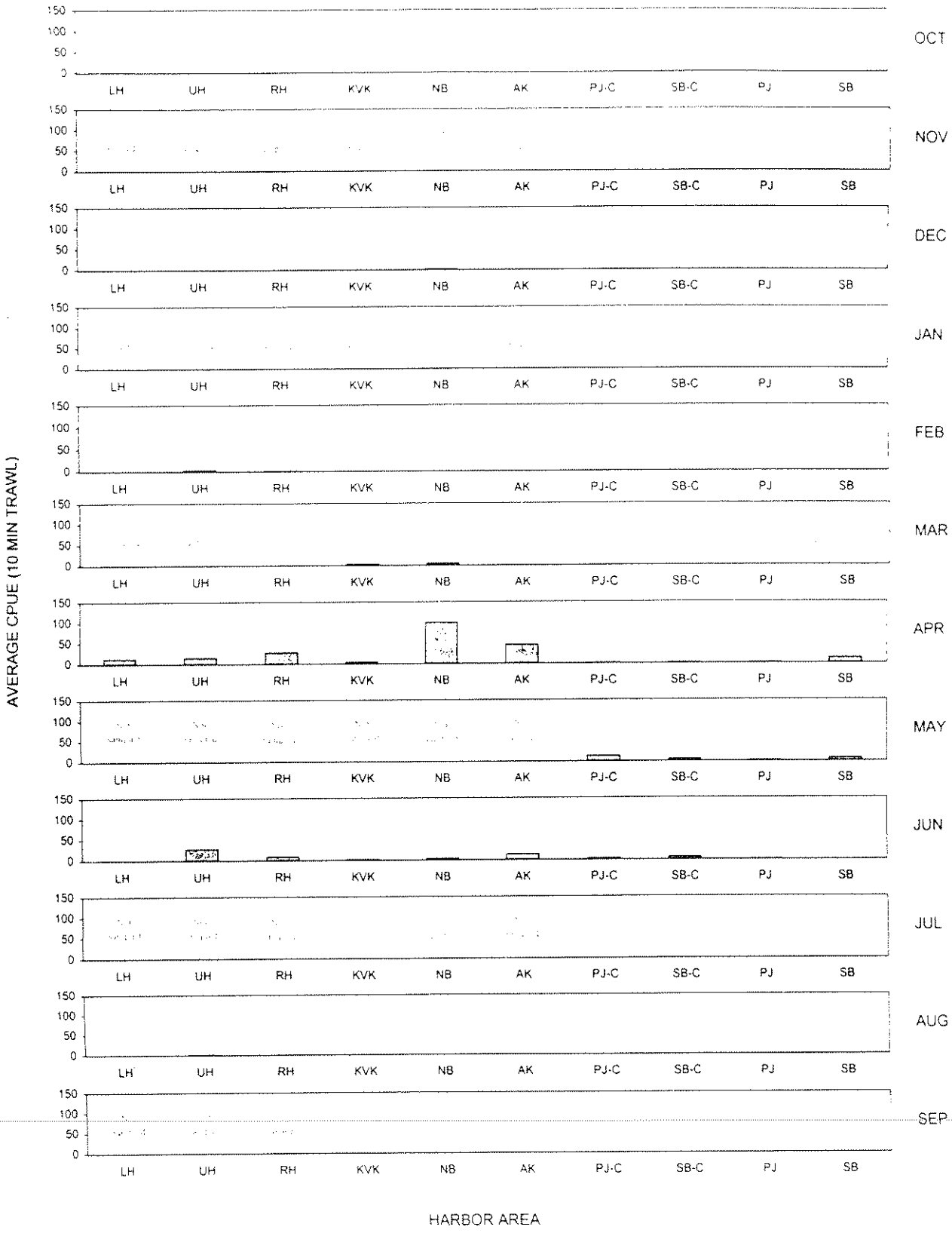
NOTE: Not Sampled. Not all stations sampled each month; see sampling schedule for actual months and stations sampled.
LH - Lower Harbor (HW 1); UH - Upper Harbor (HW 2,4); RH - Red Hook (HW 3); KVK - Kill Van Kull (HW 5); AK - Arthur Kill (HW 6,7);
NB - Newark Bay (HW 8-10); PJ-C - Port Jersey Channel (PJ 4); SB - South Brooklyn Channel (SB 4); PJ - Port Jersey (PJ 1,3,5-6); SB - South Brooklyn (SB 1,3)

Figure A-16. Average Bottom Trawl CPUE (10 min. tow) of Silver hake, October 1998 - September 1999



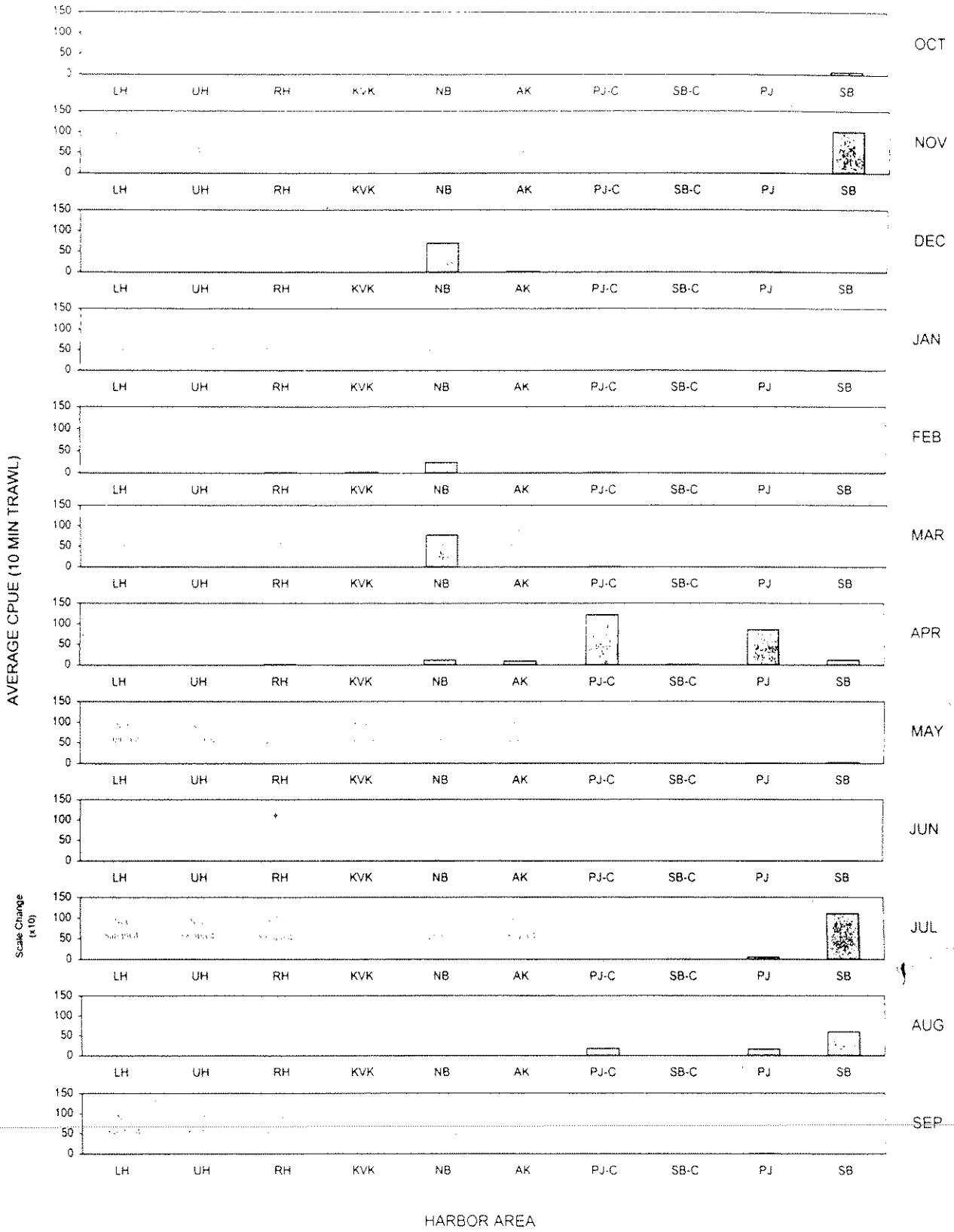
NOTE: Not Sampled. Not all stations sampled each month [illegible]
LH - Lower Harbor (HW [illegible]), UH - Upper Harbor (HW [illegible]), RH - Red Hook (HW [illegible]), KVK - [illegible], AK - Arthur Kill (HW [illegible])
NB - Newark Bay (HW [illegible]), PJ-C - Port Jersey Channel (P [illegible]), SB-C - South Brooklyn Channel (SB [illegible]), PJ - Port Jersey (PJ [illegible]), SB - South Brooklyn (SB [illegible])

Figure A-17. Average Bottom Trawl CPUE (10 min. tow) of Smallmouth flounder, October 1998 - September 1999



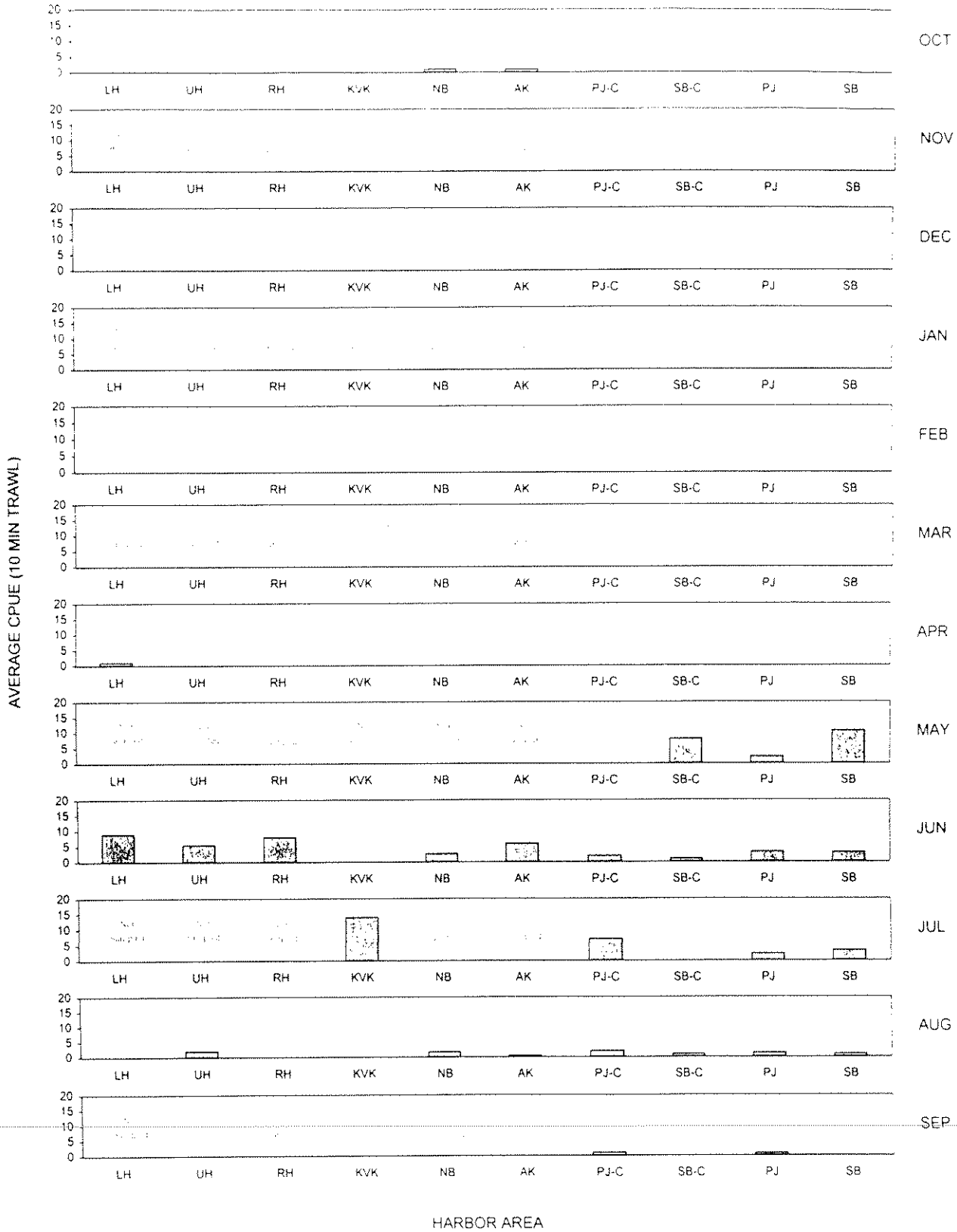
NOTE: Not Sampled - Not all stations sampled each month, see sampling schedule for actual months and stations sampled.
LH - Lower Harbor (HW 1), UH - Upper Harbor (HW 2-4), RH - Red Hook (HW 3), KVK - Kill Van Kull (HW 5), AK - Arthur Kill (HW 6-7)
NB - Newark Bay (HW 8-10), PJ-C Port Jersey Channel (PJ 4), SB-C South Brooklyn Channel (SB 4), PJ - Port Jersey (PJ [illegible]), SB - South Brooklyn (SB [illegible])

Figure A-18. Average Bottom Trawl CPUE (10 min. tow) of Spotted hake, October 1998 - September 1999



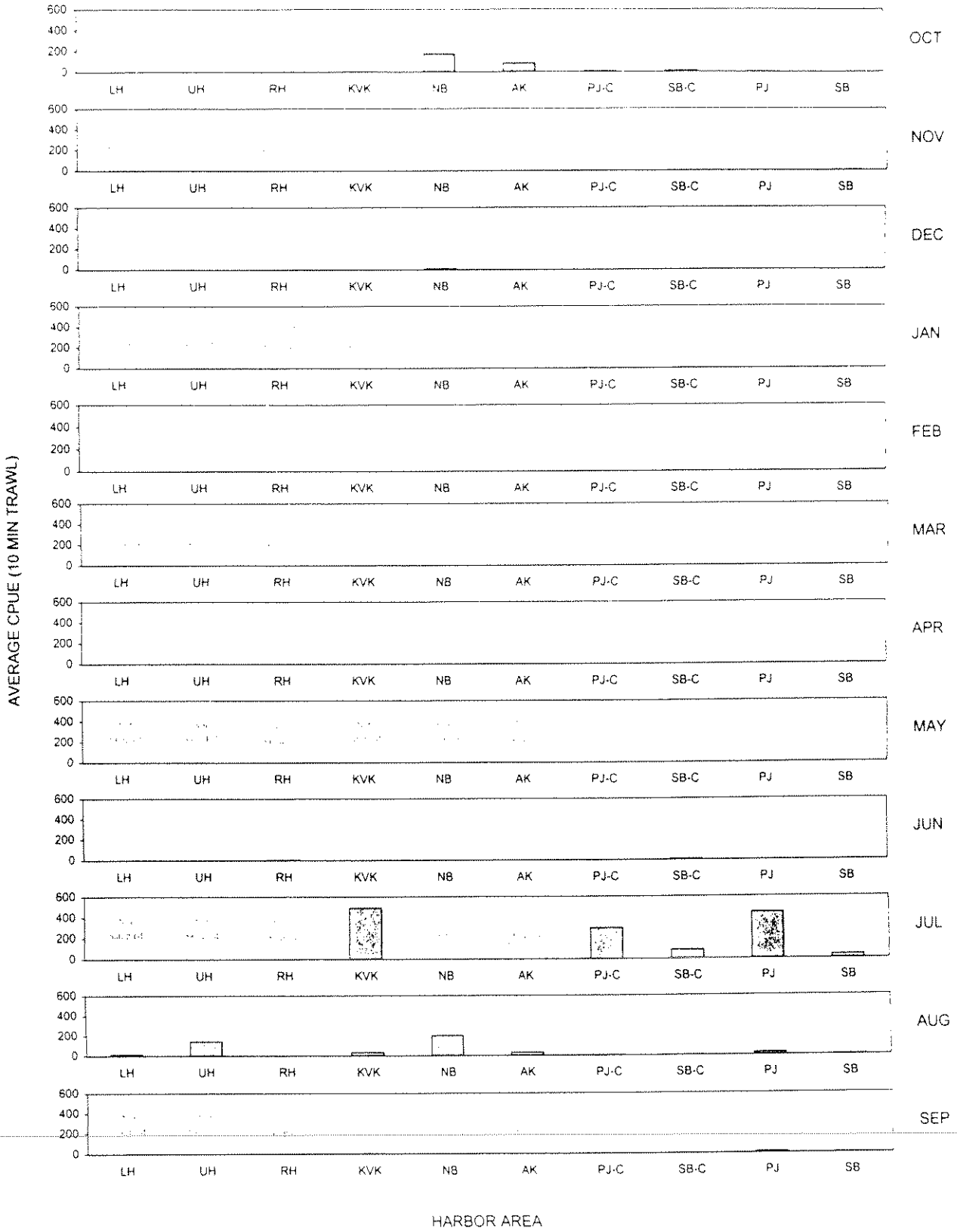
NOTE: Not Sampled - Not all stations sampled each month; see sampling schedule for actual months and stations sampled.
LH - Lower Harbor (HW 1); UH - Upper Harbor (HW 2,3); RH - Red Hook (HW 3); KVK - Kill Van Kull (HW 5); AK - Arthur Kill (HW 6,7);
NB - Newark Bay (HW 8-10); PJ-C Port Jersey Channel (PJ 4); SB-C South Brooklyn Channel (SB 4); PJ - Port Jersey (PJ 1-3, 5-6); SB - South Brooklyn (SB 1-3)

Figure A-19. Average Bottom Trawl CPUE (10 min. tow) of Striped bass, October 1998 - September 1999



NOTE: Not Sampled - Not all stations sampled each month; see sampling schedule for actual months and stations sampled.
LH - Lower Harbor (HW 1); UH - Upper Harbor (HW 2-4); RH - Red Hook (HW 3); KVK - Kill Van Kull (HW 5); AK - Arthur Kill (HW 6-7);
NB - Newark Bay (HW 8-11); PJ-C Port Jersey Channel (PJ 4); SB-C South Brooklyn Channel (SB 4); PJ - Port Jersey (PJ 1-3, 5-6); SB - South Brooklyn (SB 1-3)

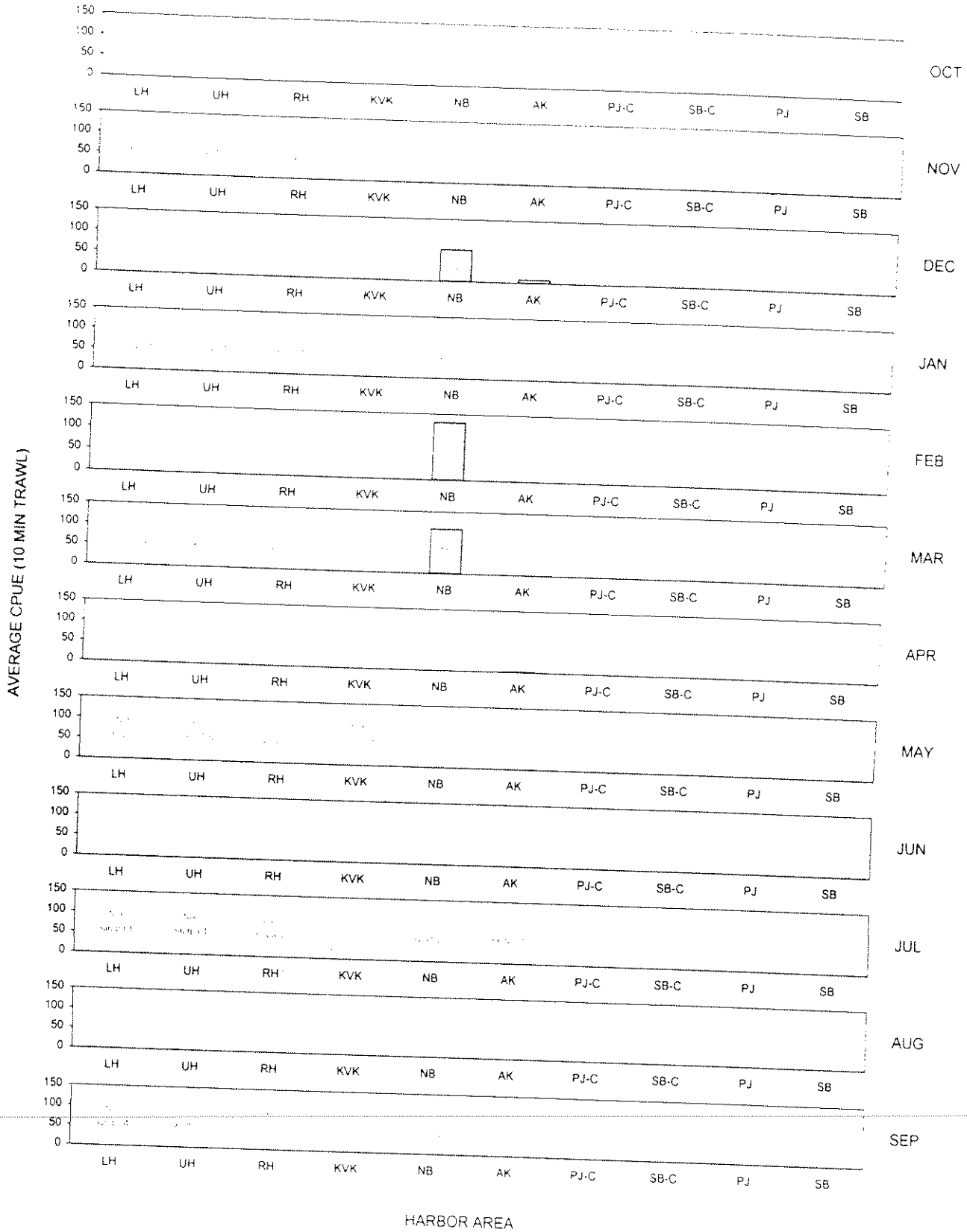
Figure A-20. Average Bottom Trawl CPUE (10 min. tow) of Summer flounder, October 1998 - September 1999



NOTE: Not Sampled; Not all stations sampled each month; see sampling schedule for details on months and stations sampled

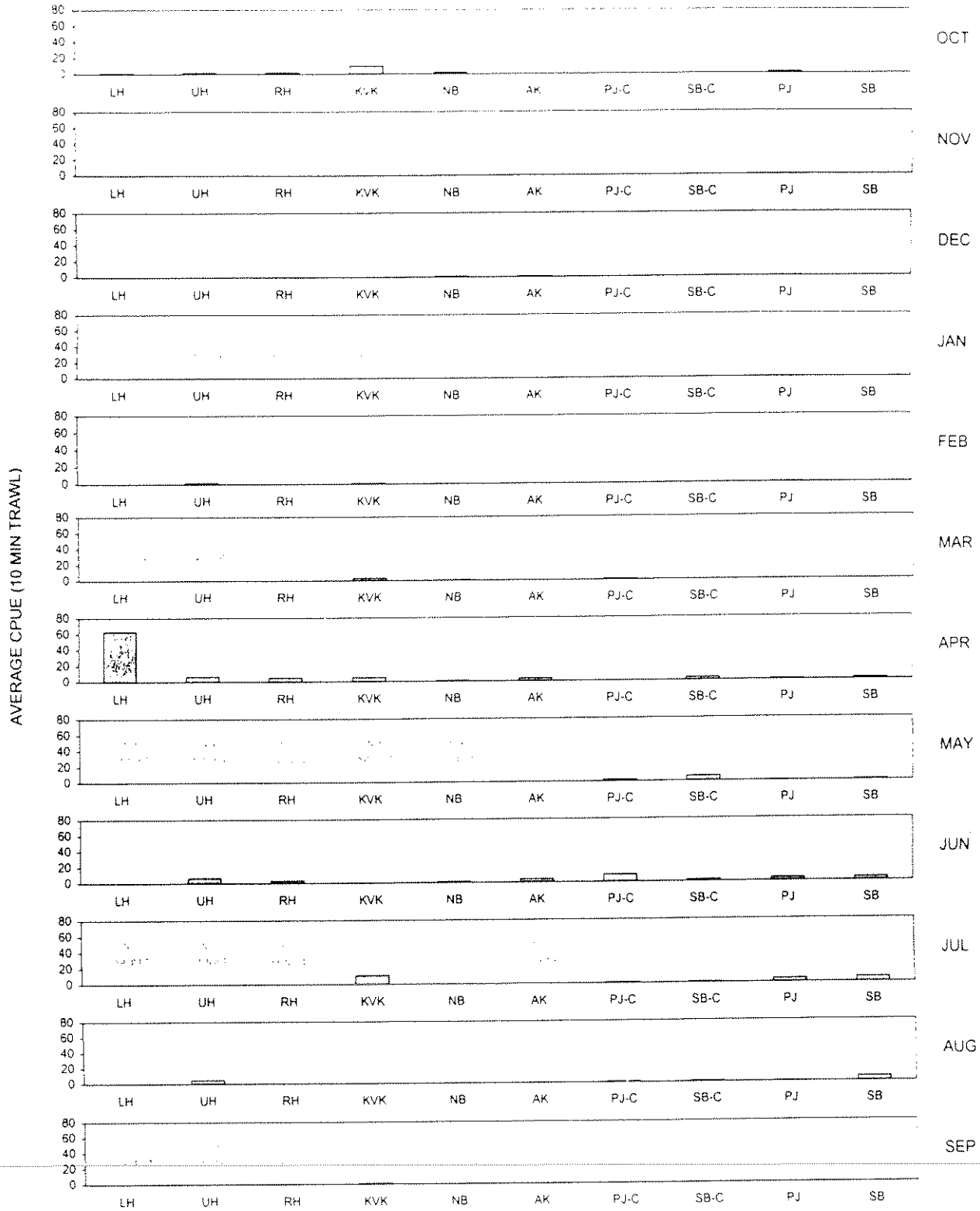
LH - Lower Harbor (HW 3); UH - Upper Harbor (HW 2 & 4); RH - Red Bank (HW 1); KVK - Kill Van Kull (HA 5); AK - Arthur Kill (HW 6 & 7);
NB - Newark Bay (HW 8 & 9); PJ-C - Port Jersey Channel (PJ 4); SB-C - South Brooklyn Channel (SB 4); PJ - Port Jersey (PJ 1, 2 & 3); SB - South Brooklyn (SB 1, 2 & 3)

Figure A-21. Average Bottom Trawl CPUE (10 min. tow) of Weakfish, October 1998 - September 1999



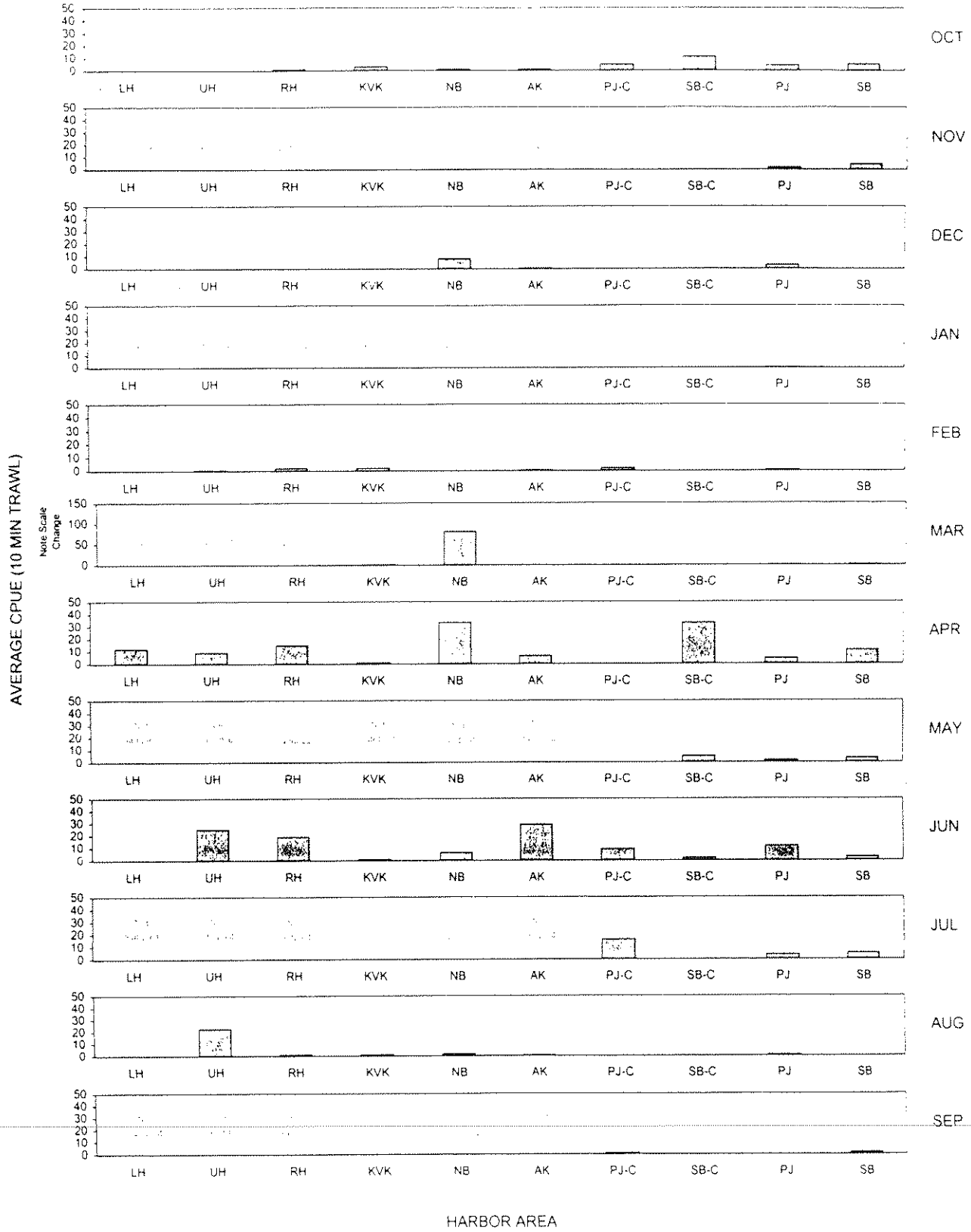
NOTE: Not Sampled - Not all stations sampled each month; see sampling schedule for actual months and stations sampled.
LH - Lower Harbor (HW 1), UH - Upper Harbor (HW 2,4), RH - Red Hook (HW 3), KVK - Kill Van Kull (HW 5), AK - Arthur Kill (HW 6,7),
NB - Newark Bay (HW 8-1), PJ-C - Port Jersey Channel (PJ 4), SB-C - South Brooklyn Channel (SB 4), PJ - Port Jersey (PJ 1,2,3,5), SB - South Brooklyn (SB 1,2)

Figure A-22. Average Bottom Trawl CPUE (10 min. tow) of White Perch, October 1998 - September 1999



NOTE: Not Sampled. Not all stations sampled each month; see sampling schedule for actual months and stations sampled.
LH - Lower Harbor (HW [illegible]); UH - Upper Harbor (HW 2,4); RH - Red Hook (HW [illegible]); KVK - Kill Van Kull (HW [illegible]); AK - Arthur Kill (HW [illegible]).
NB - Newark Bay (HW [illegible]); PJ-C Port Jersey Channel (PJ 4); SB-C South Brooklyn Channel (SB 4); PJ - Port Jersey (PJ [illegible]); SB - South Brooklyn (SB [illegible]).

Figure A-23. Average Bottom Trawl CPUE (10 min. tow) of Windowpane, October 1998 - September 1999



NOTE: Not Sampled - Not all stations sampled each month, see sampling schedule for actual months and stations sampled
LH - Lower Harbor (HW 3); UH - Upper Harbor (HW 2 & 4); RH - Red Hook (HW 1); KVK - Kill Van Kull (HW 5); AK - Arthur Kill (HW 6 & 7)
NB - Newark Bay (HW 8 & 9); PJ-C Port Jersey Channel; PJ (HW 10); SB-C - South Brooklyn Channel (SB 4); PJ - Port Jersey (PJ 1, 2, & 3); SB - South Brooklyn (SB 1, 2, & 3)

Figure A-24. Average Bottom Trawl CPUE (10 min. tow) of Winter flounder, October 1998 - September 1999

TABLE A5.1

AVERAGE BOTTOM TRAWL CPUE NUMBER PER 10-MIN TOW OF ALEWIFE
OCTOBER 1998 - SEPTEMBER 1999

MONTH	HARBOR AREA	AVG CPUE
OCT	Lower Harbor	0.0
OCT	Upper Harbor	0.0
OCT	Red Hook	0.0
OCT	Kill Van Kull	0.0
OCT	Newark Bay	1.0
OCT	Arthur Kill	0.0
OCT	Port Jersey Channel	0.0
OCT	South Brooklyn Channel	0.0
OCT	Port Jersey	0.0
OCT	South Brooklyn	0.0
NOV	Port Jersey Channel	0.0
NOV	South Brooklyn Channel	2.0
NOV	Port Jersey	0.0
NOV	South Brooklyn	0.0
DEC	Lower Harbor	0.0
DEC	Upper Harbor	0.0
DEC	Red Hook	3.0
DEC	Kill Van Kull	0.0
DEC	Newark Bay	15.0
DEC	Arthur Kill	7.0
DEC	Port Jersey Channel	0.0
DEC	South Brooklyn Channel	0.0
DEC	Port Jersey	0.0
DEC	South Brooklyn	0.0
JAN	Port Jersey Channel	0.0
JAN	South Brooklyn Channel	0.0
JAN	Port Jersey	0.0
JAN	South Brooklyn	0.0
FEB	Lower Harbor	0.0
FEB	Upper Harbor	0.5
FEB	Red Hook	0.0
FEB	Kill Van Kull	0.0
FEB	Newark Bay	0.0
FEB	Arthur Kill	0.0
FEB	Port Jersey Channel	0.0
FEB	South Brooklyn Channel	0.0
FEB	Port Jersey	0.2
FEB	South Brooklyn	0.0
MAR	Kill Van Kull	0.0
MAR	Newark Bay	0.0
MAR	Port Jersey Channel	0.0
MAR	South Brooklyn Channel	2.0
MAR	Port Jersey	0.2
MAR	South Brooklyn	0.0
APR	Lower Harbor	36.0
APR	Upper Harbor	0.5
APR	Red Hook	0.0
APR	Kill Van Kull	0.0
APR	Newark Bay	0.3
APR	Arthur Kill	0.5
APR	Port Jersey Channel	4.0
APR	South Brooklyn Channel	0.0
APR	Port Jersey	82.2
APR	South Brooklyn	0.0
MAY	Port Jersey Channel	0.0
MAY	South Brooklyn Channel	0.0
MAY	Port Jersey	0.4
MAY	South Brooklyn	0.0
JUN	Lower Harbor	0.0
JUN	Upper Harbor	0.2
JUN	Red Hook	0.2

TABLE A2-1 Cont'd

AVERAGE BOTTOM TRAWL CPUE (NUMBER PER 10-MIN TOW) OF ALEWIFE
OCTOBER 1998 - SEPTEMBER 1999

MONTH	HARBOR AREA	AVG CPUE
JUN	Kill Van Kull	0.0
JUN	Newark Bay	0.0
JUN	Arthur Kill	0.0
JUN	Port Jersey Channel	0.0
JUN	South Brooklyn Channel	1.0
JUN	Port Jersey	0.2
JUN	South Brooklyn	0.0
JUL	Kill Van Kull	0.0
JUL	Port Jersey Channel	38.0
JUL	South Brooklyn Channel	19.0
JUL	Port Jersey	62.6
JUL	South Brooklyn	3.3
AUG	Lower Harbor	0.0
AUG	Upper Harbor	0.0
AUG	Red Hook	0.0
AUG	Kill Van Kull	0.0
AUG	Newark Bay	0.0
AUG	Arthur Kill	1.0
AUG	Port Jersey Channel	56.0
AUG	South Brooklyn Channel	6.0
AUG	Port Jersey	8.0
AUG	South Brooklyn	11.7
SEP	Kill Van Kull	0.0
SEP	Port Jersey Channel	1.0
SEP	South Brooklyn Channel	1.0
SEP	Port Jersey	15.0
SEP	South Brooklyn	6.0

Areas: Lower Harbor (HW 1), Upper Harbor (HW 2,4), Red Hook (HW 3), Kill Van Kull (HW 5), Newark Bay (HW 8-10), Arthur Kill (HW 6-7), Port Jersey Channel (PJ 4), South Brooklyn Channel (SB 4), Port Jersey (PJ 1-3, 5-6), South Brooklyn (SB 1-3)

Note: All samples collected with bottom trawl. Not all stations sampled each month, see sampling schedule for actual months and stations sampled.

TABLE A2-2

AVERAGE BOTTOM TRAWL CPUE (NUMBER PER 10-MIN TOW) OF AMERICAN SHAD
OCTOBER 1998 - SEPTEMBER 1999

MONTH	HARBOR AREA	AVG CPUE
OCT	Lower Harbor	0.0
OCT	Upper Harbor	0.0
OCT	Red Hook	0.0
OCT	Kill Van Kull	0.0
OCT	Newark Bay	1.0
OCT	Arthur Kill	0.0
OCT	Port Jersey Channel	0.0
OCT	South Brooklyn Channel	0.0
OCT	Port Jersey	0.3
OCT	South Brooklyn	0.0
NOV	Port Jersey Channel	0.0
NOV	South Brooklyn Channel	63.0
NOV	Port Jersey	2.5
NOV	South Brooklyn	8.7
DEC	Lower Harbor	0.0
DEC	Upper Harbor	0.0
DEC	Red Hook	0.0
DEC	Kill Van Kull	0.0
DEC	Newark Bay	10.0
DEC	Arthur Kill	6.5
DEC	Port Jersey Channel	0.0
DEC	South Brooklyn Channel	0.0
DEC	Port Jersey	0.5
DEC	South Brooklyn	0.0
JAN	Port Jersey Channel	0.0
JAN	South Brooklyn Channel	0.0
JAN	Port Jersey	0.0
JAN	South Brooklyn	0.0
FEB	Lower Harbor	0.0
FEB	Upper Harbor	1.5
FEB	Red Hook	5.0
FEB	Kill Van Kull	0.0
FEB	Newark Bay	0.0
FEB	Arthur Kill	0.5
FEB	Port Jersey Channel	1.0
FEB	South Brooklyn Channel	0.0
FEB	Port Jersey	0.0
FEB	South Brooklyn	0.7
MAR	Kill Van Kull	0.0
MAR	Newark Bay	0.0
MAR	Port Jersey Channel	0.0
MAR	South Brooklyn Channel	16.0
MAR	Port Jersey	0.0
MAR	South Brooklyn	0.0
APR	Lower Harbor	6.0
APR	Upper Harbor	0.0
APR	Red Hook	0.0
APR	Kill Van Kull	0.0
APR	Newark Bay	0.0
APR	Arthur Kill	0.0
APR	Port Jersey Channel	3.0
APR	South Brooklyn Channel	0.0
APR	Port Jersey	3.4
APR	South Brooklyn	0.0
MAY	Port Jersey Channel	0.0
MAY	South Brooklyn Channel	0.0
MAY	Port Jersey	0.0
MAY	South Brooklyn	0.0
JUN	Lower Harbor	0.0
JUN	Upper Harbor	0.0
JUN	Red Hook	0.0

TABLE A2-2 Cont'd.

AVERAGE BOTTOM TRAWL CPUE (NUMBER PER 10-MIN TOW) OF AMERICAN SHAD
OCTOBER 1998 - SEPTEMBER 1999

MONTH	HARBOR AREA	AVG CPUE
JUN	Kill Van Kull	0.0
JUN	Newark Bay	0.0
JUN	Arthur Kill	0.0
JUN	Port Jersey Channel	0.0
JUN	South Brooklyn Channel	0.0
JUN	Port Jersey	0.2
JUN	South Brooklyn	0.0
JUL	Kill Van Kull	0.0
JUL	Port Jersey Channel	3.0
JUL	South Brooklyn Channel	0.0
JUL	Port Jersey	0.0
JUL	South Brooklyn	0.0
AUG	Lower Harbor	0.0
AUG	Upper Harbor	0.0
AUG	Red Hook	0.0
AUG	Kill Van Kull	0.0
AUG	Newark Bay	0.0
AUG	Arthur Kill	0.0
AUG	Port Jersey Channel	2.0
AUG	South Brooklyn Channel	0.0
AUG	Port Jersey	0.6
AUG	South Brooklyn	0.0
SEP	Kill Van Kull	0.0
SEP	Port Jersey Channel	16.0
SEP	South Brooklyn Channel	0.0
SEP	Port Jersey	0.0
SEP	South Brooklyn	0.0

Areas: Lower Harbor (HW 1), Upper Harbor (HW 2,4), Red Hook (HW 3), Kill Van Kull (HW 5), Newark Bay (HW 8-10), Arthur Kill (HW 6-7), Port Jersey Channel (PJ 4), South Brooklyn Channel (SB 4), Port Jersey (PJ 1-3, 5-6), South Brooklyn (SB 1-3)

Note: All samples collected with bottom trawl. Not all stations sampled each month, see sampling schedule for actual months and stations sampled.

TABLE A2-3

AVERAGE BOTTOM TRAWL CPUE (NUMBER PER 10 MIN TOW) OF ATLANTIC HERRING
OCTOBER 1998 - SEPTEMBER 1999

MONTH	HARBOR AREA	AVG CPUE
OCT	Lower Harbor	0.0
OCT	Upper Harbor	0.0
OCT	Red Hook	0.0
OCT	Kill Van Kull	0.0
OCT	Newark Bay	0.0
OCT	Arthur Kill	0.0
OCT	Port Jersey Channel	0.0
OCT	South Brooklyn Channel	0.0
OCT	Port Jersey	0.0
OCT	South Brooklyn	0.0
NOV	Port Jersey Channel	0.0
NOV	South Brooklyn Channel	0.0
NOV	Port Jersey	0.0
NOV	South Brooklyn	0.0
DEC	Lower Harbor	0.0
DEC	Upper Harbor	0.0
DEC	Red Hook	0.0
DEC	Kill Van Kull	0.0
DEC	Newark Bay	0.0
DEC	Arthur Kill	0.0
DEC	Port Jersey Channel	0.0
DEC	South Brooklyn Channel	0.0
DEC	Port Jersey	0.0
DEC	South Brooklyn	0.0
JAN	Port Jersey Channel	0.0
JAN	South Brooklyn Channel	0.0
JAN	Port Jersey	0.0
JAN	South Brooklyn	3.3
FEB	Lower Harbor	0.0
FEB	Upper Harbor	0.0
FEB	Red Hook	0.0
FEB	Kill Van Kull	0.0
FEB	Newark Bay	0.0
FEB	Arthur Kill	0.0
FEB	Port Jersey Channel	0.5
FEB	South Brooklyn Channel	0.0
FEB	Port Jersey	0.0
FEB	South Brooklyn	0.0
MAR	Kill Van Kull	0.0
MAR	Newark Bay	0.0
MAR	Port Jersey Channel	1.0
MAR	South Brooklyn Channel	12.0
MAR	Port Jersey	1.0
MAR	South Brooklyn	0.0
APR	Lower Harbor	0.0
APR	Upper Harbor	0.0
APR	Red Hook	0.0
APR	Kill Van Kull	0.0
APR	Newark Bay	0.0
APR	Arthur Kill	0.0
APR	Port Jersey Channel	0.0
APR	South Brooklyn Channel	0.0
APR	Port Jersey	0.0
APR	South Brooklyn	0.0
MAY	Port Jersey Channel	0.0
MAY	South Brooklyn Channel	0.0
MAY	Port Jersey	0.0
MAY	South Brooklyn	36.3
JUN	Lower Harbor	0.0
JUN	Upper Harbor	0.0
JUN	Red Hook	0.0

TABLE A2-3 Cont'd

AVERAGE BOTTOM TRAWL CPUE NUMBER PER 10-MIN TOW, OF ATLANTIC HERRING
OCTOBER 1998 - SEPTEMBER 1999

MONTH	HARBOR AREA	AVG CPUE
JUN	Kill Van Kull	0.0
JUN	Newark Bay	0.0
JUN	Arthur Kill	0.0
JUN	Port Jersey Channel	8.0
JUN	South Brooklyn Channel	0.0
JUN	Port Jersey	2.2
JUN	South Brooklyn	0.0
JUL	Kill Van Kull	0.0
JUL	Port Jersey Channel	0.0
JUL	South Brooklyn Channel	0.0
JUL	Port Jersey	0.0
JUL	South Brooklyn	0.0
AUG	Lower Harbor	0.0
AUG	Upper Harbor	0.0
AUG	Red Hook	0.0
AUG	Kill Van Kull	0.0
AUG	Newark Bay	0.0
AUG	Arthur Kill	0.0
AUG	Port Jersey Channel	0.0
AUG	South Brooklyn Channel	0.0
AUG	Port Jersey	0.0
AUG	South Brooklyn	0.0
SEP	Kill Van Kull	0.0
SEP	Port Jersey Channel	0.0
SEP	South Brooklyn Channel	0.0
SEP	Port Jersey	0.0
SEP	South Brooklyn	0.0

Areas: Lower Harbor (HW 1), Upper Harbor (HW 2,4), Red Hook (HW 3), Kill Van Kull (HW 5), Newark Bay (HW 8-10), Arthur Kill (HW 6-7), Port Jersey Channel (PJ 4), South Brooklyn Channel (SB 4), Port Jersey (PJ 1-3, 5-6), South Brooklyn (SB 1-3)

Note: All samples collected with bottom trawl. Not all stations sampled each month, see sampling schedule for actual months and stations sampled.

TABLE AI 4

AVERAGE BOTTOM TRAWL CPUE (NUMBER PER 10 MIN TOW) OF ATLANTIC MACKEREL
OCTOBER 1998 - SEPTEMBER 1999

MONTH	HARBOR AREA	AVG CPUE
OCT	Lower Harbor	0.0
OCT	Upper Harbor	0.0
OCT	Red Hook	0.0
OCT	Kill Van Kull	0.0
OCT	Newark Bay	0.0
OCT	Arthur Kill	0.0
OCT	Port Jersey Channel	0.0
OCT	South Brooklyn Channel	0.0
OCT	Port Jersey	0.0
OCT	South Brooklyn	0.0
NOV	Port Jersey Channel	0.0
NOV	South Brooklyn Channel	0.0
NOV	Port Jersey	0.0
NOV	South Brooklyn	0.0
DEC	Lower Harbor	0.0
DEC	Upper Harbor	0.0
DEC	Red Hook	0.0
DEC	Kill Van Kull	0.0
DEC	Newark Bay	0.0
DEC	Arthur Kill	0.0
DEC	Port Jersey Channel	0.0
DEC	South Brooklyn Channel	0.0
DEC	Port Jersey	0.0
DEC	South Brooklyn	0.0
JAN	Port Jersey Channel	0.0
JAN	South Brooklyn Channel	0.0
JAN	Port Jersey	0.0
JAN	South Brooklyn	0.0
FEB	Lower Harbor	0.0
FEB	Upper Harbor	0.0
FEB	Red Hook	0.0
FEB	Kill Van Kull	0.0
FEB	Newark Bay	0.0
FEB	Arthur Kill	0.0
FEB	Port Jersey Channel	0.0
FEB	South Brooklyn Channel	0.0
FEB	Port Jersey	0.0
FEB	South Brooklyn	0.0
MAR	Kill Van Kull	0.0
MAR	Newark Bay	0.0
MAR	Port Jersey Channel	0.0
MAR	South Brooklyn Channel	0.0
MAR	Port Jersey	0.0
MAR	South Brooklyn	0.0
APR	Lower Harbor	0.0
APR	Upper Harbor	0.0
APR	Red Hook	0.0
APR	Kill Van Kull	0.0
APR	Newark Bay	0.0
APR	Arthur Kill	0.0
APR	Port Jersey Channel	0.0
APR	South Brooklyn Channel	0.0
APR	Port Jersey	0.0
APR	South Brooklyn	0.0
MAY	Port Jersey Channel	0.0
MAY	South Brooklyn Channel	0.0
MAY	Port Jersey	0.0
MAY	South Brooklyn	0.0
JUN	Lower Harbor	0.0
JUN	Upper Harbor	0.0
JUN	Red Hook	0.0

TABLE A2-4 Cont'd.

AVERAGE BOTTOM TRAWL CPUE (NUMBER PER 10-MIN TOW) OF ATLANTIC MACKEREL
OCTOBER 1998 - SEPTEMBER 1999

MONTH	HARBOR AREA	AVG CPUE
JUN	Kill Van Kull	0.0
JUN	Newark Bay	0.0
JUN	Arthur Kill	0.0
JUN	Port Jersey Channel	0.0
JUN	South Brooklyn Channel	0.0
JUN	Port Jersey	0.2
JUN	South Brooklyn	0.0
JUL	Kill Van Kull	0.0
JUL	Port Jersey Channel	0.0
JUL	South Brooklyn Channel	0.0
JUL	Port Jersey	0.0
JUL	South Brooklyn	0.0
AUG	Lower Harbor	0.0
AUG	Upper Harbor	0.0
AUG	Red Hook	0.0
AUG	Kill Van Kull	0.0
AUG	Newark Bay	0.0
AUG	Arthur Kill	0.0
AUG	Port Jersey Channel	0.0
AUG	South Brooklyn Channel	0.0
AUG	Port Jersey	0.0
AUG	South Brooklyn	0.0
SEP	Kill Van Kull	0.0
SEP	Port Jersey Channel	0.0
SEP	South Brooklyn Channel	0.0
SEP	Port Jersey	0.0
SEP	South Brooklyn	0.0

Areas: Lower Harbor (HW 1), Upper Harbor (HW 2,4), Red Hook (HW 3), Kill Van Kull (HW 5), Newark Bay (HW 8-10), Arthur Kill (HW 6-7), Port Jersey Channel (PJ 4), South Brooklyn Channel (SB 4), Port Jersey (PJ 1-3, 5-6), South Brooklyn (SB 1-3)

Note: All samples collected with bottom trawl. Not all stations sampled each month, see sampling schedule for actual months and stations sampled.

TABLE A2-5

AVERAGE BOTTOM TRAWL CPUE (NUMBER PER 10-MIN TOW) OF ATLANTIC MENHADEN
OCTOBER 1998 - SEPTEMBER 1999

MONTH	HARBOR AREA	AVG CPUE
OCT	Lower Harbor	0.0
OCT	Upper Harbor	0.0
OCT	Red Hook	0.0
OCT	Kill Van Kull	0.0
OCT	Newark Bay	1.0
OCT	Arthur Kill	0.5
OCT	Port Jersey Channel	0.0
OCT	South Brooklyn Channel	0.0
OCT	Port Jersey	0.0
OCT	South Brooklyn	0.0
NOV	Port Jersey Channel	0.0
NOV	South Brooklyn Channel	1.0
NOV	Port Jersey	0.0
NOV	South Brooklyn	0.0
DEC	Lower Harbor	0.0
DEC	Upper Harbor	0.0
DEC	Red Hook	0.0
DEC	Kill Van Kull	0.0
DEC	Newark Bay	0.0
DEC	Arthur Kill	0.5
DEC	Port Jersey Channel	0.0
DEC	South Brooklyn Channel	0.0
DEC	Port Jersey	0.0
DEC	South Brooklyn	0.0
JAN	Port Jersey Channel	0.0
JAN	South Brooklyn Channel	0.0
JAN	Port Jersey	0.0
JAN	South Brooklyn	0.0
FEB	Lower Harbor	0.0
FEB	Upper Harbor	0.0
FEB	Red Hook	0.0
FEB	Kill Van Kull	0.0
FEB	Newark Bay	0.0
FEB	Arthur Kill	0.0
FEB	Port Jersey Channel	0.0
FEB	South Brooklyn Channel	0.0
FEB	Port Jersey	0.6
FEB	South Brooklyn	0.0
MAR	Kill Van Kull	0.0
MAR	Newark Bay	0.0
MAR	Port Jersey Channel	0.0
MAR	South Brooklyn Channel	0.0
MAR	Port Jersey	0.0
MAR	South Brooklyn	0.0
APR	Lower Harbor	0.0
APR	Upper Harbor	0.0
APR	Red Hook	0.0
APR	Kill Van Kull	0.0
APR	Newark Bay	0.0
APR	Arthur Kill	0.0
APR	Port Jersey Channel	0.0
APR	South Brooklyn Channel	0.0
APR	Port Jersey	0.0
APR	South Brooklyn	0.0
MAY	Port Jersey Channel	0.0
MAY	South Brooklyn Channel	0.0
MAY	Port Jersey	0.0
MAY	South Brooklyn	0.0
JUN	Lower Harbor	0.0
JUN	Upper Harbor	0.0
JUN	Red Hook	0.0

TABLE A2-6 Cont'd

AVERAGE BOTTOM TRAWL CPUE (NUMBER PER 10-MIN TOW) OF ATLANTIC MENHADEN
OCTOBER 1998 - SEPTEMBER 1999

MONTH	HARBOR AREA	AVG CPUE
JUN	Kill Van Kull	0.0
JUN	Newark Bay	0.0
JUN	Arthur Kill	0.0
JUN	Port Jersey Channel	0.0
JUN	South Brooklyn Channel	0.0
JUN	Port Jersey	0.0
JUN	South Brooklyn	0.0
JUL	Kill Van Kull	0.0
JUL	Port Jersey Channel	1.0
JUL	South Brooklyn Channel	0.0
JUL	Port Jersey	1.0
JUL	South Brooklyn	0.0
AUG	Lower Harbor	5.0
AUG	Upper Harbor	0.0
AUG	Red Hook	0.0
AUG	Kill Van Kull	0.0
AUG	Newark Bay	0.3
AUG	Arthur Kill	0.0
AUG	Port Jersey Channel	28.0
AUG	South Brooklyn Channel	0.0
AUG	Port Jersey	4.0
AUG	South Brooklyn	0.0
SEP	Kill Van Kull	0.0
SEP	Port Jersey Channel	0.0
SEP	South Brooklyn Channel	0.0
SEP	Port Jersey	4.0
SEP	South Brooklyn	0.0

Areas: Lower Harbor (HW 1), Upper Harbor (HW 2,4), Red Hook (HW 3), Kill Van Kull (HW 5), Newark Bay (HW 8-10), Arthur Kill (HW 6-7), Port Jersey Channel (PJ 4), South Brooklyn Channel (SB 4), Port Jersey (PJ 1-3, 5-6), South Brooklyn (SB 1-3)

Note: All samples collected with bottom trawl. Not all stations sampled each month, see sampling schedule for actual months and stations sampled.

TABLE A2-6

AVERAGE BOTTOM TRAWL CPUE (NUMBER PER 10-MIN TOW) OF ATLANTIC SILVERSIDE
OCTOBER 1998 - SEPTEMBER 1999

MONTH	HARBOR AREA	AVG CPUE
OCT	Lower Harbor	0.0
OCT	Upper Harbor	0.0
OCT	Red Hook	0.0
OCT	Kill Van Kull	0.0
OCT	Newark Bay	0.0
OCT	Arthur Kill	0.0
OCT	Port Jersey Channel	0.0
OCT	South Brooklyn Channel	0.0
OCT	Port Jersey	0.3
OCT	South Brooklyn	0.0
NOV	Port Jersey Channel	0.0
NOV	South Brooklyn Channel	0.0
NOV	Port Jersey	0.0
NOV	South Brooklyn	32.7
DEC	Lower Harbor	0.0
DEC	Upper Harbor	0.0
DEC	Red Hook	0.0
DEC	Kill Van Kull	0.0
DEC	Newark Bay	1.0
DEC	Arthur Kill	0.0
DEC	Port Jersey Channel	0.0
DEC	South Brooklyn Channel	0.0
DEC	Port Jersey	0.3
DEC	South Brooklyn	0.0
JAN	Port Jersey Channel	0.0
JAN	South Brooklyn Channel	0.0
JAN	Port Jersey	0.3
JAN	South Brooklyn	19.0
FEB	Lower Harbor	0.0
FEB	Upper Harbor	0.0
FEB	Red Hook	0.0
FEB	Kill Van Kull	0.0
FEB	Newark Bay	0.0
FEB	Arthur Kill	0.0
FEB	Port Jersey Channel	0.0
FEB	South Brooklyn Channel	0.0
FEB	Port Jersey	0.6
FEB	South Brooklyn	8.3
MAR	Kill Van Kull	0.0
MAR	Newark Bay	0.0
MAR	Port Jersey Channel	0.0
MAR	South Brooklyn Channel	0.0
MAR	Port Jersey	0.0
MAR	South Brooklyn	0.7
APR	Lower Harbor	0.0
APR	Upper Harbor	0.0
APR	Red Hook	0.0
APR	Kill Van Kull	0.0
APR	Newark Bay	0.0
APR	Arthur Kill	0.0
APR	Port Jersey Channel	0.0
APR	South Brooklyn Channel	0.0
APR	Port Jersey	0.0
APR	South Brooklyn	0.0
MAY	Port Jersey Channel	0.0
MAY	South Brooklyn Channel	0.0
MAY	Port Jersey	0.0
MAY	South Brooklyn	0.0
JUN	Lower Harbor	0.0
JUN	Upper Harbor	0.0
JUN	Red Hook	0.0

TABLE A2-6 Cont'd

AVERAGE BOTTOM TRAWL CPUE (NUMBER PER 10-MIN TOW) OF ATLANTIC SILVERSIDE
OCTOBER 1998 - SEPTEMBER 1999

MONTH	HARBOR AREA	AVG CPUE
JUN	Kill Van Kull	0.0
JUN	Newark Bay	0.0
JUN	Arthur Kill	0.0
JUN	Port Jersey Channel	0.0
JUN	South Brooklyn Channel	0.0
JUN	Port Jersey	0.0
JUN	South Brooklyn	0.0
JUL	Kill Van Kull	0.0
JUL	Port Jersey Channel	76.0
JUL	South Brooklyn Channel	0.0
JUL	Port Jersey	99.4
JUL	South Brooklyn	0.0
AUG	Lower Harbor	0.0
AUG	Upper Harbor	0.0
AUG	Red Hook	0.0
AUG	Kill Van Kull	0.0
AUG	Newark Bay	0.0
AUG	Arthur Kill	0.0
AUG	Port Jersey Channel	0.0
AUG	South Brooklyn Channel	0.0
AUG	Port Jersey	0.0
AUG	South Brooklyn	1.0
SEP	Kill Van Kull	0.0
SEP	Port Jersey Channel	0.0
SEP	South Brooklyn Channel	0.0
SEP	Port Jersey	0.0
SEP	South Brooklyn	6.0

Areas: Lower Harbor (HW 1), Upper Harbor (HW 2,4), Red Hook (HW 3), Kill Van Kull (HW 5), Newark Bay (HW 8-10), Arthur Kill (HW 6-7), Port Jersey Channel (PJ 4), South Brooklyn Channel (SB 4), Port Jersey (PJ 1-3, 5-6), South Brooklyn (SB 1-3)

Note: All samples collected with bottom trawl. Not all stations sampled each month, see sampling schedule for actual months and stations sampled.

TABLE A2-7

AVERAGE BOTTOM TRAWL CPUE (NUMBER PER 10-MIN TOW) OF ATLANTIC TOMCOD
OCTOBER 1998 - SEPTEMBER 1999

MONTH	HARBOR AREA	AVG CPUE
OCT	Lower Harbor	0.0
OCT	Upper Harbor	0.0
OCT	Red Hook	0.0
OCT	Kill Van Kull	0.0
OCT	Newark Bay	0.0
OCT	Arthur Kill	0.0
OCT	Port Jersey Channel	0.0
OCT	South Brooklyn Channel	0.0
OCT	Port Jersey	0.0
OCT	South Brooklyn	0.0
NOV	Port Jersey Channel	0.0
NOV	South Brooklyn Channel	0.0
NOV	Port Jersey	0.0
NOV	South Brooklyn	0.0
DEC	Lower Harbor	0.0
DEC	Upper Harbor	0.0
DEC	Red Hook	0.0
DEC	Kill Van Kull	0.0
DEC	Newark Bay	0.0
DEC	Arthur Kill	0.0
DEC	Port Jersey Channel	0.0
DEC	South Brooklyn Channel	0.0
DEC	Port Jersey	0.3
DEC	South Brooklyn	0.0
JAN	Port Jersey Channel	0.0
JAN	South Brooklyn Channel	0.0
JAN	Port Jersey	0.0
JAN	South Brooklyn	0.0
FEB	Lower Harbor	0.0
FEB	Upper Harbor	0.0
FEB	Red Hook	0.0
FEB	Kill Van Kull	0.0
FEB	Newark Bay	0.0
FEB	Arthur Kill	0.0
FEB	Port Jersey Channel	0.0
FEB	South Brooklyn Channel	0.0
FEB	Port Jersey	0.0
FEB	South Brooklyn	0.0
MAR	Kill Van Kull	0.0
MAR	Newark Bay	0.0
MAR	Port Jersey Channel	0.0
MAR	South Brooklyn Channel	0.0
MAR	Port Jersey	0.0
MAR	South Brooklyn	0.0
APR	Lower Harbor	0.0
APR	Upper Harbor	0.0
APR	Red Hook	1.0
APR	Kill Van Kull	0.0
APR	Newark Bay	0.0
APR	Arthur Kill	0.0
APR	Port Jersey Channel	0.0
APR	South Brooklyn Channel	0.0
APR	Port Jersey	0.0
APR	South Brooklyn	0.0
MAY	Port Jersey Channel	0.0
MAY	South Brooklyn Channel	2.0
MAY	Port Jersey	35.8
MAY	South Brooklyn	96.3
JUN	Lower Harbor	0.0
JUN	Upper Harbor	44.5
JUN	Red Hook	4.2

TABLE A6-7 Cont'd

AVERAGE BOTTOM TRAWL CPUE (NUMBER PER 10-MIN TOW) OF ATLANTIC TOMCOD
OCTOBER 1998 - SEPTEMBER 1999

MONTH	HARBOR AREA	AVG CPUE
JUN	Kill Van Kull	1.0
JUN	Newark Bay	0.3
JUN	Arthur Kill	0.0
JUN	Port Jersey Channel	113.0
JUN	South Brooklyn Channel	0.0
JUN	Port Jersey	3.8
JUN	South Brooklyn	2.3
JUL	Kill Van Kull	0.0
JUL	Port Jersey Channel	2.0
JUL	South Brooklyn Channel	0.0
JUL	Port Jersey	0.0
JUL	South Brooklyn	0.0
AUG	Lower Harbor	0.0
AUG	Upper Harbor	2.0
AUG	Red Hook	0.0
AUG	Kill Van Kull	0.0
AUG	Newark Bay	0.0
AUG	Arthur Kill	0.5
AUG	Port Jersey Channel	0.0
AUG	South Brooklyn Channel	0.0
AUG	Port Jersey	0.0
AUG	South Brooklyn	0.0
SEP	Kill Van Kull	0.0
SEP	Port Jersey Channel	0.0
SEP	South Brooklyn Channel	0.0
SEP	Port Jersey	0.0
SEP	South Brooklyn	0.0

Areas: Lower Harbor (HW 1), Upper Harbor (HW 2,4), Red Hook (HW 3), Kill Van Kull (HW 5), Newark Bay (HW 8-10), Arthur Kill (HW 6-7), Port Jersey Channel (PJ 4), South Brooklyn Channel (SB 4), Port Jersey (PJ 1-3, 5-6), South Brooklyn (SB 1-3)

Note: All samples collected with bottom trawl. Not all stations sampled each month, see sampling schedule for actual months and stations sampled.

TABLE A2-3

AVERAGE BOTTOM TRAWL CPUE (NUMBER PER 10-MIN TOW) OF BAY ANCHOVY
OCTOBER 1998 - SEPTEMBER 1999

MONTH	HARBOR AREA	AVG CPUE
OCT	Lower Harbor	0.0
OCT	Upper Harbor	0.0
OCT	Red Hook	6.0
OCT	Kill Van Kull	2.0
OCT	Newark Bay	452.0
OCT	Arthur Kill	146.0
OCT	Port Jersey Channel	0.0
OCT	South Brooklyn Channel	3.0
OCT	Port Jersey	0.0
OCT	South Brooklyn	7.0
NOV	Port Jersey Channel	0.0
NOV	South Brooklyn Channel	7.0
NOV	Port Jersey	0.0
NOV	South Brooklyn	0.0
DEC	Lower Harbor	0.0
DEC	Upper Harbor	0.0
DEC	Red Hook	0.0
DEC	Kill Van Kull	0.0
DEC	Newark Bay	7.0
DEC	Arthur Kill	5.5
DEC	Port Jersey Channel	0.0
DEC	South Brooklyn Channel	0.0
DEC	Port Jersey	1.5
DEC	South Brooklyn	0.0
JAN	Port Jersey Channel	0.0
JAN	South Brooklyn Channel	0.0
JAN	Port Jersey	0.3
JAN	South Brooklyn	0.0
FEB	Lower Harbor	0.0
FEB	Upper Harbor	0.0
FEB	Red Hook	0.0
FEB	Kill Van Kull	0.0
FEB	Newark Bay	0.0
FEB	Arthur Kill	0.0
FEB	Port Jersey Channel	0.0
FEB	South Brooklyn Channel	0.0
FEB	Port Jersey	0.0
FEB	South Brooklyn	0.0
MAR	Kill Van Kull	0.0
MAR	Newark Bay	0.0
MAR	Port Jersey Channel	0.0
MAR	South Brooklyn Channel	0.0
MAR	Port Jersey	0.0
MAR	South Brooklyn	0.0
APR	Lower Harbor	0.0
APR	Upper Harbor	0.0
APR	Red Hook	0.0
APR	Kill Van Kull	0.0
APR	Newark Bay	0.0
APR	Arthur Kill	0.0
APR	Port Jersey Channel	1.0
APR	South Brooklyn Channel	0.0
APR	Port Jersey	0.2
APR	South Brooklyn	0.0
MAY	Port Jersey Channel	0.0
MAY	South Brooklyn Channel	0.0
MAY	Port Jersey	37.4
MAY	South Brooklyn	27.0
JUN	Lower Harbor	28.0
JUN	Upper Harbor	1.0
JUN	Red Hook	7.1

TABLE A2-8 Cont'd

AVERAGE BOTTOM TRAWL CPUE (NUMBER PER 10-MIN TOW) OF BAY ANCHOVY
OCTOBER 1998 - SEPTEMBER 1999

MONTH	HARBOR AREA	AVG CPUE
JUN	Kill Van Kull	0.0
JUN	Newark Bay	0.0
JUN	Arthur Kill	0.0
JUN	Port Jersey Channel	74.0
JUN	South Brooklyn Channel	49.0
JUN	Port Jersey	24.8
JUN	South Brooklyn	33.0
JUL	Kill Van Kull	31.0
JUL	Port Jersey Channel	9.0
JUL	South Brooklyn Channel	4.0
JUL	Port Jersey	29.2
JUL	South Brooklyn	24.7
AUG	Lower Harbor	8.0
AUG	Upper Harbor	2.5
AUG	Red Hook	0.0
AUG	Kill Van Kull	0.0
AUG	Newark Bay	0.3
AUG	Arthur Kill	0.0
AUG	Port Jersey Channel	417.0
AUG	South Brooklyn Channel	6.0
AUG	Port Jersey	377.4
AUG	South Brooklyn	4.3
SEP	Kill Van Kull	4.0
SEP	Port Jersey Channel	7.0
SEP	South Brooklyn Channel	7.0
SEP	Port Jersey	379.0
SEP	South Brooklyn	32.3

Areas: Lower Harbor (HW 1), Upper Harbor (HW 2,4), Red Hook (HW 3), Kill Van Kull (HW 5), Newark Bay (HW 8-10), Arthur Kill (HW 6-7), Port Jersey Channel (PJ 4), South Brooklyn Channel (SB 4), Port Jersey (PJ 1-3, 5-6), South Brooklyn (SB 1-3)

Note: All samples collected with bottom trawl. Not all stations sampled each month, see sampling schedule for actual months and stations sampled.

TABLE A2-9

AVERAGE BOTTOM TRAWL CPUE NUMBER PER 10-MIN TOW OF BLACK SEA BASS
OCTOBER 1998 - SEPTEMBER 1999

MONTH	HARBOR AREA	AVG CPUE
OCT	Lower Harbor	2.0
OCT	Upper Harbor	0.0
OCT	Red Hook	0.0
OCT	Kill Van Kull	0.0
OCT	Newark Bay	0.0
OCT	Arthur Kill	0.0
OCT	Port Jersey Channel	1.0
OCT	South Brooklyn Channel	0.0
OCT	Port Jersey	3.5
OCT	South Brooklyn	3.0
NOV	Port Jersey Channel	0.0
NOV	South Brooklyn Channel	0.0
NOV	Port Jersey	0.0
NOV	South Brooklyn	0.0
DEC	Lower Harbor	0.0
DEC	Upper Harbor	0.0
DEC	Red Hook	0.0
DEC	Kill Van Kull	0.0
DEC	Newark Bay	0.0
DEC	Arthur Kill	0.0
DEC	Port Jersey Channel	0.0
DEC	South Brooklyn Channel	0.0
DEC	Port Jersey	0.3
DEC	South Brooklyn	0.0
JAN	Port Jersey Channel	0.0
JAN	South Brooklyn Channel	0.0
JAN	Port Jersey	0.0
JAN	South Brooklyn	0.0
FEB	Lower Harbor	0.0
FEB	Upper Harbor	0.0
FEB	Red Hook	0.0
FEB	Kill Van Kull	0.0
FEB	Newark Bay	0.0
FEB	Arthur Kill	0.0
FEB	Port Jersey Channel	0.0
FEB	South Brooklyn Channel	0.0
FEB	Port Jersey	0.0
FEB	South Brooklyn	0.0
MAR	Kill Van Kull	0.0
MAR	Newark Bay	0.0
MAR	Port Jersey Channel	0.0
MAR	South Brooklyn Channel	0.0
MAR	Port Jersey	0.0
MAR	South Brooklyn	0.0
APR	Lower Harbor	0.0
APR	Upper Harbor	0.0
APR	Red Hook	0.0
APR	Kill Van Kull	0.0
APR	Newark Bay	0.0
APR	Arthur Kill	0.0
APR	Port Jersey Channel	0.0
APR	South Brooklyn Channel	0.0
APR	Port Jersey	0.0
APR	South Brooklyn	0.0
MAY	Port Jersey Channel	0.0
MAY	South Brooklyn Channel	0.0
MAY	Port Jersey	0.0
MAY	South Brooklyn	0.0
JUN	Lower Harbor	0.0
JUN	Upper Harbor	0.5
JUN	Red Hook	0.0

TABLE A2-3 Cont'd

AVERAGE BOTTOM TRAWL CPUE (NUMBER PER 10-MIN TOW) OF BLACK SEA BASS
OCTOBER 1998 - SEPTEMBER 1999

MONTH	HARBOR AREA	AVG CPUE
JUN	Kill Van Kull	0.0
JUN	Newark Bay	0.0
JUN	Arthur Kill	0.0
JUN	Port Jersey Channel	0.0
JUN	South Brooklyn Channel	0.0
JUN	Port Jersey	0.6
JUN	South Brooklyn	0.0
JUL	Kill Van Kull	0.0
JUL	Port Jersey Channel	0.0
JUL	South Brooklyn Channel	0.0
JUL	Port Jersey	0.0
JUL	South Brooklyn	0.0
AUG	Lower Harbor	0.0
AUG	Upper Harbor	0.5
AUG	Red Hook	0.0
AUG	Kill Van Kull	0.0
AUG	Newark Bay	0.0
AUG	Arthur Kill	0.0
AUG	Port Jersey Channel	0.0
AUG	South Brooklyn Channel	0.0
AUG	Port Jersey	1.2
AUG	South Brooklyn	2.3
SEP	Kill Van Kull	0.0
SEP	Port Jersey Channel	0.0
SEP	South Brooklyn Channel	0.0
SEP	Port Jersey	0.0
SEP	South Brooklyn	2.3

Areas: Lower Harbor (HW 1), Upper Harbor (HW 2,4), Red Hook (HW 3), Kill Van Kull (HW 5), Newark Bay (HW 8-10), Arthur Kill (HW 6-7), Port Jersey Channel (PJ 4), South Brooklyn Channel (SB 4), Port Jersey (PJ 1-3, 5-6), South Brooklyn (SB 1-3)

Note: All samples collected with bottom trawl. Not all stations sampled each month, see sampling schedule for actual months and stations sampled.

TABLE A2-10

AVERAGE BOTTOM TRAWL CPUE (NUMBER PER 10-MIN TOW) OF BLUEBACK HERRING
OCTOBER 1998 - SEPTEMBER 1999

MONTH	HARBOR AREA	AVG CPUE
OCT	Lower Harbor	0.0
OCT	Upper Harbor	0.0
OCT	Red Hook	0.0
OCT	Kill Van Kull	0.0
OCT	Newark Bay	0.0
OCT	Arthur Kill	0.0
OCT	Port Jersey Channel	0.0
OCT	South Brooklyn Channel	0.0
OCT	Port Jersey	0.0
OCT	South Brooklyn	0.0
NOV	Port Jersey Channel	0.0
NOV	South Brooklyn Channel	13.0
NOV	Port Jersey	8.5
NOV	South Brooklyn	0.0
DEC	Lower Harbor	0.0
DEC	Upper Harbor	0.0
DEC	Red Hook	0.0
DEC	Kill Van Kull	0.0
DEC	Newark Bay	0.0
DEC	Arthur Kill	0.0
DEC	Port Jersey Channel	0.0
DEC	South Brooklyn Channel	0.0
DEC	Port Jersey	0.0
DEC	South Brooklyn	0.0
JAN	Port Jersey Channel	0.0
JAN	South Brooklyn Channel	0.0
JAN	Port Jersey	0.0
JAN	South Brooklyn	0.0
FEB	Lower Harbor	0.0
FEB	Upper Harbor	0.0
FEB	Red Hook	0.0
FEB	Kill Van Kull	0.0
FEB	Newark Bay	0.0
FEB	Arthur Kill	0.0
FEB	Port Jersey Channel	0.0
FEB	South Brooklyn Channel	0.0
FEB	Port Jersey	0.0
FEB	South Brooklyn	0.0
MAR	Kill Van Kull	0.0
MAR	Newark Bay	0.0
MAR	Port Jersey Channel	0.0
MAR	South Brooklyn Channel	1.0
MAR	Port Jersey	0.0
MAR	South Brooklyn	0.0
APR	Lower Harbor	2.0
APR	Upper Harbor	0.0
APR	Red Hook	0.0
APR	Kill Van Kull	1.0
APR	Newark Bay	0.0
APR	Arthur Kill	0.0
APR	Port Jersey Channel	0.0
APR	South Brooklyn Channel	0.0
APR	Port Jersey	3.0
APR	South Brooklyn	0.0
MAY	Port Jersey Channel	0.0
MAY	South Brooklyn Channel	0.0
MAY	Port Jersey	35.0
MAY	South Brooklyn	0.0
JUN	Lower Harbor	0.0
JUN	Upper Harbor	0.0
JUN	Red Hook	0.0

TABLE A2-10 Cont'd.

AVERAGE BOTTOM TRAWL CPUE (NUMBER PER 10-MIN TOW) OF BLUEBACK HERRING
OCTOBER 1998 - SEPTEMBER 1999

MONTH	HARBOR AREA	AVG CPUE
JUN	Kill Van Kull	0.0
JUN	Newark Bay	0.0
JUN	Arthur Kill	0.0
JUN	Port Jersey Channel	0.0
JUN	South Brooklyn Channel	0.0
JUN	Port Jersey	0.2
JUN	South Brooklyn	3.3
JUL	Kill Van Kull	0.0
JUL	Port Jersey Channel	0.0
JUL	South Brooklyn Channel	0.0
JUL	Port Jersey	1.0
JUL	South Brooklyn	3.3
AUG	Lower Harbor	0.0
AUG	Upper Harbor	0.0
AUG	Red Hook	0.0
AUG	Kill Van Kull	0.0
AUG	Newark Bay	0.0
AUG	Arthur Kill	0.0
AUG	Port Jersey Channel	1.0
AUG	South Brooklyn Channel	0.0
AUG	Port Jersey	0.0
AUG	South Brooklyn	0.0
SEP	Kill Van Kull	0.0
SEP	Port Jersey Channel	15.0
SEP	South Brooklyn Channel	0.0
SEP	Port Jersey	2.0
SEP	South Brooklyn	0.7

Areas: Lower Harbor (HW 1), Upper Harbor (HW 2,4), Red Hook (HW 3), Kill Van Kull (HW 5), Newark Bay (HW 8-10), Arthur Kill (HW 6-7), Port Jersey Channel (PJ 4), South Brooklyn Channel (SB 4), Port Jersey (PJ 1-3, 5-6), South Brooklyn (SB 1-3)

Note: All samples collected with bottom trawl. Not all stations sampled each month, see sampling schedule for actual months and stations sampled.

TABLE A3-11

AVERAGE BOTTOM TRAWL CPUE NUMBER PER 10-MIN TOW OF BLUEFISH
OCTOBER 1998 - SEPTEMBER 1999

MONTH	HARBOR AREA	AVG CPUE
OCT	Lower Harbor	0.0
OCT	Upper Harbor	0.0
OCT	Red Hook	0.0
OCT	Kill Van Kull	2.0
OCT	Newark Bay	3.0
OCT	Arthur Kill	2.0
OCT	Port Jersey Channel	1.0
OCT	South Brooklyn Channel	4.0
OCT	Port Jersey	0.0
OCT	South Brooklyn	0.0
NOV	Port Jersey Channel	0.0
NOV	South Brooklyn Channel	0.0
NOV	Port Jersey	0.0
NOV	South Brooklyn	0.0
DEC	Lower Harbor	0.0
DEC	Upper Harbor	0.0
DEC	Red Hook	0.0
DEC	Kill Van Kull	0.0
DEC	Newark Bay	0.0
DEC	Arthur Kill	0.0
DEC	Port Jersey Channel	0.0
DEC	South Brooklyn Channel	0.0
DEC	Port Jersey	0.0
DEC	South Brooklyn	0.0
JAN	Port Jersey Channel	0.0
JAN	South Brooklyn Channel	0.0
JAN	Port Jersey	0.0
JAN	South Brooklyn	0.0
FEB	Lower Harbor	0.0
FEB	Upper Harbor	0.0
FEB	Red Hook	0.0
FEB	Kill Van Kull	0.0
FEB	Newark Bay	0.0
FEB	Arthur Kill	0.0
FEB	Port Jersey Channel	0.0
FEB	South Brooklyn Channel	0.0
FEB	Port Jersey	0.0
FEB	South Brooklyn	0.0
MAR	Kill Van Kull	0.0
MAR	Newark Bay	0.0
MAR	Port Jersey Channel	0.0
MAR	South Brooklyn Channel	0.0
MAR	Port Jersey	0.0
MAR	South Brooklyn	0.0
APR	Lower Harbor	0.0
APR	Upper Harbor	0.0
APR	Red Hook	0.0
APR	Kill Van Kull	0.0
APR	Newark Bay	0.0
APR	Arthur Kill	0.0
APR	Port Jersey Channel	0.0
APR	South Brooklyn Channel	0.0
APR	Port Jersey	0.0
APR	South Brooklyn	0.0
MAY	Port Jersey Channel	0.0
MAY	South Brooklyn Channel	0.0
MAY	Port Jersey	0.0
MAY	South Brooklyn	0.0
JUN	Lower Harbor	0.0
JUN	Upper Harbor	0.0
JUN	Red Hook	0.0

TABLE A2.11 Cont'd

AVERAGE BOTTOM TRAWL CPUE (NUMBER PER 10-MIN TOW) OF BLUEFISH
OCTOBER 1998 - SEPTEMBER 1999

MONTH	HARBOR AREA	AVG CPUE
JUN	Kill Van Kull	0.0
JUN	Newark Bay	0.0
JUN	Arthur Kill	0.0
JUN	Port Jersey Channel	1.0
JUN	South Brooklyn Channel	0.0
JUN	Port Jersey	0.2
JUN	South Brooklyn	0.0
JUL	Kill Van Kull	0.0
JUL	Port Jersey Channel	0.0
JUL	South Brooklyn Channel	0.0
JUL	Port Jersey	0.0
JUL	South Brooklyn	0.0
AUG	Lower Harbor	0.0
AUG	Upper Harbor	0.0
AUG	Red Hook	0.0
AUG	Kill Van Kull	1.0
AUG	Newark Bay	0.0
AUG	Arthur Kill	0.0
AUG	Port Jersey Channel	1.0
AUG	South Brooklyn Channel	0.0
AUG	Port Jersey	0.2
AUG	South Brooklyn	0.7
SEP	Kill Van Kull	0.0
SEP	Port Jersey Channel	0.0
SEP	South Brooklyn Channel	0.0
SEP	Port Jersey	2.2
SEP	South Brooklyn	0.7

Areas: Lower Harbor (HW 1), Upper Harbor (HW 2,4), Red Hook (HW 3), Kill Van Kull (HW 5), Newark Bay (HW 8-10), Arthur Kill (HW 6-7), Port Jersey Channel (PJ 4), South Brooklyn Channel (SB 4), Port Jersey (PJ 1-3, 5-6), South Brooklyn (SB 1-3)

Note: All samples collected with bottom trawl. Not all stations sampled each month, see sampling schedule for actual months and stations sampled.

TABLE A2.12

AVERAGE BOTTOM TRAWL CPUE (NUMBER PER 10 MIN TOW) OF BUTTERFISH
OCTOBER 1998 - SEPTEMBER 1999

MONTH	HARBOR AREA	AVG CPUE
OCT	Lower Harbor	0.0
OCT	Upper Harbor	0.0
OCT	Red Hook	0.0
OCT	Kill Van Kull	0.0
OCT	Newark Bay	20.0
OCT	Arthur Kill	0.0
OCT	Port Jersey Channel	0.0
OCT	South Brooklyn Channel	27.0
OCT	Port Jersey	0.3
OCT	South Brooklyn	0.0
NOV	Port Jersey Channel	0.0
NOV	South Brooklyn Channel	7.0
NOV	Port Jersey	0.5
NOV	South Brooklyn	0.0
DEC	Lower Harbor	0.0
DEC	Upper Harbor	0.0
DEC	Red Hook	0.0
DEC	Kill Van Kull	0.0
DEC	Newark Bay	1.0
DEC	Arthur Kill	0.0
DEC	Port Jersey Channel	0.0
DEC	South Brooklyn Channel	0.0
DEC	Port Jersey	1.0
DEC	South Brooklyn	0.0
JAN	Port Jersey Channel	0.0
JAN	South Brooklyn Channel	0.0
JAN	Port Jersey	0.0
JAN	South Brooklyn	0.0
FEB	Lower Harbor	0.0
FEB	Upper Harbor	0.0
FEB	Red Hook	0.0
FEB	Kill Van Kull	0.0
FEB	Newark Bay	0.0
FEB	Arthur Kill	0.0
FEB	Port Jersey Channel	0.0
FEB	South Brooklyn Channel	0.0
FEB	Port Jersey	0.0
FEB	South Brooklyn	0.0
MAR	Kill Van Kull	0.0
MAR	Newark Bay	0.0
MAR	Port Jersey Channel	0.0
MAR	South Brooklyn Channel	0.0
MAR	Port Jersey	0.0
MAR	South Brooklyn	0.0
APR	Lower Harbor	0.0
APR	Upper Harbor	0.0
APR	Red Hook	0.0
APR	Kill Van Kull	0.0
APR	Newark Bay	0.0
APR	Arthur Kill	0.0
APR	Port Jersey Channel	0.0
APR	South Brooklyn Channel	0.0
APR	Port Jersey	0.0
APR	South Brooklyn	0.0
MAY	Port Jersey Channel	0.0
MAY	South Brooklyn Channel	2.0
MAY	Port Jersey	0.4
MAY	South Brooklyn	1.3
JUN	Lower Harbor	0.0
JUN	Upper Harbor	0.0
JUN	Red Hook	1.0

TABLE A2 12 Cont'd

AVERAGE BOTTOM TRAWL CPUE (NUMBER PER 10-MIN TOW) OF BUTTERFISH
OCTOBER 1998 - SEPTEMBER 1999

MONTH	HARBOR AREA	AVG CPUE
JUN	Kill Van Kull	0.0
JUN	Newark Bay	0.3
JUN	Arthur Kill	0.0
JUN	Port Jersey Channel	1.0
JUN	South Brooklyn Channel	1.0
JUN	Port Jersey	0.0
JUN	South Brooklyn	0.0
JUL	Kill Van Kull	1.0
JUL	Port Jersey Channel	3.0
JUL	South Brooklyn Channel	8.0
JUL	Port Jersey	37.8
JUL	South Brooklyn	22.3
AUG	Lower Harbor	62.0
AUG	Upper Harbor	3.5
AUG	Red Hook	0.0
AUG	Kill Van Kull	4.0
AUG	Newark Bay	0.3
AUG	Arthur Kill	0.5
AUG	Port Jersey Channel	25.0
AUG	South Brooklyn Channel	8.0
AUG	Port Jersey	10.0
AUG	South Brooklyn	2.7
SEP	Kill Van Kull	0.0
SEP	Port Jersey Channel	1.0
SEP	South Brooklyn Channel	0.0
SEP	Port Jersey	15.4
SEP	South Brooklyn	2.0

Areas: Lower Harbor (HW 1), Upper Harbor (HW 2,4), Red Hook (HW 3), Kill Van Kull (HW 5), Newark Bay (HW 8-10), Arthur Kill (HW 6-7), Port Jersey Channel (PJ 4), South Brooklyn Channel (SB 4), Port Jersey (PJ 1-3, 5-6), South Brooklyn (SB 1-3)

Note: All samples collected with bottom trawl. Not all stations sampled each month, see sampling schedule for actual months and stations sampled.

TABLE A2-13

AVERAGE BOTTOM TRAWL CPUE (NUMBER PER 10-MIN TOW) OF FOURSPOT FLOUNDER
OCTOBER 1998 - SEPTEMBER 1999

MONTH	HARBOR AREA	AVG CPUE
OCT	Lower Harbor	0.0
OCT	Upper Harbor	0.0
OCT	Red Hook	0.0
OCT	Kill Van Kull	0.0
OCT	Newark Bay	0.0
OCT	Arthur Kill	0.0
OCT	Port Jersey Channel	2.0
OCT	South Brooklyn Channel	0.0
OCT	Port Jersey	0.3
OCT	South Brooklyn	0.0
NOV	Port Jersey Channel	0.0
NOV	South Brooklyn Channel	0.0
NOV	Port Jersey	0.0
NOV	South Brooklyn	0.0
DEC	Lower Harbor	0.0
DEC	Upper Harbor	0.0
DEC	Red Hook	0.0
DEC	Kill Van Kull	0.0
DEC	Newark Bay	0.0
DEC	Arthur Kill	0.0
DEC	Port Jersey Channel	0.0
DEC	South Brooklyn Channel	0.0
DEC	Port Jersey	0.0
DEC	South Brooklyn	0.0
JAN	Port Jersey Channel	0.0
JAN	South Brooklyn Channel	0.0
JAN	Port Jersey	0.0
JAN	South Brooklyn	0.0
FEB	Lower Harbor	0.0
FEB	Upper Harbor	0.0
FEB	Red Hook	0.0
FEB	Kill Van Kull	0.0
FEB	Newark Bay	0.0
FEB	Arthur Kill	0.0
FEB	Port Jersey Channel	0.0
FEB	South Brooklyn Channel	0.0
FEB	Port Jersey	0.0
FEB	South Brooklyn	0.0
MAR	Kill Van Kull	0.0
MAR	Newark Bay	0.0
MAR	Port Jersey Channel	0.0
MAR	South Brooklyn Channel	0.0
MAR	Port Jersey	0.0
MAR	South Brooklyn	0.0
APR	Lower Harbor	0.0
APR	Upper Harbor	0.0
APR	Red Hook	0.0
APR	Kill Van Kull	0.0
APR	Newark Bay	0.0
APR	Arthur Kill	0.0
APR	Port Jersey Channel	0.0
APR	South Brooklyn Channel	0.0
APR	Port Jersey	0.2
APR	South Brooklyn	0.0
MAY	Port Jersey Channel	0.0
MAY	South Brooklyn Channel	0.0
MAY	Port Jersey	0.0
MAY	South Brooklyn	0.0
JUN	Lower Harbor	0.0
JUN	Upper Harbor	0.0
JUN	Red Hook	0.0

TABLE A2-13 Cont'd

AVERAGE BOTTOM TRAWL CPUE (NUMBER PER 10-MIN TOW) OF FOURSPOT FLOUNDER
OCTOBER 1998 - SEPTEMBER 1999

MONTH	HARBOR AREA	AVG CPUE
JUN	Kill Van Kull	0.0
JUN	Newark Bay	0.0
JUN	Arthur Kill	0.0
JUN	Port Jersey Channel	0.0
JUN	South Brooklyn Channel	0.0
JUN	Port Jersey	0.0
JUN	South Brooklyn	0.0
JUL	Kill Van Kull	0.0
JUL	Port Jersey Channel	0.0
JUL	South Brooklyn Channel	0.0
JUL	Port Jersey	0.0
JUL	South Brooklyn	0.0
AUG	Lower Harbor	0.0
AUG	Upper Harbor	0.0
AUG	Red Hook	0.0
AUG	Kill Van Kull	0.0
AUG	Newark Bay	0.0
AUG	Arthur Kill	0.0
AUG	Port Jersey Channel	0.0
AUG	South Brooklyn Channel	0.0
AUG	Port Jersey	0.0
AUG	South Brooklyn	0.0
SEP	Kill Van Kull	0.0
SEP	Port Jersey Channel	0.0
SEP	South Brooklyn Channel	0.0
SEP	Port Jersey	0.0
SEP	South Brooklyn	0.0

Areas: Lower Harbor (HW 1), Upper Harbor (HW 2,4), Red Hook (HW 3), Kill Van Kull (HW 5), Newark Bay (HW 8-10), Arthur Kill (HW 6-7), Port Jersey Channel (PJ 4), South Brooklyn Channel (SB 4), Port Jersey (PJ 1-3, 5-6), South Brooklyn (SB 1-3)

Note: All samples collected with bottom trawl. Not all stations sampled each month, see sampling schedule for actual months and stations sampled.

TABLE A2-14

AVERAGE BOTTOM TRAWL CPUE (NUMBER PER 10-MIN TOW) OF RED HAKE
OCTOBER 1998 - SEPTEMBER 1999

MONTH	HARBOR AREA	AVG CPUE
OCT	Lower Harbor	0.0
OCT	Upper Harbor	0.0
OCT	Red Hook	0.0
OCT	Kill Van Kull	0.0
OCT	Newark Bay	0.0
OCT	Arthur Kill	0.0
OCT	Port Jersey Channel	0.0
OCT	South Brooklyn Channel	0.0
OCT	Port Jersey	0.0
OCT	South Brooklyn	0.0
NOV	Port Jersey Channel	0.0
NOV	South Brooklyn Channel	0.0
NOV	Port Jersey	0.5
NOV	South Brooklyn	0.0
DEC	Lower Harbor	0.0
DEC	Upper Harbor	0.0
DEC	Red Hook	0.0
DEC	Kill Van Kull	0.0
DEC	Newark Bay	0.0
DEC	Arthur Kill	0.0
DEC	Port Jersey Channel	0.0
DEC	South Brooklyn Channel	0.0
DEC	Port Jersey	0.0
DEC	South Brooklyn	0.0
JAN	Port Jersey Channel	0.0
JAN	South Brooklyn Channel	0.0
JAN	Port Jersey	0.0
JAN	South Brooklyn	0.0
FEB	Lower Harbor	0.0
FEB	Upper Harbor	0.0
FEB	Red Hook	0.0
FEB	Kill Van Kull	0.0
FEB	Newark Bay	0.0
FEB	Arthur Kill	0.0
FEB	Port Jersey Channel	0.0
FEB	South Brooklyn Channel	0.0
FEB	Port Jersey	0.0
FEB	South Brooklyn	0.0
MAR	Kill Van Kull	0.0
MAR	Newark Bay	0.0
MAR	Port Jersey Channel	0.0
MAR	South Brooklyn Channel	1.0
MAR	Port Jersey	0.0
MAR	South Brooklyn	0.0
APR	Lower Harbor	0.0
APR	Upper Harbor	0.0
APR	Red Hook	0.0
APR	Kill Van Kull	0.0
APR	Newark Bay	0.0
APR	Arthur Kill	0.0
APR	Port Jersey Channel	0.0
APR	South Brooklyn Channel	0.0
APR	Port Jersey	0.0
APR	South Brooklyn	0.0
MAY	Port Jersey Channel	0.0
MAY	South Brooklyn Channel	0.0
MAY	Port Jersey	0.0
MAY	South Brooklyn	0.0
JUN	Lower Harbor	0.0
JUN	Upper Harbor	0.0
JUN	Red Hook	0.0

TABLE A2-14 Cont'd

AVERAGE BOTTOM TRAWL CPUE (NUMBER PER 10-MIN TOW) OF RED HAKE
OCTOBER 1998 - SEPTEMBER 1999

MONTH	HARBOR AREA	AVG CPUE
JUN	Kill Van Kull	0.0
JUN	Newark Bay	0.0
JUN	Arthur Kill	0.0
JUN	Port Jersey Channel	3.0
JUN	South Brooklyn Channel	0.0
JUN	Port Jersey	0.0
JUN	South Brooklyn	0.0
JUL	Kill Van Kull	0.0
JUL	Port Jersey Channel	0.0
JUL	South Brooklyn Channel	0.0
JUL	Port Jersey	0.0
JUL	South Brooklyn	0.0
AUG	Lower Harbor	0.0
AUG	Upper Harbor	0.5
AUG	Red Hook	0.0
AUG	Kill Van Kull	0.0
AUG	Newark Bay	0.0
AUG	Arthur Kill	0.0
AUG	Port Jersey Channel	0.0
AUG	South Brooklyn Channel	0.0
AUG	Port Jersey	0.0
AUG	South Brooklyn	0.0
SEP	Kill Van Kull	0.0
SEP	Port Jersey Channel	0.0
SEP	South Brooklyn Channel	0.0
SEP	Port Jersey	0.0
SEP	South Brooklyn	0.0

Areas: Lower Harbor (HW 1), Upper Harbor (HW 2,4), Red Hook (HW 3), Kill Van Kull (HW 5), Newark Bay (HW 8-10), Arthur Kill (HW 6-7), Port Jersey Channel (PJ 4), South Brooklyn Channel (SB 4), Port Jersey (PJ 1-3, 5-6), South Brooklyn (SB 1-3)

Note: All samples collected with bottom trawl. Not all stations sampled each month, see sampling schedule for actual months and stations sampled.

TABLE A2-15

AVERAGE BOTTOM TRAWL CPUE NUMBER PER 10-MIN TOW! OF SCUP
OCTOBER 1998 - SEPTEMBER 1999

MONTH	HARBOR AREA	AVG CPUE
OCT	Lower Harbor	0.0
OCT	Upper Harbor	0.0
OCT	Red Hook	4.0
OCT	Kill Van Kull	0.0
OCT	Newark Bay	0.0
OCT	Arthur Kill	0.0
OCT	Port Jersey Channel	0.0
OCT	South Brooklyn Channel	3.0
OCT	Port Jersey	1.5
OCT	South Brooklyn	0.0
NOV	Port Jersey Channel	0.0
NOV	South Brooklyn Channel	0.0
NOV	Port Jersey	0.0
NOV	South Brooklyn	0.0
DEC	Lower Harbor	0.0
DEC	Upper Harbor	0.0
DEC	Red Hook	0.0
DEC	Kill Van Kull	0.0
DEC	Newark Bay	0.0
DEC	Arthur Kill	0.0
DEC	Port Jersey Channel	0.0
DEC	South Brooklyn Channel	0.0
DEC	Port Jersey	0.0
DEC	South Brooklyn	0.0
JAN	Port Jersey Channel	0.0
JAN	South Brooklyn Channel	0.0
JAN	Port Jersey	0.0
JAN	South Brooklyn	0.0
FEB	Lower Harbor	0.0
FEB	Upper Harbor	0.0
FEB	Red Hook	0.0
FEB	Kill Van Kull	0.0
FEB	Newark Bay	0.0
FEB	Arthur Kill	0.0
FEB	Port Jersey Channel	0.0
FEB	South Brooklyn Channel	0.0
FEB	Port Jersey	0.0
FEB	South Brooklyn	0.0
MAR	Kill Van Kull	0.0
MAR	Newark Bay	0.0
MAR	Port Jersey Channel	0.0
MAR	South Brooklyn Channel	0.0
MAR	Port Jersey	0.0
MAR	South Brooklyn	0.0
APR	Lower Harbor	0.0
APR	Upper Harbor	0.0
APR	Red Hook	0.0
APR	Kill Van Kull	0.0
APR	Newark Bay	0.0
APR	Arthur Kill	0.0
APR	Port Jersey Channel	0.0
APR	South Brooklyn Channel	0.0
APR	Port Jersey	0.0
APR	South Brooklyn	0.0
MAY	Port Jersey Channel	0.0
MAY	South Brooklyn Channel	1.0
MAY	Port Jersey	0.0
MAY	South Brooklyn	0.3
JUN	Lower Harbor	0.0
JUN	Upper Harbor	0.0
JUN	Red Hook	1.0

TABLE A0-15 Cont'd

AVERAGE BOTTOM TRAWL CPUE (NUMBER PER 10-MIN TOW) OF SCUP
OCTOBER 1998 - SEPTEMBER 1999

MONTH	HARBOR AREA	AVG CPUE
JUN	Kill Van Kull	0.0
JUN	Newark Bay	0.0
JUN	Arthur Kill	0.0
JUN	Port Jersey Channel	0.0
JUN	South Brooklyn Channel	0.0
JUN	Port Jersey	1.0
JUN	South Brooklyn	0.0
JUL	Kill Van Kull	0.0
JUL	Port Jersey Channel	2.0
JUL	South Brooklyn Channel	23.0
JUL	Port Jersey	8.4
JUL	South Brooklyn	37.3
AUG	Lower Harbor	0.0
AUG	Upper Harbor	1.5
AUG	Red Hook	0.0
AUG	Kill Van Kull	8.0
AUG	Newark Bay	10.3
AUG	Arthur Kill	2.5
AUG	Port Jersey Channel	4.0
AUG	South Brooklyn Channel	14.0
AUG	Port Jersey	4.8
AUG	South Brooklyn	20.3
SEP	Kill Van Kull	3.0
SEP	Port Jersey Channel	1.0
SEP	South Brooklyn Channel	0.0
SEP	Port Jersey	9.8
SEP	South Brooklyn	32.0

Areas: Lower Harbor (HW 1), Upper Harbor (HW 2,4), Red Hook (HW 3), Kill Van Kull (HW 5), Newark Bay (HW 8-10), Arthur Kill (HW 6-7), Port Jersey Channel (PJ 4), South Brooklyn Channel (SB 4), Port Jersey (PJ 1-3, 5-6), South Brooklyn (SB 1-3)

Note: All samples collected with bottom trawl. Not all stations sampled each month, see sampling schedule for actual months and stations sampled.

TABLE A2-16

AVERAGE BOTTOM TRAWL CPUE (NUMBER PER 10-MIN TOW) OF SILVER HAKE
OCTOBER 1998 - SEPTEMBER 1999

MONTH	HARBOR AREA	AVG CPUE
OCT	Lower Harbor	0.0
OCT	Upper Harbor	0.0
OCT	Red Hook	0.0
OCT	Kill Van Kull	0.0
OCT	Newark Bay	0.0
OCT	Arthur Kill	0.0
OCT	Port Jersey Channel	0.0
OCT	South Brooklyn Channel	0.0
OCT	Port Jersey	0.0
OCT	South Brooklyn	0.0
NOV	Port Jersey Channel	0.0
NOV	South Brooklyn Channel	0.0
NOV	Port Jersey	0.0
NOV	South Brooklyn	0.0
DEC	Lower Harbor	0.0
DEC	Upper Harbor	0.0
DEC	Red Hook	0.0
DEC	Kill Van Kull	0.0
DEC	Newark Bay	0.0
DEC	Arthur Kill	0.0
DEC	Port Jersey Channel	0.0
DEC	South Brooklyn Channel	0.0
DEC	Port Jersey	0.3
DEC	South Brooklyn	0.0
JAN	Port Jersey Channel	0.0
JAN	South Brooklyn Channel	0.0
JAN	Port Jersey	0.0
JAN	South Brooklyn	0.0
FEB	Lower Harbor	0.0
FEB	Upper Harbor	5.5
FEB	Red Hook	0.0
FEB	Kill Van Kull	0.0
FEB	Newark Bay	0.0
FEB	Arthur Kill	0.0
FEB	Port Jersey Channel	0.0
FEB	South Brooklyn Channel	0.0
FEB	Port Jersey	0.0
FEB	South Brooklyn	0.0
MAR	Kill Van Kull	0.0
MAR	Newark Bay	1.3
MAR	Port Jersey Channel	0.0
MAR	South Brooklyn Channel	0.0
MAR	Port Jersey	0.0
MAR	South Brooklyn	0.7
APR	Lower Harbor	6.0
APR	Upper Harbor	2.5
APR	Red Hook	0.0
APR	Kill Van Kull	0.0
APR	Newark Bay	5.0
APR	Arthur Kill	0.5
APR	Port Jersey Channel	0.0
APR	South Brooklyn Channel	0.0
APR	Port Jersey	1.2
APR	South Brooklyn	2.0
MAY	Port Jersey Channel	7.0
MAY	South Brooklyn Channel	0.0
MAY	Port Jersey	0.0
MAY	South Brooklyn	0.0
JUN	Lower Harbor	0.0
JUN	Upper Harbor	0.0
JUN	Red Hook	0.0

TABLE A2-16 Cont'd.

AVERAGE BOTTOM TRAWL CPUE (NUMBER PER 10-MIN TOW) OF SILVER HAKE
OCTOBER 1998 - SEPTEMBER 1999

MONTH	HARBOR AREA	AVG CPUE
JUN	Kill Van Kull	0.0
JUN	Newark Bay	0.0
JUN	Arthur Kill	0.0
JUN	Port Jersey Channel	0.0
JUN	South Brooklyn Channel	1.0
JUN	Port Jersey	0.0
JUN	South Brooklyn	0.0
JUL	Kill Van Kull	0.0
JUL	Port Jersey Channel	0.0
JUL	South Brooklyn Channel	0.0
JUL	Port Jersey	0.0
JUL	South Brooklyn	0.0
AUG	Lower Harbor	0.0
AUG	Upper Harbor	0.0
AUG	Red Hook	0.0
AUG	Kill Van Kull	0.0
AUG	Newark Bay	0.0
AUG	Arthur Kill	0.0
AUG	Port Jersey Channel	0.0
AUG	South Brooklyn Channel	0.0
AUG	Port Jersey	0.0
AUG	South Brooklyn	0.0
SEP	Kill Van Kull	0.0
SEP	Port Jersey Channel	0.0
SEP	South Brooklyn Channel	0.0
SEP	Port Jersey	0.0
SEP	South Brooklyn	0.0

Areas: Lower Harbor (HW 1), Upper Harbor (HW 2,4), Red Hook (HW 3), Kill Van Kull (HW 5), Newark Bay (HW 8-10), Arthur Kill (HW 6-7), Port Jersey Channel (PJ 4), South Brooklyn Channel (SB 4), Port Jersey (PJ 1-3, 5-6), South Brooklyn (SB 1-3)

Note: All samples collected with bottom trawl. Not all stations sampled each month, see sampling schedule for actual months and stations sampled.

TABLE A2-17

AVERAGE BOTTOM TRAWL CPUE (NUMBER PER 10-MIN TOW) OF SMALLMOUTH FLOUNDER
OCTOBER 1998 - SEPTEMBER 1999

MONTH	HARBOR AREA	AVG CPUE
OCT	Lower Harbor	0.0
OCT	Upper Harbor	1.0
OCT	Red Hook	0.0
OCT	Kill Van Kull	3.0
OCT	Newark Bay	0.0
OCT	Arthur Kill	0.0
OCT	Port Jersey Channel	0.0
OCT	South Brooklyn Channel	1.0
OCT	Port Jersey	1.3
OCT	South Brooklyn	0.0
NOV	Port Jersey Channel	0.0
NOV	South Brooklyn Channel	0.0
NOV	Port Jersey	0.3
NOV	South Brooklyn	0.0
DEC	Lower Harbor	0.0
DEC	Upper Harbor	0.0
DEC	Red Hook	0.0
DEC	Kill Van Kull	0.0
DEC	Newark Bay	2.0
DEC	Arthur Kill	0.5
DEC	Port Jersey Channel	0.0
DEC	South Brooklyn Channel	0.0
DEC	Port Jersey	1.8
DEC	South Brooklyn	0.0
JAN	Port Jersey Channel	0.0
JAN	South Brooklyn Channel	0.0
JAN	Port Jersey	0.0
JAN	South Brooklyn	0.0
FEB	Lower Harbor	0.0
FEB	Upper Harbor	0.0
FEB	Red Hook	0.0
FEB	Kill Van Kull	0.0
FEB	Newark Bay	0.0
FEB	Arthur Kill	0.0
FEB	Port Jersey Channel	0.0
FEB	South Brooklyn Channel	0.0
FEB	Port Jersey	0.0
FEB	South Brooklyn	0.0
MAR	Kill Van Kull	0.0
MAR	Newark Bay	0.0
MAR	Port Jersey Channel	0.0
MAR	South Brooklyn Channel	0.0
MAR	Port Jersey	0.0
MAR	South Brooklyn	0.0
APR	Lower Harbor	0.0
APR	Upper Harbor	0.0
APR	Red Hook	0.0
APR	Kill Van Kull	0.0
APR	Newark Bay	0.0
APR	Arthur Kill	0.0
APR	Port Jersey Channel	0.0
APR	South Brooklyn Channel	0.0
APR	Port Jersey	0.0
APR	South Brooklyn	0.0
MAY	Port Jersey Channel	0.0
MAY	South Brooklyn Channel	0.0
MAY	Port Jersey	0.0
MAY	South Brooklyn	0.0
JUN	Lower Harbor	0.0
JUN	Upper Harbor	0.0
JUN	Red Hook	0.0

TABLE A2-17 Cont'd

AVERAGE BOTTOM TRAWL CPUE (NUMBER PER 10-MIN TOW) OF SMALLMOUTH FLOUNDER
OCTOBER 1998 - SEPTEMBER 1999

MONTH	HARBOR AREA	AVG CPUE
JUN	Kill Van Kull	0.0
JUN	Newark Bay	0.0
JUN	Arthur Kill	0.0
JUN	Port Jersey Channel	0.0
JUN	South Brooklyn Channel	0.0
JUN	Port Jersey	0.0
JUN	South Brooklyn	0.0
JUL	Kill Van Kull	0.0
JUL	Port Jersey Channel	0.0
JUL	South Brooklyn Channel	0.0
JUL	Port Jersey	0.0
JUL	South Brooklyn	0.0
AUG	Lower Harbor	0.0
AUG	Upper Harbor	0.0
AUG	Red Hook	0.0
AUG	Kill Van Kull	0.0
AUG	Newark Bay	0.0
AUG	Arthur Kill	0.0
AUG	Port Jersey Channel	0.0
AUG	South Brooklyn Channel	0.0
AUG	Port Jersey	0.2
AUG	South Brooklyn	0.0
SEP	Kill Van Kull	0.0
SEP	Port Jersey Channel	0.0
SEP	South Brooklyn Channel	0.0
SEP	Port Jersey	0.0
SEP	South Brooklyn	0.0

Areas: Lower Harbor (HW 1), Upper Harbor (HW 2,4), Red Hook (HW 3), Kill Van Kull (HW 5), Newark Bay (HW 8-10), Arthur Kill (HW 6-7), Port Jersey Channel (PJ 4), South Brooklyn Channel (SB 4), Port Jersey (PJ 1-3, 5-6), South Brooklyn (SB 1-3)

Note: All samples collected with bottom trawl. Not all stations sampled each month, see sampling schedule for actual months and stations sampled.

TABLE A2-18

AVERAGE BOTTOM TRAWL CPUE (NUMBER PER 10-MIN TOW) OF SPOTTED HAKE
OCTOBER 1998 - SEPTEMBER 1999

MONTH	HARBOR AREA	AVG CPUE
OCT	Lower Harbor	0.0
OCT	Upper Harbor	0.0
OCT	Red Hook	0.0
OCT	Kill Van Kull	0.0
OCT	Newark Bay	0.0
OCT	Arthur Kill	0.0
OCT	Port Jersey Channel	0.0
OCT	South Brooklyn Channel	0.0
OCT	Port Jersey	0.0
OCT	South Brooklyn	0.0
NOV	Port Jersey Channel	0.0
NOV	South Brooklyn Channel	0.0
NOV	Port Jersey	0.0
NOV	South Brooklyn	0.0
DEC	Lower Harbor	0.0
DEC	Upper Harbor	0.0
DEC	Red Hook	0.0
DEC	Kill Van Kull	0.0
DEC	Newark Bay	0.0
DEC	Arthur Kill	2.0
DEC	Port Jersey Channel	0.0
DEC	South Brooklyn Channel	0.0
DEC	Port Jersey	0.0
DEC	South Brooklyn	0.3
JAN	Port Jersey Channel	0.0
JAN	South Brooklyn Channel	0.0
JAN	Port Jersey	0.0
JAN	South Brooklyn	0.0
FEB	Lower Harbor	0.0
FEB	Upper Harbor	0.0
FEB	Red Hook	2.5
FEB	Kill Van Kull	1.0
FEB	Newark Bay	0.0
FEB	Arthur Kill	0.0
FEB	Port Jersey Channel	0.0
FEB	South Brooklyn Channel	0.0
FEB	Port Jersey	0.0
FEB	South Brooklyn	0.0
MAR	Kill Van Kull	0.0
MAR	Newark Bay	3.0
MAR	Port Jersey Channel	4.7
MAR	South Brooklyn Channel	0.0
MAR	Port Jersey	0.0
MAR	South Brooklyn	0.0
APR	Lower Harbor	0.0
APR	Upper Harbor	13.0
APR	Red Hook	15.5
APR	Kill Van Kull	28.0
APR	Newark Bay	4.0
APR	Arthur Kill	100.0
APR	Port Jersey Channel	45.5
APR	South Brooklyn Channel	1.0
APR	Port Jersey	2.0
APR	South Brooklyn	1.0
MAY	Port Jersey Channel	12.3
MAY	South Brooklyn Channel	13.0
MAY	Port Jersey	5.0
MAY	South Brooklyn	2.3
JUN	Lower Harbor	5.7
JUN	Upper Harbor	0.0
JUN	Red Hook	28.3
		9.0

TABLE A2-18 Cont'd

AVERAGE BOTTOM TRAWL CPUE (NUMBER PER 10-MIN TOW) OF SPOTTED HAKE
OCTOBER 1998 - SEPTEMBER 1999

MONTH	HARBOR AREA	AVG CPUE
JUN	Kill Van Kull	2.0
JUN	Newark Bay	3.3
JUN	Arthur Kill	13.5
JUN	Port Jersey Channel	3.0
JUN	South Brooklyn Channel	6.0
JUN	Port Jersey	0.8
JUN	South Brooklyn	0.0
JUL	Kill Van Kull	0.0
JUL	Port Jersey Channel	0.0
JUL	South Brooklyn Channel	0.0
JUL	Port Jersey	0.0
JUL	South Brooklyn	0.0
AUG	Lower Harbor	0.0
AUG	Upper Harbor	1.0
AUG	Red Hook	0.0
AUG	Kill Van Kull	0.0
AUG	Newark Bay	0.0
AUG	Arthur Kill	0.0
AUG	Port Jersey Channel	0.0
AUG	South Brooklyn Channel	0.0
AUG	Port Jersey	0.0
AUG	South Brooklyn	0.0
SEP	Kill Van Kull	0.0
SEP	Port Jersey Channel	0.0
SEP	South Brooklyn Channel	0.0
SEP	Port Jersey	0.0
SEP	South Brooklyn	0.0

Areas: Lower Harbor (HW 1), Upper Harbor (HW 2,4), Red Hook (HW 3), Kill Van Kull (HW 5), Newark Bay (HW 8-10), Arthur Kill (HW 6-7), Port Jersey Channel (PJ 4), South Brooklyn Channel (SB 4), Port Jersey (PJ 1-3, 5-6), South Brooklyn (SB 1-3)

Note: All samples collected with bottom trawl. Not all stations sampled each month, see sampling schedule for actual months and stations sampled.

TABLE A2-19

AVERAGE BOTTOM TRAWL CPUE (NUMBER PER 10-MIN TOW) OF STRIPED BASS
OCTOBER 1998 - SEPTEMBER 1999

MONTH	HARBOR AREA	AVG CPUE
OCT	Lower Harbor	0.0
OCT	Upper Harbor	0.0
OCT	Red Hook	0.0
OCT	Kill Van Kull	0.0
OCT	Newark Bay	0.0
OCT	Arthur Kill	0.0
OCT	Port Jersey Channel	0.0
OCT	South Brooklyn Channel	0.0
OCT	Port Jersey	0.0
OCT	South Brooklyn	6.3
NOV	Port Jersey Channel	0.0
NOV	South Brooklyn Channel	0.0
NOV	Port Jersey	0.8
NOV	South Brooklyn	101.0
DEC	Lower Harbor	0.0
DEC	Upper Harbor	0.0
DEC	Red Hook	0.0
DEC	Kill Van Kull	0.0
DEC	Newark Bay	70.0
DEC	Arthur Kill	1.5
DEC	Port Jersey Channel	0.0
DEC	South Brooklyn Channel	0.0
DEC	Port Jersey	1.3
DEC	South Brooklyn	0.0
JAN	Port Jersey Channel	0.0
JAN	South Brooklyn Channel	0.0
JAN	Port Jersey	0.0
JAN	South Brooklyn	1.3
FEB	Lower Harbor	0.0
FEB	Upper Harbor	0.0
FEB	Red Hook	1.0
FEB	Kill Van Kull	2.0
FEB	Newark Bay	24.0
FEB	Arthur Kill	0.0
FEB	Port Jersey Channel	1.0
FEB	South Brooklyn Channel	0.0
FEB	Port Jersey	0.0
FEB	South Brooklyn	0.0
MAR	Kill Van Kull	0.0
MAR	Newark Bay	78.0
MAR	Port Jersey Channel	1.0
MAR	South Brooklyn Channel	0.0
MAR	Port Jersey	0.0
MAR	South Brooklyn	0.0
APR	Lower Harbor	0.0
APR	Upper Harbor	0.0
APR	Red Hook	1.0
APR	Kill Van Kull	0.0
APR	Newark Bay	12.7
APR	Arthur Kill	9.5
APR	Port Jersey Channel	122.0
APR	South Brooklyn Channel	2.0
APR	Port Jersey	86.2
APR	South Brooklyn	12.3
MAY	Port Jersey Channel	0.0
MAY	South Brooklyn Channel	0.0
MAY	Port Jersey	2.4
MAY	South Brooklyn	2.3
JUN	Lower Harbor	0.0
JUN	Upper Harbor	0.0
JUN	Red Hook	1.0

TABLE A2-19 Cont'd

AVERAGE BOTTOM TRAWL CPUE (NUMBER PER 10-MIN TOW) OF STRIPED BASS
OCTOBER 1998 - SEPTEMBER 1999

MONTH	HARBOR AREA	AVG CPUE
JUN	Kill Van Kull	0.0
JUN	Newark Bay	0.3
JUN	Arthur Kill	0.0
JUN	Port Jersey Channel	0.0
JUN	South Brooklyn Channel	0.0
JUN	Port Jersey	0.0
JUN	South Brooklyn	0.7
JUL	Kill Van Kull	0.0
JUL	Port Jersey Channel	2.0
JUL	South Brooklyn Channel	3.0
JUL	Port Jersey	58.2
JUL	South Brooklyn	1110.7
AUG	Lower Harbor	0.0
AUG	Upper Harbor	0.0
AUG	Red Hook	0.0
AUG	Kill Van Kull	0.0
AUG	Newark Bay	0.0
AUG	Arthur Kill	0.5
AUG	Port Jersey Channel	18.0
AUG	South Brooklyn Channel	0.0
AUG	Port Jersey	17.2
AUG	South Brooklyn	59.7
SEP	Kill Van Kull	0.0
SEP	Port Jersey Channel	0.0
SEP	South Brooklyn Channel	0.0
SEP	Port Jersey	0.4
SEP	South Brooklyn	0.0

Areas: Lower Harbor (HW 1), Upper Harbor (HW 2,4), Red Hook (HW 3), Kill Van Kull (HW 5), Newark Bay (HW 8-10), Arthur Kill (HW 6-7), Port Jersey Channel (PJ 4), South Brooklyn Channel (SB 4), Port Jersey (PJ 1-3, 5-6), South Brooklyn (SB 1-3)

Note: All samples collected with bottom trawl. Not all stations sampled each month, see sampling schedule for actual months and stations sampled.

TABLE A2-20

AVERAGE BOTTOM TRAWL CPUE NUMBER PER 10-MIN TOW OF SUMMER FLOUNDER
OCTOBER 1998 - SEPTEMBER 1999

MONTH	HARBOR AREA	AVG CPUE
OCT	Lower Harbor	0.0
OCT	Upper Harbor	0.0
OCT	Red Hook	0.0
OCT	Kill Van Kull	0.0
OCT	Newark Bay	1.0
OCT	Arthur Kill	1.0
OCT	Port Jersey Channel	0.0
OCT	South Brooklyn Channel	0.0
OCT	Port Jersey	0.0
OCT	South Brooklyn	0.0
NOV	Port Jersey Channel	0.0
NOV	South Brooklyn Channel	0.0
NOV	Port Jersey	0.0
NOV	South Brooklyn	0.0
DEC	Lower Harbor	0.0
DEC	Upper Harbor	0.0
DEC	Red Hook	0.0
DEC	Kill Van Kull	0.0
DEC	Newark Bay	0.0
DEC	Arthur Kill	0.0
DEC	Port Jersey Channel	0.0
DEC	South Brooklyn Channel	0.0
DEC	Port Jersey	0.0
DEC	South Brooklyn	0.0
JAN	Port Jersey Channel	0.0
JAN	South Brooklyn Channel	0.0
JAN	Port Jersey	0.0
JAN	South Brooklyn	0.0
FEB	Lower Harbor	0.0
FEB	Upper Harbor	0.0
FEB	Red Hook	0.0
FEB	Kill Van Kull	0.0
FEB	Newark Bay	0.0
FEB	Arthur Kill	0.0
FEB	Port Jersey Channel	0.0
FEB	South Brooklyn Channel	0.0
FEB	Port Jersey	0.0
FEB	South Brooklyn	0.0
MAR	Kill Van Kull	0.0
MAR	Newark Bay	0.0
MAR	Port Jersey Channel	0.0
MAR	South Brooklyn Channel	0.0
MAR	Port Jersey	0.0
MAR	South Brooklyn	1.0
APR	Lower Harbor	0.0
APR	Upper Harbor	0.0
APR	Red Hook	0.0
APR	Kill Van Kull	0.0
APR	Newark Bay	0.0
APR	Arthur Kill	0.0
APR	Port Jersey Channel	0.0
APR	South Brooklyn Channel	0.0
APR	Port Jersey	0.0
APR	South Brooklyn	0.0
MAY	Port Jersey Channel	8.0
MAY	South Brooklyn Channel	2.0
MAY	Port Jersey	15.7
MAY	South Brooklyn	9.0
JUN	Lower Harbor	5.5
JUN	Upper Harbor	8.0
JUN	Red Hook	

TABLE A2-20 Cont'd.

AVERAGE BOTTOM TRAWL CPUE (NUMBER PER 10-MIN TOW) OF SUMMER FLOUNDER
OCTOBER 1998 - SEPTEMBER 1999

MONTH	HARBOR AREA	AVG CPUE
JUN	Kill Van Kull	0.0
JUN	Newark Bay	2.7
JUN	Arthur Kill	6.0
JUN	Port Jersey Channel	2.0
JUN	South Brooklyn Channel	1.0
JUN	Port Jersey	3.2
JUN	South Brooklyn	3.0
JUL	Kill Van Kull	14.0
JUL	Port Jersey Channel	7.0
JUL	South Brooklyn Channel	0.0
JUL	Port Jersey	2.2
JUL	South Brooklyn	3.3
AUG	Lower Harbor	0.0
AUG	Upper Harbor	2.0
AUG	Red Hook	0.0
AUG	Kill Van Kull	0.0
AUG	Newark Bay	1.7
AUG	Arthur Kill	0.5
AUG	Port Jersey Channel	2.0
AUG	South Brooklyn Channel	1.0
AUG	Port Jersey	1.4
AUG	South Brooklyn	1.0
SEP	Kill Van Kull	0.0
SEP	Port Jersey Channel	1.0
SEP	South Brooklyn Channel	0.0
SEP	Port Jersey	0.8
SEP	South Brooklyn	0.0

Areas: Lower Harbor (HW 1), Upper Harbor (HW 2,4), Red Hook (HW 3), Kill Van Kull (HW 5), Newark Bay (HW 8-10), Arthur Kill (HW 6-7), Port Jersey Channel (PJ 4), South Brooklyn Channel (SB 4), Port Jersey (PJ 1-3, 5-6), South Brooklyn (SB 1-3)

Note: All samples collected with bottom trawl. Not all stations sampled each month, see sampling schedule for actual months and stations sampled.

TABLE A2-21

AVERAGE BOTTOM TRAWL CPUE (NUMBER PER 10-MIN TOW) OF WEAKFISH
OCTOBER 1998 - SEPTEMBER 1999

MONTH	HARBOR AREA	AVG CPUE
OCT	Lower Harbor	0.0
OCT	Upper Harbor	0.0
OCT	Red Hook	3.0
OCT	Kill Van Kull	2.0
OCT	Newark Bay	173.0
OCT	Arthur Kill	83.5
OCT	Port Jersey Channel	7.0
OCT	South Brooklyn Channel	9.0
OCT	Port Jersey	3.3
OCT	South Brooklyn	0.7
NOV	Port Jersey Channel	0.0
NOV	South Brooklyn Channel	1.0
NOV	Port Jersey	0.3
NOV	South Brooklyn	1.3
DEC	Lower Harbor	0.0
DEC	Upper Harbor	0.0
DEC	Red Hook	0.0
DEC	Kill Van Kull	0.0
DEC	Newark Bay	9.0
DEC	Arthur Kill	0.5
DEC	Port Jersey Channel	0.0
DEC	South Brooklyn Channel	0.0
DEC	Port Jersey	0.8
DEC	South Brooklyn	0.0
JAN	Port Jersey Channel	0.0
JAN	South Brooklyn Channel	0.0
JAN	Port Jersey	0.0
JAN	South Brooklyn	0.0
FEB	Lower Harbor	0.0
FEB	Upper Harbor	0.0
FEB	Red Hook	0.0
FEB	Kill Van Kull	0.0
FEB	Newark Bay	0.0
FEB	Arthur Kill	0.0
FEB	Port Jersey Channel	0.0
FEB	South Brooklyn Channel	0.0
FEB	Port Jersey	0.0
FEB	South Brooklyn	0.0
MAR	Kill Van Kull	0.0
MAR	Newark Bay	0.0
MAR	Port Jersey Channel	0.0
MAR	South Brooklyn Channel	0.0
MAR	Port Jersey	0.0
MAR	South Brooklyn	0.0
APR	Lower Harbor	0.0
APR	Upper Harbor	0.0
APR	Red Hook	0.0
APR	Kill Van Kull	0.0
APR	Newark Bay	0.0
APR	Arthur Kill	0.0
APR	Port Jersey Channel	0.0
APR	South Brooklyn Channel	0.0
APR	Port Jersey	0.0
APR	South Brooklyn	0.0
MAY	Port Jersey Channel	0.0
MAY	South Brooklyn Channel	0.0
MAY	Port Jersey	0.2
MAY	South Brooklyn	1.0
JUN	Lower Harbor	0.0
JUN	Upper Harbor	1.5
JUN	Red Hook	5.0

TABLE AC-21 Cont'd

AVERAGE BOTTOM TRAWL CPUE (NUMBER PER 10-MIN TOW) OF WEAKFISH
OCTOBER 1998 - SEPTEMBER 1999

MONTH	HARBOR AREA	AVG CPUE
JUN	Kill Van Kull	0.0
JUN	Newark Bay	0.0
JUN	Arthur Kill	0.0
JUN	Port Jersey Channel	0.0
JUN	South Brooklyn Channel	8.0
JUN	Port Jersey	1.0
JUN	South Brooklyn	0.0
JUL	Kill Van Kull	494.0
JUL	Port Jersey Channel	297.0
JUL	South Brooklyn Channel	85.0
JUL	Port Jersey	446.4
JUL	South Brooklyn	36.3
AUG	Lower Harbor	14.0
AUG	Upper Harbor	145.5
AUG	Red Hook	0.0
AUG	Kill Van Kull	35.0
AUG	Newark Bay	201.0
AUG	Arthur Kill	31.5
AUG	Port Jersey Channel	6.0
AUG	South Brooklyn Channel	3.0
AUG	Port Jersey	23.8
AUG	South Brooklyn	3.7
SEP	Kill Van Kull	3.0
SEP	Port Jersey Channel	0.0
SEP	South Brooklyn Channel	0.0
SEP	Port Jersey	11.4
SEP	South Brooklyn	2.0

Areas: Lower Harbor (HW 1), Upper Harbor (HW 2,4), Red Hook (HW 3), Kill Van Kull (HW 5), Newark Bay (HW 8-10), Arthur Kill (HW 6-7), Port Jersey Channel (PJ 4), South Brooklyn Channel (SB 4), Port Jersey (PJ 1-3, 5-6), South Brooklyn (SB 1-3)

Note: All samples collected with bottom trawl. Not all stations sampled each month, see sampling schedule for actual months and stations sampled.

TABLE A2-22

AVERAGE BOTTOM TRAWL CPUE (NUMBER PER 10-MIN TOW) OF WHITE PERCH
OCTOBER 1998 - SEPTEMBER 1999

MONTH	HARBOR AREA	AVG CPUE
OCT	Lower Harbor	0.0
OCT	Upper Harbor	0.0
OCT	Red Hook	0.0
OCT	Kill Van Kull	0.0
OCT	Newark Bay	0.0
OCT	Arthur Kill	0.0
OCT	Port Jersey Channel	0.0
OCT	South Brooklyn Channel	0.0
OCT	Port Jersey	0.0
OCT	South Brooklyn	0.0
NOV	Port Jersey Channel	0.0
NOV	South Brooklyn Channel	0.0
NOV	Port Jersey	0.0
NOV	South Brooklyn	0.0
DEC	Lower Harbor	0.0
DEC	Upper Harbor	0.0
DEC	Red Hook	0.0
DEC	Kill Van Kull	0.0
DEC	Newark Bay	0.0
DEC	Arthur Kill	77.0
DEC	Port Jersey Channel	8.5
DEC	South Brooklyn Channel	0.0
DEC	Port Jersey	0.0
DEC	South Brooklyn	0.0
JAN	Port Jersey Channel	0.0
JAN	South Brooklyn Channel	0.0
JAN	Port Jersey	0.0
JAN	South Brooklyn	0.0
FEB	Lower Harbor	0.0
FEB	Upper Harbor	0.0
FEB	Red Hook	0.0
FEB	Kill Van Kull	0.0
FEB	Newark Bay	0.0
FEB	Arthur Kill	131.0
FEB	Port Jersey Channel	0.0
FEB	South Brooklyn Channel	0.0
FEB	Port Jersey	0.0
FEB	South Brooklyn	0.0
MAR	Kill Van Kull	0.0
MAR	Newark Bay	0.0
MAR	Port Jersey Channel	108.7
MAR	South Brooklyn Channel	0.0
MAR	Port Jersey	0.0
MAR	South Brooklyn	0.0
APR	Lower Harbor	0.0
APR	Upper Harbor	0.0
APR	Red Hook	0.0
APR	Kill Van Kull	0.0
APR	Newark Bay	0.0
APR	Arthur Kill	0.0
APR	Port Jersey Channel	1.5
APR	South Brooklyn Channel	0.0
APR	Port Jersey	0.0
APR	South Brooklyn	0.0
MAY	Port Jersey Channel	0.0
MAY	South Brooklyn Channel	0.0
MAY	Port Jersey	0.0
MAY	South Brooklyn	0.0
JUN	Lower Harbor	0.0
JUN	Upper Harbor	0.0
JUN	Red Hook	0.0

AVERAGE BOTTOM TRAWL CPUE (NUMBER PER 10 MIN TOW) OF WHITE PERCH
OCTOBER 1998 - SEPTEMBER 1999

MONTH	HARBOR AREA	AVG CPUE
JUN	Kill Van Kull	0.0
JUN	Newark Bay	0.0
JUN	Arthur Kill	0.0
JUN	Port Jersey Channel	0.0
JUN	South Brooklyn Channel	0.0
JUN	Port Jersey	0.0
JUN	South Brooklyn	0.0
JUL	Kill Van Kull	0.0
JUL	Port Jersey Channel	0.0
JUL	South Brooklyn Channel	0.0
JUL	Port Jersey	0.0
JUL	South Brooklyn	0.0
AUG	Lower Harbor	0.0
AUG	Upper Harbor	0.0
AUG	Red Hook	0.0
AUG	Kill Van Kull	0.0
AUG	Newark Bay	0.0
AUG	Arthur Kill	0.0
AUG	Port Jersey Channel	0.0
AUG	South Brooklyn Channel	0.0
AUG	Port Jersey	0.0
AUG	South Brooklyn	0.0
SEP	Kill Van Kull	0.0
SEP	Port Jersey Channel	0.0
SEP	South Brooklyn Channel	0.0
SEP	Port Jersey	0.0
SEP	South Brooklyn	0.0

Areas: Lower Harbor (HW 1), Upper Harbor (HW 2,4), Red Hook (HW 3), Kill Van Kull (HW 5), Newark Bay (HW 8-10), Arthur Kill (HW 6-7), Port Jersey Channel (PJ 4), South Brooklyn Channel (SB 4), Port Jersey (PJ 1-3, 5-6), South Brooklyn (SB 1-3)

Note: All samples collected with bottom trawl. Not all stations sampled each month, see sampling schedule for actual months and stations sampled.

TABLE A2-33

AVERAGE BOTTOM TRAWL CPUE (NUMBER PER 10-MIN TOW) OF WINDOWPANE
OCTOBER 1998 - SEPTEMBER 1999

MONTH	HARBOR AREA	AVG CPUE
OCT	Lower Harbor	1.0
OCT	Upper Harbor	1.5
OCT	Red Hook	2.0
OCT	Kill Van Kull	10.0
OCT	Newark Bay	2.0
OCT	Arthur Kill	0.0
OCT	Port Jersey Channel	0.0
OCT	South Brooklyn Channel	0.0
OCT	Port Jersey	1.8
OCT	South Brooklyn	0.0
NOV	Port Jersey Channel	0.0
NOV	South Brooklyn Channel	0.0
NOV	Port Jersey	0.0
NOV	South Brooklyn	0.0
DEC	Lower Harbor	0.0
DEC	Upper Harbor	0.0
DEC	Red Hook	0.0
DEC	Kill Van Kull	0.0
DEC	Newark Bay	1.0
DEC	Arthur Kill	0.5
DEC	Port Jersey Channel	0.0
DEC	South Brooklyn Channel	0.0
DEC	Port Jersey	0.3
DEC	South Brooklyn	0.0
JAN	Port Jersey Channel	0.0
JAN	South Brooklyn Channel	0.0
JAN	Port Jersey	0.3
JAN	South Brooklyn	0.0
FEB	Lower Harbor	0.0
FEB	Upper Harbor	1.5
FEB	Red Hook	0.0
FEB	Kill Van Kull	1.0
FEB	Newark Bay	0.0
FEB	Arthur Kill	0.0
FEB	Port Jersey Channel	0.0
FEB	South Brooklyn Channel	0.0
FEB	Port Jersey	0.2
FEB	South Brooklyn	0.0
MAR	Kill Van Kull	3.0
MAR	Newark Bay	0.7
MAR	Port Jersey Channel	1.0
MAR	South Brooklyn Channel	0.0
MAR	Port Jersey	0.0
MAR	South Brooklyn	0.0
APR	Lower Harbor	63.0
APR	Upper Harbor	6.5
APR	Red Hook	5.0
APR	Kill Van Kull	5.0
APR	Newark Bay	1.0
APR	Arthur Kill	3.0
APR	Port Jersey Channel	0.0
APR	South Brooklyn Channel	3.0
APR	Port Jersey	1.0
APR	South Brooklyn	2.0
MAY	Port Jersey Channel	2.0
MAY	South Brooklyn Channel	6.0
MAY	Port Jersey	0.2
MAY	South Brooklyn	1.0
JUN	Lower Harbor	0.0
JUN	Upper Harbor	6.5
JUN	Red Hook	3.0

TABLE A2-33 (Cont'd

AVERAGE BOTTOM TRAWL CPUE (NUMBER PER 10-MIN TOW) OF WINDOWPANE
OCTOBER 1998 - SEPTEMBER 1999

MONTH	HARBOR AREA	AVG CPUE
JUN	Kill Van Kull	0.0
JUN	Newark Bay	1.3
JUN	Arthur Kill	4.0
JUN	Port Jersey Channel	9.0
JUN	South Brooklyn Channel	2.0
JUN	Port Jersey	3.8
JUN	South Brooklyn	4.0
JUL	Kill Van Kull	11.0
JUL	Port Jersey Channel	1.0
JUL	South Brooklyn Channel	1.0
JUL	Port Jersey	4.4
JUL	South Brooklyn	6.0
AUG	Lower Harbor	0.0
AUG	Upper Harbor	5.0
AUG	Red Hook	0.0
AUG	Kill Van Kull	0.0
AUG	Newark Bay	0.0
AUG	Arthur Kill	0.0
AUG	Port Jersey Channel	1.0
AUG	South Brooklyn Channel	1.0
AUG	Port Jersey	0.2
AUG	South Brooklyn	5.7
SEP	Kill Van Kull	1.0
SEP	Port Jersey Channel	0.0
SEP	South Brooklyn Channel	0.0
SEP	Port Jersey	0.0
SEP	South Brooklyn	0.0

Areas: Lower Harbor (HW 1), Upper Harbor (HW 2,4), Red Hook (HW 3), Kill Van Kull (HW 5), Newark Bay (HW 8-10), Arthur Kill (HW 6-7), Port Jersey Channel (PJ 4), South Brooklyn Channel (SB 4), Port Jersey (PJ 1-3, 5-6), South Brooklyn (SB 1-3)

Note: All samples collected with bottom trawl. Not all stations sampled each month, see sampling schedule for actual months and stations sampled.

TABLE A2-24

AVERAGE BOTTOM TRAWL CPUE (NUMBER PER 10-MIN TOW) OF WINTER FLOUNDER
OCTOBER 1998 - SEPTEMBER 1999

MONTH	HARBOR AREA	AVG CPUE
OCT	Lower Harbor	0.0
OCT	Upper Harbor	0.0
OCT	Red Hook	1.0
OCT	Kill Van Kull	3.0
OCT	Newark Bay	1.0
OCT	Arthur Kill	1.0
OCT	Port Jersey Channel	5.0
OCT	South Brooklyn Channel	11.0
OCT	Port Jersey	4.3
OCT	South Brooklyn	5.3
NOV	Port Jersey Channel	0.0
NOV	South Brooklyn Channel	0.0
NOV	Port Jersey	1.8
NOV	South Brooklyn	4.3
DEC	Lower Harbor	0.0
DEC	Upper Harbor	0.0
DEC	Red Hook	0.0
DEC	Kill Van Kull	0.0
DEC	Newark Bay	8.0
DEC	Arthur Kill	0.5
DEC	Port Jersey Channel	0.0
DEC	South Brooklyn Channel	0.0
DEC	Port Jersey	3.0
DEC	South Brooklyn	0.0
JAN	Port Jersey Channel	0.0
JAN	South Brooklyn Channel	0.0
JAN	Port Jersey	0.3
JAN	South Brooklyn	0.0
FEB	Lower Harbor	0.0
FEB	Upper Harbor	0.5
FEB	Red Hook	2.0
FEB	Kill Van Kull	2.0
FEB	Newark Bay	0.0
FEB	Arthur Kill	0.5
FEB	Port Jersey Channel	2.0
FEB	South Brooklyn Channel	0.0
FEB	Port Jersey	0.8
FEB	South Brooklyn	0.0
MAR	Kill Van Kull	1.0
MAR	Newark Bay	80.7
MAR	Port Jersey Channel	0.0
MAR	South Brooklyn Channel	0.0
MAR	Port Jersey	0.6
MAR	South Brooklyn	1.7
APR	Lower Harbor	12.0
APR	Upper Harbor	9.0
APR	Red Hook	15.0
APR	Kill Van Kull	1.0
APR	Newark Bay	33.3
APR	Arthur Kill	6.5
APR	Port Jersey Channel	0.0
APR	South Brooklyn Channel	33.0
APR	Port Jersey	4.4
APR	South Brooklyn	11.0
MAY	Port Jersey Channel	0.0
MAY	South Brooklyn Channel	5.0
MAY	Port Jersey	1.6
MAY	South Brooklyn	3.3
JUN	Lower Harbor	0.0
JUN	Upper Harbor	15.0
JUN	Red Hook	19.0

TABLE A2-24 Cont'd

AVERAGE BOTTOM TRAWL CPUE (NUMBER PER 10-MIN TOW) OF WINTER FLOUNDER
OCTOBER 1998 - SEPTEMBER 1999

MONTH	HARBOR AREA	AVG CPUE
JUN	Kill Van Kull	1.0
JUN	Newark Bay	6.3
JUN	Arthur Kill	29.0
JUN	Port Jersey Channel	9.0
JUN	South Brooklyn Channel	2.0
JUN	Port Jersey	11.6
JUN	South Brooklyn	3.0
JUL	Kill Van Kull	0.0
JUL	Port Jersey Channel	16.0
JUL	South Brooklyn Channel	0.0
JUL	Port Jersey	3.8
JUL	South Brooklyn	5.0
AUG	Lower Harbor	0.0
AUG	Upper Harbor	22.5
AUG	Red Hook	1.0
AUG	Kill Van Kull	1.0
AUG	Newark Bay	1.7
AUG	Arthur Kill	0.5
AUG	Port Jersey Channel	0.0
AUG	South Brooklyn Channel	0.0
AUG	Port Jersey	0.8
AUG	South Brooklyn	0.0
SEP	Kill Van Kull	0.0
SEP	Port Jersey Channel	1.0
SEP	South Brooklyn Channel	0.0
SEP	Port Jersey	0.0
SEP	South Brooklyn	1.7

Areas: Lower Harbor (HW 1), Upper Harbor (HW 2,4), Red Hook (HW 3), Kill Van Kull (HW 5), Newark Bay (HW 8-10), Arthur Kill (HW 6-7), Port Jersey Channel (PJ 4), South Brooklyn Channel (SB 4), Port Jersey (PJ 1-3, 5-6), South Brooklyn (SB 1-3)

Note: All samples collected with bottom trawl. Not all stations sampled each month, see sampling schedule for actual months and stations sampled.

TABLE A2-05

AVERAGE BOTTOM TRAWL CPUE (NUMBER PER 10-MIN TOW) OF ALL SPECIES COMBINED
OCTOBER 1998 - SEPTEMBER 1999

MONTH	HARBOR AREA	AVG CPUE
OCT	Lower Harbor	0.1
OCT	Upper Harbor	0.1
OCT	Red Hook	0.3
OCT	Kill Van Kull	0.5
OCT	Newark Bay	12.0
OCT	Arthur Kill	4.3
OCT	Port Jersey Channel	0.8
OCT	South Brooklyn Channel	1.1
OCT	Port Jersey	0.4
OCT	South Brooklyn	0.4
NOV	Port Jersey Channel	0.0
NOV	South Brooklyn Channel	1.7
NOV	Port Jersey	0.3
NOV	South Brooklyn	2.7
DEC	Lower Harbor	0.0
DEC	Upper Harbor	0.0
DEC	Red Hook	0.1
DEC	Kill Van Kull	0.0
DEC	Newark Bay	3.8
DEC	Arthur Kill	0.6
DEC	Port Jersey Channel	0.0
DEC	South Brooklyn Channel	0.0
DEC	Port Jersey	0.2
DEC	South Brooklyn	0.0
JAN	Port Jersey Channel	0.0
JAN	South Brooklyn Channel	0.0
JAN	Port Jersey	0.1
JAN	South Brooklyn	0.4
FEB	Lower Harbor	0.0
FEB	Upper Harbor	0.2
FEB	Red Hook	0.2
FEB	Kill Van Kull	0.1
FEB	Newark Bay	2.8
FEB	Arthur Kill	0.0
FEB	Port Jersey Channel	0.1
FEB	South Brooklyn Channel	0.0
FEB	Port Jersey	0.1
FEB	South Brooklyn	0.2
MAR	Kill Van Kull	0.1
MAR	Newark Bay	5.0
MAR	Port Jersey Channel	0.1
MAR	South Brooklyn Channel	0.6
MAR	Port Jersey	0.0
MAR	South Brooklyn	0.1
APR	Lower Harbor	2.6
APR	Upper Harbor	0.6
APR	Red Hook	0.9
APR	Kill Van Kull	0.3
APR	Newark Bay	2.8
APR	Arthur Kill	1.3
APR	Port Jersey Channel	2.4
APR	South Brooklyn Channel	0.7
APR	Port Jersey	3.3
APR	South Brooklyn	0.7
MAY	Port Jersey Channel	0.5
MAY	South Brooklyn Channel	0.6
MAY	Port Jersey	2.2
MAY	South Brooklyn	3.4
JUN	Lower Harbor	2.7
JUN	Upper Harbor	2.3
JUN	Red Hook	0.8

TABLE A2-28 Cont'd

AVERAGE BOTTOM TRAWL CPUE NUMBER PER 10-MIN TOW OF ALL SPECIES COMBINED
OCTOBER 1998 - SEPTEMBER 1999

MONTH	HARBOR AREA	AVG CPUE
JUN	Kill Van Kull	0.1
JUN	Newark Bay	0.3
JUN	Arthur Kill	1.0
JUN	Port Jersey Channel	4.2
JUN	South Brooklyn Channel	1.3
JUN	Port Jersey	1.0
JUN	South Brooklyn	0.9
JUL	Kill Van Kull	10.1
JUL	Port Jersey Channel	8.5
JUL	South Brooklyn Channel	2.6
JUL	Port Jersey	14.1
JUL	South Brooklyn	23.1
AUG	Lower Harbor	1.6
AUG	Upper Harbor	3.9
AUG	Red Hook	0.1
AUG	Kill Van Kull	0.9
AUG	Newark Bay	3.9
AUG	Arthur Kill	0.7
AUG	Port Jersey Channel	10.3
AUG	South Brooklyn Channel	0.8
AUG	Port Jersey	8.3
AUG	South Brooklyn	2.6
SEP	Kill Van Kull	0.3
SEP	Port Jersey Channel	0.9
SEP	South Brooklyn Channel	0.2
SEP	Port Jersey	8.1
SEP	South Brooklyn	2.0

Areas: Lower Harbor (HW 1), Upper Harbor (HW 2,4), Red Hook (HW 3), Kill Van Kull (HW 5), Newark Bay (HW 8-10), Arthur Kill (HW 6-7), Port Jersey Channel (PJ 4), South Brooklyn Channel (SB 4), Port Jersey (PJ 1-3, 5-6), South Brooklyn (SB 1-3)

Note: All samples collected with bottom trawl. Not all stations sampled each month, see sampling schedule for actual months and stations sampled.

APPENDIX B

BOTTOM TRAWL LENGTH-FREQUENCY DISTRIBUTION
OCTOBER 1998 – SEPTEMBER 1999

TABLE B-1

LENGTH FREQUENCY DISTRIBUTION OF ALEWIFE COLLECTED IN BOTTOM TRAWL SAMPLES
OCTOBER 1998 - SEPTEMBER 1999 (ALL STATIONS COMBINED)

	MONTH											
LENGTH INTERVAL (mm)	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
≤ 50												
51-60											1	
61-70											1	
71-80											30	
81-90							2				58	21
91-100							11				23	31
101-110		1	1				20				3	3
111-120							39					1
121-130			10		1		76					
131-140			4				46					
141-150			4				15					
151-160							7					
161-170		1	1				3					
171-180			7				10					
181-190			4				2					
191-200							10				1	
201-210			1				2					
211-220							6					
221-230					1		2					
> 230							2	1				
SUM		2	32		2		253	1			117	56

TABLE B-2

LENGTH FREQUENCY DISTRIBUTION OF AMERICAN SHAD COLLECTED IN BOTTOM TRAWL SAMPLES
OCTOBER 1998 - SEPTEMBER 1999 (ALL STATIONS COMBINED)

	MONTH											
LENGTH INTERVAL (mm)	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
≤ 80										3	1	
81-90											2	4
91-100							2				1	8
101-110		3	1		1	2						3
111-120		30	3		3	2	5				1	1
121-130		36	14		4	2	3					
131-140	1	7	7		1	6	4					
141-150		6			1	2	4					
151-160		2				1						
161-170							2					
171-180						1			1			
181-190												
191-200												
201-210												
211-220					1							
221-230							1					
231-240							1					
241-250												
251-260							1					
> 260												
SUM	1	84	25		11	16	23		1	3	5	16

TABLE B-3

LENGTH FREQUENCY DISTRIBUTION OF ATLANTIC HERRING COLLECTED IN BOTTOM TRAWL SAMPLES
OCTOBER 1998 - SEPTEMBER 1999 (ALL STATIONS COMBINED)

	MONTH											
LENGTH INTERVAL (mm)	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
≤ 60						2			1			
61-75								12	5			
76-90								15	5			
91-105								3	6			
106-120												
121-135												
136-150												
151-165												
166-180												
181-195						1						
196-210												
211-225												
226-240												
241-255												
256-270				5		3						
271-285				1		2						
286-300						4						
301-315				9	1	5						
316-330				2								
> 330					1							
SUM				17	2	17		30	17			

TABLE B-4

LENGTH FREQUENCY DISTRIBUTION OF ATLANTIC MACKEREL COLLECTED IN BOTTOM TRAWL SAMPLES
OCTOBER 1998 - SEPTEMBER 1999 (ALL STATIONS COMBINED)

	MONTH											
LENGTH INTERVAL (mm)	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
≤ 20												
21-25												
26-30												
31-35												
36-40												
41-45												
46-50												
51-55												
56-60												
61-65												
66-70									1			
71-75												
76-80												
81-85												
86-90												
91-95												
96-100												
101-105												
106-110												
> 110												
SUM									1			

TABLE B-5

LENGTH FREQUENCY DISTRIBUTION OF ATLANTIC MENHADEN COLLECTED IN BOTTOM TRAWL SAMPLES
OCTOBER 1998 - SEPTEMBER 1999 (ALL STATIONS COMBINED)

	MONTH											
LENGTH INTERVAL (mm)	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
≤ 35												
36-40												
41-45												
46-50											1	
51-55										1	6	
56-60											17	
61-65										2	17	
66-70											4	
71-75										1	2	
76-80											1	1
81-85		1								1	1	2
86-90											2	
91-95												2
96-100			1									4
101-105												
106-110					1							1
111-115											1	1
116-120												1
121-125	2											
> 125												
SUM	2	1	1		1					5	52	12

TABLE B-6

LENGTH FREQUENCY DISTRIBUTION OF ATLANTIC SILVERSIDE COLLECTED IN BOTTOM TRAWL SAMPLES
OCTOBER 1998 - SEPTEMBER 1999 (ALL STATIONS COMBINED)

	MONTH											
LENGTH INTERVAL (mm)	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
≤ 35												
36-40												
41-45										3		
46-50										14		
51-55										74		
56-60										98		
61-65		1								76		
66-70		2								21		
71-75		5		1						6		1
76-80		3		1	3					2	1	5
81-85		8		2	3							
86-90		6		2	2							1
91-95		3	1	8	4							1
96-100		5		4		1						
101-105		8	1	2								
106-110		2			2							1
111-115		1		1								
116-120				1								
121-125												
> 125												
SUM		44	2	22	14	1				294	1	9

TABLE B-7

LENGTH FREQUENCY DISTRIBUTION OF ATLANTIC TOMCOD COLLECTED IN BOTTOM TRAWL SAMPLES
OCTOBER 1998 - SEPTEMBER 1999 (ALL STATIONS COMBINED)

	MONTH											
LENGTH INTERVAL (mm)	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
≤ 40												
41-45								5				
46-50								16				
51-55								70	2			
56-60								54	2			
61-65								40	18			
66-70								9	36			
71-75								3	58			
76-80									51			
81-85									36			
86-90								1	12			
91-95												
96-100									1		2	
101-105										1	1	
106-110											2	
111-115										1		
116-120												
121-125												
126-130												
> 130			1				1					
SUM			1				1	198	216	2	5	

TABLE B-8

LENGTH FREQUENCY DISTRIBUTION OF BAY ANCHOVY COLLECTED IN BOTTOM TRAWL SAMPLES
OCTOBER 1998 - SEPTEMBER 1999 (ALL STATIONS COMBINED)

	MONTH											
LENGTH INTERVAL (mm)	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
≤ 20										1		
21-25										1	1	5
26-30	4									1	72	14
31-35	1									17	135	34
36-40	1		1							77	119	44
41-45	5		5							26	31	27
46-50	1		3							5	27	8
51-55	3		4	1				2		2	26	14
56-60	3							4	3		27	11
61-65	6	1						12	5	2	10	24
66-70	17	1	1					14	33	7		15
71-75	42	1	1				1	25	61	12	1	7
76-80	66		3					43	77	16	1	2
81-85	128	1	1					36	58	10		2
86-90	88	2	2					13	7	4		
91-95	32		2				1	2	5			
96-100	5	1	1					1	3			
101-105												
106-110												
> 110												
SUM	402	7	24	1			2	152	252	181	450	207

TABLE B-9

LENGTH FREQUENCY DISTRIBUTION OF BLACK SEA BASS COLLECTED IN BOTTOM TRAWL SAMPLES
OCTOBER 1998 - SEPTEMBER 1999 (ALL STATIONS COMBINED)

	MONTH											
LENGTH INTERVAL (mm)	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
≤ 35											4	
36-40											1	
41-45											2	
46-50	1											1
51-55												
56-60	4											
61-65	1											1
66-70	3											1
71-75	3		1									
76-80									1			
81-85	3											
86-90	1											
91-95	1											
96-100												
101-105												
106-110									1			
111-115												
116-120									1			
121-125									1			
> 125											2	
SUM	17		1						4		9	3

TABLE B-10

LENGTH FREQUENCY DISTRIBUTION OF BLUEBACK HERRING COLLECTED IN BOTTOM TRAWL SAMPLES
OCTOBER 1998 - SEPTEMBER 1999 (ALL STATIONS COMBINED)

	MONTH											
LENGTH INTERVAL (mm)	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
≤ 35										2		
36-40												
41-45												
46-50												
51-55								1		1		
56-60								8		3		
61-65							2	24		2		
66-70							2	36			1	
71-75							2	32				
76-80								13	1			
81-85								5				2
86-90		1						1				3
91-95		3						1	3			7
96-100		6				1	3					7
101-105		18					1					1
106-110		13					1		1			1
111-115		4					2					1
116-120		1										
121-125		1										
> 125							1		1			
SUM		47				1	14	121	6	8	1	22

TABLE B-11

LENGTH FREQUENCY DISTRIBUTION OF BLUEFISH COLLECTED IN BOTTOM TRAWL SAMPLES
OCTOBER 1998 - SEPTEMBER 1999 (ALL STATIONS COMBINED)

	MONTH											
LENGTH INTERVAL (mm)	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
≤ 110											1	1
111-120												
121-130											1	
131-140												2
141-150												
151-160	1											
161-170	2											2
171-180	2										1	1
181-190	3										1	2
191-200	1											
201-210												
211-220												
221-230	1											
231-240	1											
241-250	1											
251-260	1											1
261-270												
271-280	1											
281-290									2			
> 290												
SUM	14								2		4	9

TABLE B-12

LENGTH FREQUENCY DISTRIBUTION OF BUTTERFISH COLLECTED IN BOTTOM TRAWL SAMPLES
OCTOBER 1998 - SEPTEMBER 1999 (ALL STATIONS COMBINED)

	MONTH											
LENGTH INTERVAL (mm)	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
≤ 20										9		
21-30										113		
31-40								1		81	1	
41-50								1	1	11	3	
51-60									1	1	1	
61-70											2	
71-80										1	4	
81-90										2	32	
91-100											39	
101-110	1									1	24	1
111-120	9										23	
121-130	15	1									12	9
131-140	13		2								3	12
141-150	5	2	3								2	22
151-160	4	1						1			4	11
161-170								1			1	4
171-180												1
> 180	1	5							1	1		
SUM	48	9	5					4	3	220	151	60

TABLE B-13

LENGTH FREQUENCY DISTRIBUTION OF FOURSPOT FLOUNDER COLLECTED IN BOTTOM TRAWL SAMPLES
OCTOBER 1998 - SEPTEMBER 1999 (ALL STATIONS COMBINED)

	MONTH											
LENGTH INTERVAL (mm)	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
≤ 60												
61-75	1											
76-90	1											
91-105	1											
106-120												
121-135												
136-150												
151-165												
166-180												
181-195												
196-210												
211-225												
226-240												
241-255												
256-270												
271-285							1					
286-300												
301-315							1					
316-330												
> 330												
SUM	3						2					

TABLE B-14

LENGTH FREQUENCY DISTRIBUTION OF RED HAKE COLLECTED IN BOTTOM TRAWL SAMPLES
OCTOBER 1998 - SEPTEMBER 1999 (ALL STATIONS COMBINED)

	MONTH											
LENGTH INTERVAL (mm)	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
≤ 50												
51-60		2										
61-70												
71-80									1			
81-90												
91-100									1			
101-110												
111-120												
121-130									1			
131-140												
141-150												
151-160												
161-170												
171-180												
181-190												
191-200												
201-210												
211-220											1	
221-230						1						
> 230												
SUM		2				1			3		1	

TABLE B-15

LENGTH FREQUENCY DISTRIBUTION OF SCUP COLLECTED IN BOTTOM TRAWL SAMPLES
OCTOBER 1998 - SEPTEMBER 1999 (ALL STATIONS COMBINED)

	MONTH											
LENGTH INTERVAL (mm)	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
≤ 60												
61-70												
71-80												
81-90	2											1
91-100	2											6
101-110	1							1	1			10
111-120								1	2	1		16
121-130									2	6	1	3
131-140										36	2	
141-150										44	1	
151-160										12	20	
161-170										2	36	2
171-180											23	4
181-190	2										17	13
191-200	4										2	18
201-210	2											6
211-220												
221-230												
231-240												
> 240												
SUM	13							2	5	101	102	79

TABLE B-16

LENGTH FREQUENCY DISTRIBUTION OF SILVER HAKE COLLECTED IN BOTTOM TRAWL SAMPLES
OCTOBER 1998 - SEPTEMBER 1999 (ALL STATIONS COMBINED)

	MONTH											
LENGTH INTERVAL (mm)	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
≤ 65					1							
66-70												
71-75												
76-80					3	1						
81-85			1		3	2						
86-90					1		1					
91-95					2		3					
96-100							6					
101-105					1	2	8					
106-110							4					
111-115							6					
116-120							4	1				
121-125							1					
126-130							1	2				
131-135								1				
136-140												
141-145												
146-150									1			
151-155												
> 155												
SUM			1		11	5	34	4	1			

TABLE B-17

LENGTH FREQUENCY DISTRIBUTION OF SMALLMOUTH FLOUNDER COLLECTED IN BOTTOM TRAWL SAMPLES
OCTOBER 1998 - SEPTEMBER 1999 (ALL STATIONS COMBINED)

	MONTH											
LENGTH INTERVAL (mm)	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
≤ 60												
61-70												
71-80												
81-90												
91-100												
101-110	4	1										
111-120	2		2									
121-130	2		3									
131-140	1		1									
141-150	1		3									
151-160			1									
161-170												
171-180												
181-190												
191-200												
201-210												
211-220												
221-230												
231-240												
> 240												
SUM	10	1	10									

TABLE B-18

LENGTH FREQUENCY DISTRIBUTION OF SPOTTED HAKE COLLECTED IN BOTTOM TRAWL SAMPLES
OCTOBER 1998 - SEPTEMBER 1999 (ALL STATIONS COMBINED)

	MONTH											
LENGTH INTERVAL (mm)	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
≤ 60			1		1			3	1			
61-70			1				1		2			
71-80			1		3	9	17	3	11			
81-90					1	3	46	1	6			
91-100						2	86	1	4			
101-110					1	1	66	4	3			
111-120						1	50	1	8			
121-130							43	1	7			
131-140							19	7	9			
141-150							6	3	9			
151-160							5	1	8			
161-170							2		8			
171-180									10			
181-190									6			
191-200									8			
201-210									6			
211-220									6			
221-230									1			
231-240									2		1	
> 240									2		1	
SUM			3		6	16	341	25	117		2	

TABLE B-19

LENGTH FREQUENCY DISTRIBUTION OF STRIPED BASS COLLECTED IN BOTTOM TRAWL SAMPLES
OCTOBER 1998 - SEPTEMBER 1999 (ALL STATIONS COMBINED)

	MONTH											
LENGTH INTERVAL (mm)	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
≤ 30												
31-50										293	1	
51-70										155	71	
71-90		2				1	40			1	107	
91-110	1	43	5		1	2	149		1		6	1
111-130	7	79	12		1	16	97					
131-150		6	9			18	30					
151-170			17		3	19	15					
171-190			13		4	28	9					
191-210			10		9	38	8					
211-230			5		3	42	15					
231-250			4		1	29	6					
251-270		1			2	13	1	1				
271-290		1	2		1	12	3				1	
291-310		1			2	8	2					
311-330						3	1	1				
331-350						3						
371-370				1		3		1	1			
371-390					1							
391-410			1									
> 410												
SUM	8	133	78	1	28	235	376	3	2	449	186	1

TABLE B-20

LENGTH FREQUENCY DISTRIBUTION OF SUMMER FLOUNDER COLLECTED IN BOTTOM TRAWL SAMPLES
OCTOBER 1998 - SEPTEMBER 1999 (ALL STATIONS COMBINED)

	MONTH											
LENGTH INTERVAL (mm)	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
≤ 100											3	1
101-120												
121-140												
141-160									1			
161-180									1		1	
181-200												
201-220												
221-240												
241-260								3	1			
261-280								6	3			
281-300								2	14	1		1
301-320								3	16	3	2	
321-340	1							3	5	10	2	1
341-360								1	3	7	9	1
361-380	1						1	2	5	4		
381-400	1							1	6	3	2	
401-420								2	2	1		
421-440								1	1	3	1	
> 440									1	1		
SUM	3						1	24	59	33	20	4

TABLE B-21

LENGTH FREQUENCY DISTRIBUTION OF WEAKFISH COLLECTED IN BOTTOM TRAWL SAMPLES
OCTOBER 1998 - SEPTEMBER 1999 (ALL STATIONS COMBINED)

	MONTH											
LENGTH INTERVAL (mm)	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
≤30										3		
31-40										24		
41-50										70	3	
51-60										89	4	
61-70										100	63	
71-80	2									128	126	1
81-90	8									112	132	1
91-100	31	1								74	114	
101-110	48	1	2							22	69	1
111-120	84	1	1							4	45	1
121-130	75	1	5							2	45	3
131-140	41		1								26	4
141-150	19		1								23	7
151-160	16		1								13	5
161-170	8		1								9	5
171-180	8										5	5
181-190	9										6	1
191-200	6										4	2
201-210	4		1									2
211-220	4											2
221-230	4								1			
231-240	2											
241-250	1								1			
251-260												
261-270									2			
271-280									1			
281-290									2			
291-300								1	3			
301-310									2			
> 310	2							1	13	3	4	
SUM	372	4	13					2	25	631	691	40

TABLE B-22

LENGTH FREQUENCY DISTRIBUTION OF WHITE PERCH COLLECTED IN BOTTOM TRAWL SAMPLES
OCTOBER 1998 - SEPTEMBER 1999 (ALL STATIONS COMBINED)

	MONTH											
LENGTH INTERVAL (mm)	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
≤ 80						1						
81-90						2						
91-100			2		1	4	1					
101-110			3		1	3						
111-120			3			18						
121-130			10		10	15						
131-140			13		15	34						
141-150			12		19	32						
151-160			8		15	22	1					
161-170			8		18	30						
171-180			12		19	45						
181-190			9		16	32	1					
191-200			7		6	33						
201-210			3		4	20						
211-220			3		3	11			1			
221-230					2	8						
231-240			1		1	4						
241-250					1	7						
251-260						3						
> 260						2						
SUM			94		131	326	3					

TABLE B-23

LENGTH FREQUENCY DISTRIBUTION OF WINDOWPANE COLLECTED IN BOTTOM TRAWL SAMPLES
OCTOBER 1998 - SEPTEMBER 1999 (ALL STATIONS COMBINED)

	MONTH											
LENGTH INTERVAL (mm)	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
≤ 30									3	3		
31-40									13	2		
41-50					1				12	5	1	
51-60									6	4	4	
61-70							2			9	6	
71-80							1			6	2	
81-90	1							1	1	3	2	1
91-100	1									2	2	
101-110	2									1		
111-120	2										1	
121-130	6						2					
131-140	1		1						1			
141-150	3								1			
151-160	2				1		6		1			
161-170	1				2		3	1				
171-180							2		1			
181-190					1	1	7	1				
191-200	1						5		1			
201-210	2		1			1	6					
211-220							7					
221-230						1	7					
231-240							6		4			
241-250			1				11		1			
251-260				1			10	2	1			
261-270							6	2				
271-280	1						12	2	2		1	
281-290	2						3		7			
291-300						1	4		2			
301-310						1						
> 310							1		3			
SUM	25		3	1	5	5	101	9	60	35	19	1

TABLE B-24

LENGTH FREQUENCY DISTRIBUTION OF WINTER FLOUNDER COLLECTED IN BOTTOM TRAWL SAMPLES
OCTOBER 1998 - SEPTEMBER 1999 (ALL STATIONS COMBINED)

	MONTH											
LENGTH INTERVAL (mm)	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
≤ 40									34	2		
41-50									42	11	3	
51-60									34	10	4	
61-70	1								4	6	3	
71-80	1									3	1	
81-90	1		2			2					1	
91-100	2		4	1		6	4				1	1
101-110	6	1	5		1	12			1	2	3	
111-120	4	1	3		1	17	11	1	11		3	
121-130	3	1	2			36	11		13		5	
131-140	2		2		2	35	15	5	12		2	
141-150	1	1			2	23	11	4	11		6	
151-160	1		1			15	17		16	1	6	1
161-170	4	1				16	23		7		6	
171-180	5	2			1	16	15		6	1	4	1
181-190	3				1	21	13	1	4	2	1	
191-200	2	2	1		2	13	8		2		1	
201-210						10	9	1	2		1	
211-220	2		1			3	11		3			
221-230	1					7	10		1		1	
231-240	1					4	3		1		2	
241-250						1	4	1	2		1	
251-260	1					4	4		1			
261-270											1	
271-280						1						
281-290	1				1	2	1		1			
291-300		1			1		3					
301-310		1				1						
311-320							1		1			
> 320		1				3	15	1			1	
SUM	42	12	21	1	12	248	189	14	209	38	57	3

3yr old

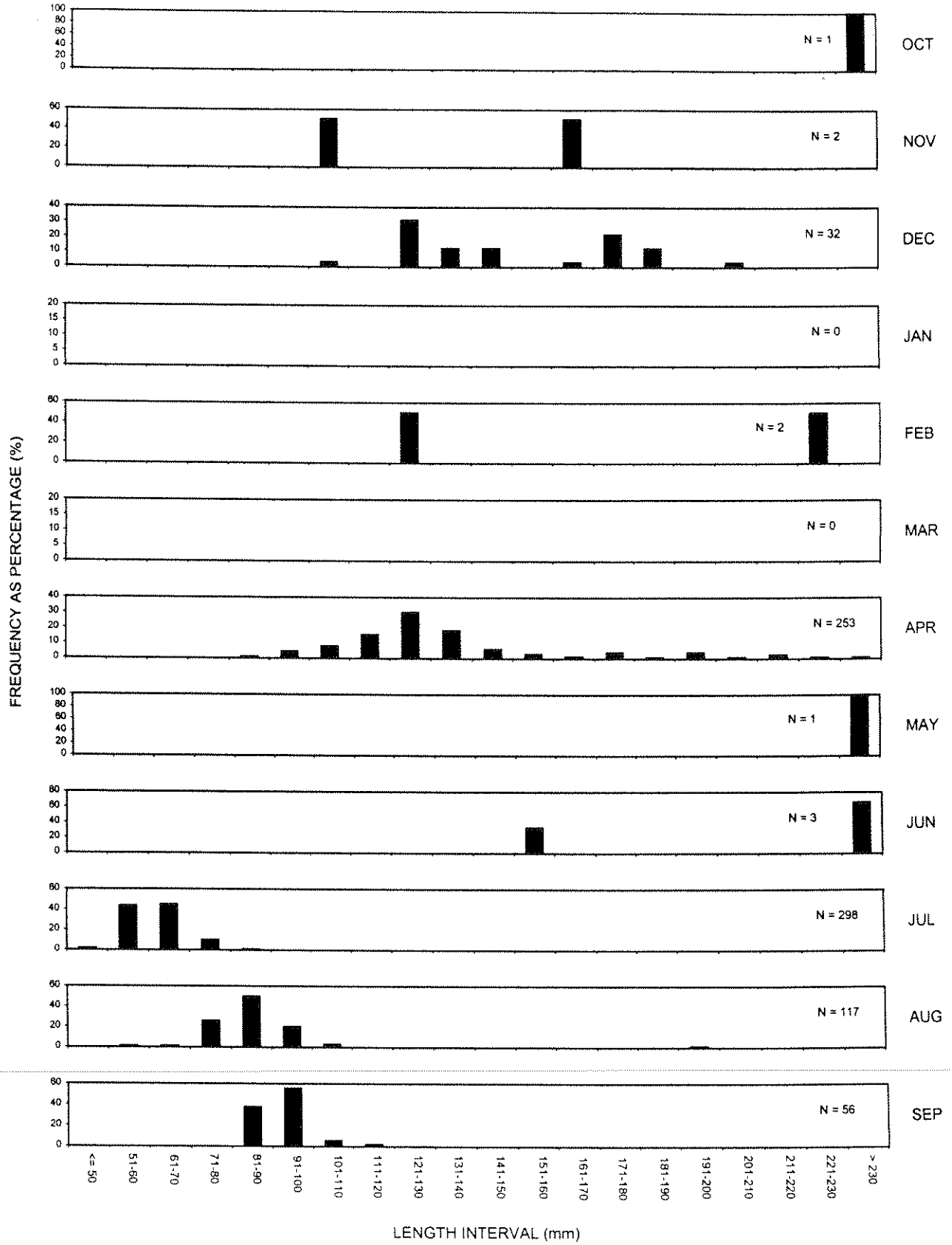


Figure B-1. Length frequency distribution of alewife collected in bottom trawl samples October 1998 - September 1999 (all stations combined)

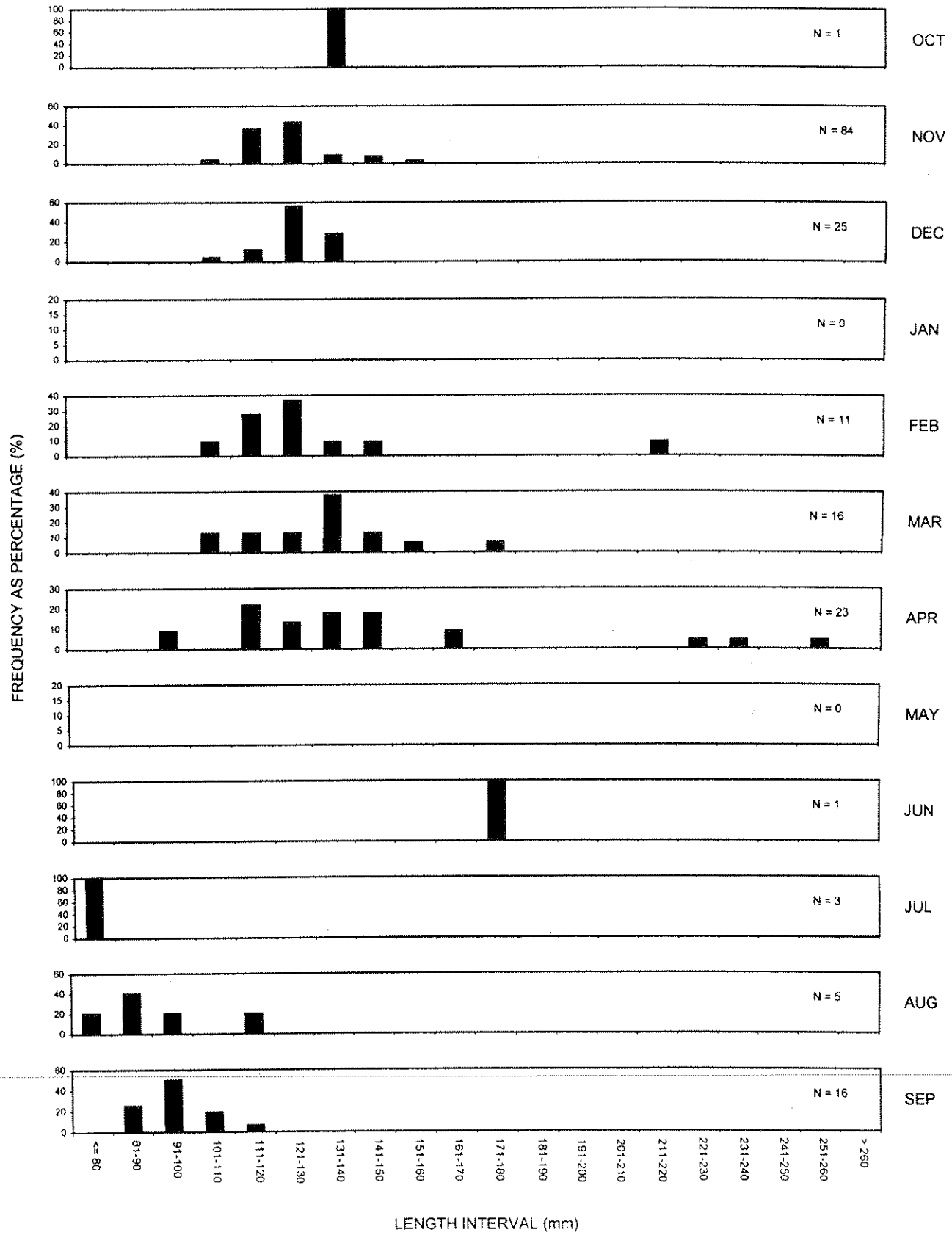


Figure B-2. Length frequency distribution of American shad collected in bottom trawl samples October 1998 - September 1999 (all stations combined)

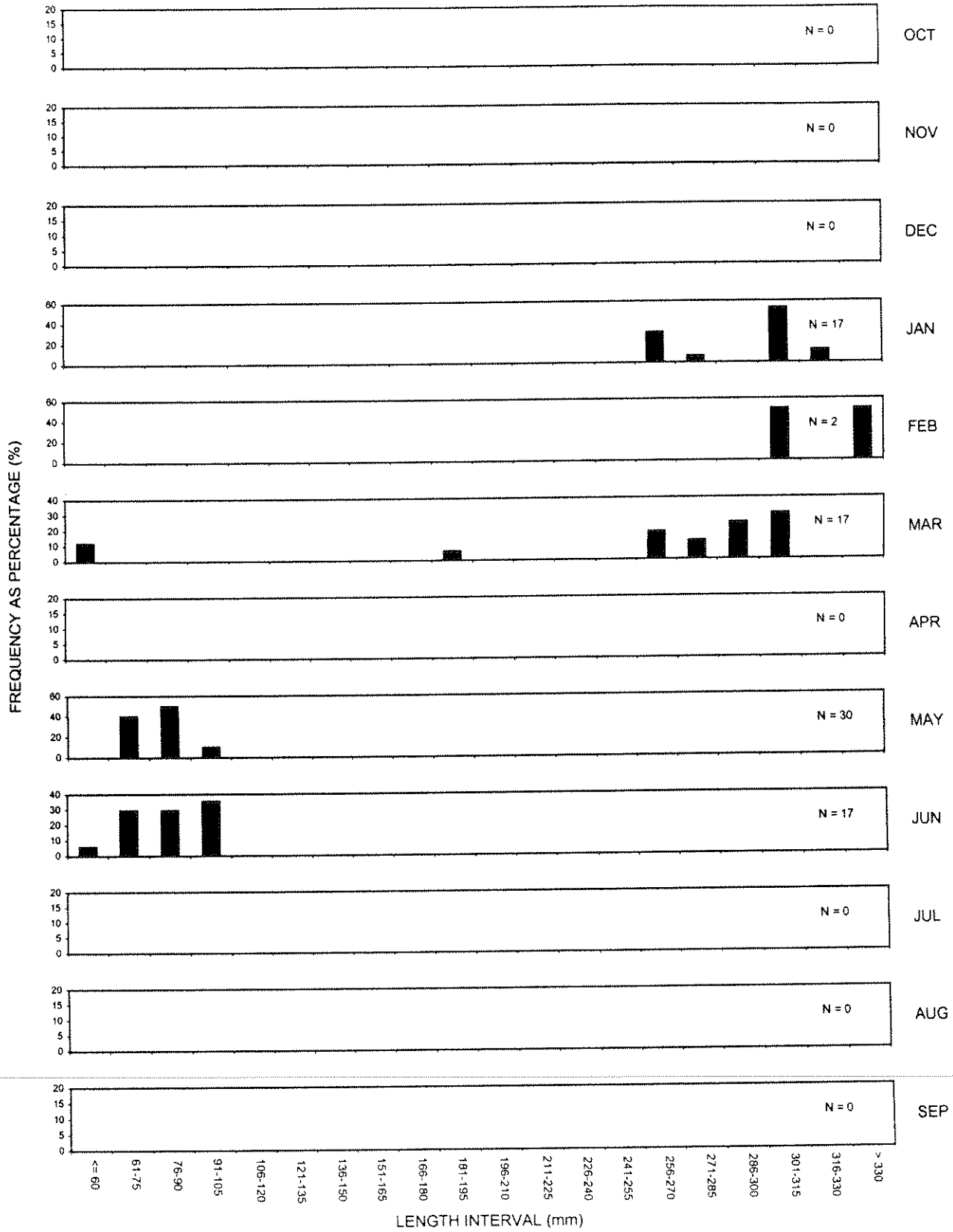


Figure B-3. Length frequency distribution of Atlantic herring collected in bottom trawl samples October 1998 - September 1999 (all stations combined)

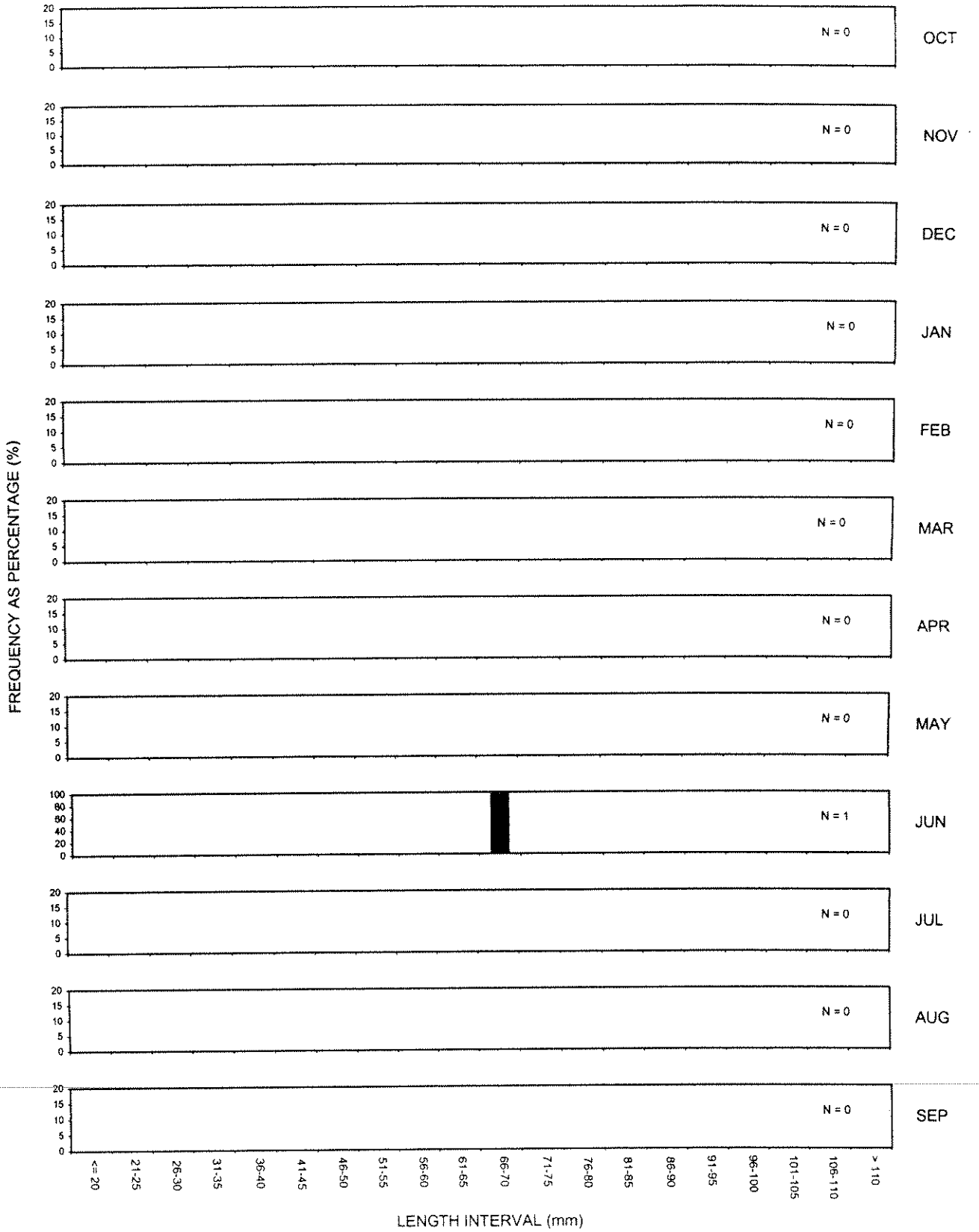


Figure B-4. Length frequency distribution of Atlantic mackerel collected in bottom trawl samples October 1998 - September 1999 (all stations combined)

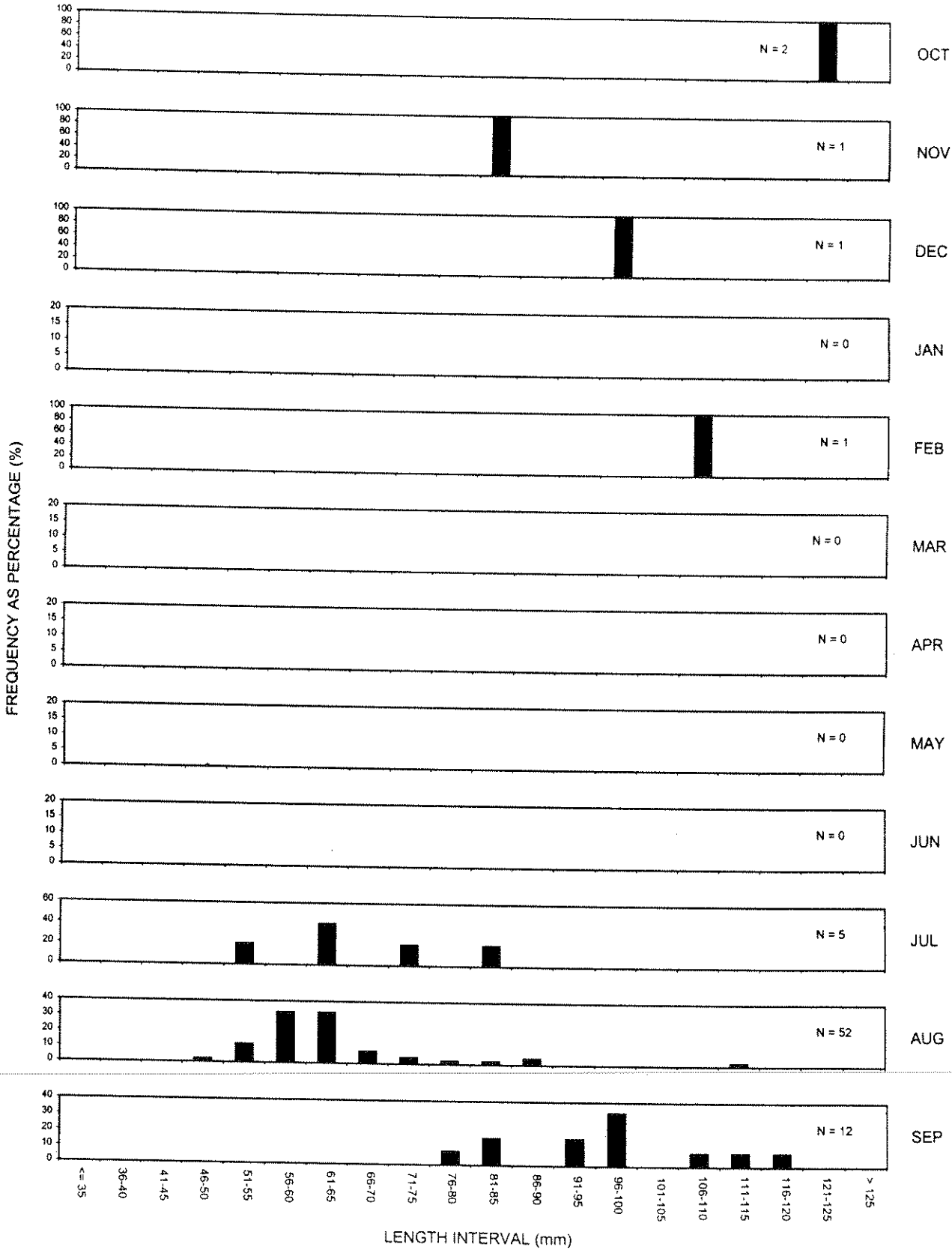


Figure B-5. Length frequency distribution of Atlantic menhaden collected in bottom trawl samples October 1998 - September 1999 (all stations combined)

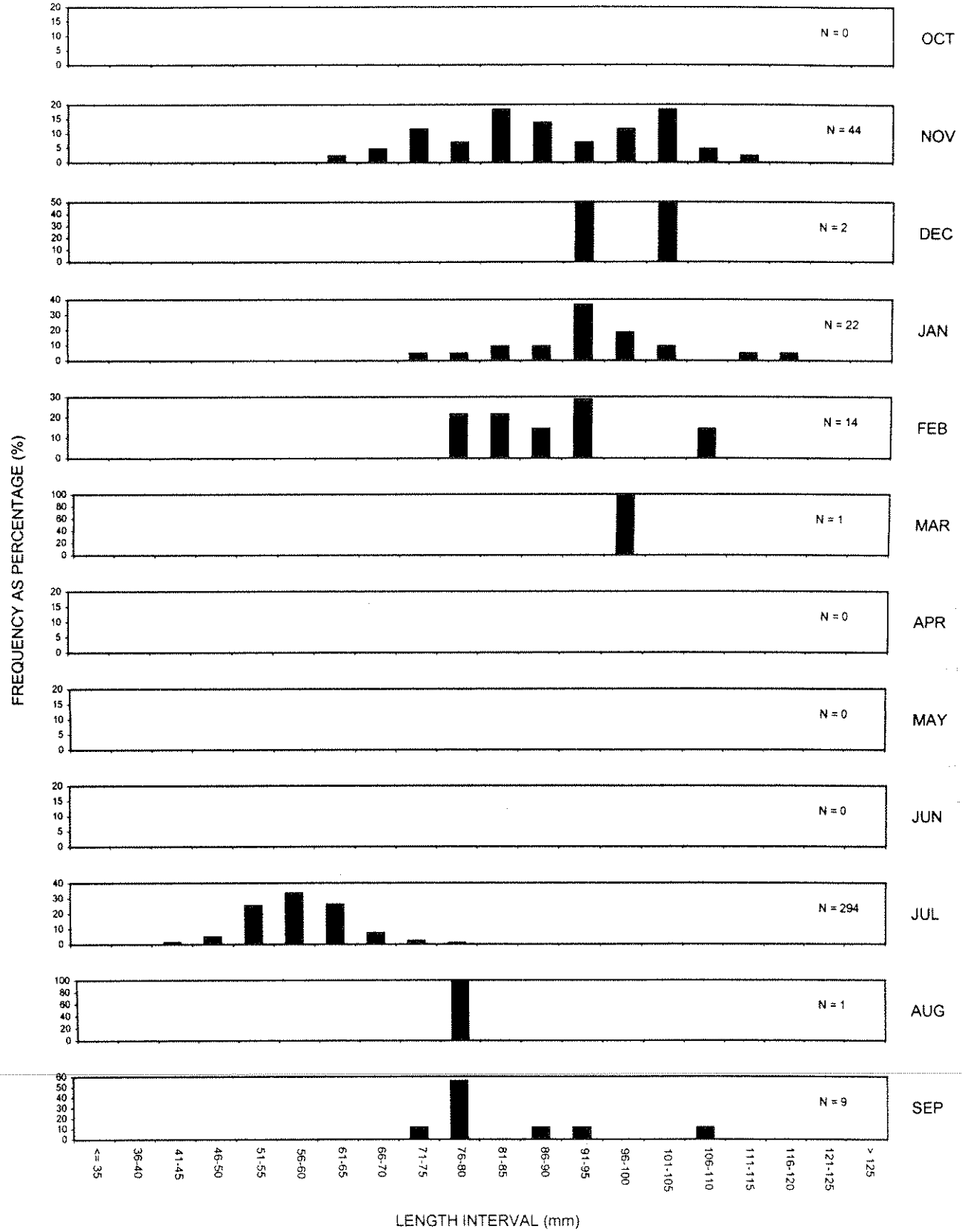


Figure B-6. Length frequency distribution of Atlantic silverside collected in bottom trawl samples October 1998 - September 1999 (all stations combined)

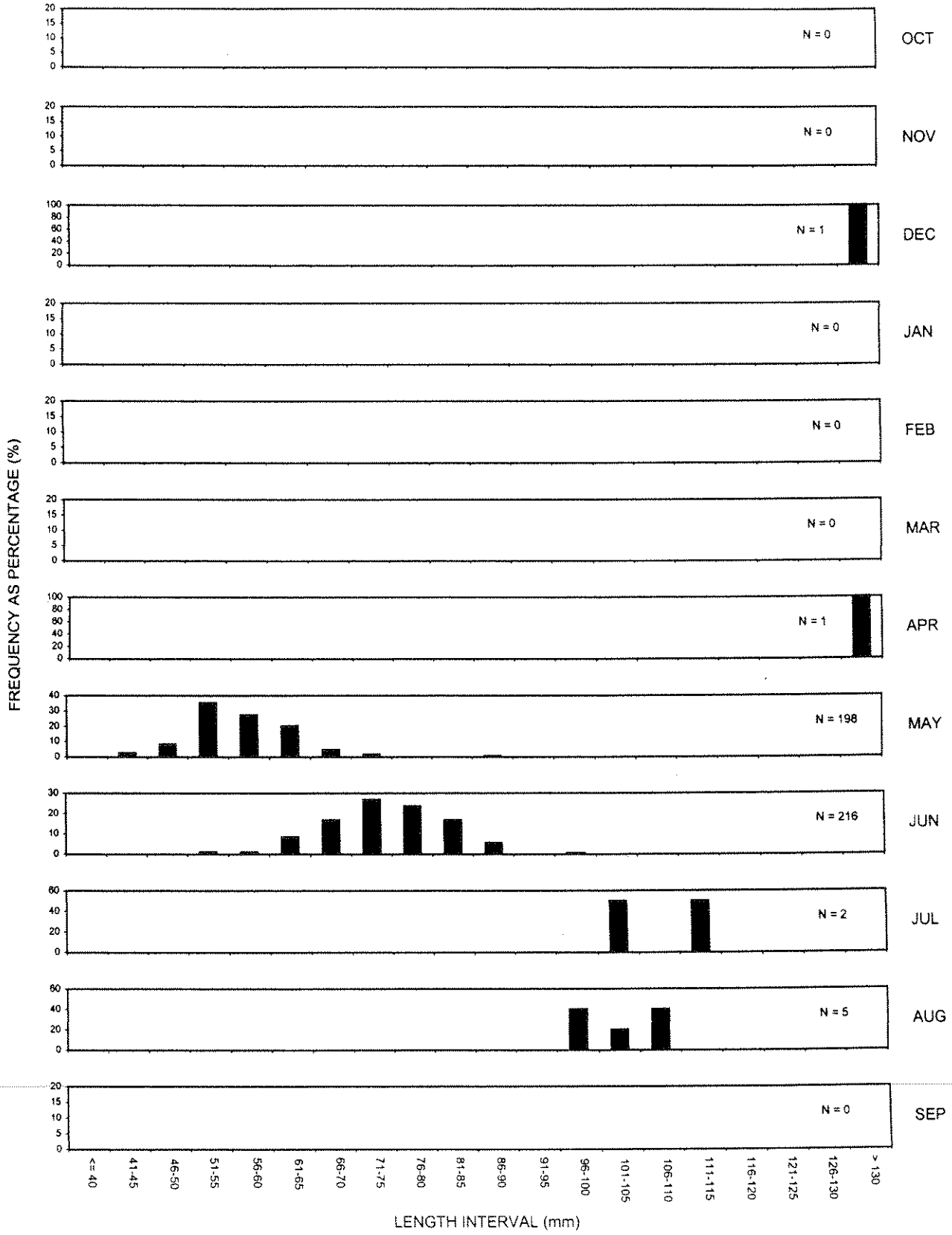


Figure B-7. Length frequency distribution of Atlantic tomcod collected in bottom trawl samples October 1998 - September 1999 (all stations combined)

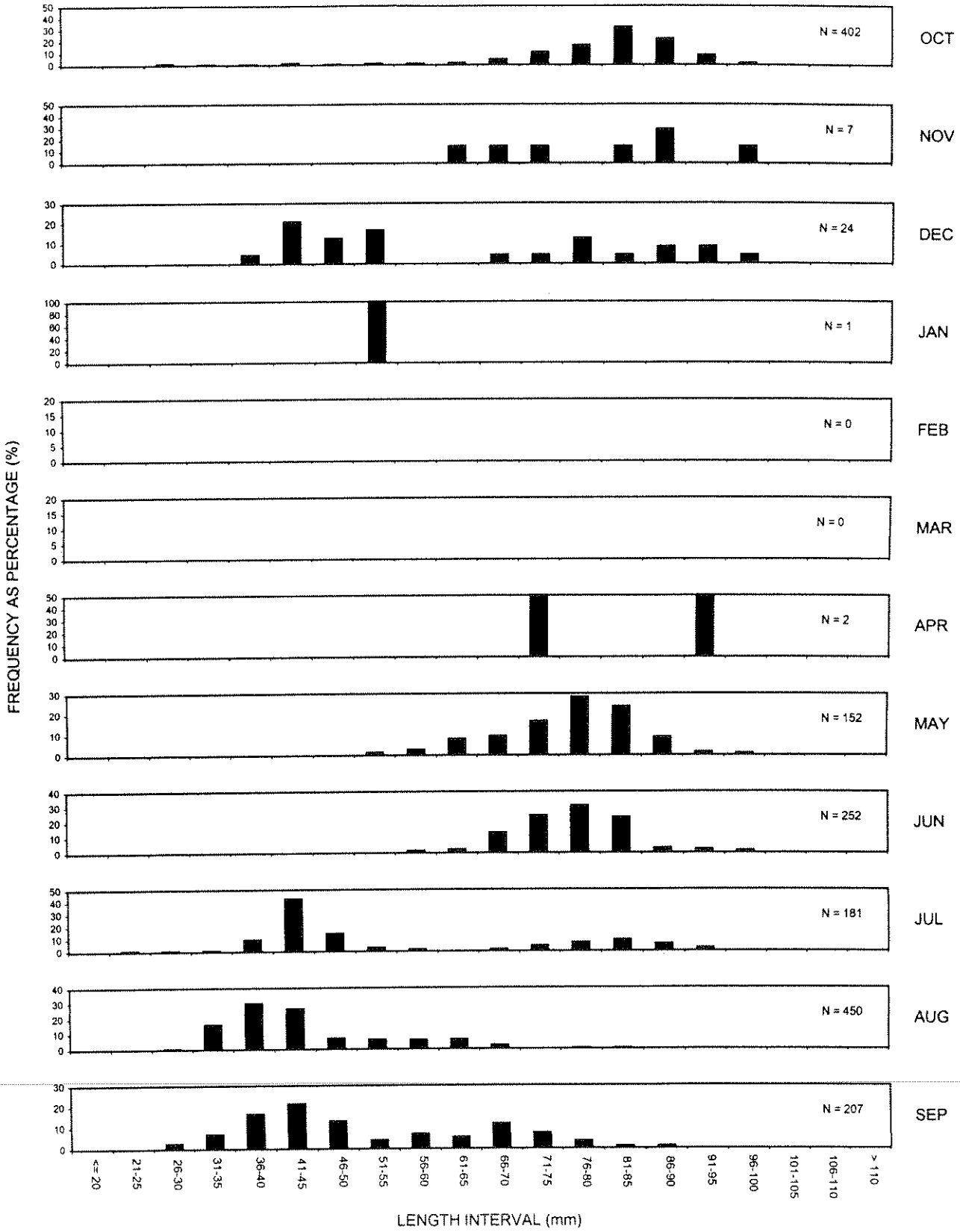


Figure B-8. Length frequency distribution of bay anchovy collected in bottom trawl samples October 1998 - September 1999 (all stations combined)

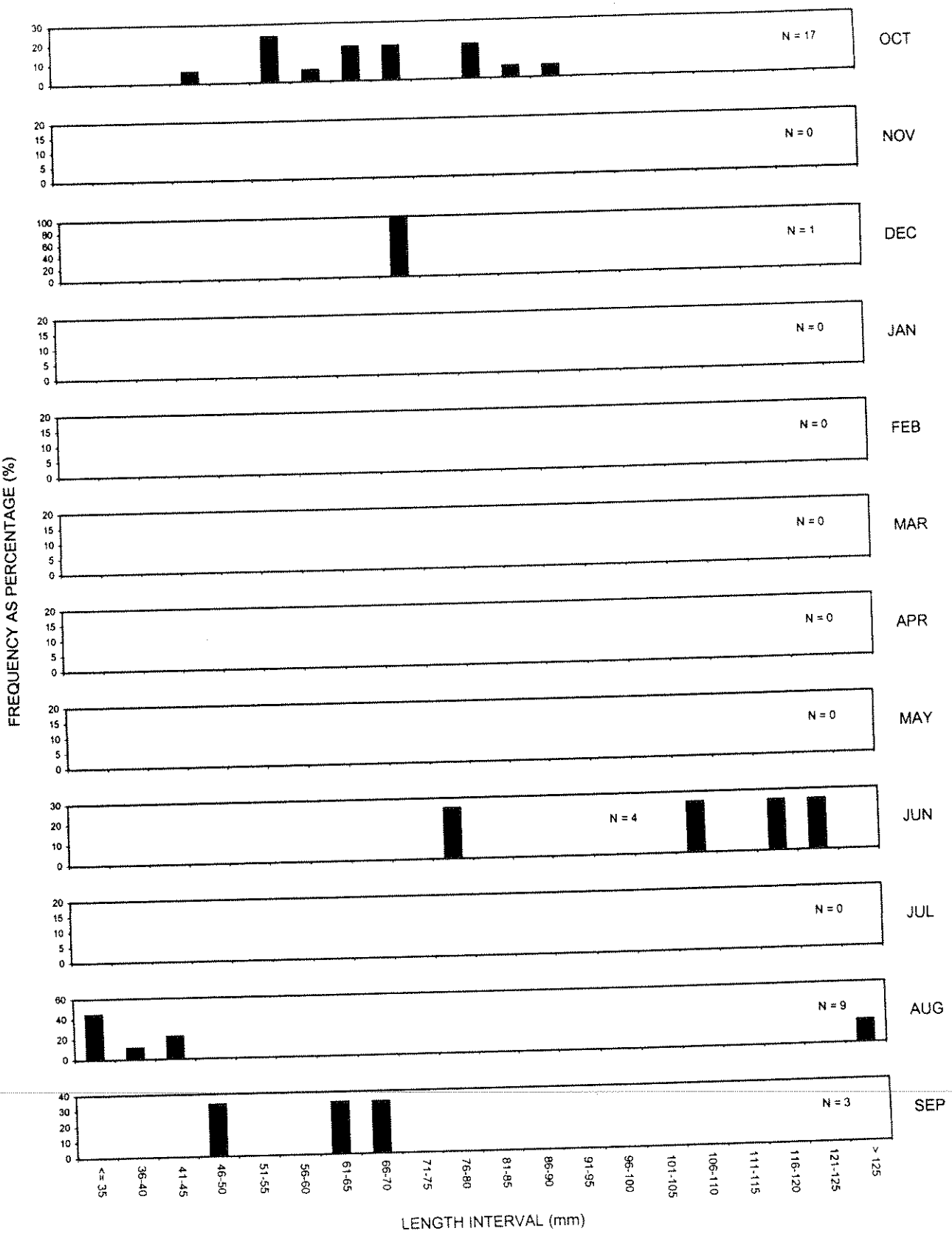


Figure B-9. Length frequency distribution of black sea bass collected in bottom trawl samples October 1998 - September 1999 (all stations combined)

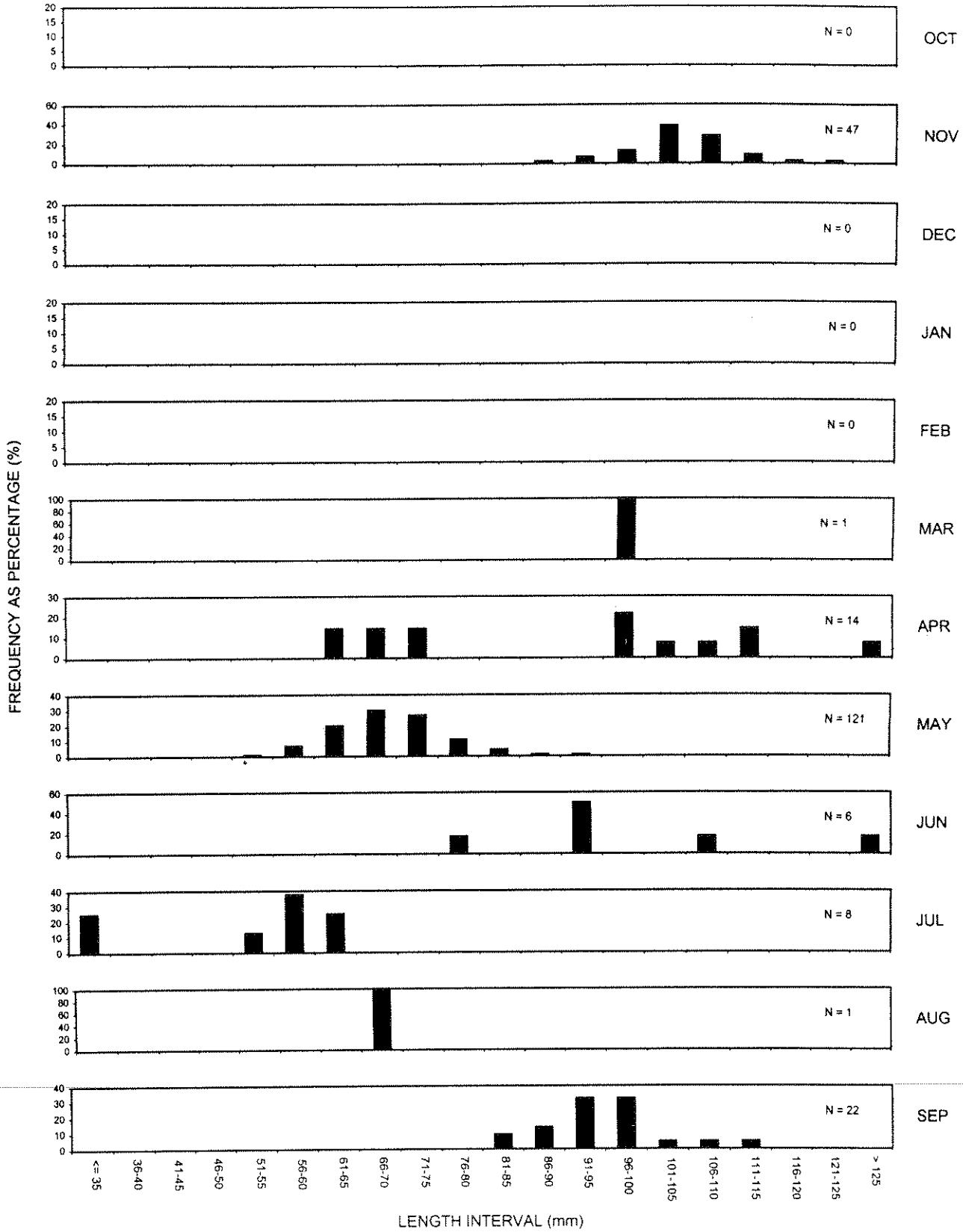


Figure B-10. Length frequency distribution of blueback herring collected in bottom trawl samples October 1998 - September 1999 (all stations combined)

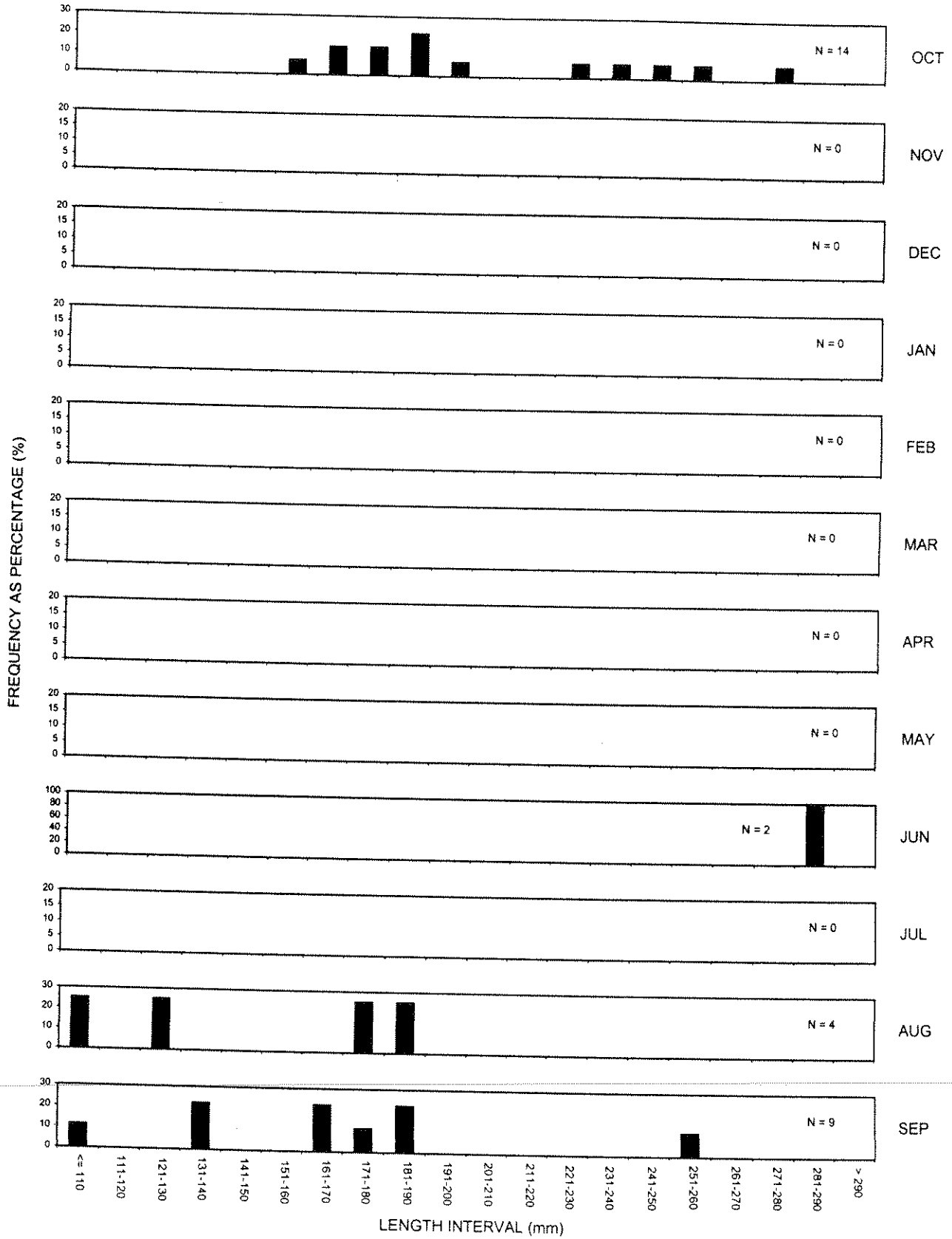


Figure B-11. Length frequency distribution of bluefish collected in bottom trawl samples October 1998 - September 1999 (all stations combined)

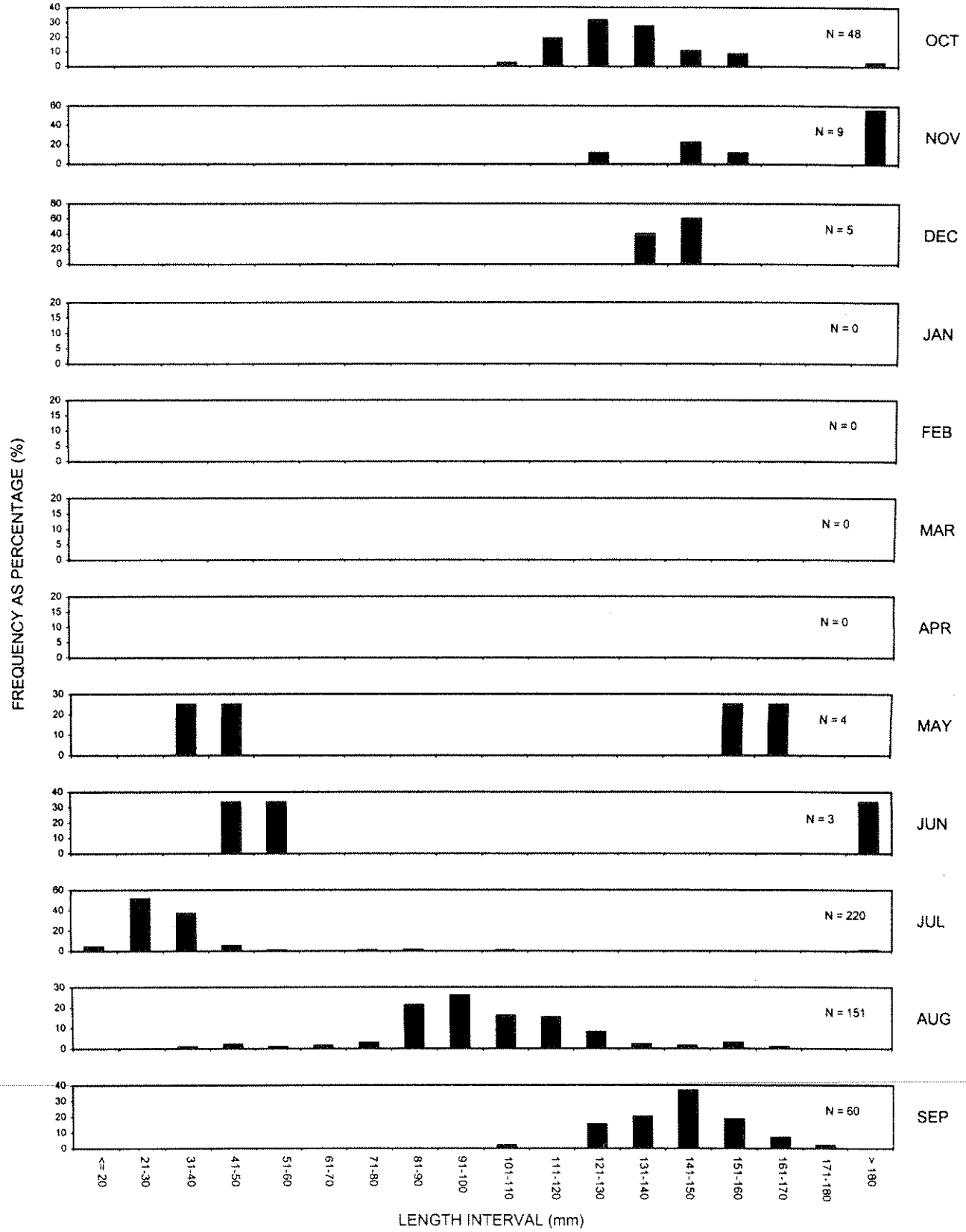


Figure B-6. Length frequency distribution of butterfish collected in bottom trawl samples October 1998 - September 1999 (all stations combined)

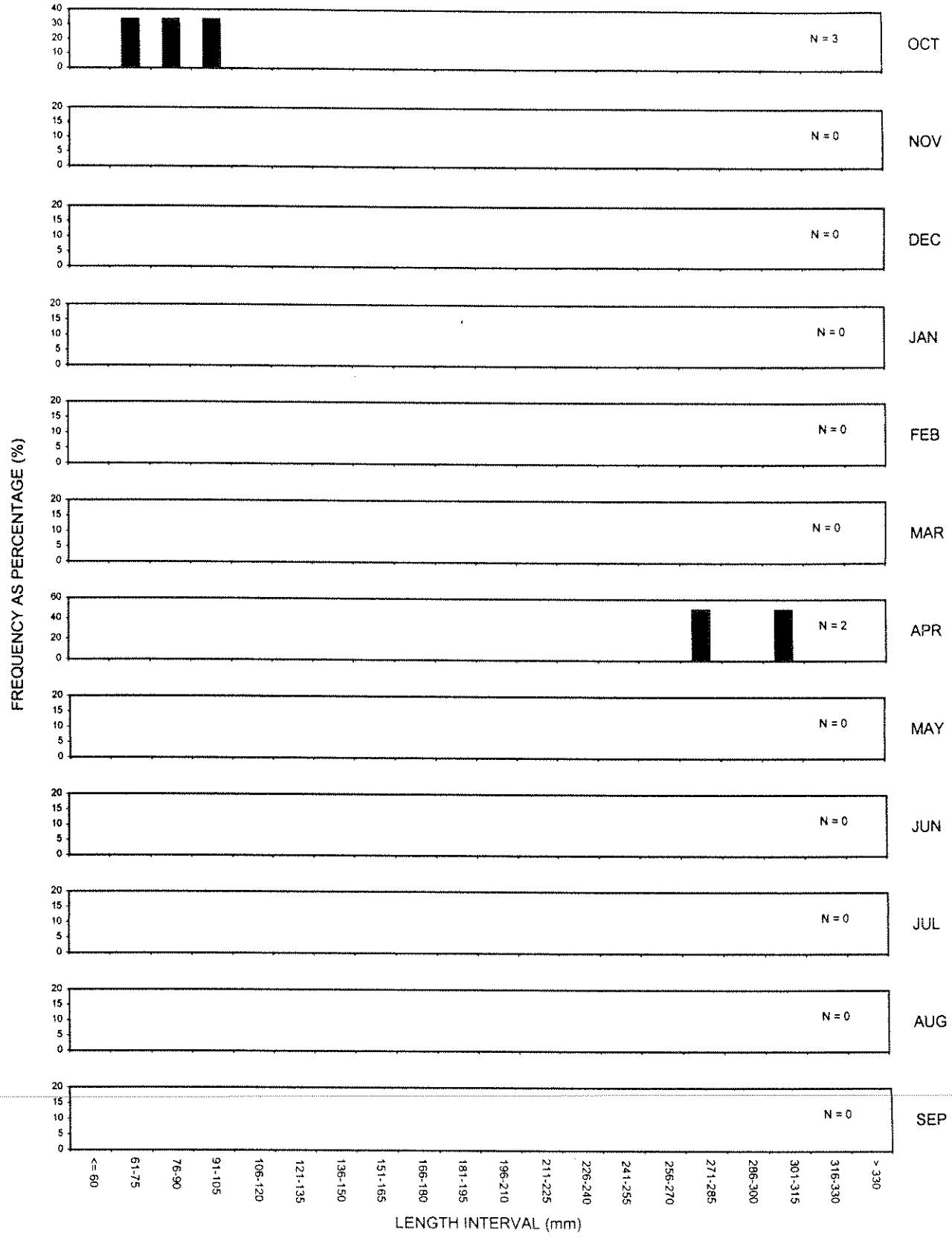


Figure B-13. Length frequency distribution of fourspot flounder collected in bottom trawl samples October 1998 - September 1999 (all stations combined)

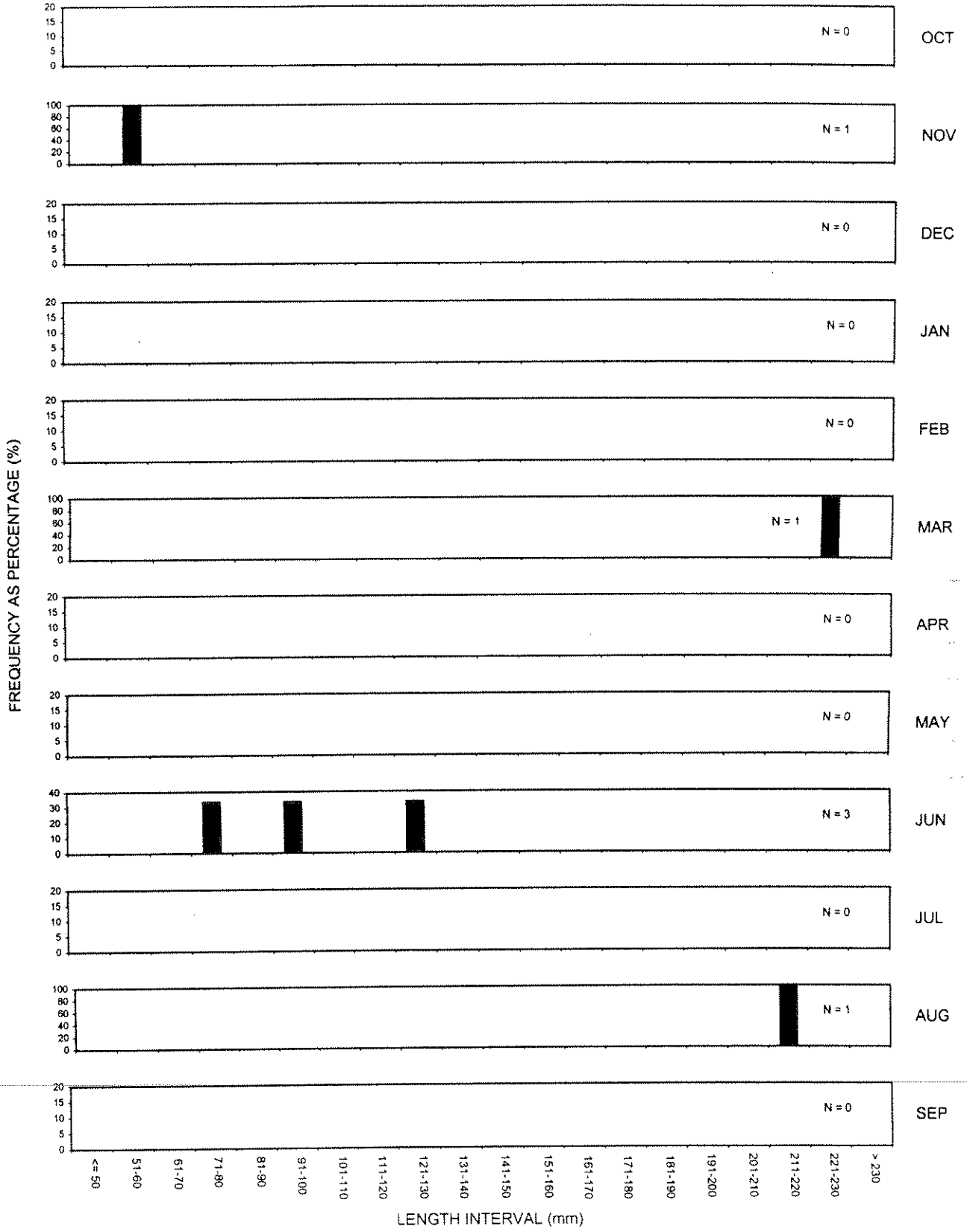


Figure B-14. Length frequency distribution of red hake collected in bottom trawl samples October 1998 - September 1999 (all stations combined)

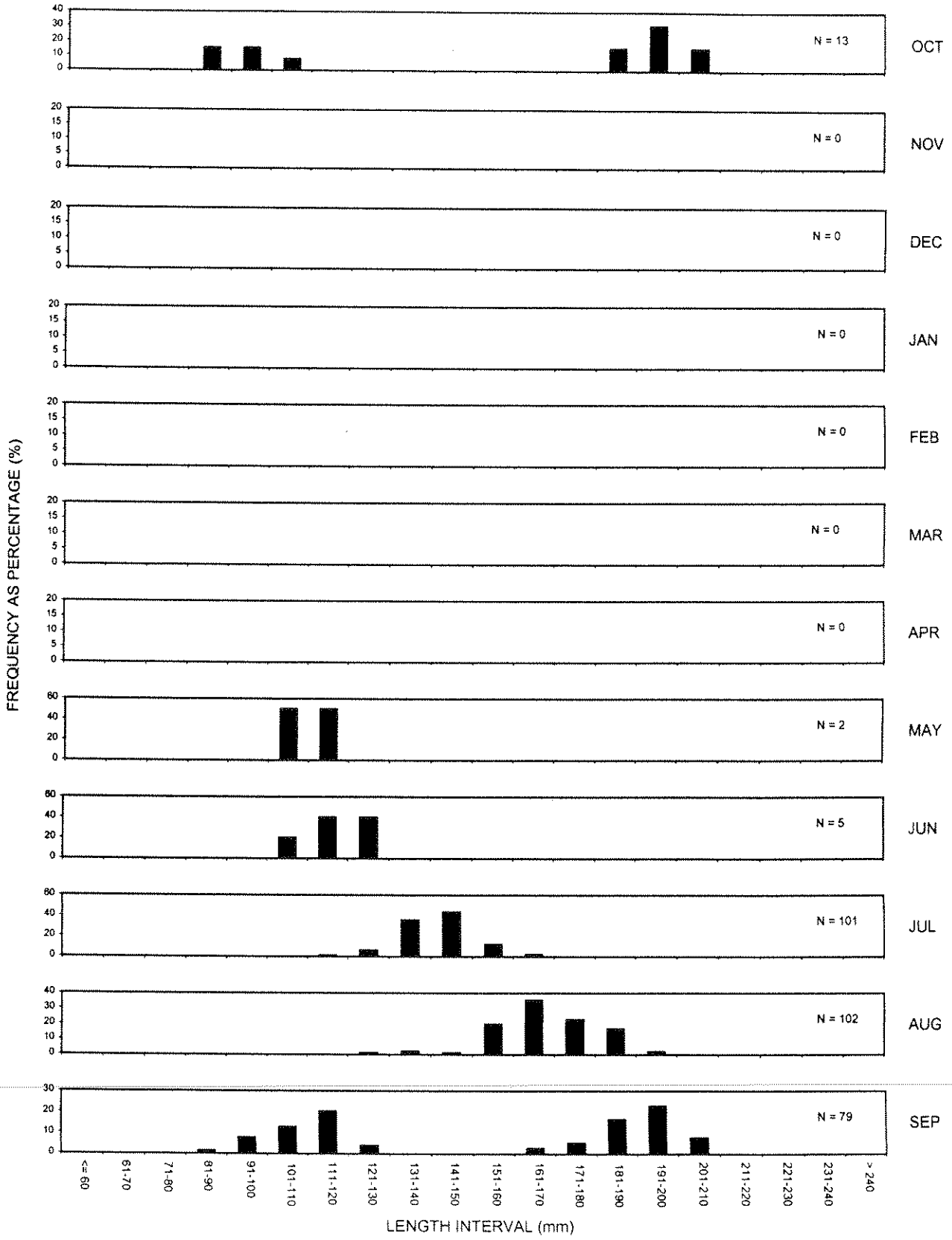


Figure B-15. Length frequency distribution of scup collected in bottom trawl samples October 1998 - September 1999 (all stations combined)

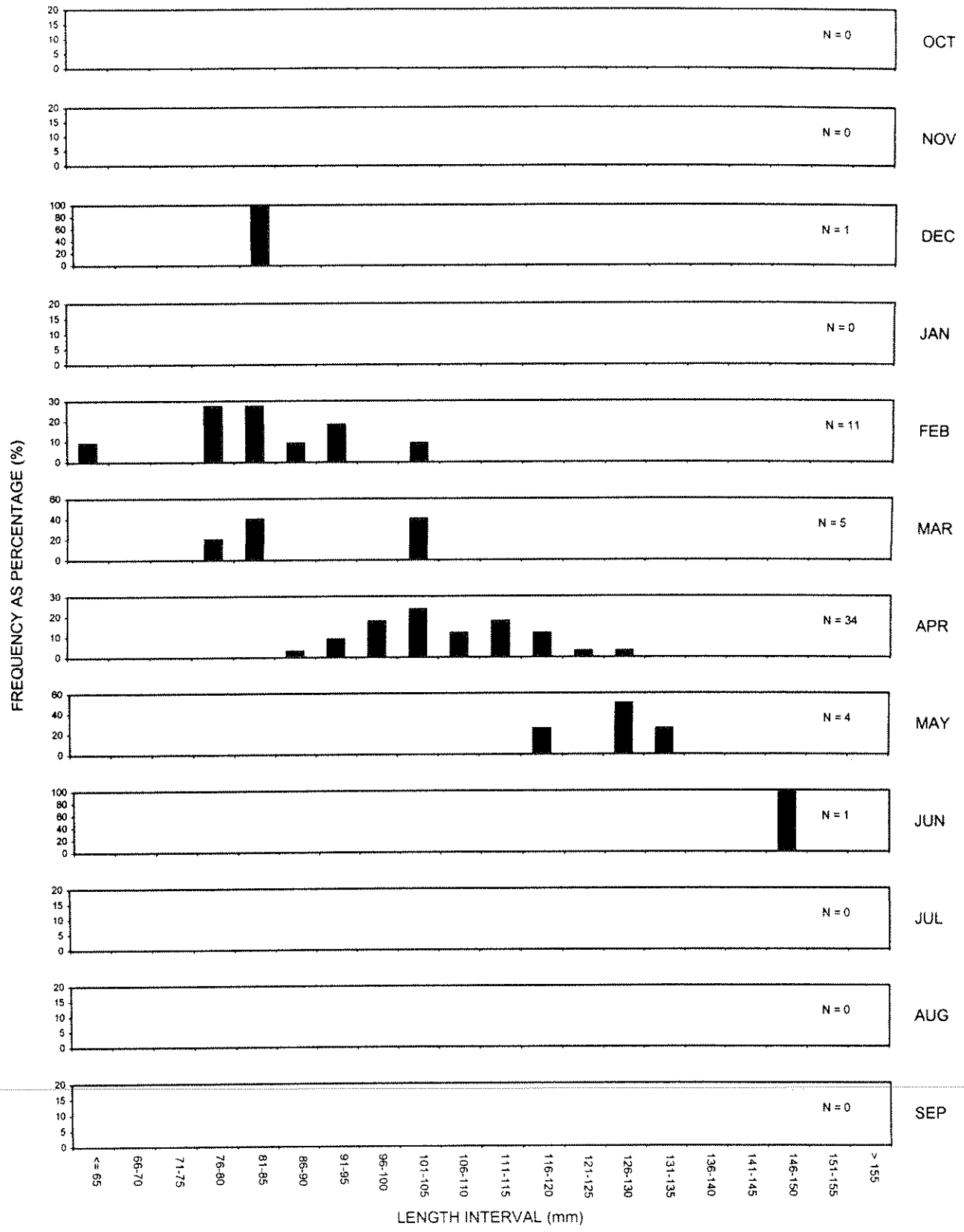


Figure B-16. Length frequency distribution of silver hake collected in bottom trawl samples October 1998 - September 1999 (all stations combined)

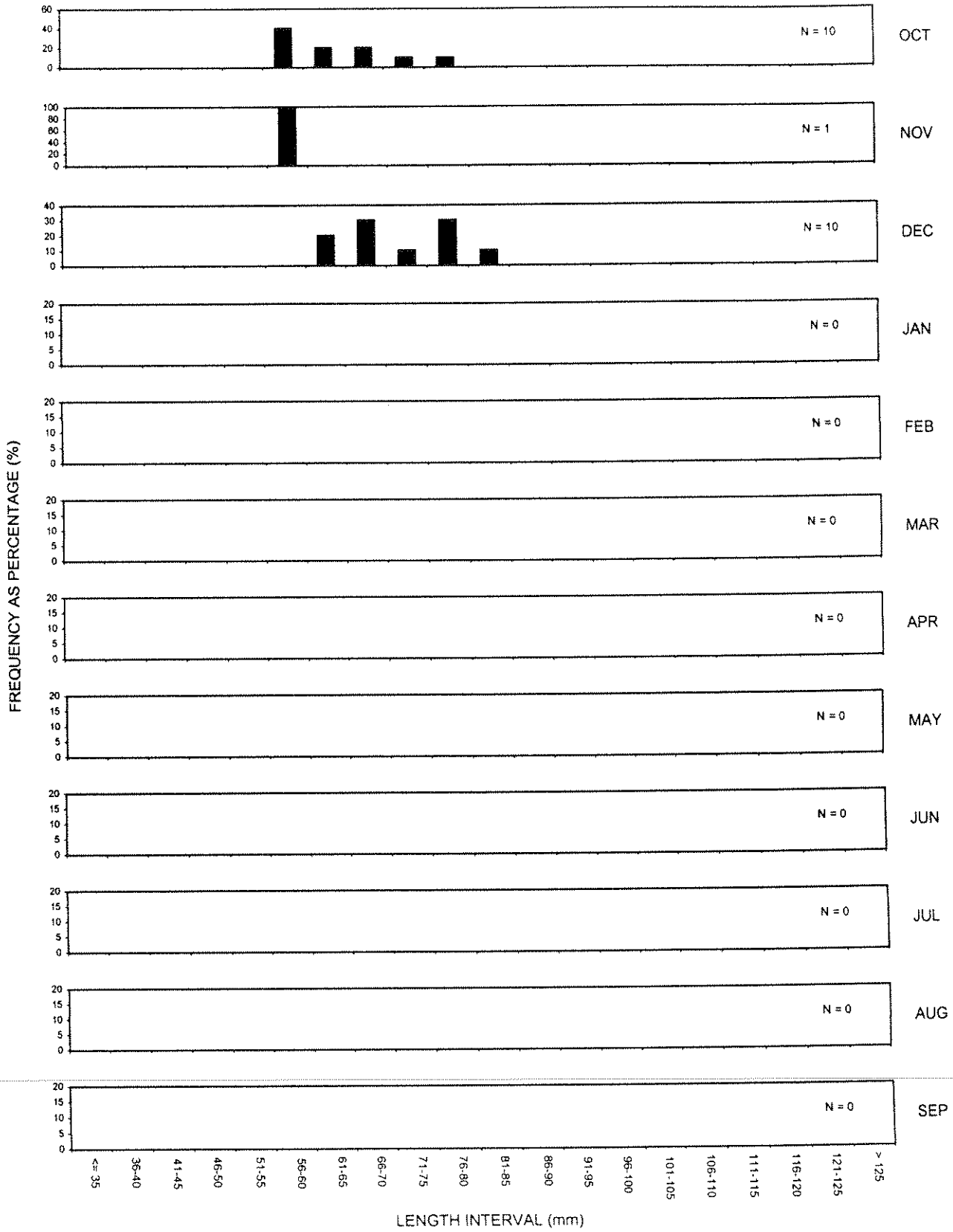


Figure B-17. Length frequency distribution of smallmouth flounder collected in bottom trawl samples October 1998 - September 1999 (all stations combined)

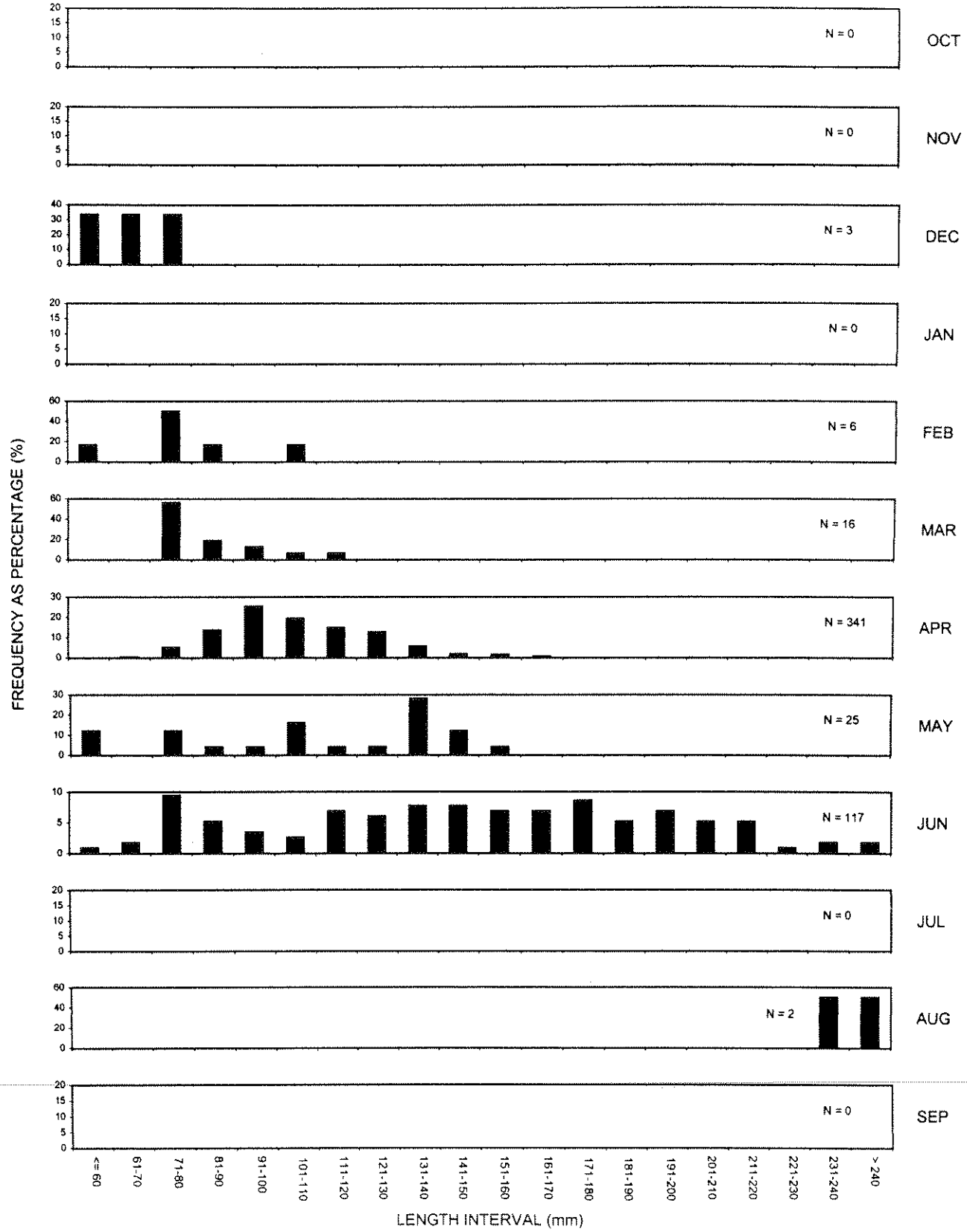


Figure B-18. Length frequency distribution of spotted hake collected in bottom trawl samples October 1998 - September 1999 (all stations combined)

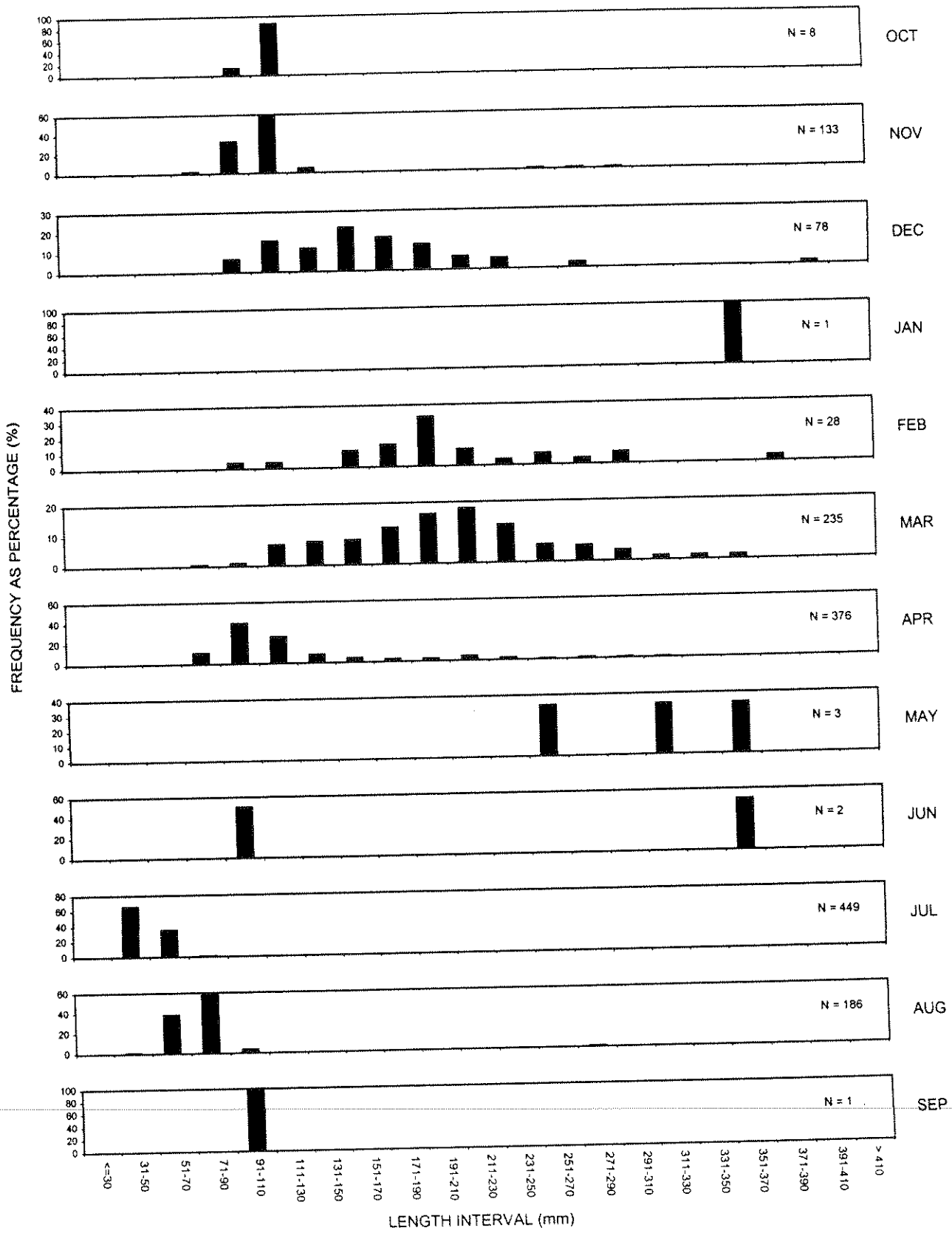


Figure B-19. Length frequency distribution of striped bass collected in bottom trawl samples October 1998 - September 1999 (all stations combined)

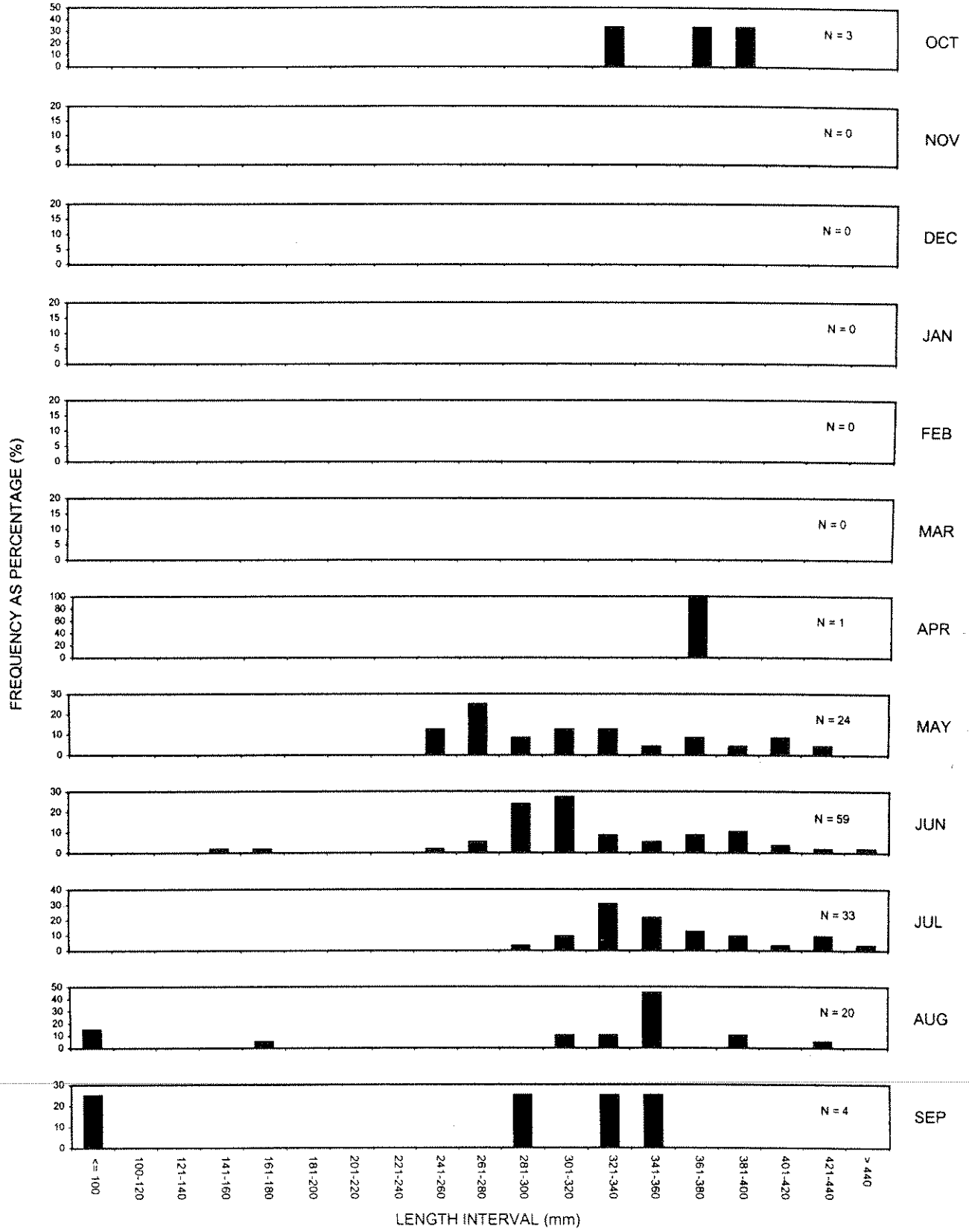


Figure B-20. Length frequency distribution of summer flounder collected in bottom trawl samples October 1998 - September 1999 (all stations combined)

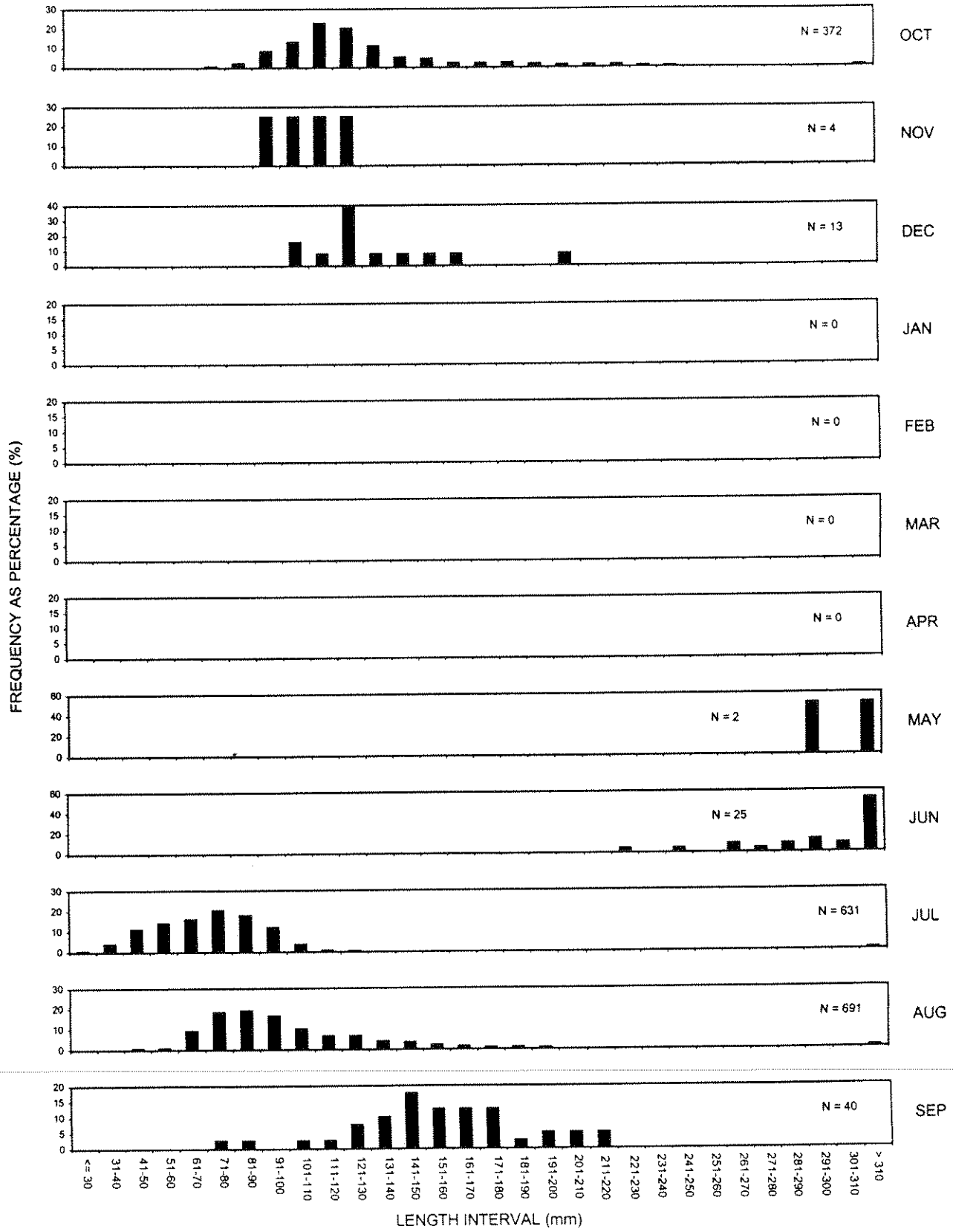


Figure B-21. Length frequency distribution of weakfish collected in bottom trawl samples October 1998 - September 1999 (all stations combined)

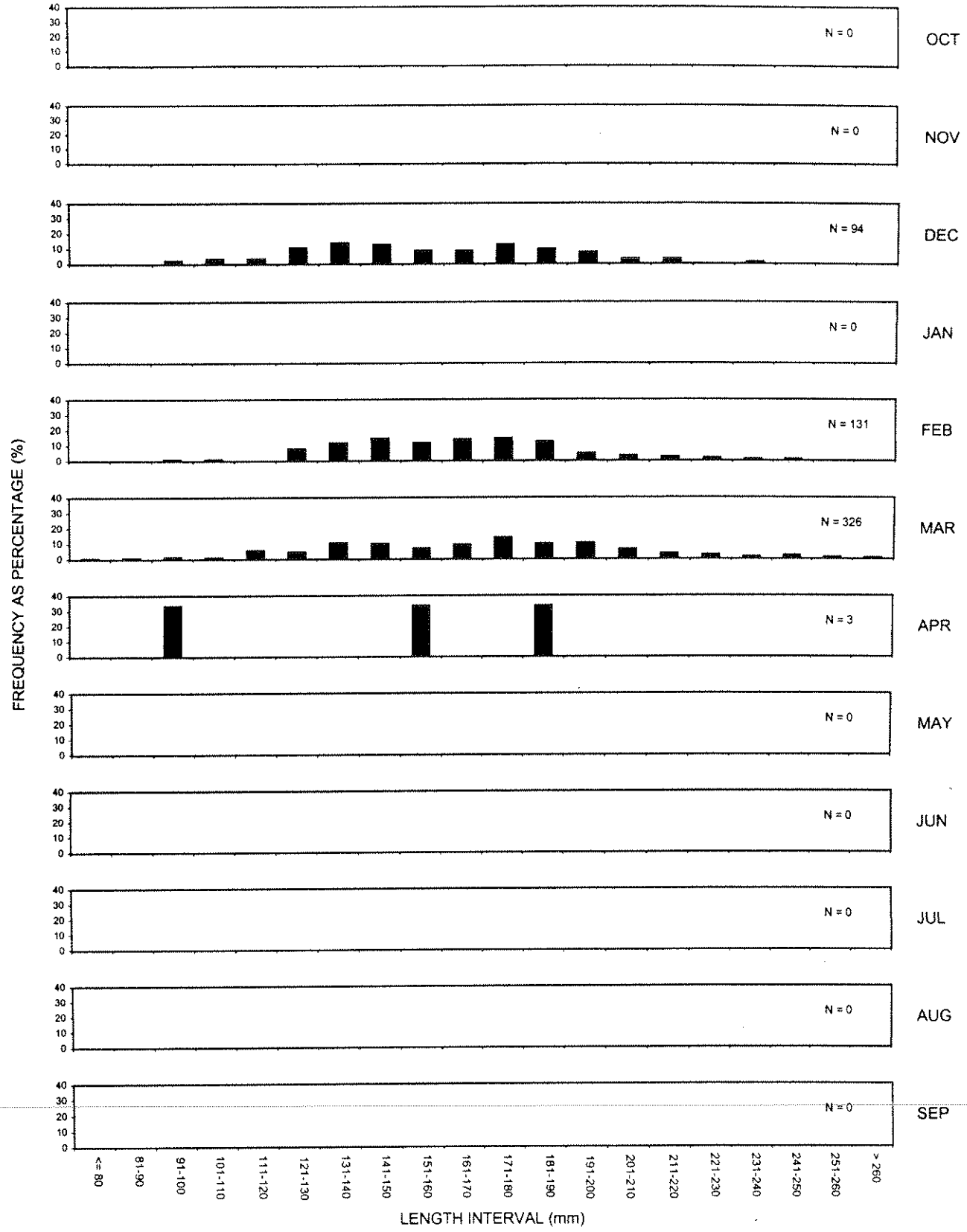


Figure B-22. Length frequency distribution of white perch collected in bottom trawl samples October 1998 - September 1999 (all stations combined)

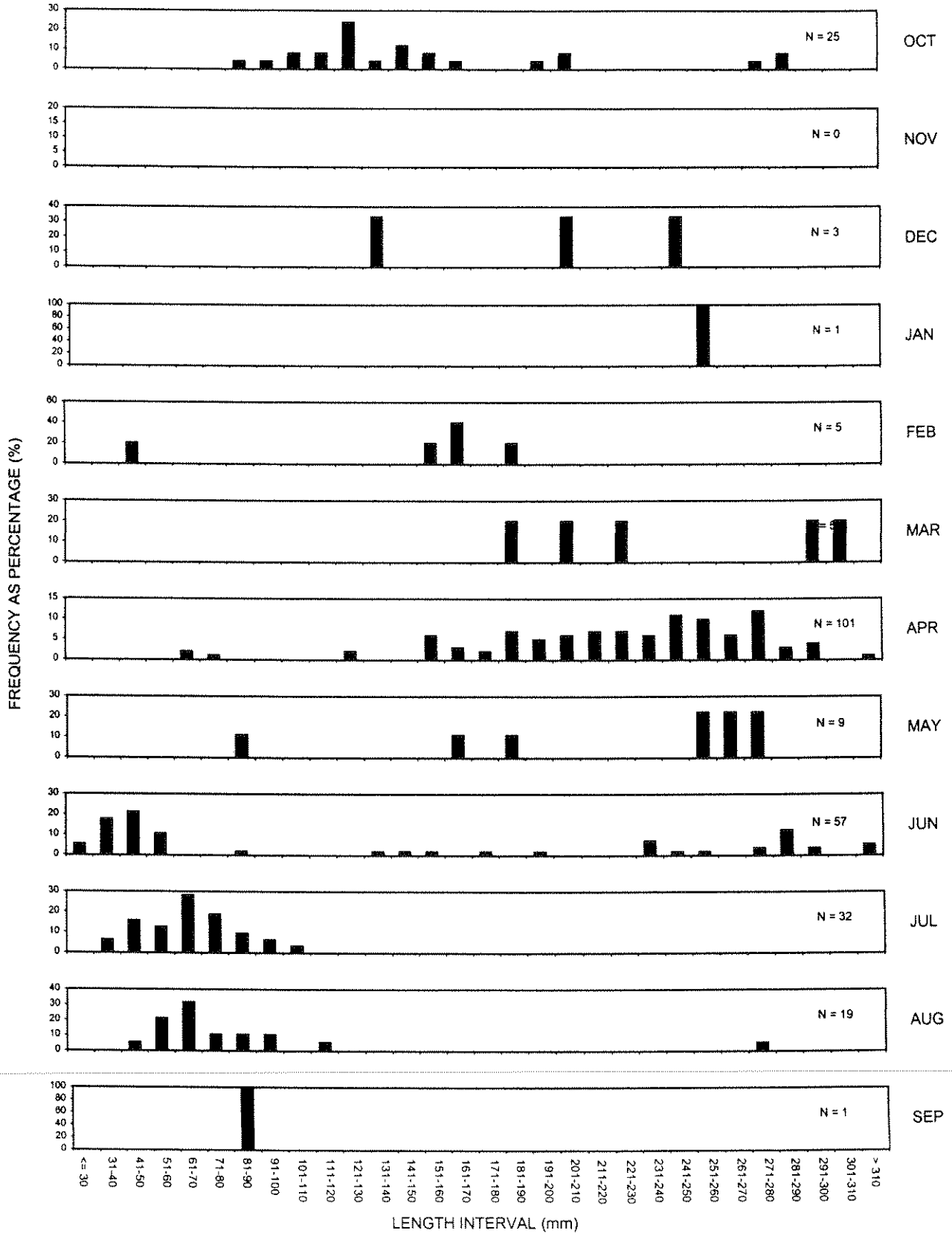


Figure B-23. Length frequency distribution of windowpane collected in bottom trawl samples October 1998 - September 1999 (all stations combined)

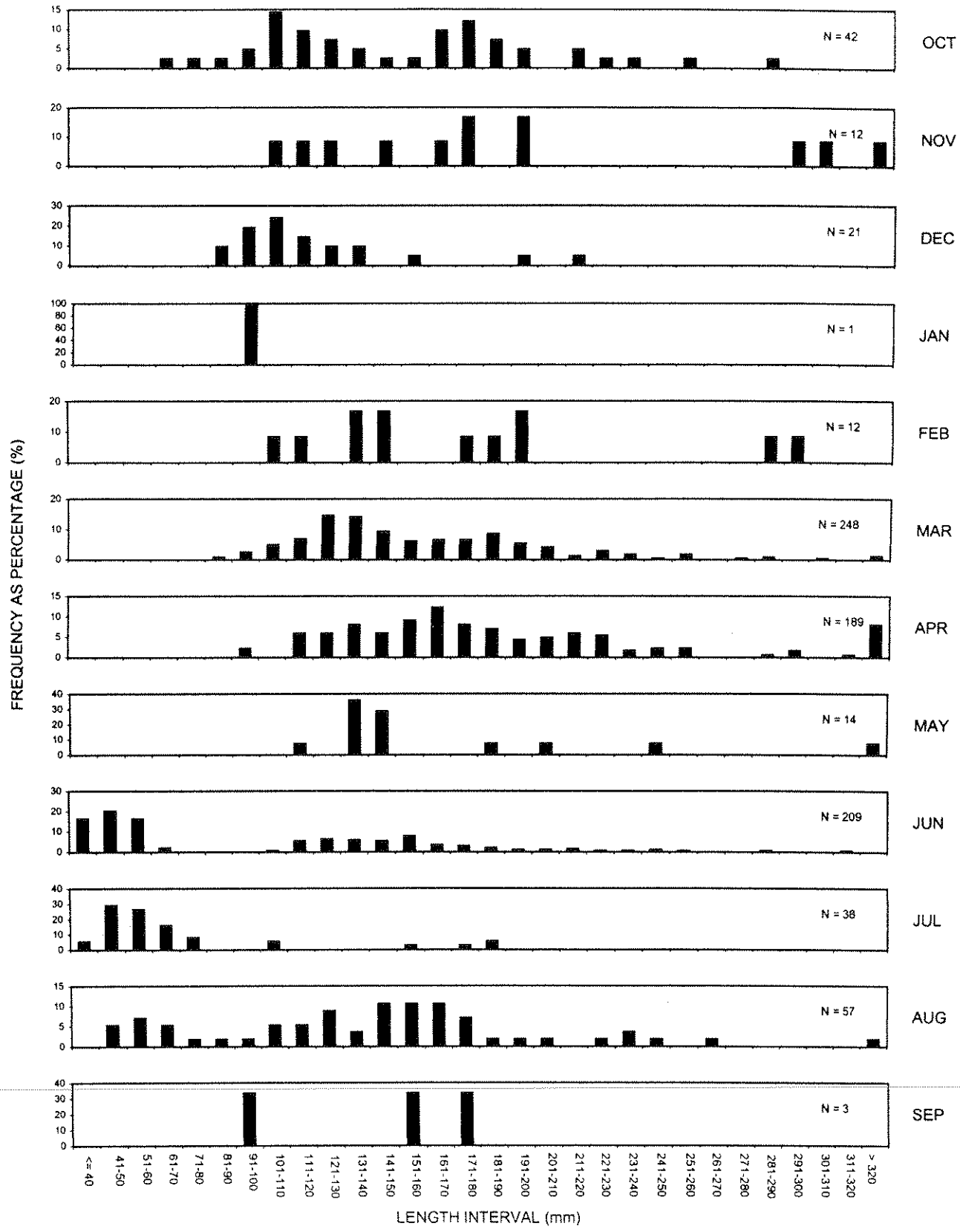


Figure B-24. Length frequency distribution of winter flounder collected in bottom trawl samples October 1998 - September 1999 (all stations combined)

APPENDIX C

TRACKED ECHOES AND STATION BOTTOM PROFILES
NOVEMBER 1998 – SEPTEMBER 1999

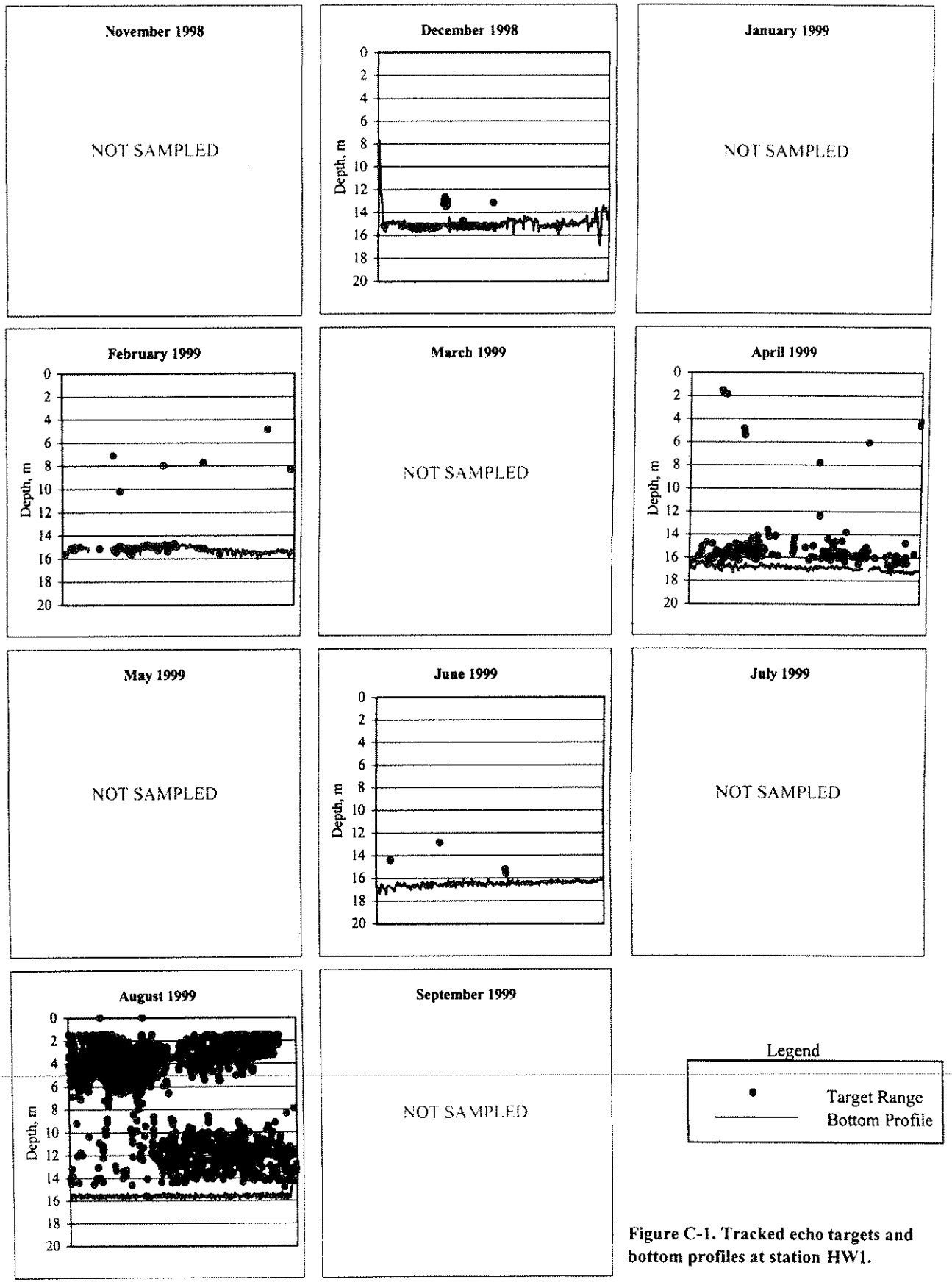


Figure C-1. Tracked echo targets and bottom profiles at station HW1.

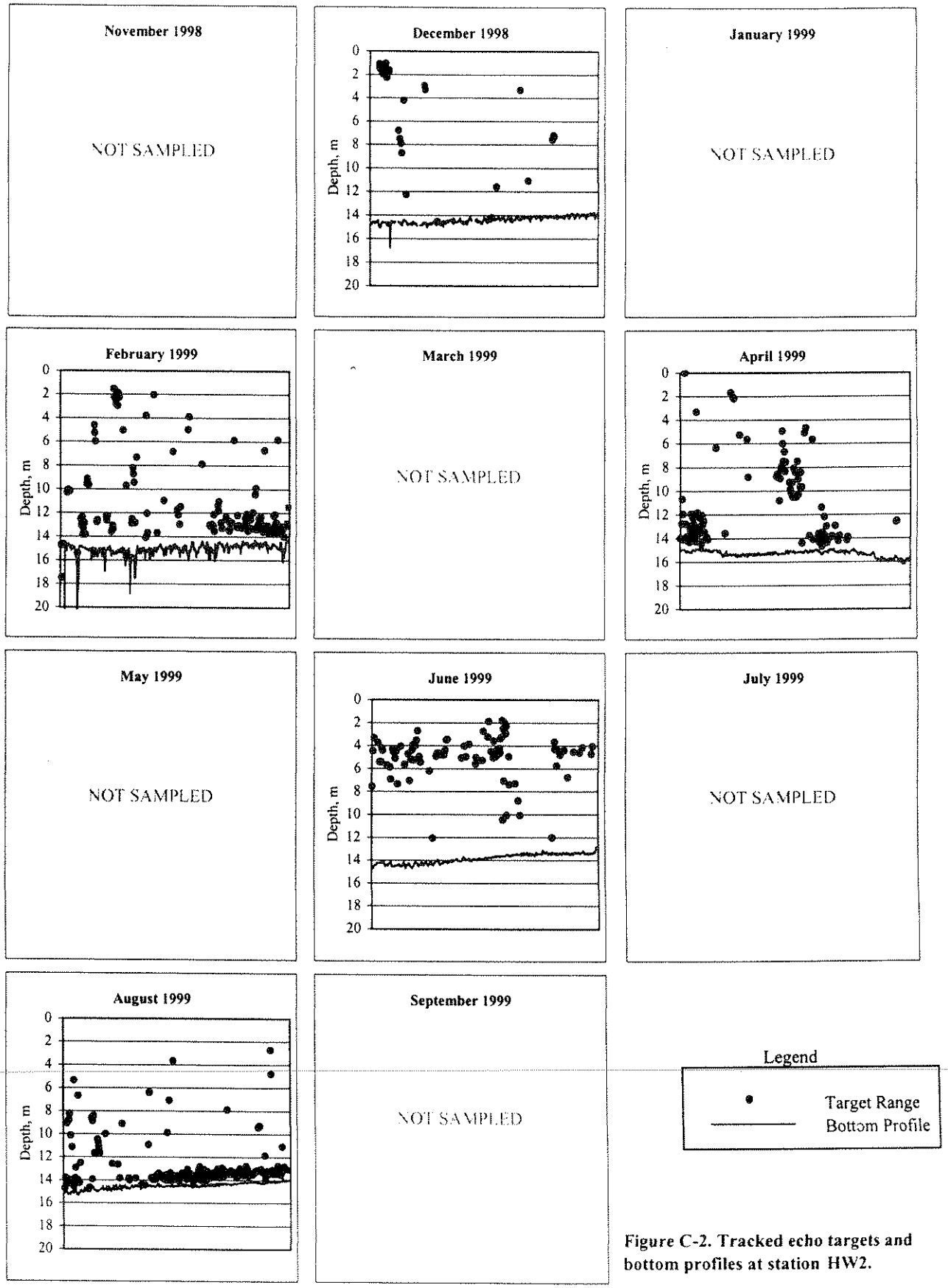


Figure C-2. Tracked echo targets and bottom profiles at station HW2.

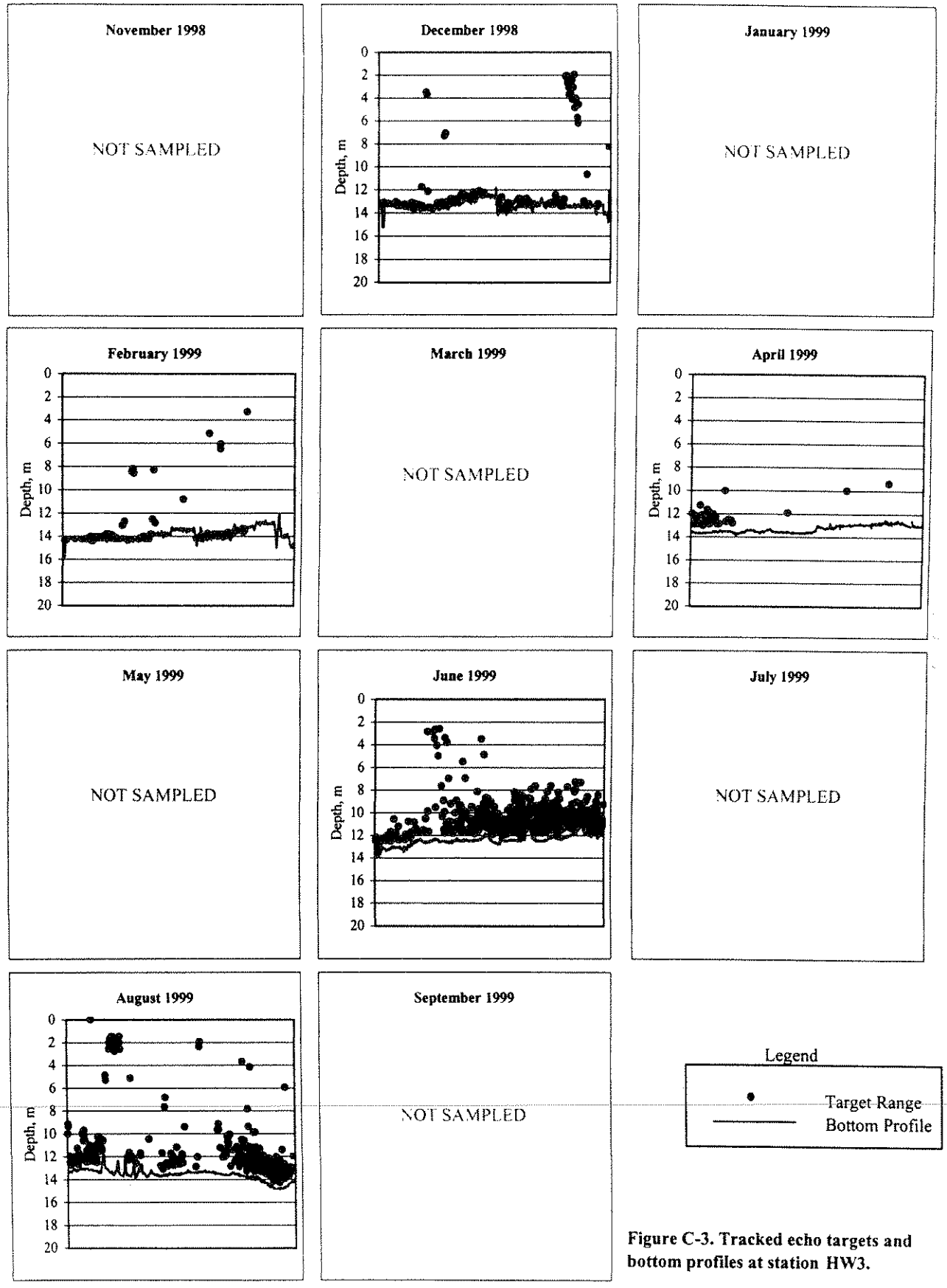


Figure C-3. Tracked echo targets and bottom profiles at station HW3.

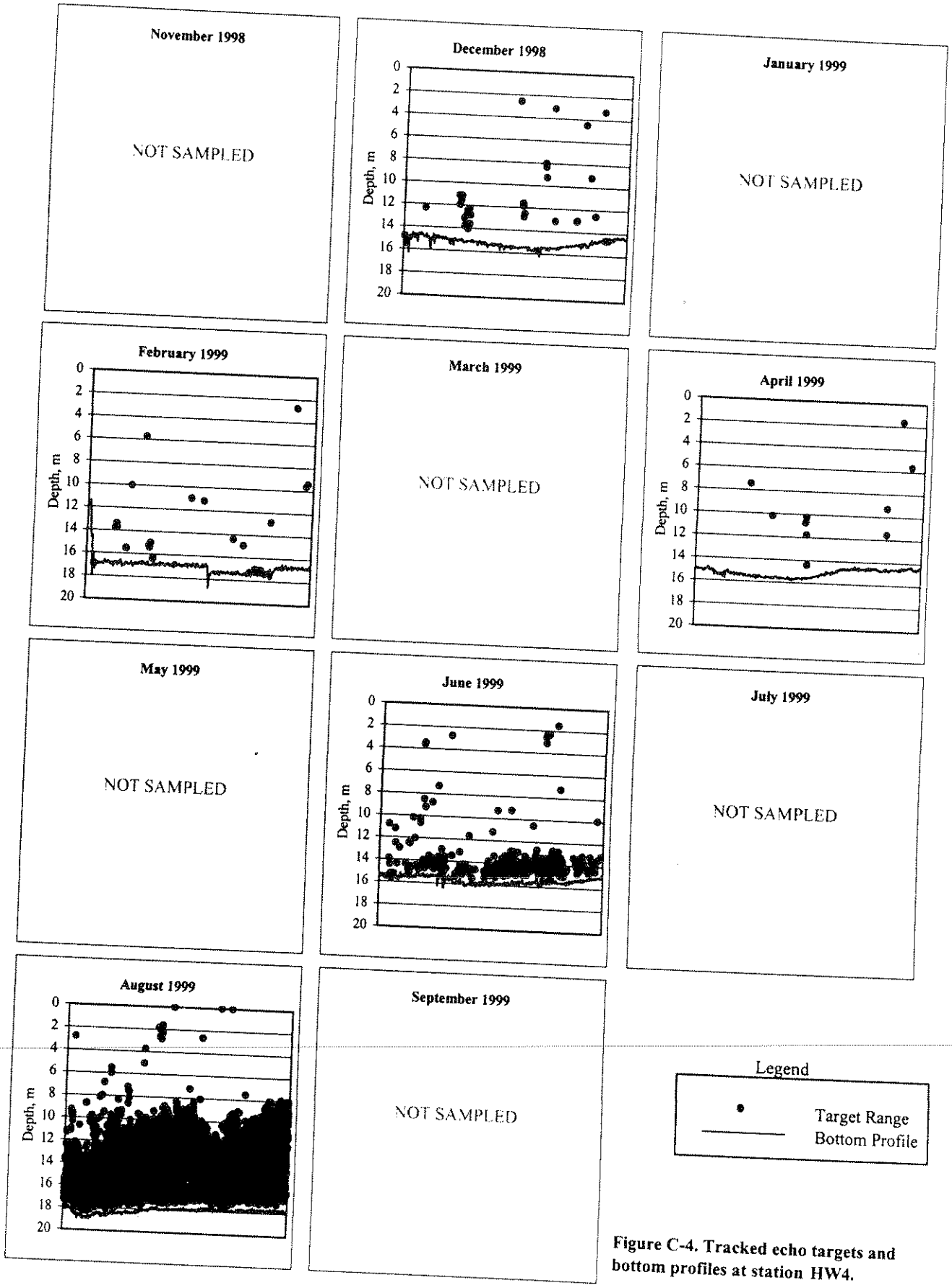


Figure C-4. Tracked echo targets and bottom profiles at station HW4.

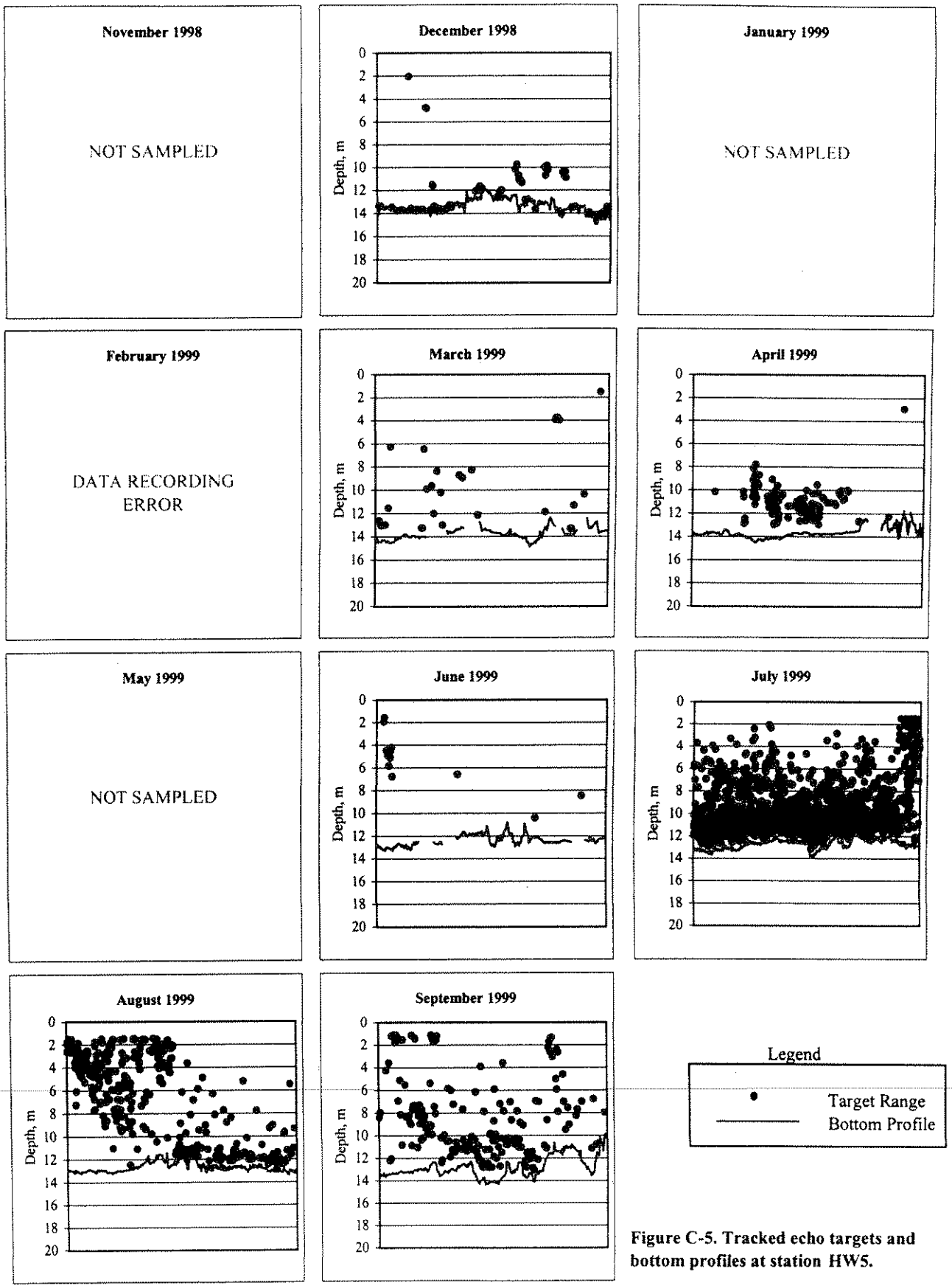


Figure C-5. Tracked echo targets and bottom profiles at station HW5.

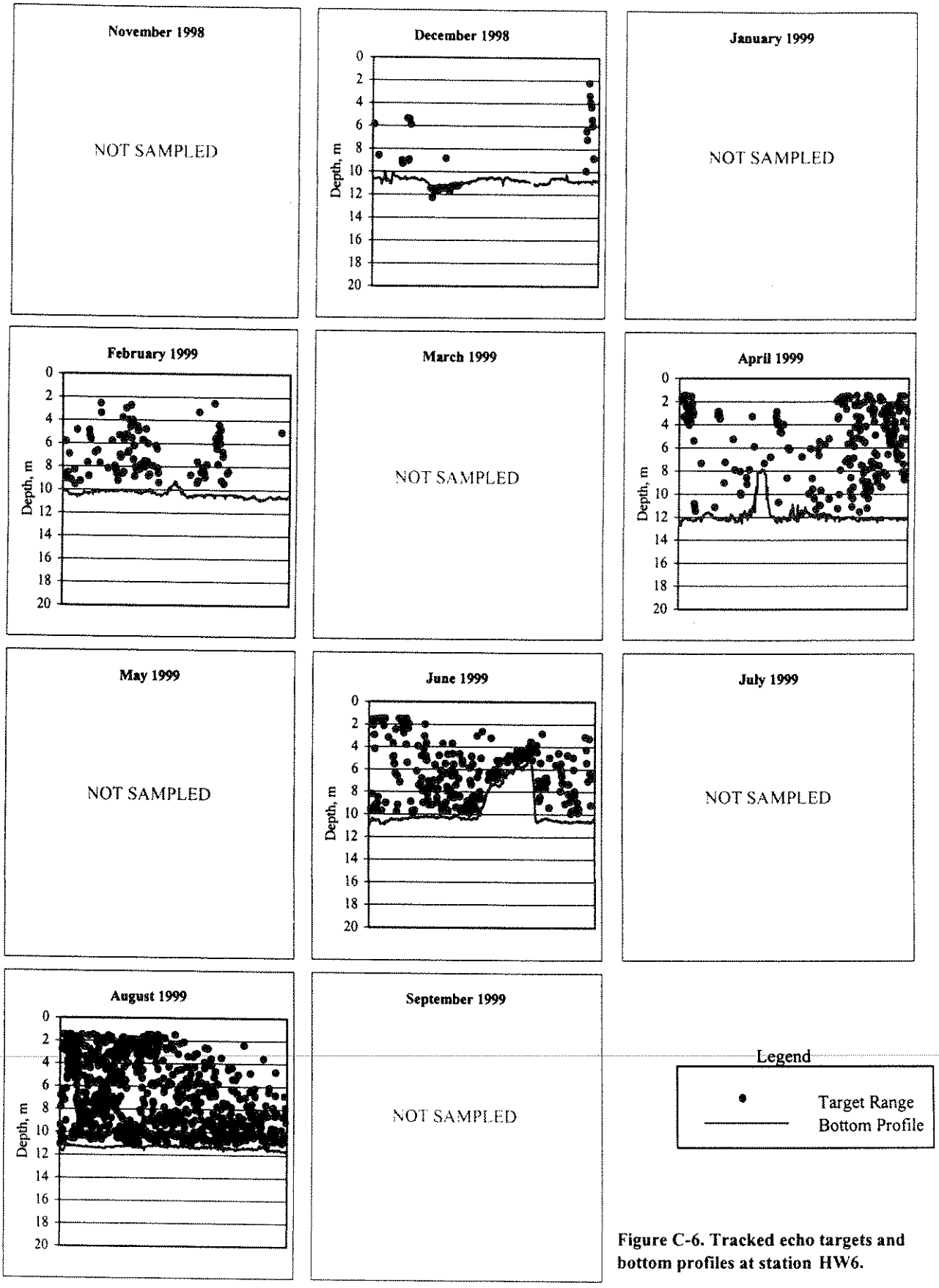


Figure C-6. Tracked echo targets and bottom profiles at station HW6.

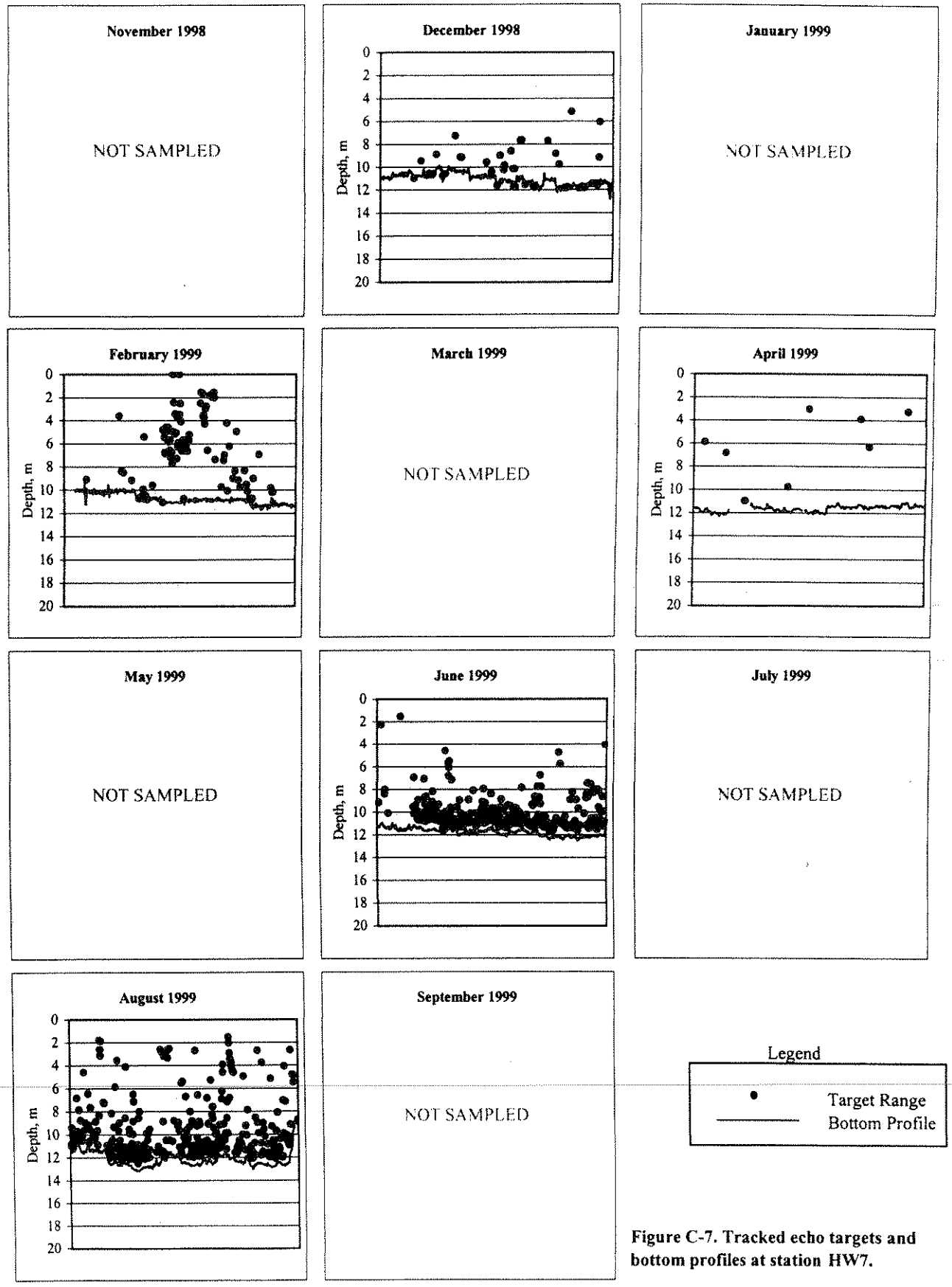


Figure C-7. Tracked echo targets and bottom profiles at station HW7.

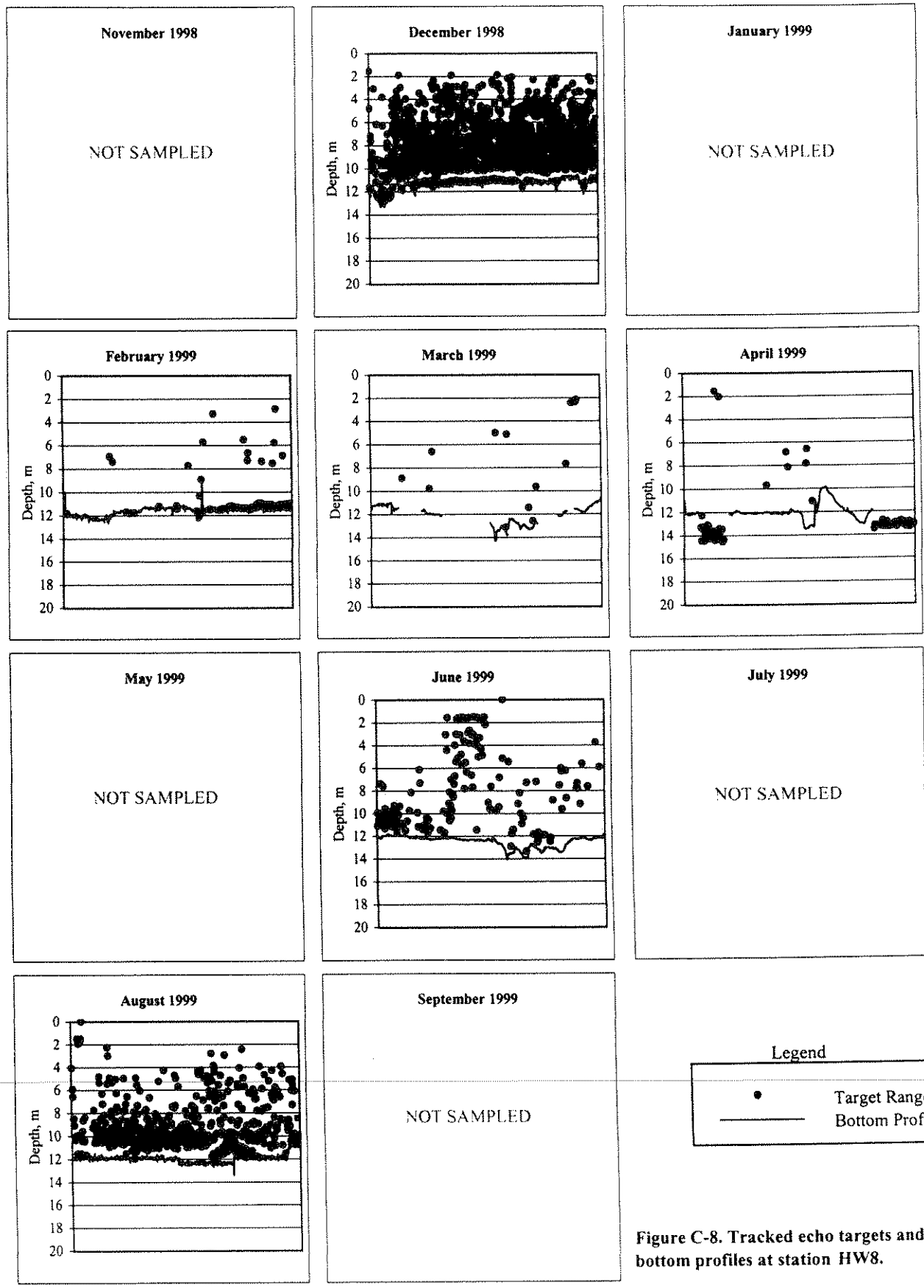


Figure C-8. Tracked echo targets and bottom profiles at station HW8.

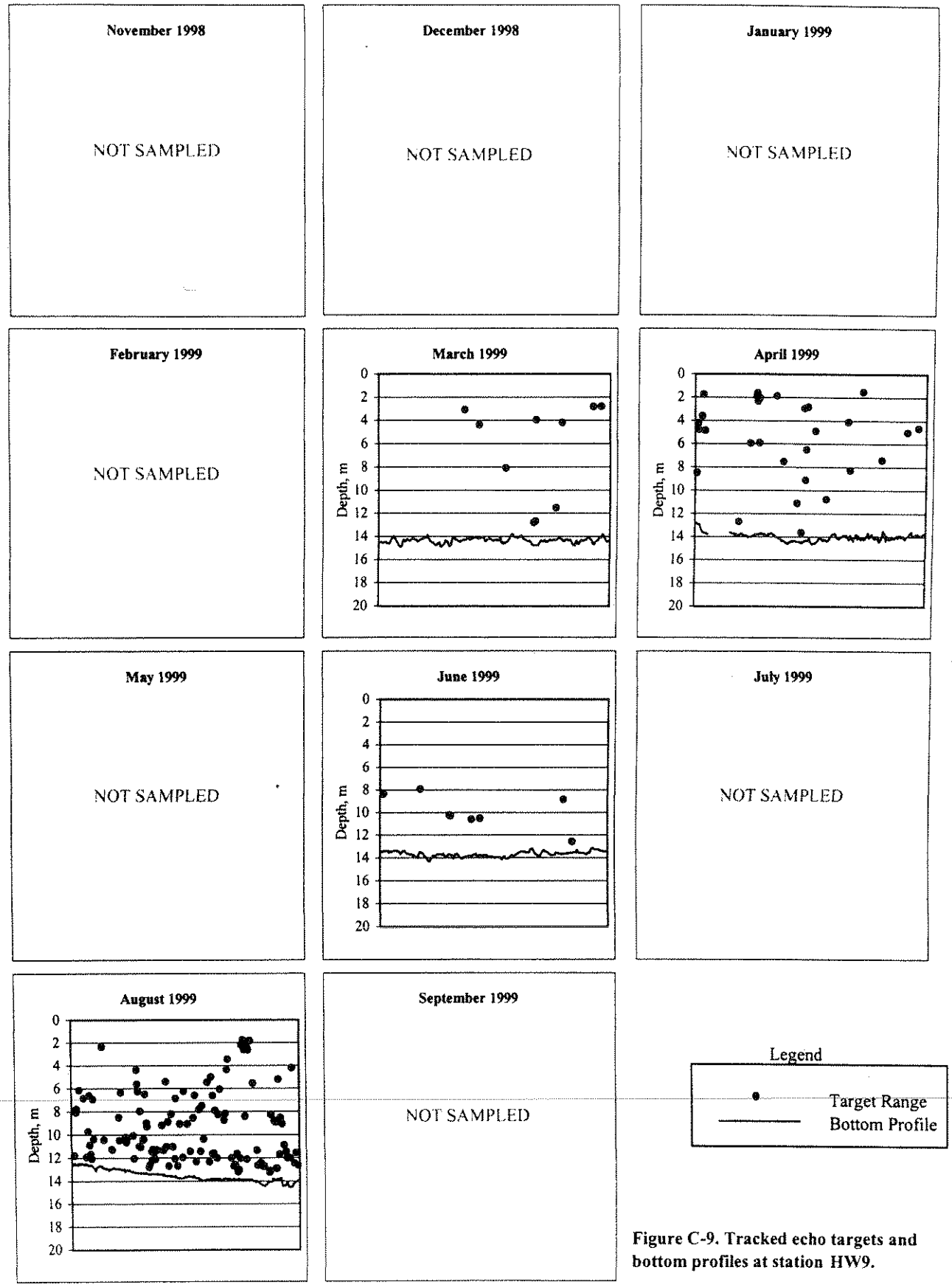


Figure C-9. Tracked echo targets and bottom profiles at station HW9.

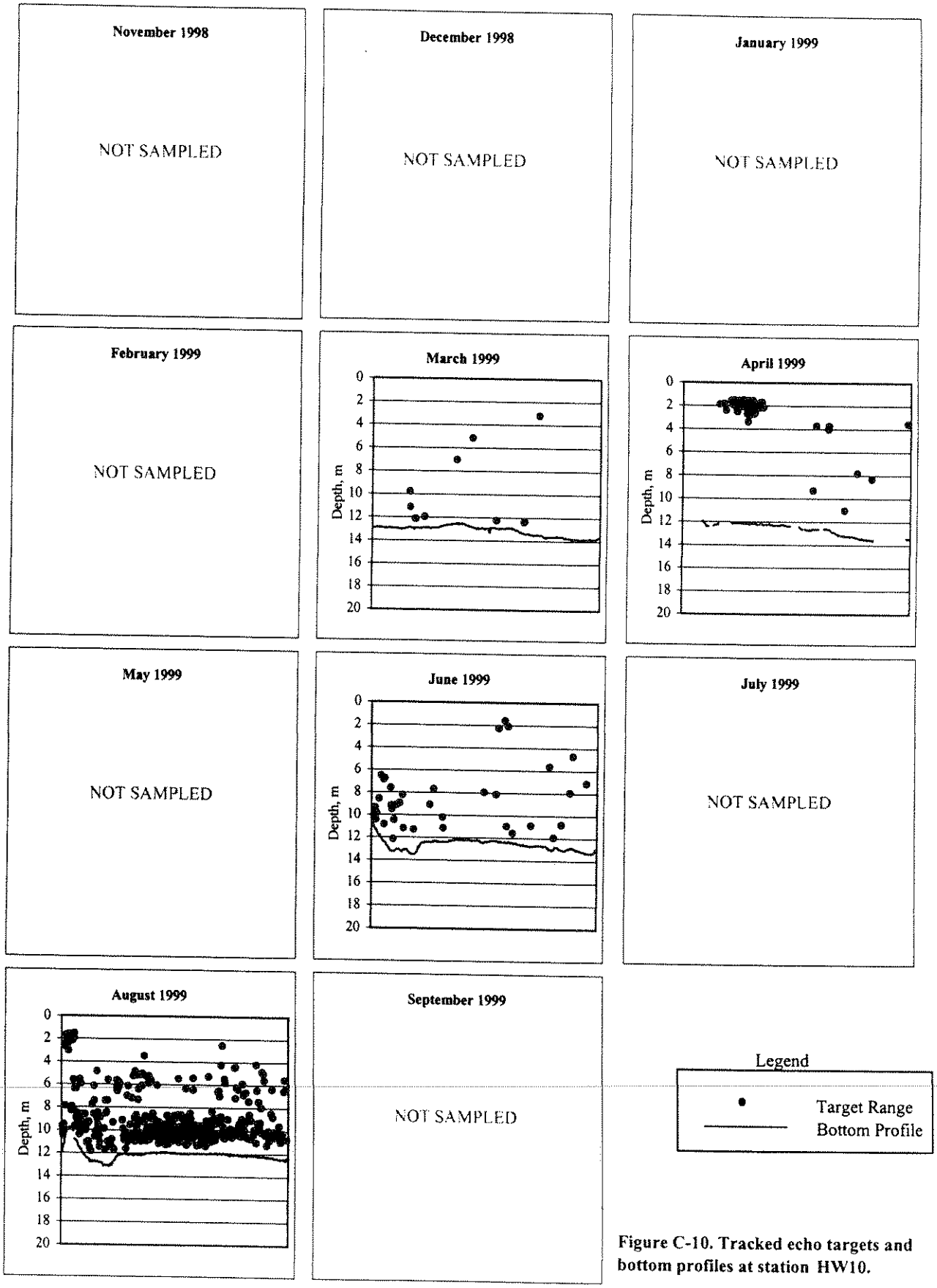


Figure C-10. Tracked echo targets and bottom profiles at station HW10.

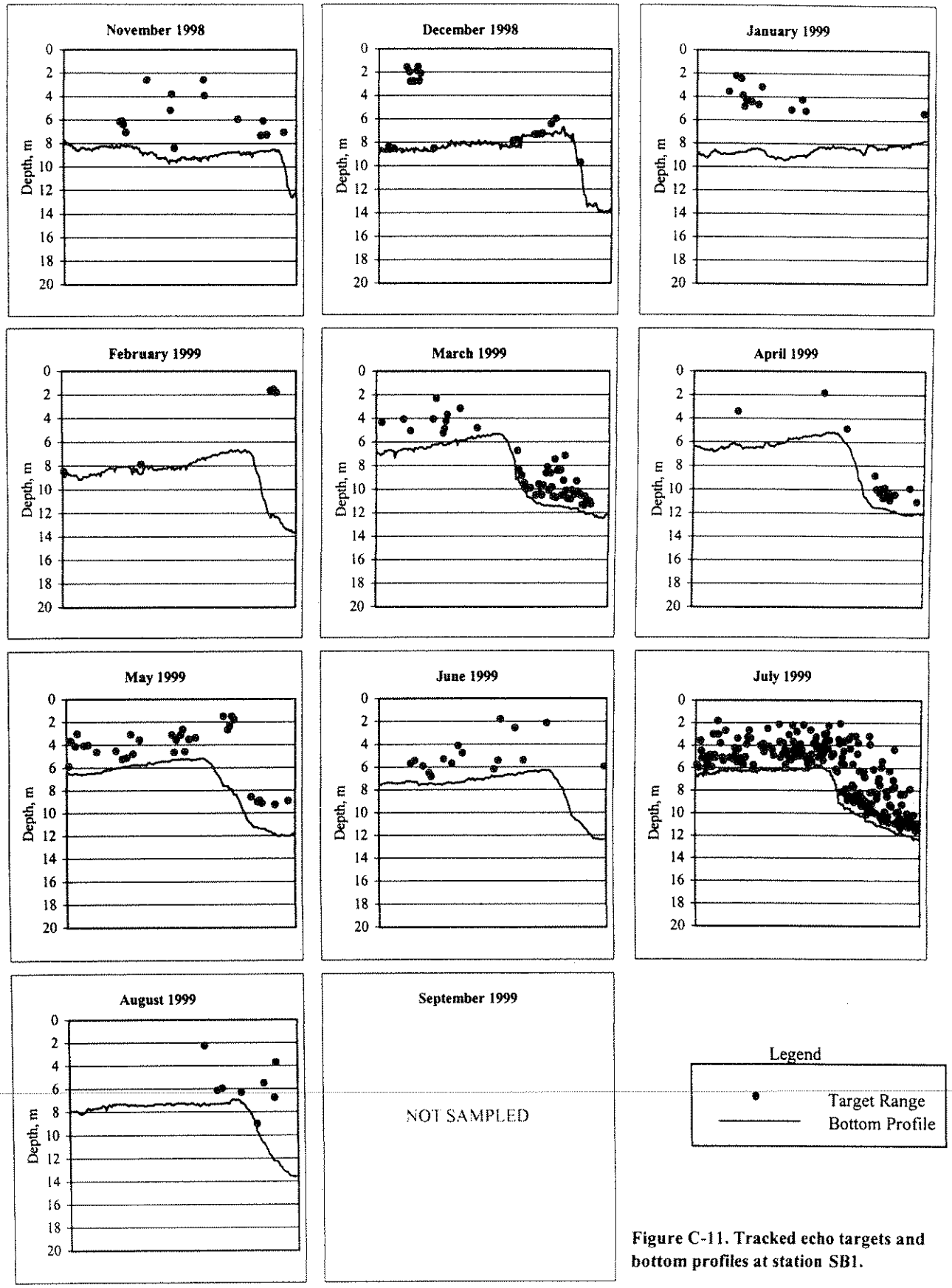


Figure C-11. Tracked echo targets and bottom profiles at station SB1.

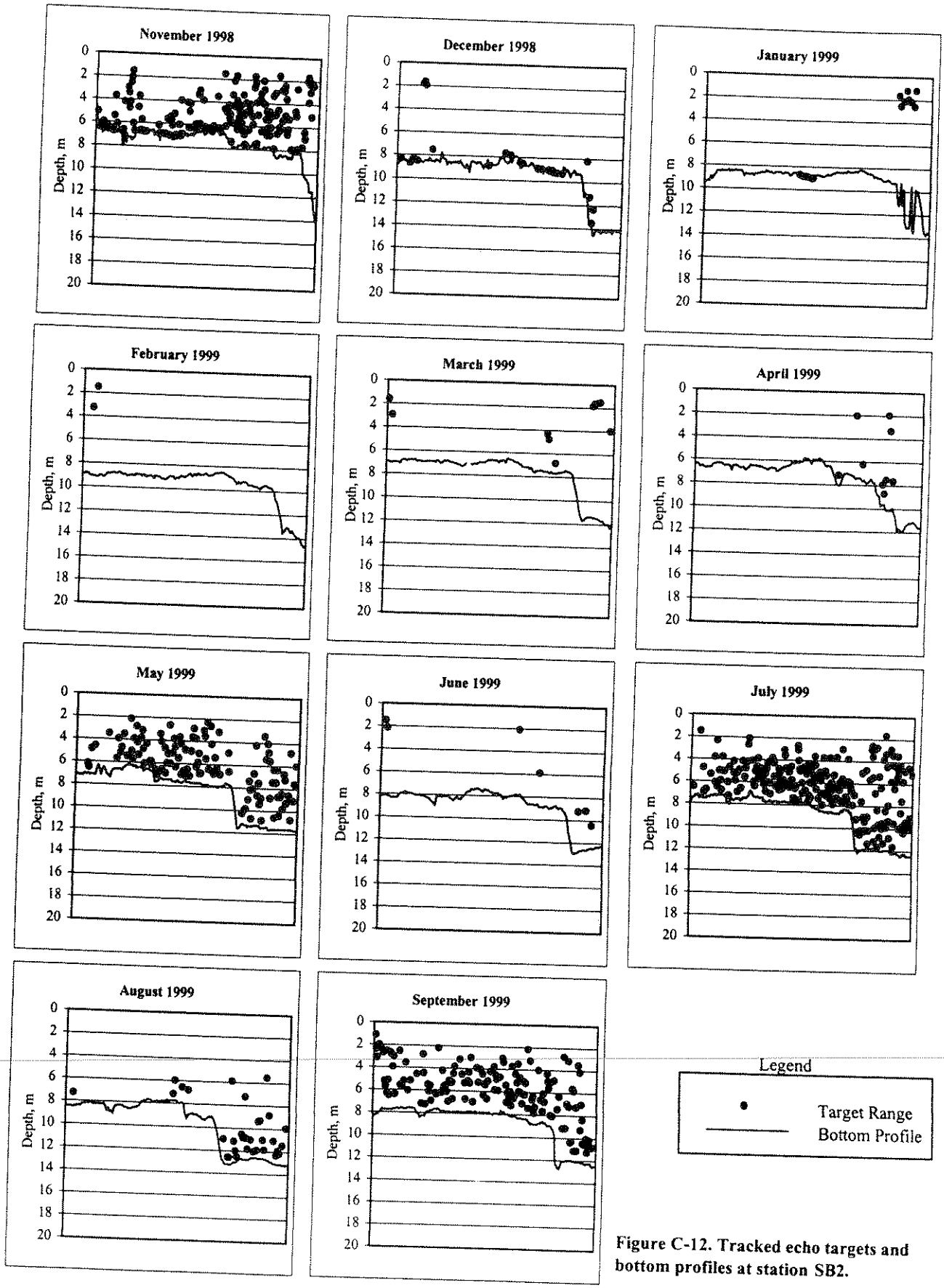


Figure C-12. Tracked echo targets and bottom profiles at station SB2.

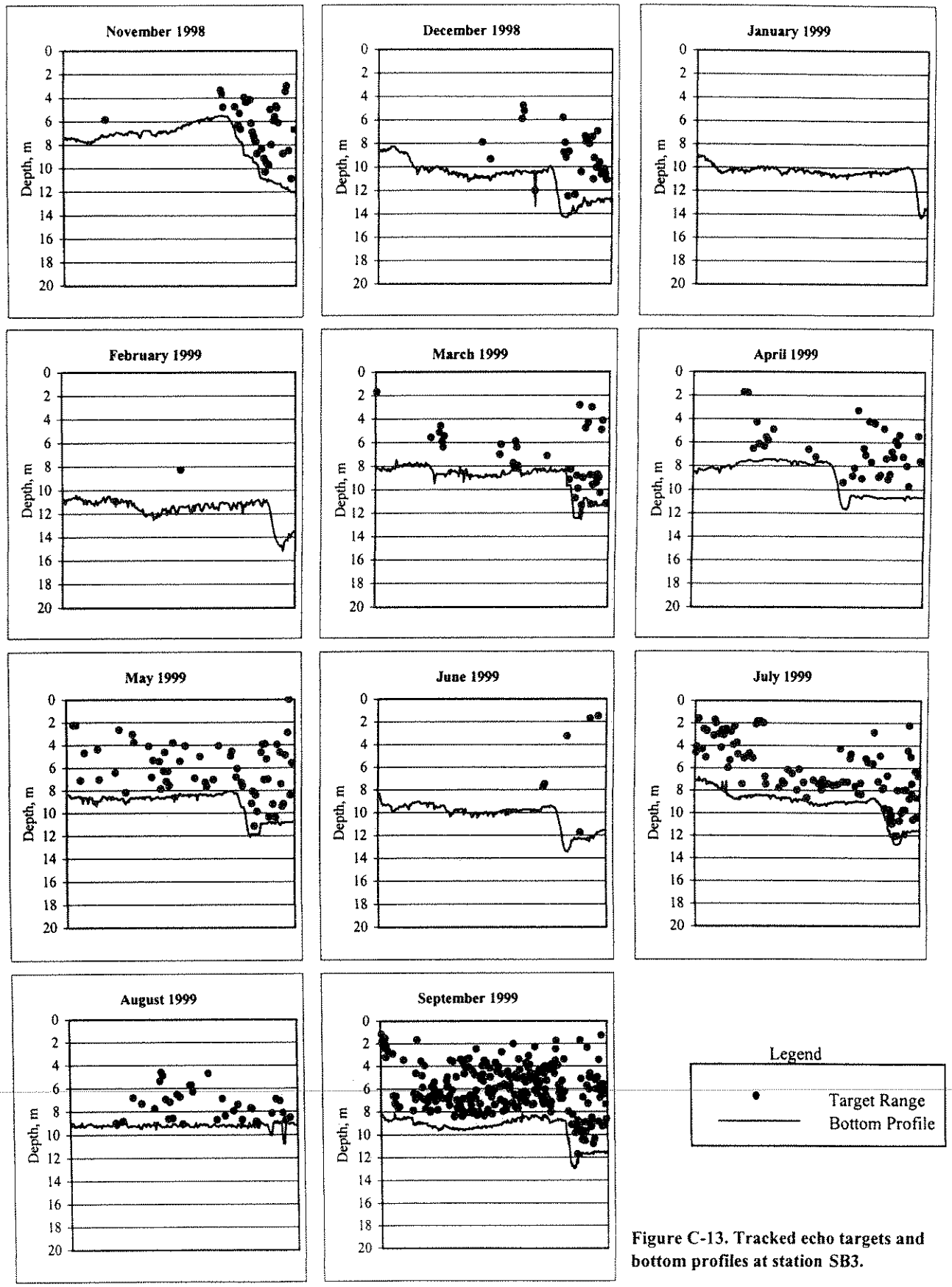


Figure C-13. Tracked echo targets and bottom profiles at station SB3.

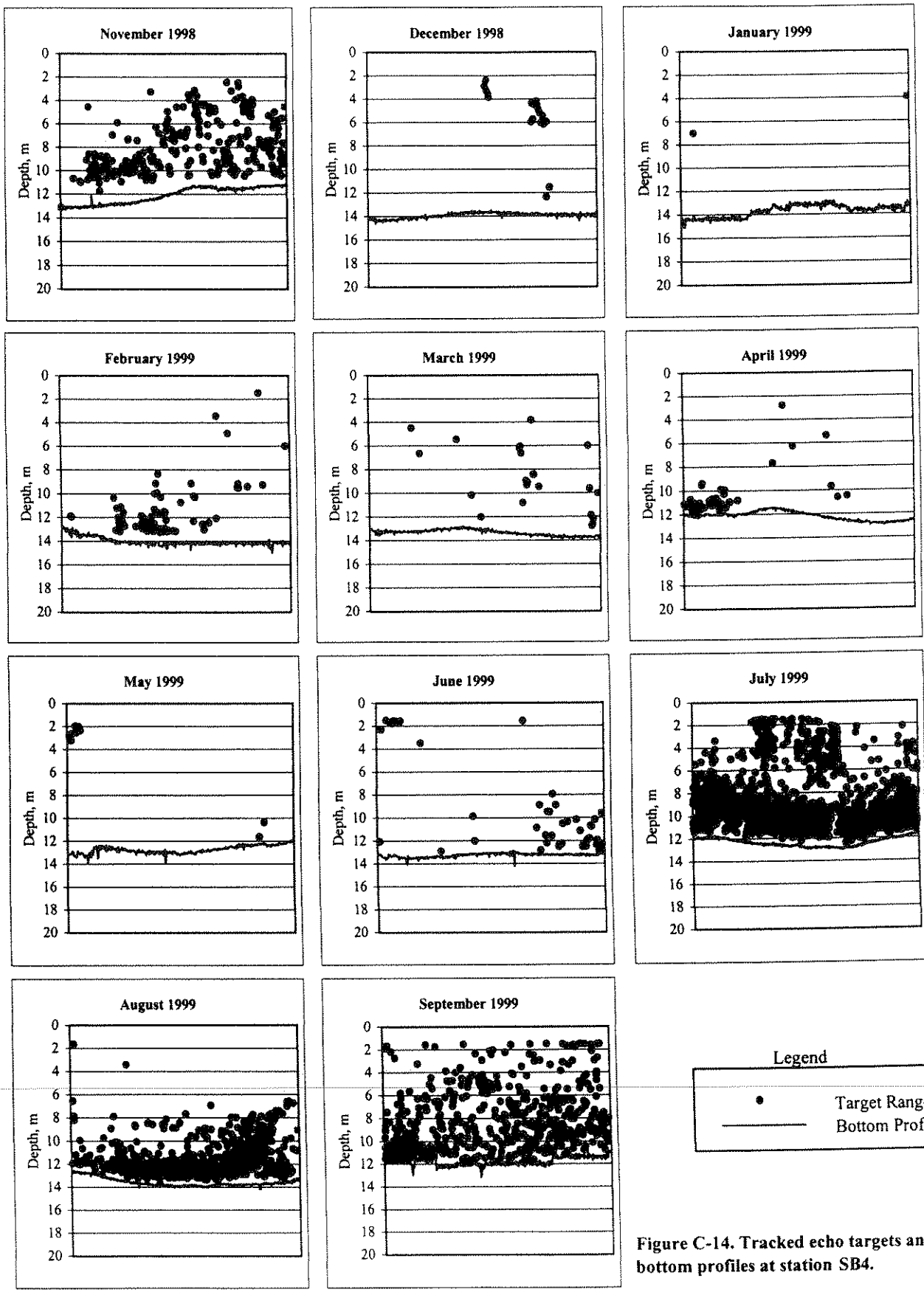


Figure C-14. Tracked echo targets and bottom profiles at station SB4.

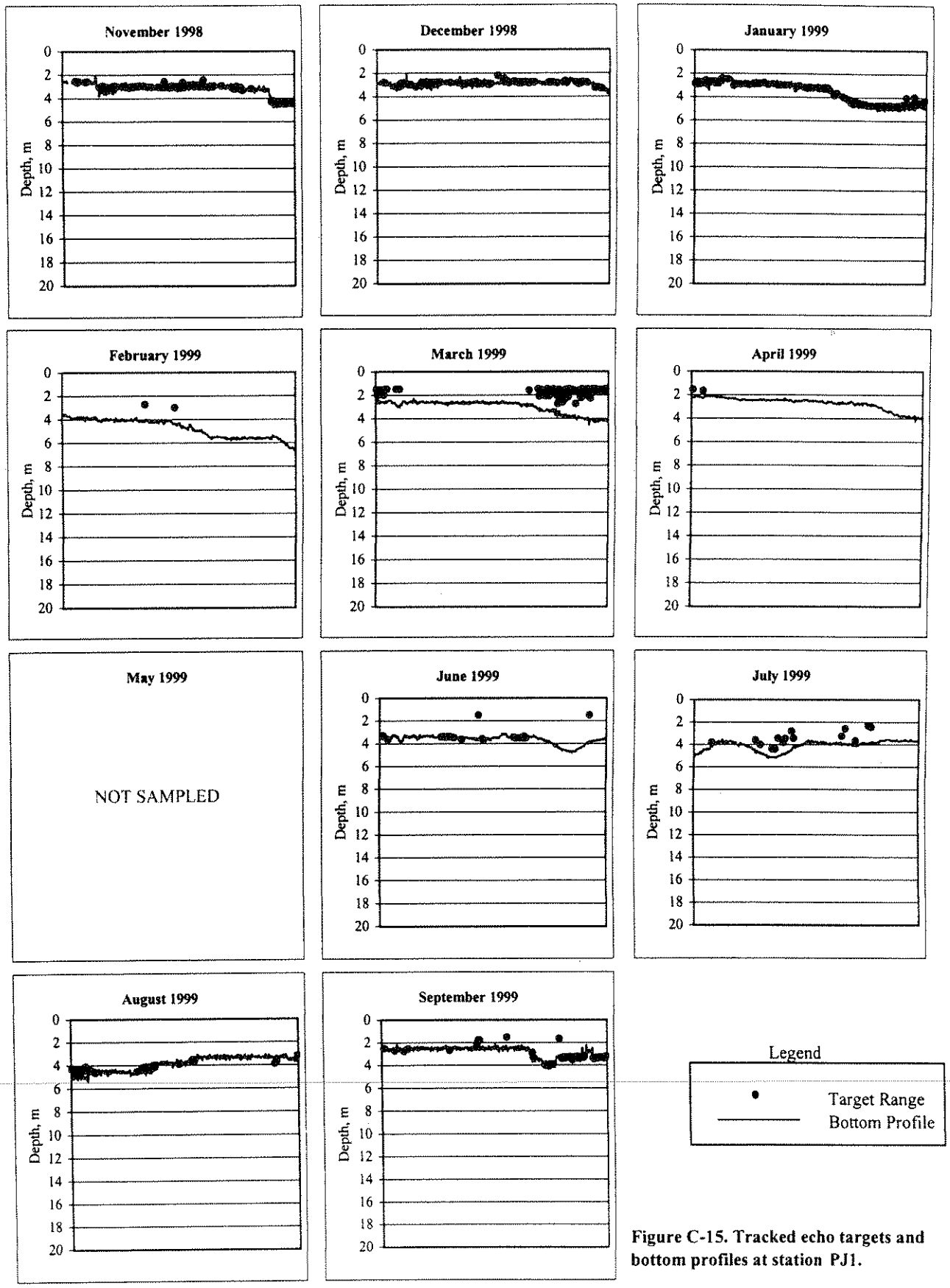


Figure C-15. Tracked echo targets and bottom profiles at station PJ1.

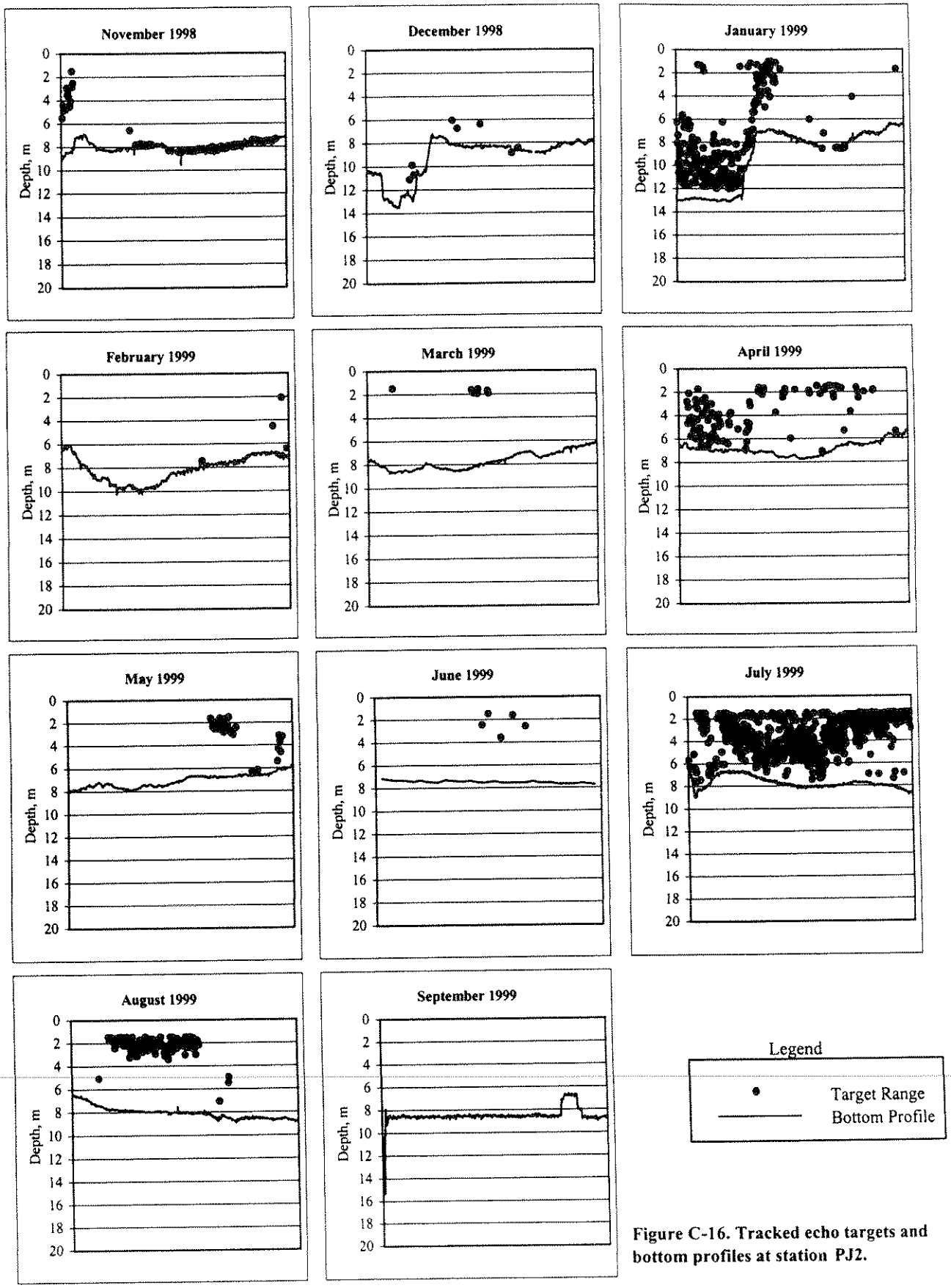


Figure C-16. Tracked echo targets and bottom profiles at station PJ2.

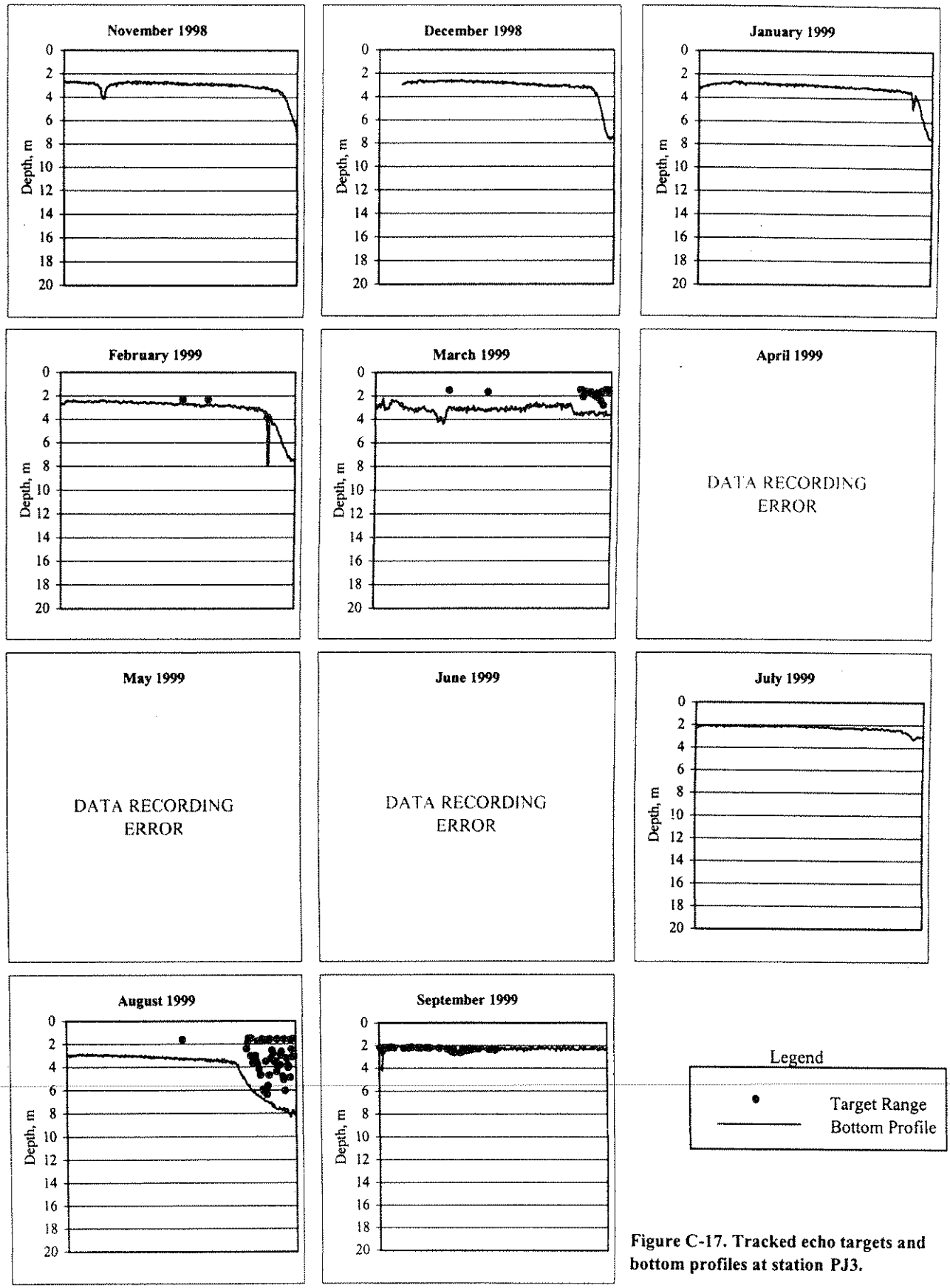


Figure C-17. Tracked echo targets and bottom profiles at station PJ3.

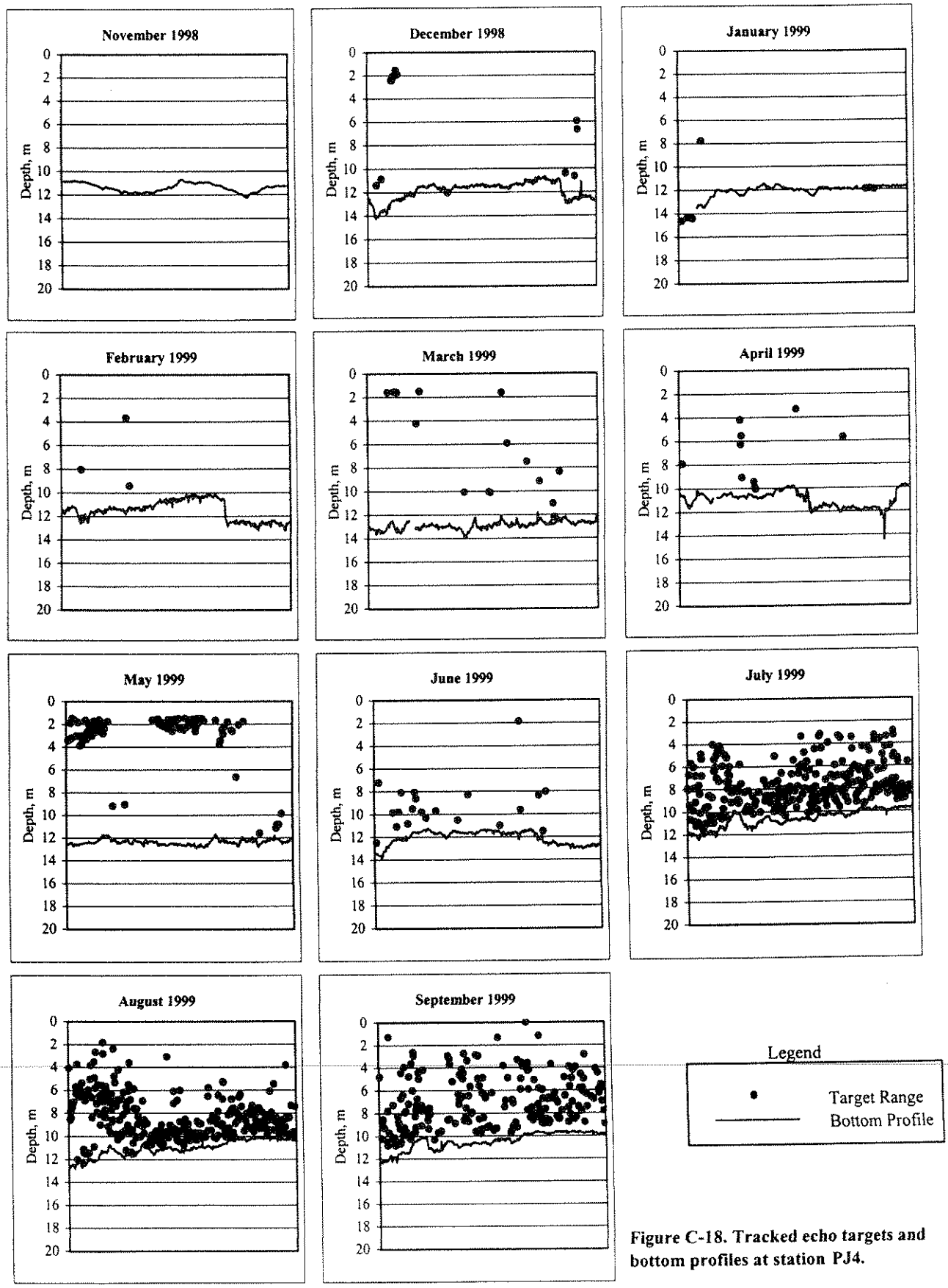


Figure C-18. Tracked echo targets and bottom profiles at station PJ4.

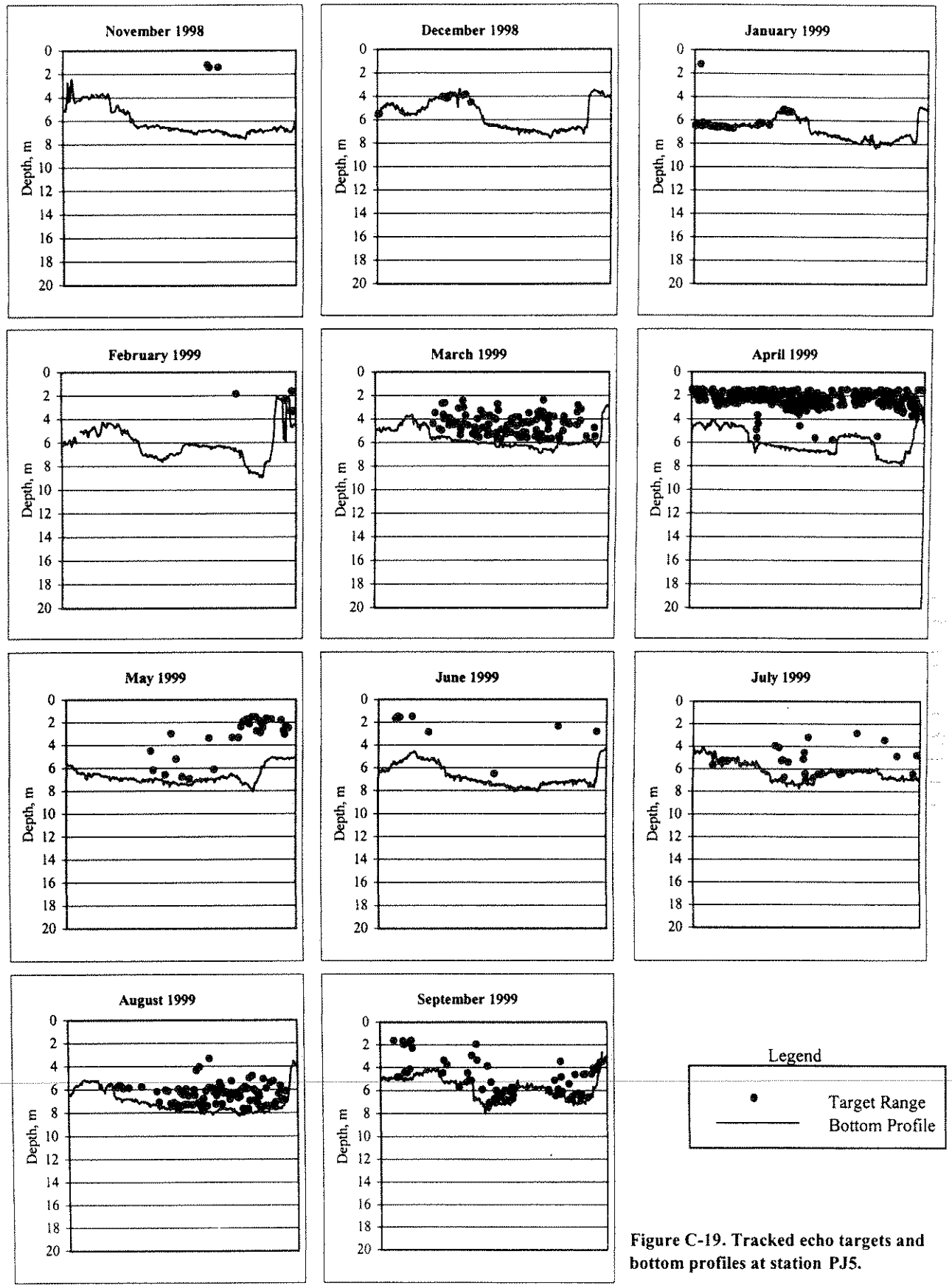


Figure C-19. Tracked echo targets and bottom profiles at station PJ5.

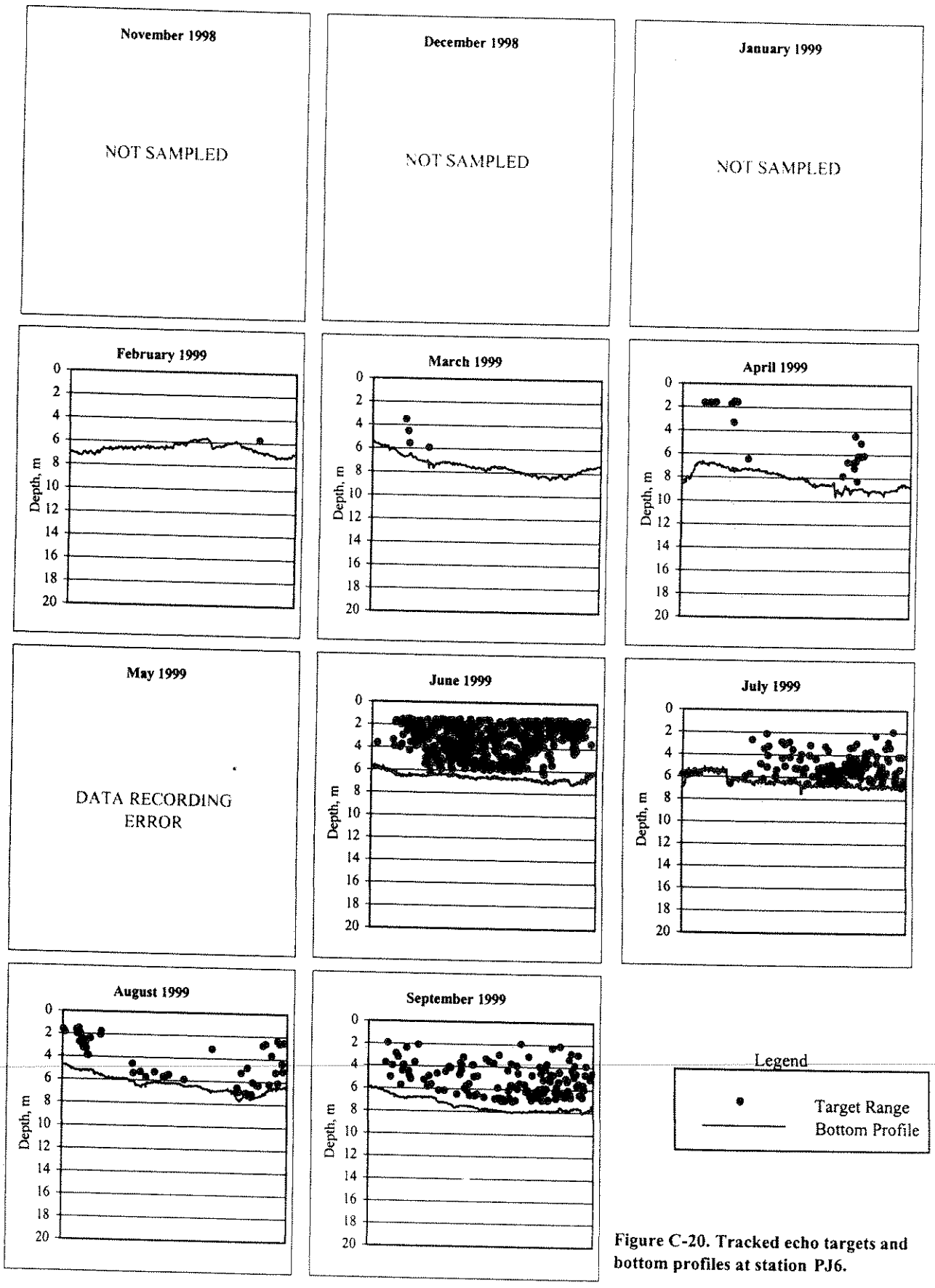


Figure C-20. Tracked echo targets and bottom profiles at station PJ6.

APPENDIX D

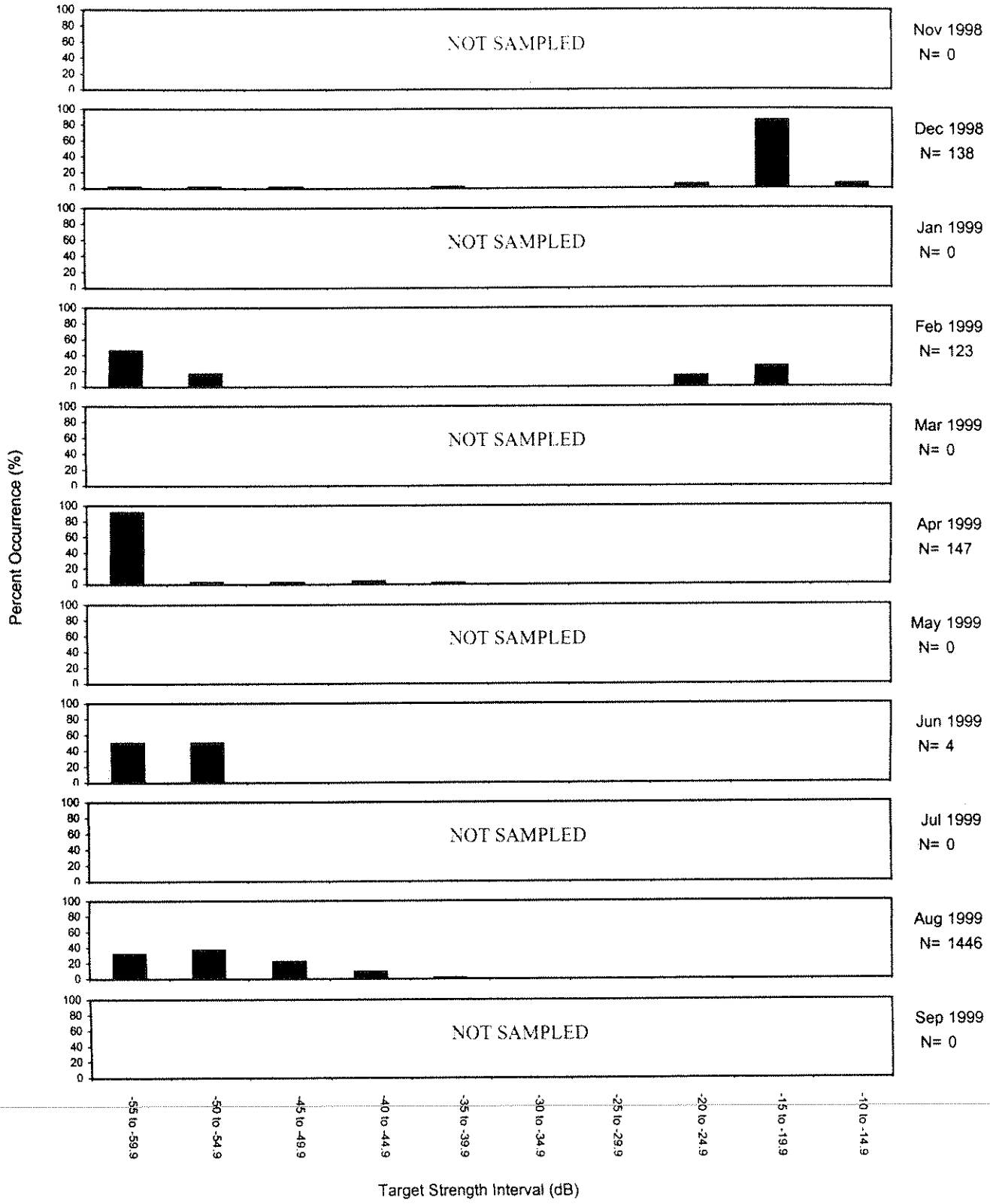
TRACKED TARGET-STRENGTH DISTRIBUTION
NOVEMBER 1998 – SEPTEMBER 1999

TABLE D-1.

FISH LENGTHS CONVERTED FROM DORSAL-ASPECT (ACOUSTIC SIZE), FOR 200 kHZ HYDROACOUSTIC SYSTEM

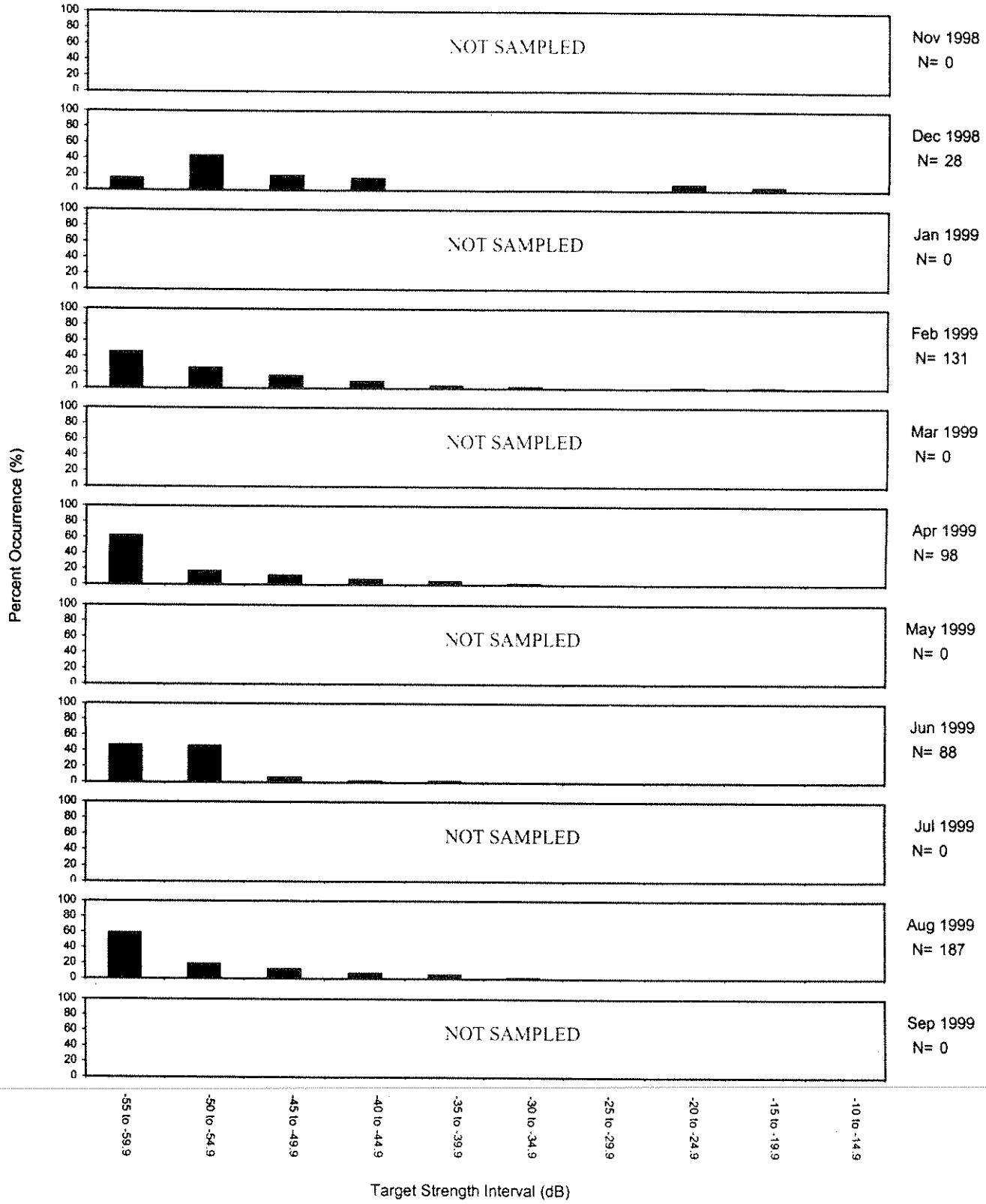
Length (mm)	Target Strength (dB)	Length (mm)	Target Strength (dB)	Length (mm)	Target Strength (dB)	Length (mm)	Target Strength (dB)
30	-55.0	80	-46.8	250	-37.4	500	-31.6
31	-54.69	81	-46.7	255	-37.2	510	-31.5
32	-54.42	82	-46.6	260	-37.0	520	-31.3
33	-54.17	83	-46.5	265	-36.9	530	-31.1
34	-53.92	84	-46.4	270	-36.7	540	-31.0
35	-53.68	85	-46.3	275	-36.6	550	-30.8
36	-53.45	86	-46.2	280	-36.4	560	-30.7
37	-53.22	87	-46.1	285	-36.3	570	-30.5
38	-53.00	88	-46.0	290	-36.1	580	-30.4
39	-52.78	89	-45.9	295	-36.0	590	-30.2
40	-52.57	90	-45.8	300	-35.9	600	-30.1
41	-52.37	91	-45.8	305	-35.7	610	-30.0
42	-52.17	92	-45.7	310	-35.6	620	-29.8
43	-51.97	93	-45.6	315	-35.5	630	-29.7
44	-51.78	94	-45.5	320	-35.3	640	-29.6
45	-51.59	95	-45.4	325	-35.2	650	-29.4
46	-51.41	96	-45.3	330	-35.1	660	-29.3
47	-51.23	97	-45.2	335	-34.9	670	-29.2
48	-51.06	98	-45.1	340	-34.8	680	-29.1
49	-50.89	99	-45.1	345	-34.7	690	-28.9
50	-50.72	100	-45.0	350	-34.6	700	-28.8
51	-50.56	105	-44.6	355	-34.5	710	-28.7
52	-50.40	110	-44.2	360	-34.3	720	-28.6
53	-50.24	115	-43.8	365	-34.2	730	-28.5
54	-50.08	120	-43.5	370	-34.1	740	-28.4
55	-49.93	125	-43.1	375	-34.0	750	-28.3
56	-49.78	130	-42.8	380	-33.9	760	-28.1
57	-49.63	135	-42.5	385	-33.8	770	-28.0
58	-49.49	140	-42.2	390	-33.7	780	-27.9
59	-49.35	145	-41.9	395	-33.6	790	-27.8
60	-49.21	150	-41.6	400	-33.5	800	-27.7
61	-49.07	155	-41.3	405	-33.4	810	-27.6
62	-48.94	160	-41.1	410	-33.3	820	-27.5
63	-48.80	165	-40.8	415	-33.2	830	-27.4
64	-48.67	170	-40.6	420	-33.1	840	-27.3
65	-48.54	175	-40.3	425	-33.0	850	-27.2
66	-48.42	180	-40.1	430	-32.9	860	-27.1
67	-48.29	185	-39.9	435	-32.8	870	-27.0
68	-48.17	190	-39.6	440	-32.7	880	-26.9
69	-48.05	195	-39.4	445	-32.6	890	-26.8
70	-47.93	200	-39.2	450	-32.5	900	-26.7
71	-47.81	205	-39.0	460	-32.3	910	-26.7
72	-47.70	210	-38.8	470	-32.1	920	-26.6
73	-47.58	215	-38.6	480	-32.0	930	-26.5
74	-47.47	220	-38.4	490	-31.8	940	-26.4
75	-47.36	225	-38.2	500	-31.6	950	-26.3
76	-47.25	230	-38.1	510	-31.5	960	-26.2
77	-47.14	235	-37.9	520	-31.3	970	-26.1
78	-47.03	240	-37.7	530	-31.1	980	-26.0
79	-46.93	245	-37.5	540	-31.0	990	-26.0

Source: Ransom et al. 1995



NOTE: No target strengths >-10 dB or < -60 dB were encountered during any surveys.

Figure D-1. Target strength distribution (% occurrence) at Station HW1, November 1998 - September 1999.



NOTE: No target strengths >-10 dB or < -60 dB were encountered during any surveys.

Figure D-2. Target strength distribution (% occurrence) at Station HW2, November 1998 - September 1999.

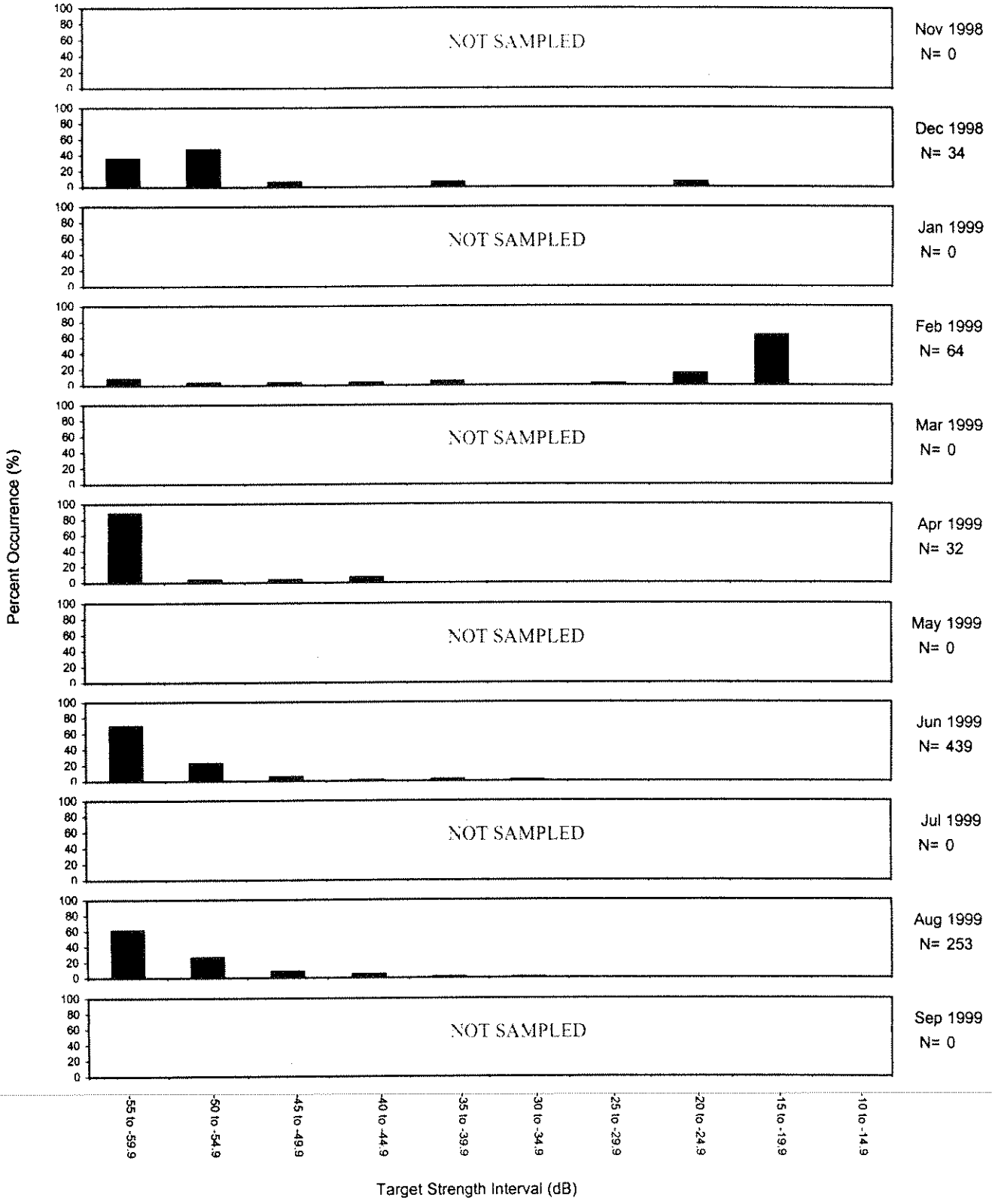
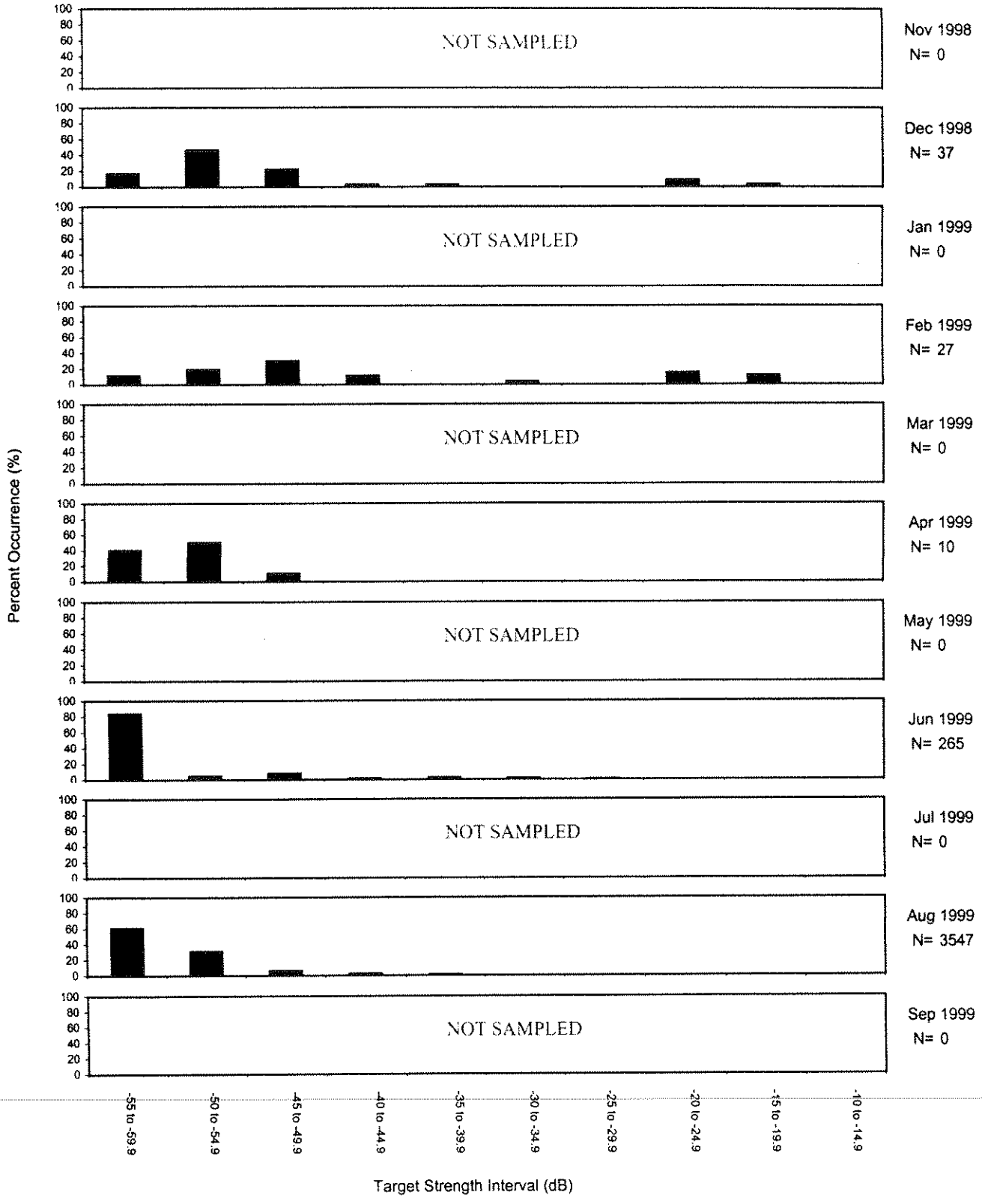


Figure D-3. Target strength distribution (% occurrence) at Station HW3, November 1998 - September 1999.



NOTE: No target strengths >-10 dB or < -60 dB were encountered during any surveys.

Figure D-4. Target strength distribution (% occurrence) at Station HW4, November 1998 - September 1999.

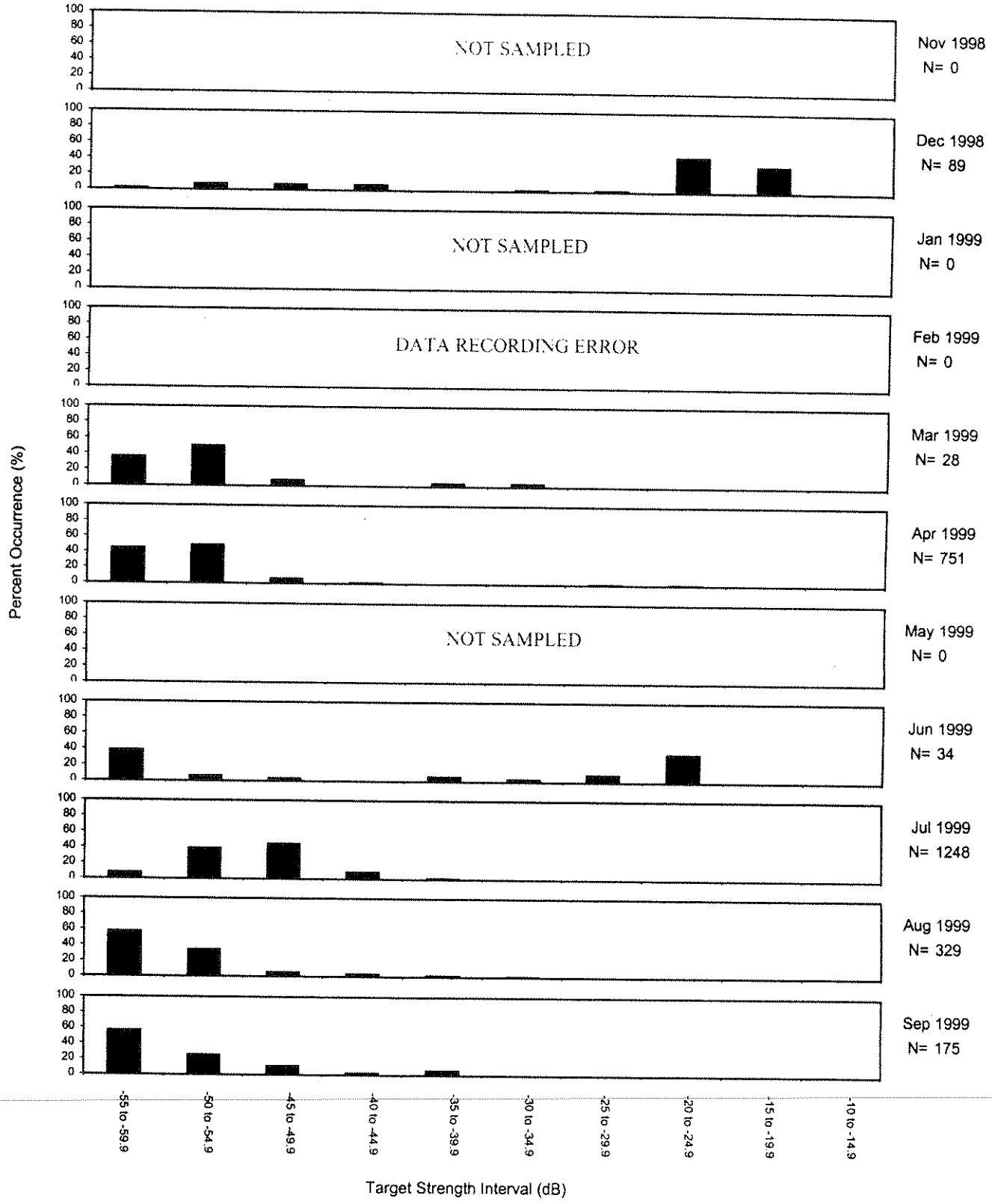
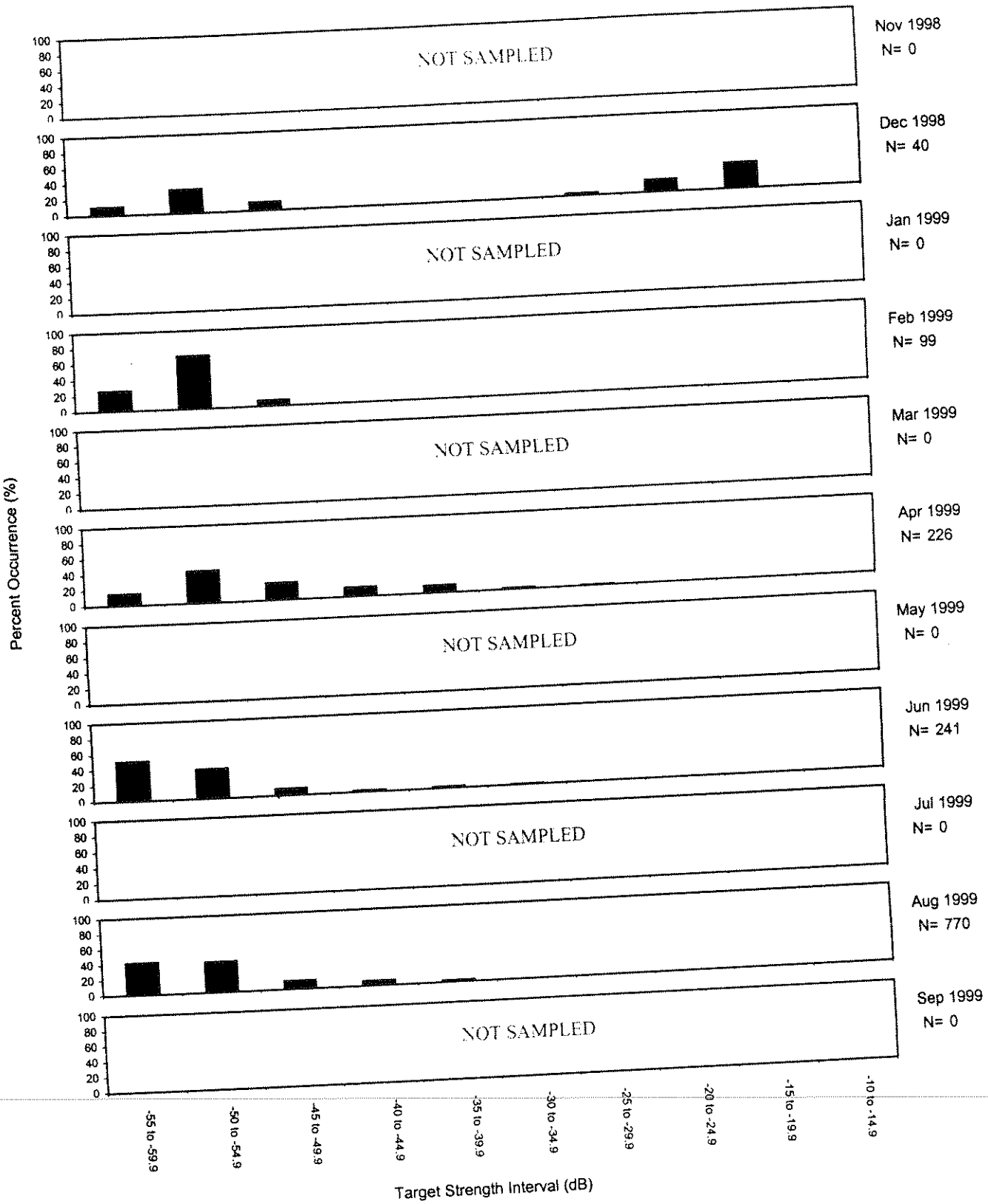
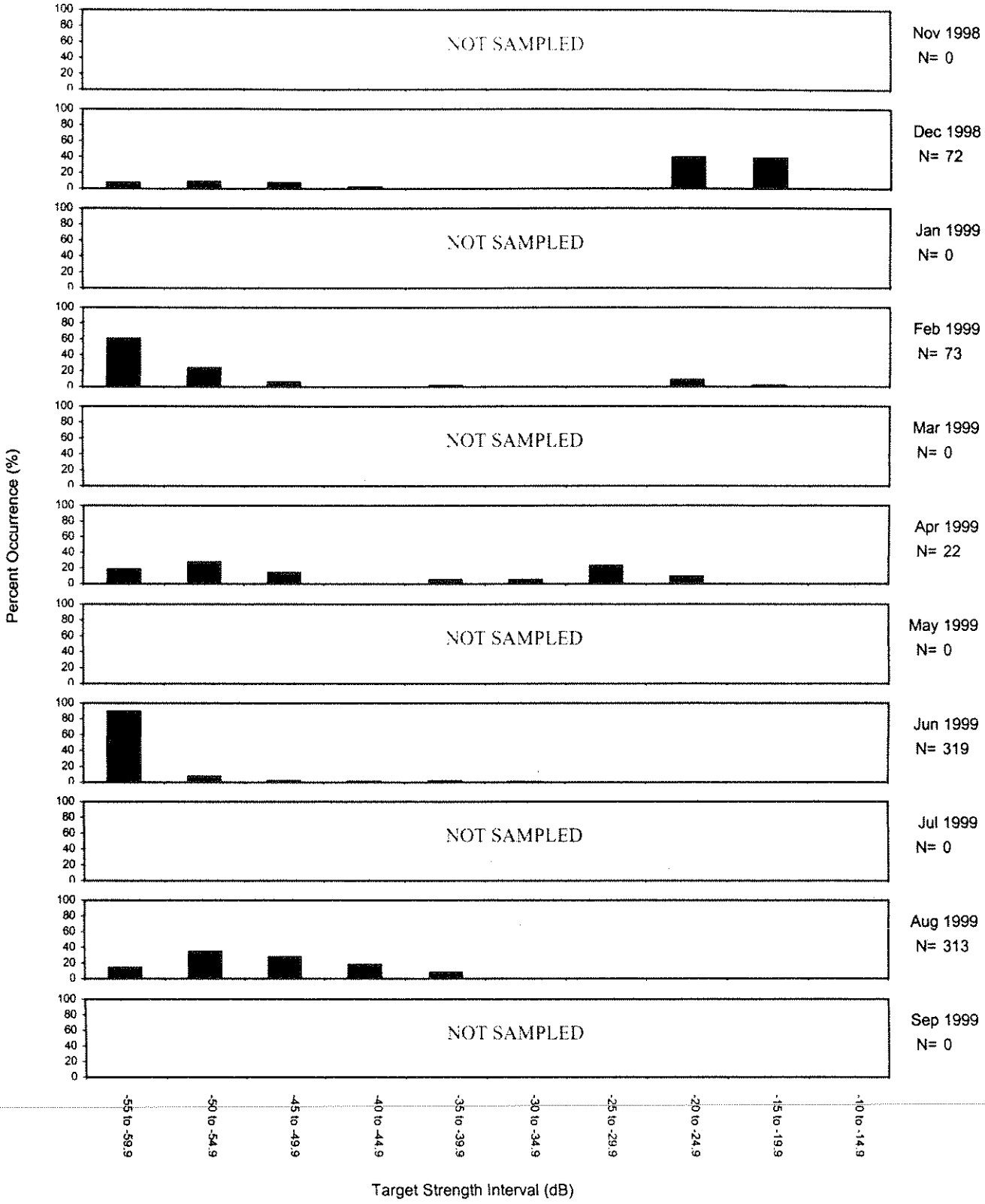


Figure D-5. Target strength distribution (% occurrence) at Station HW5, November 1998 - September 1999.



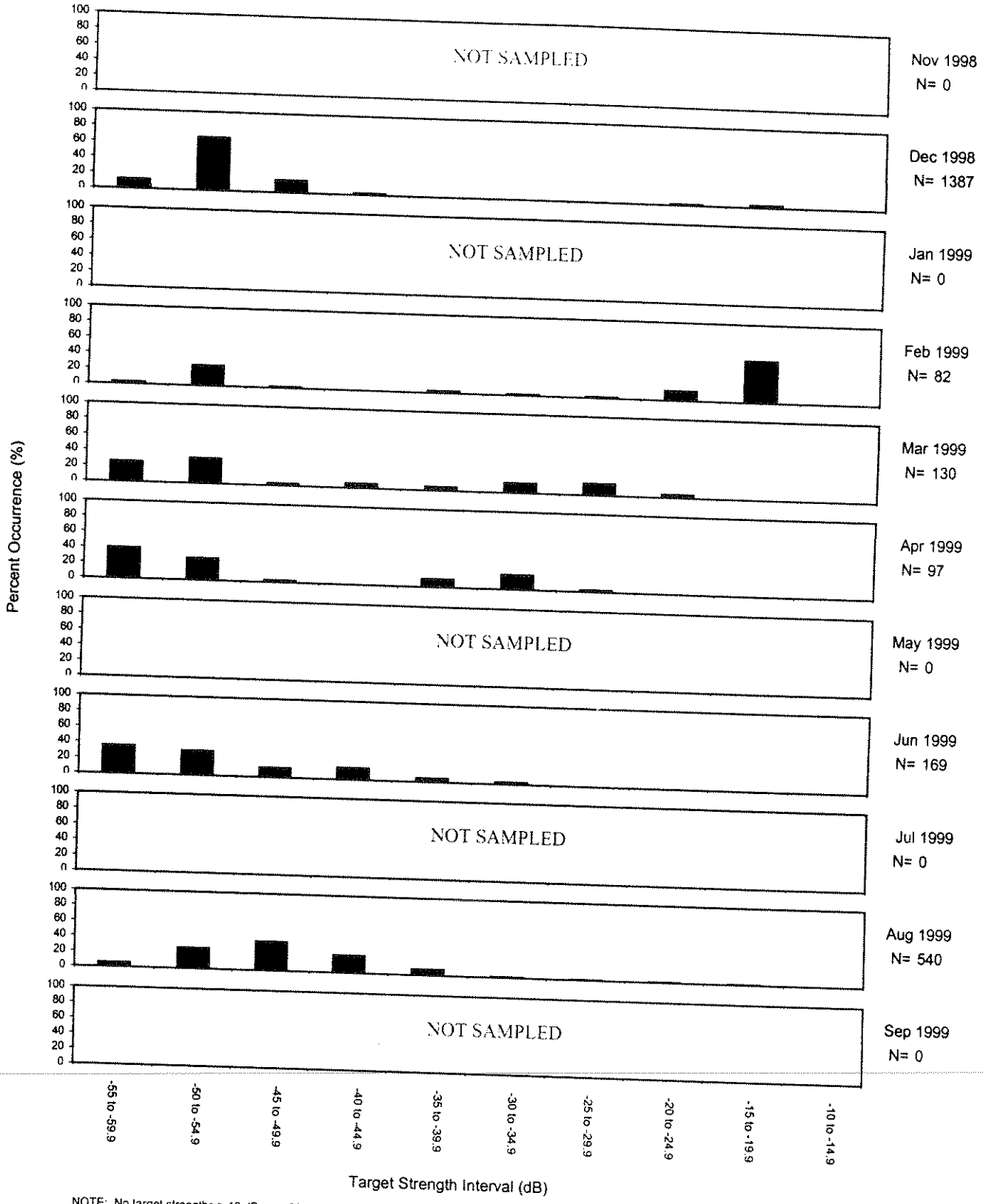
NOTE: No target strengths >-10 dB or < -60 dB were encountered during any surveys.

Figure D-6. Target strength distribution (% occurrence) at Station HW6, November 1998 - September 1999.



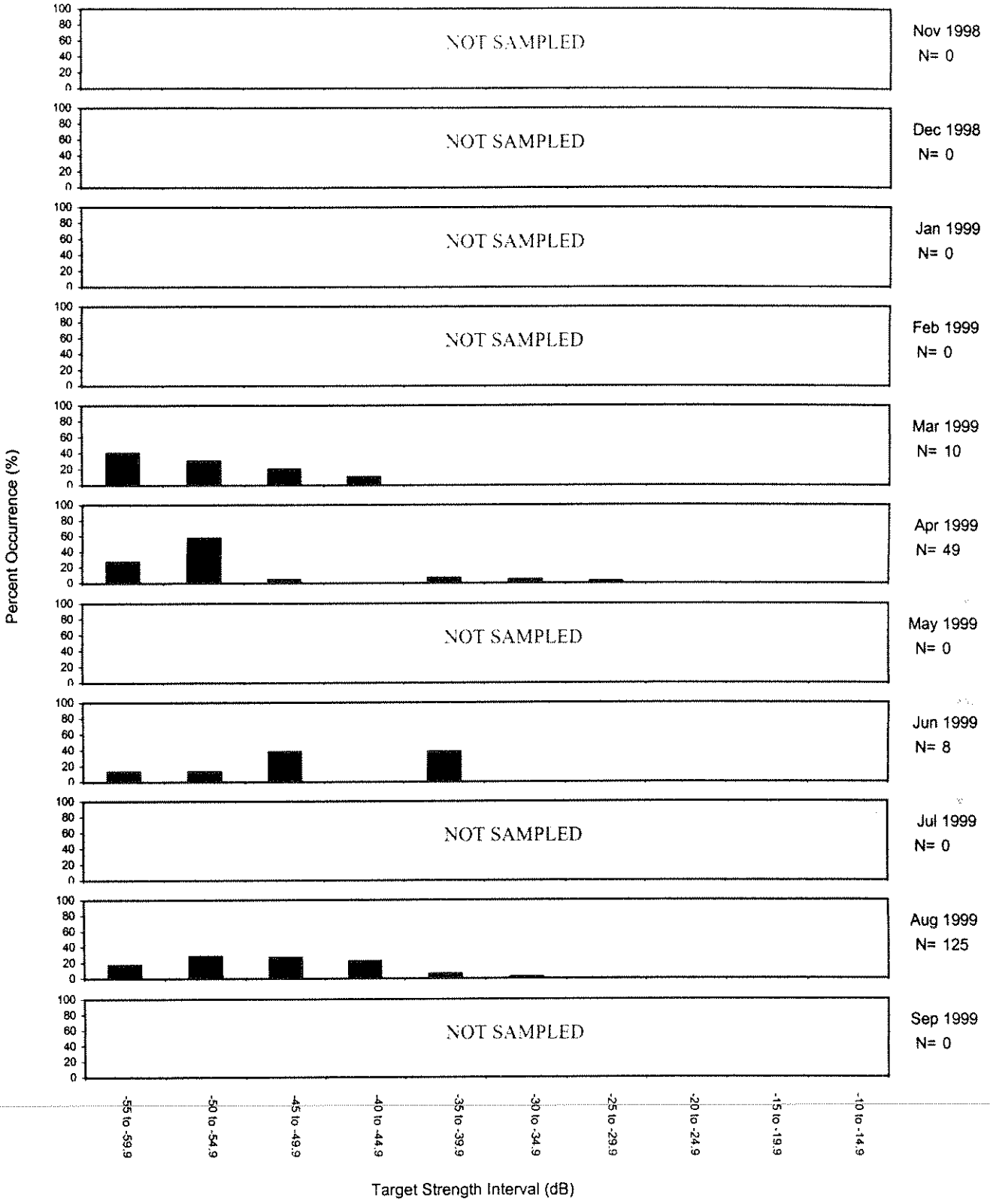
NOTE: No target strengths >-10 dB or < -60 dB were encountered during any surveys.

Figure D-7. Target strength distribution (% occurrence) at Station HW7, November 1998 - September 1999.



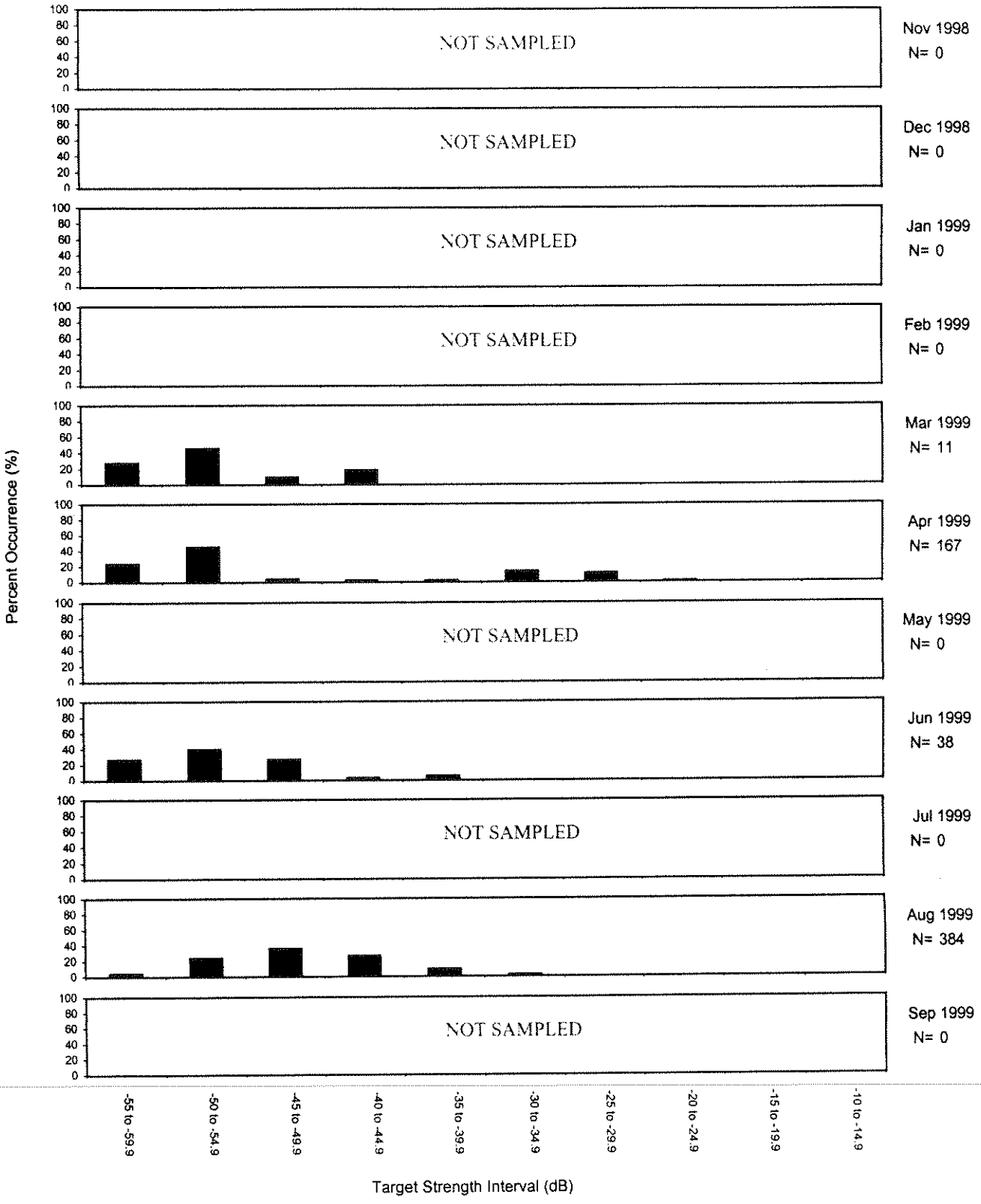
NOTE: No target strengths >-10 dB or < -60 dB were encountered during any surveys.

Figure D-8. Target strength distribution (% occurrence) at Station HW8, November 1998 - September 1999.



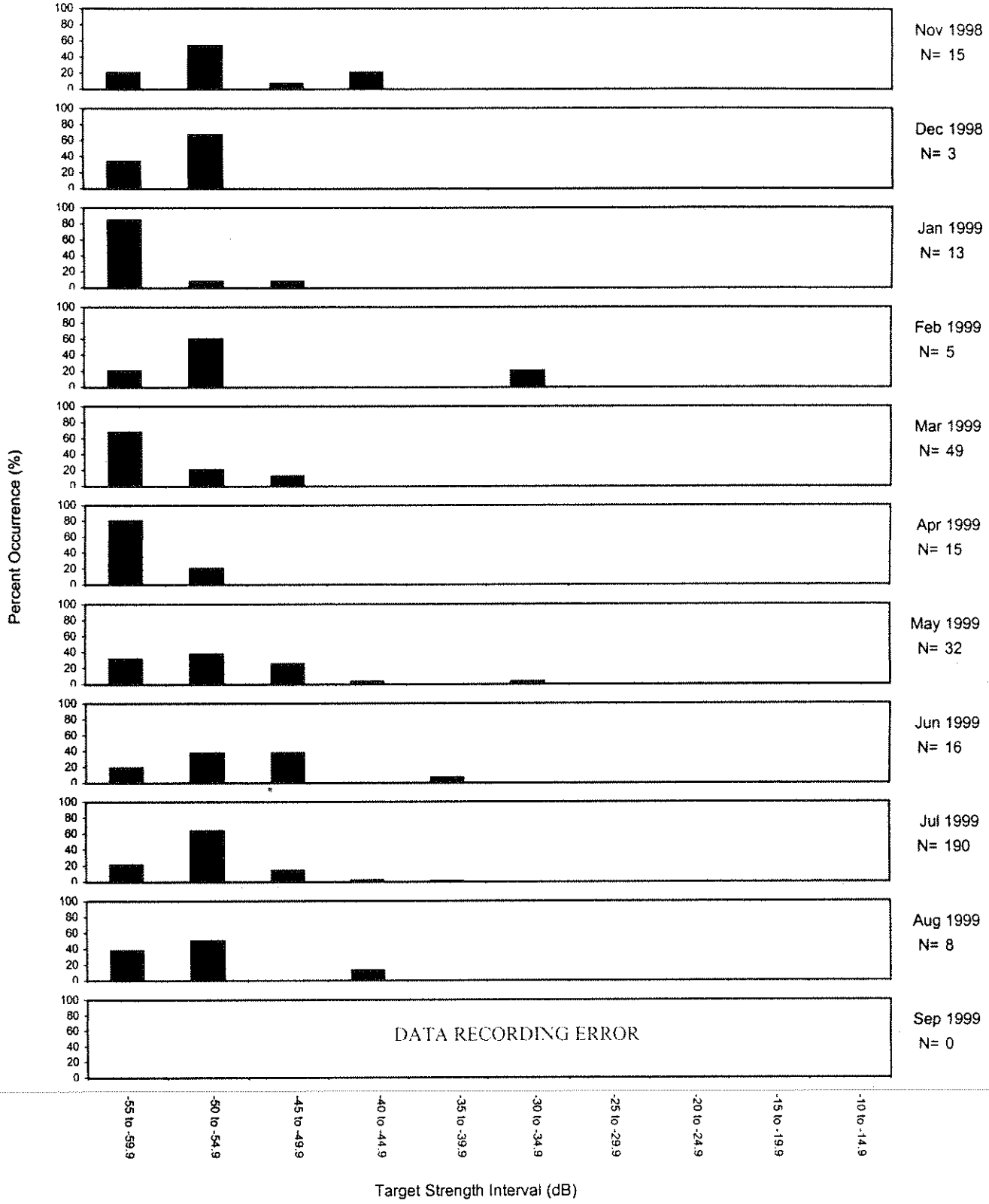
NOTE: No target strengths >-10 dB or < -60 dB were encountered during any surveys.

Figure D-9. Target strength distribution (% occurrence) at Station HW9, November 1998 - September 1999.



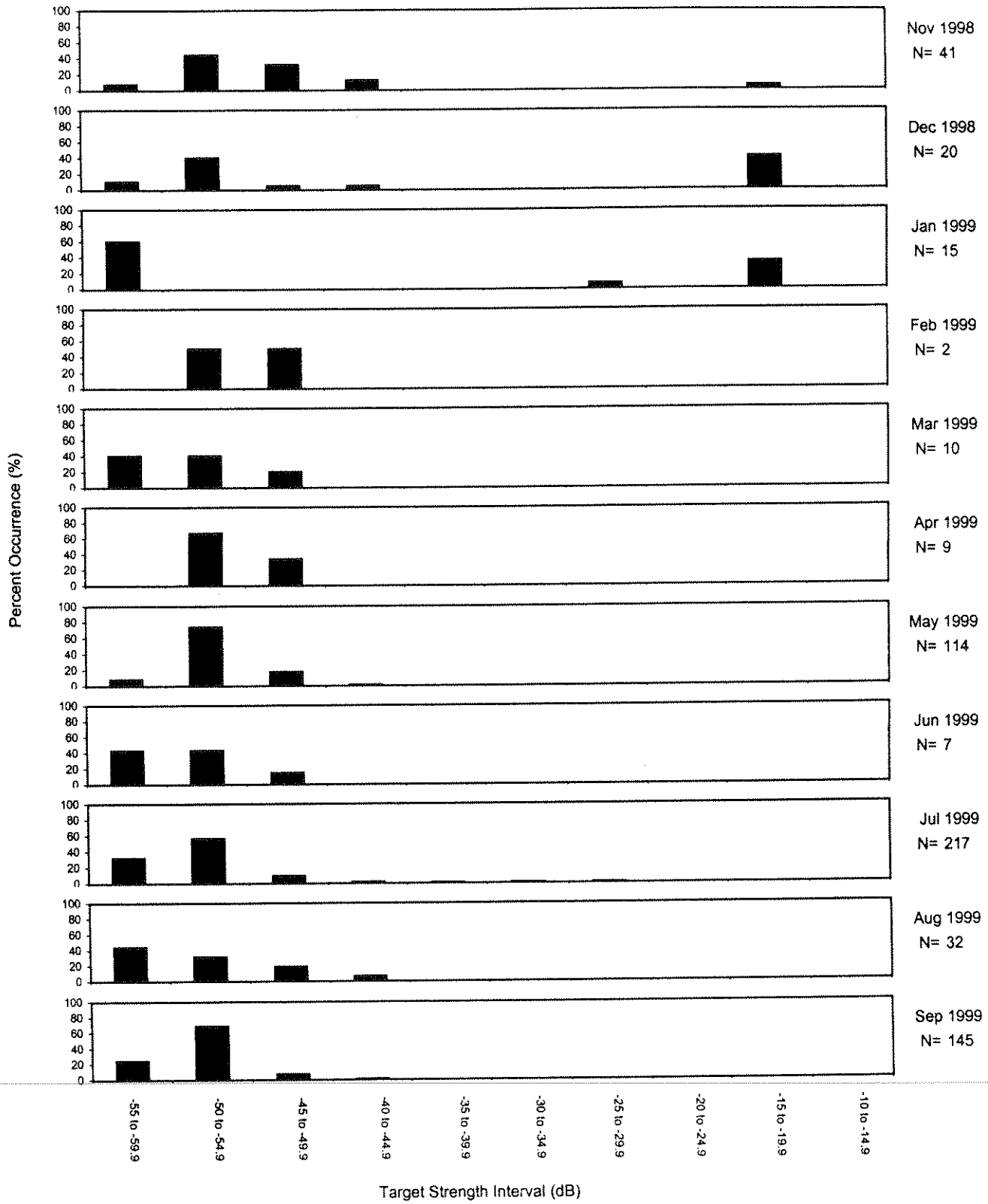
NOTE: No target strengths >-10 dB or < -60 dB were encountered during any surveys.

Figure D-10. Target strength distribution (% occurrence) at Station HW10, November 1998 - September 1999.



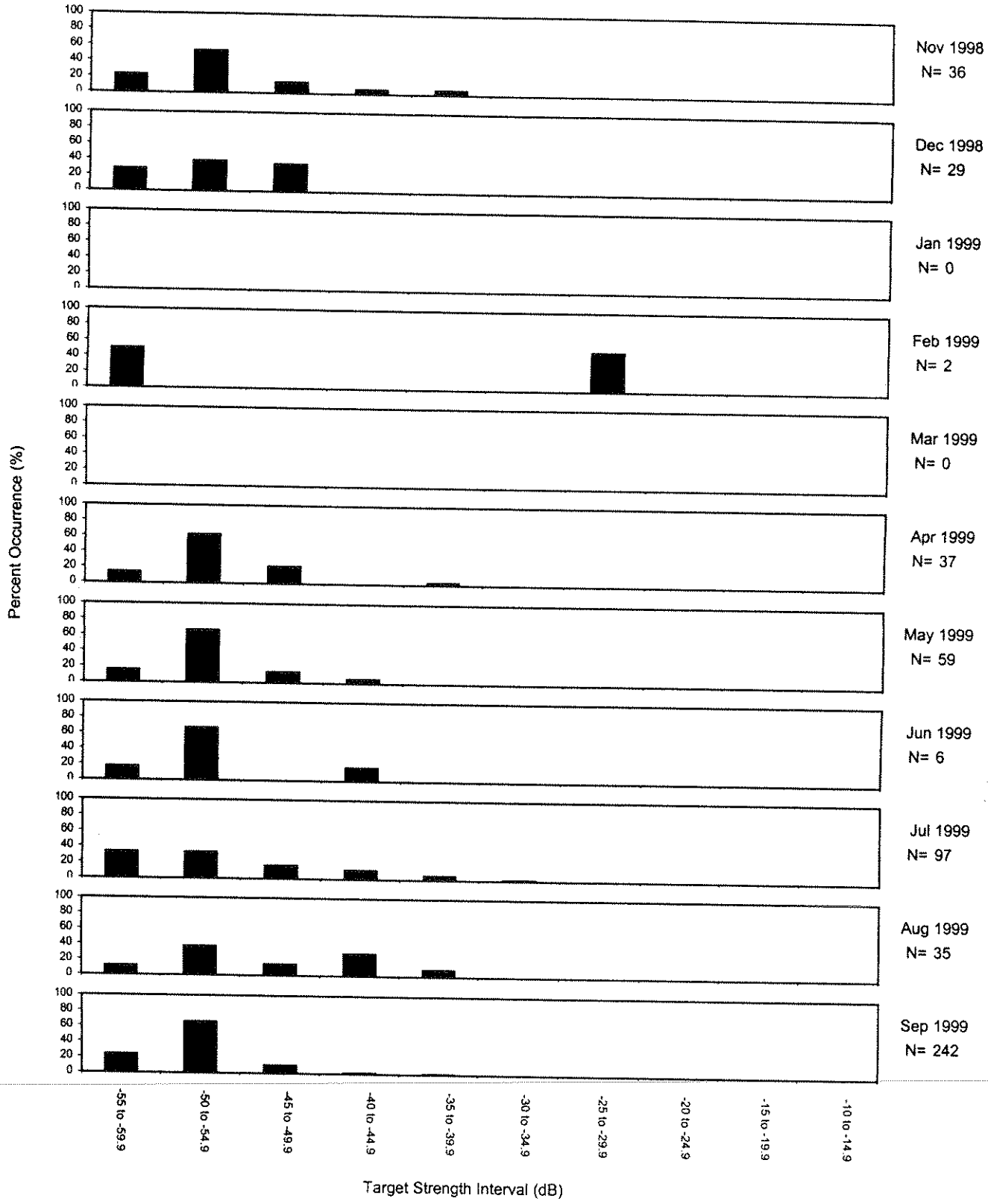
NOTE: No target strengths >-10 dB or < -60 dB were encountered during any surveys.

Figure D-11. Target strength distribution (% occurrence) at Station SB1, November 1998 - September 1999.



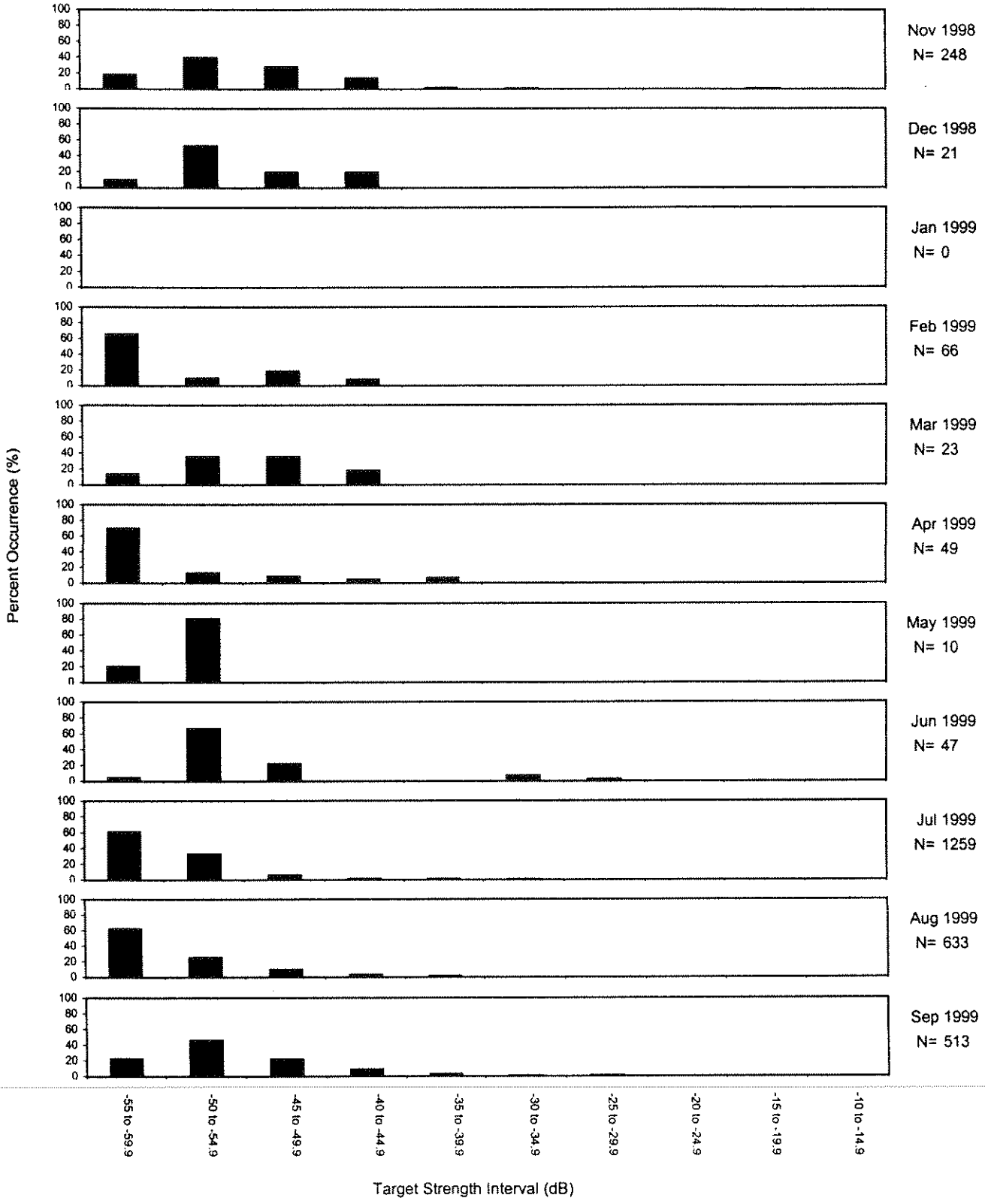
NOTE: No target strengths >-10 dB or < -60 dB were encountered during any surveys.

Figure D-12. Target strength distribution (% occurrence) at Station SB2, November 1998 - September 1999.



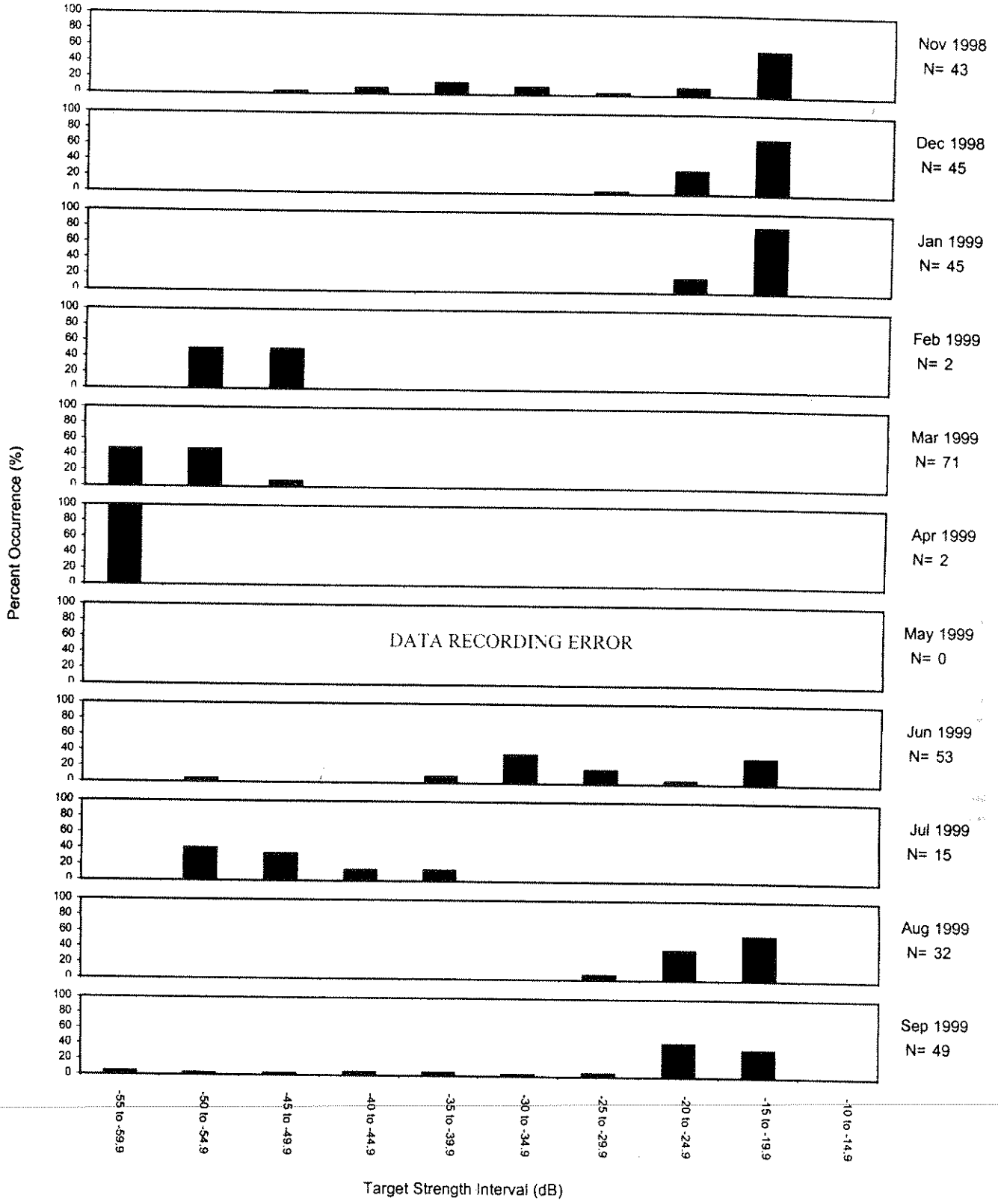
NOTE: No target strengths >-10 dB or < -60 dB were encountered during any surveys.

Figure D-13. Target strength distribution (% occurrence) at Station SB3, November 1998 - September 1999.



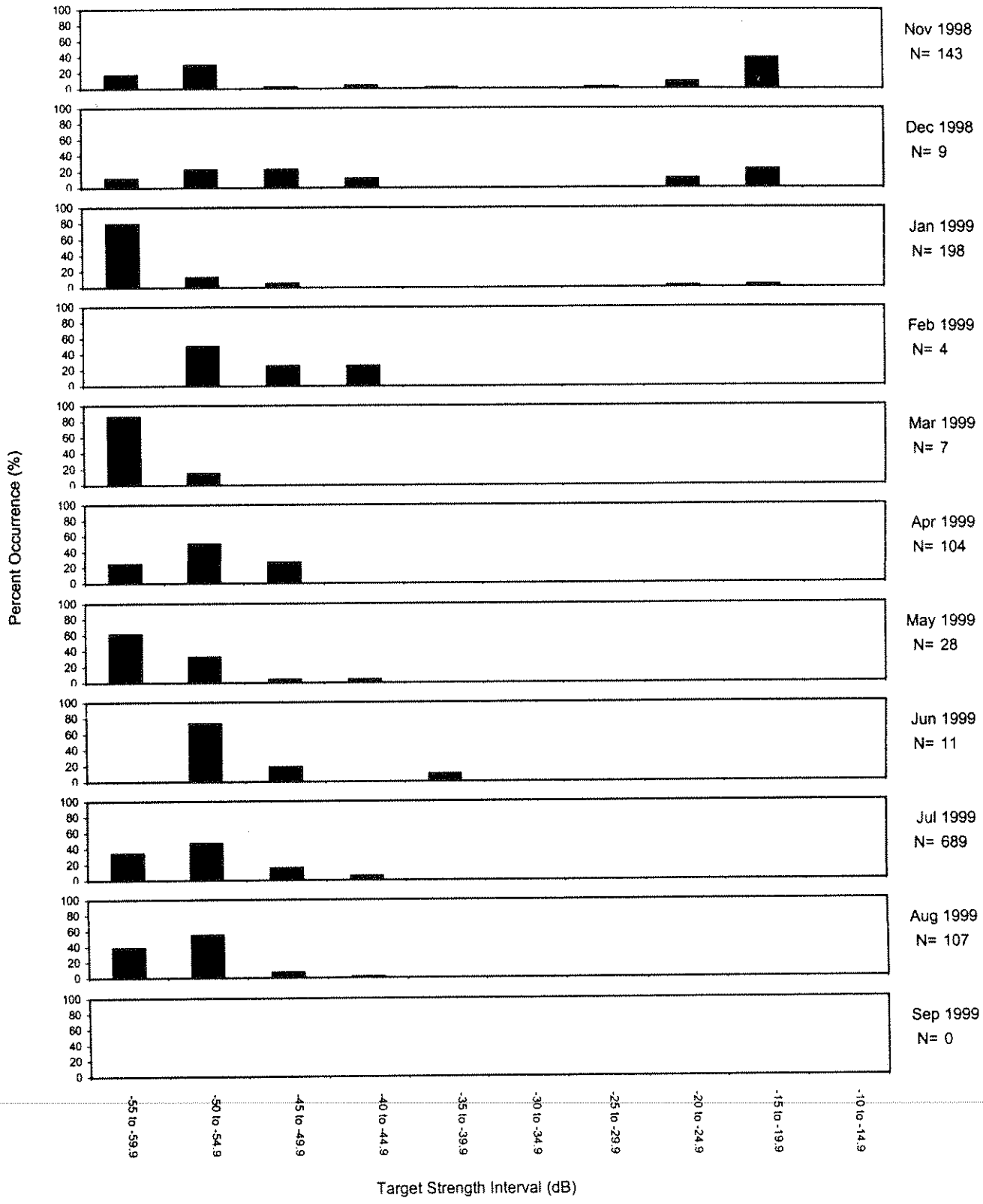
NOTE: No target strengths >-10 dB or < -60 dB were encountered during any surveys.

Figure D-14. Target strength distribution (% occurrence) at Station SB4, November 1998 - September 1999.



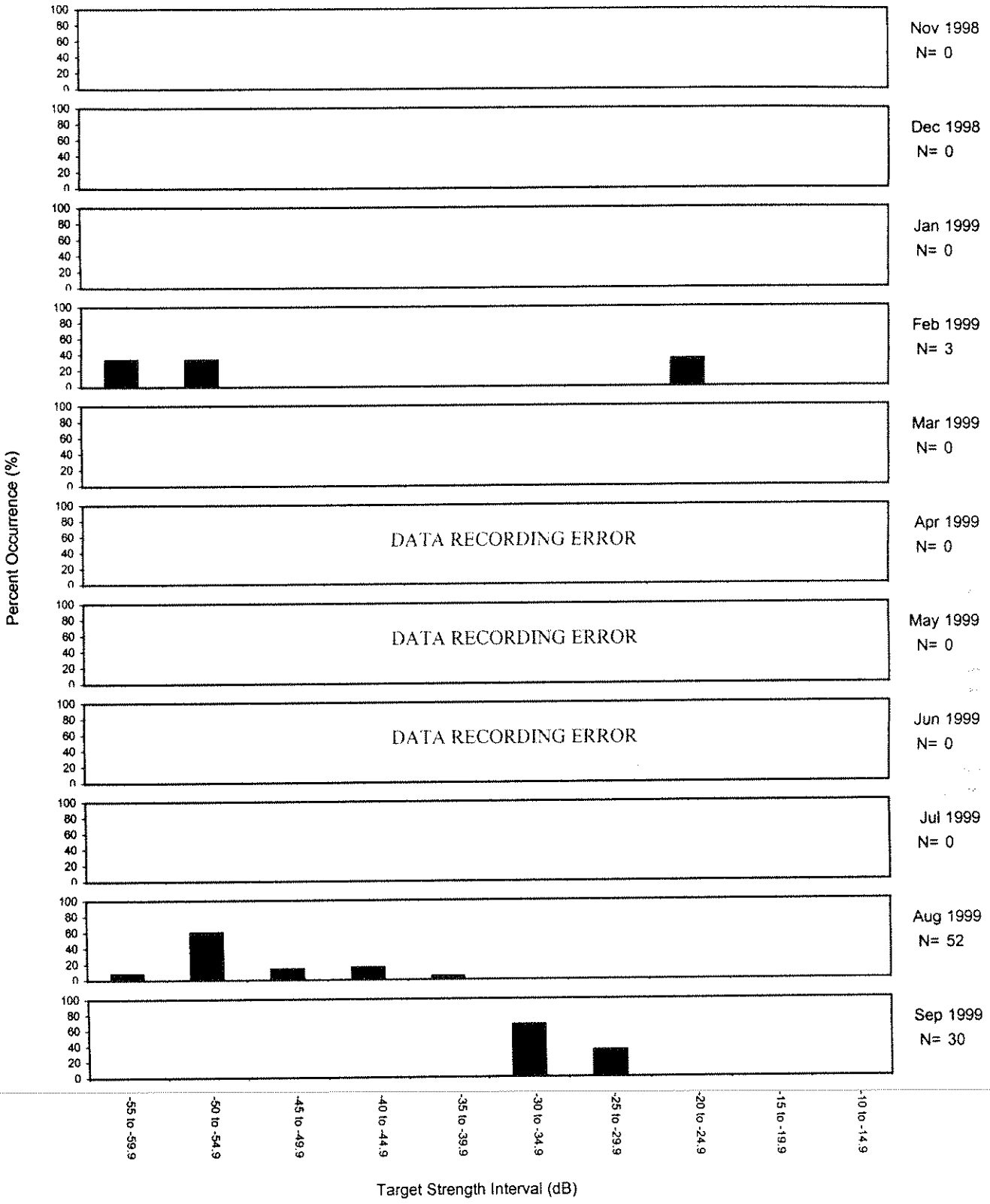
NOTE: No target strengths >-10 dB or < -60 dB were encountered during any surveys.

Figure D-15. Target strength distribution (% occurrence) at Station PJ1, November 1998 - September 1999.



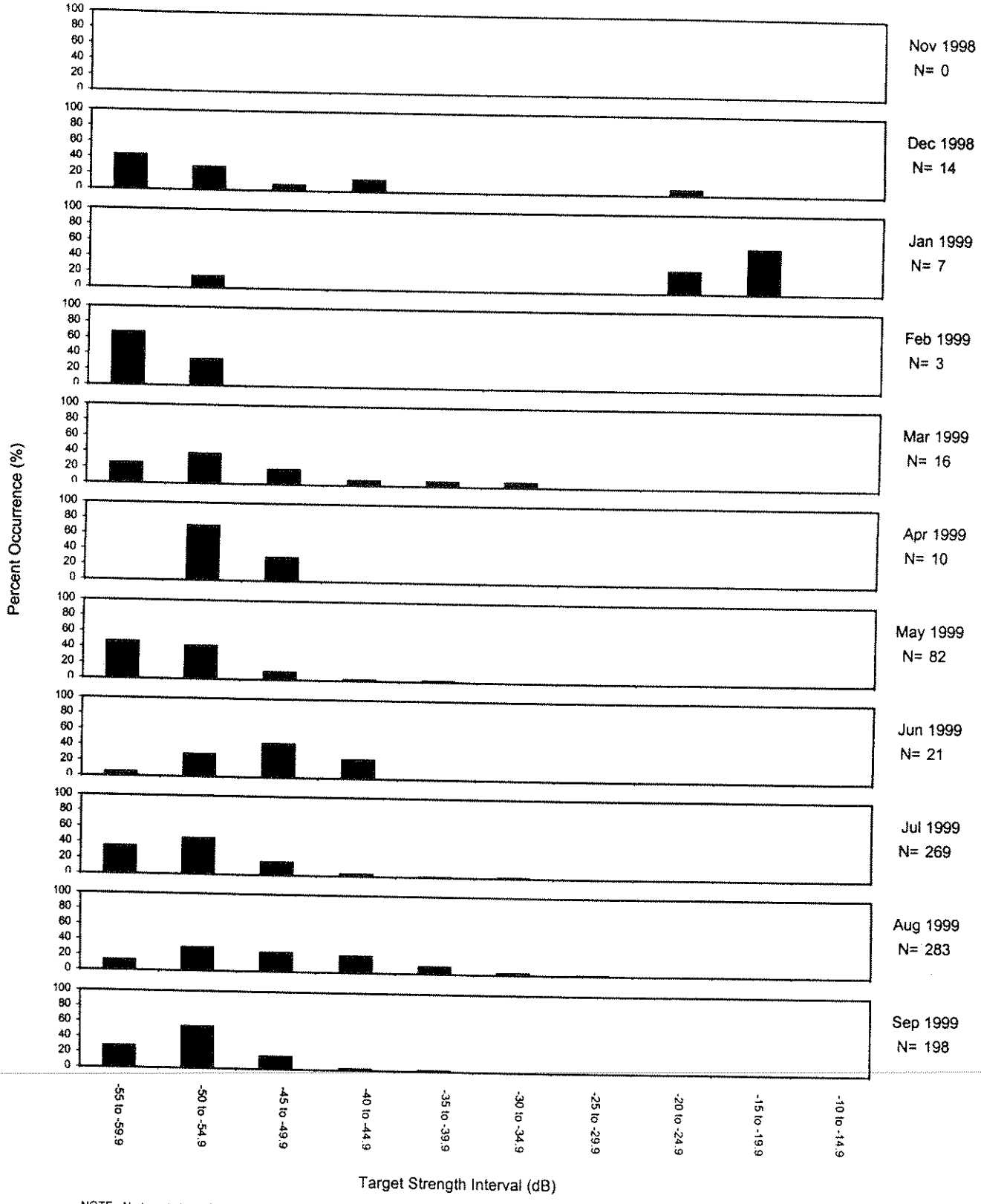
NOTE: No target strengths >-10 dB or < -60 dB were encountered during any surveys.

Figure D-16. Target strength distribution (% occurrence) at Station PJ2, November 1998 - September 1999.



NOTE: No target strengths >-10 dB or < -60 dB were encountered during any surveys.

Figure D-17. Target strength distribution (% occurrence) at Station PJ3, November 1998 - September 1999.



NOTE: No target strengths >-10 dB or < -60 dB were encountered during any surveys.

Figure D-18. Target strength distribution (% occurrence) at Station PJ4, November 1998 - September 1999.

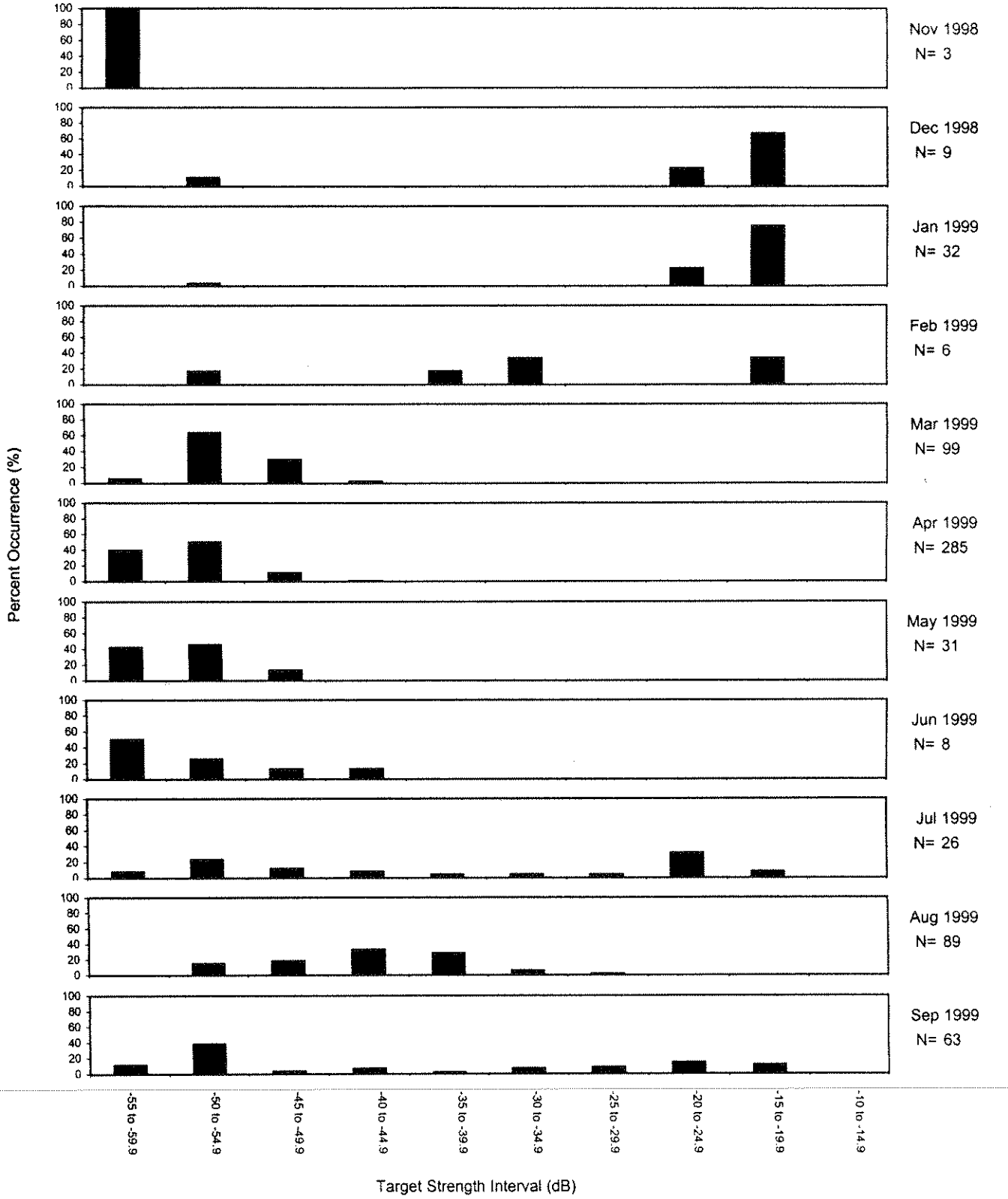
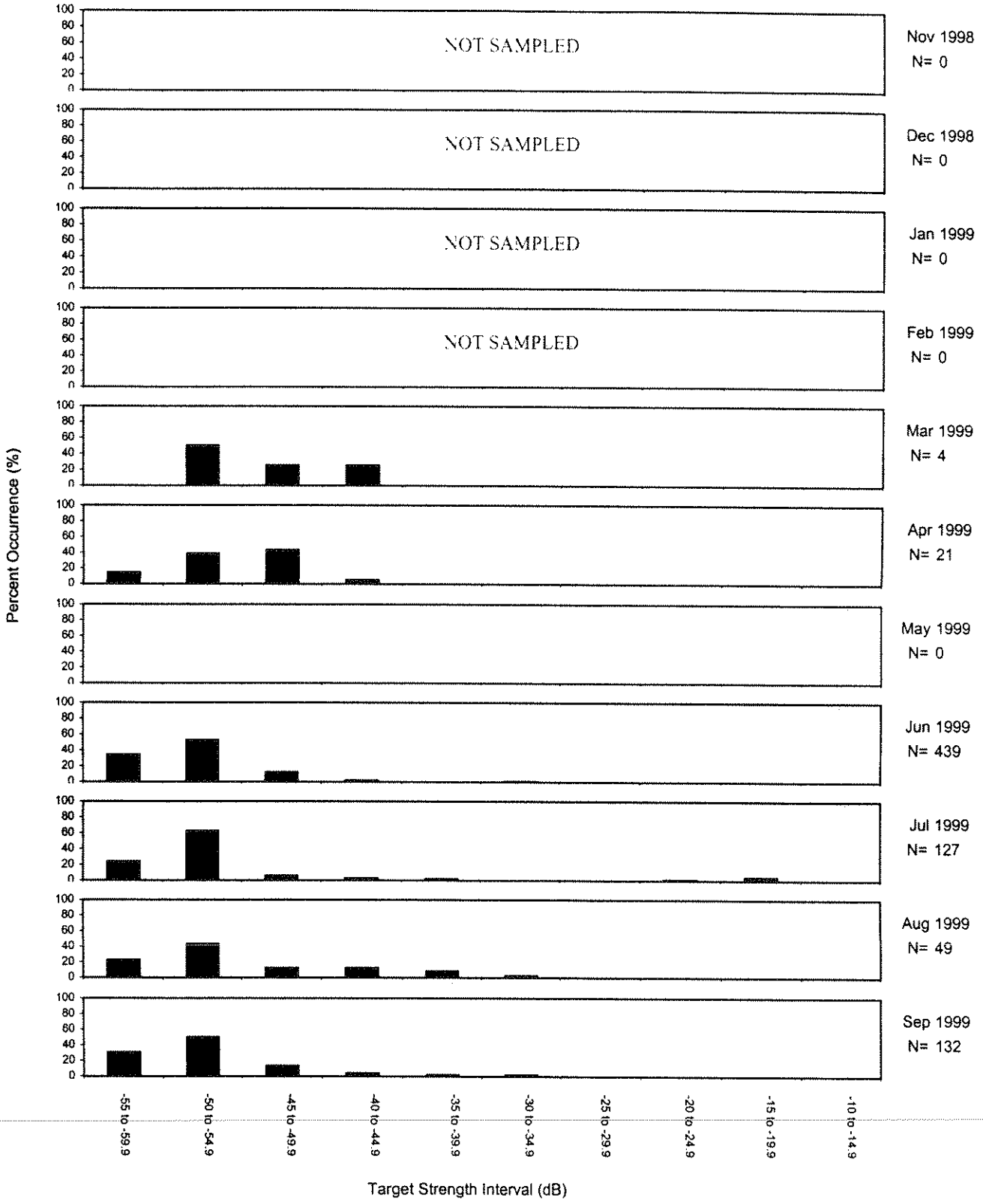


Figure D-19. Target strength distribution (% occurrence) at Station PJ5, November 1998 - September 1999.



NOTE: No target strengths >-10 dB or < -60 dB were encountered during any surveys.

Figure D-20. Target strength distribution (% occurrence) at Station PJ6, November 1998 - September 1999.

APPENDIX E

EPIBENTHIC SLED ICHTHYOPLANKTON DENSITY
FEBRUARY 1999 – JUNE 1999

APPENDIX E1

STATION ICHTHYOPLANKTON DENSITY

TABLE E1-1

EPIBENTHIC SLED ICTHYOPLANKTON DENSITY (NO./1000 CUBIC METERS) AT HW-1
FEBRUARY 1999 - JUNE 1999

STATION		HW - 1 (Ambrose Channel North)				
MONTH SAMPLED		FEB	MAR	APR	MAY	JUN
FAMILY / SCIENTIFIC NAME	COMMON NAME / LIFE STAGE					
Bothidae						
Paralichthys oblongus	Fourspot flounder					
	Egg					
Scophthalmus aquosus	Windowpane				80	44
	Post Yolk-Sac					
Clupeidae					6	2
Brevoortia tyrannus	Atlantic menhaden					
	Egg					
	Post Yolk-Sac		3	518	2	
Cottidae						7
Myoxocephalus sp.	Sculpins					
	Post Yolk-Sac					
Engraulidae			5	2		
Anchoa mitchilli	Bay anchovy					
	Egg					
Gadidae					5	76
Enchelyopus cimbrius	Fourbeard rockling					
	Egg					
Labridae			19	12		
Tautoga onitis	Tautog					
	Egg					
Pleuronectidae					183	568
Pleuronectes americanus	Winter flounder					
	Egg					
	Yolk-Sac		24	26		
	Post Yolk-sac		1			
Sciaenidae			1	8		
Cynoscion regalis	Weakfish					
	Egg					
Soleidae					68	92
Trinectes maculatus	Hogchoker					
	Egg					
Syngnathidae					228	152
Syngnathus fuscus	Northern pipefish					
	Post Yolk-Sac					
Triglidae						2
Prionotussp.	Searobins					
	Post Yolk-Sac					2

NOTE: MONTHS SHADED WERE NOT SAMPLED.

TABLE E1-4

EPIBENTHIC SLED ICTHYOPLANKTON DENSITY (NO./1000 CUBIC METERS) AT HW-4
FEBRUARY 1999 - JUNE 1999

STATION		HW - 4 (Anchorage Channel North)				
MONTH SAMPLED		FEB	MAR	APR	MAY	JUN
FAMILY / SCIENTIFIC NAME	COMMON NAME / LIFE STAGE					
Ammodytidae						
Ammodytes americanus	American sand lance					
	Post Yolk-Sac	4	4			
Bothidae						
Paralichthys oblongus	Fourspot flounder					
	Egg				531	70
Scophthalmus aquosus	Windowpane					
	Post Yolk-Sac				150	
Clupeidae						
Brevoortia tyrannus	Atlantic menhaden					
	Egg		4	992	196	
	Post Yolk-Sac				301	73
Clupea harengus	Atlantic herring					
	Post Yolk-Sac	4	24			
Cottidae						
Myoxocephalus sp.	Sculpins					
	Yolk-Sac		12			
	Post Yolk-Sac	8	40	16		
Engraulidae						
Anchoa mitchilli	Bay anchovy					
	Egg				196	459
	Post Yolk-Sac					17
Gadidae						
Enchelyopus cimbrius	Fourbeard rockling					
	Egg		242	7		
Gobiidae	Post Yolk-Sac					7
Labridae						
Tautoga onitis	Tautog					
	Egg				1006	751
Lophiidae						
Lophius americanus	Goosefish					
	Post Yolk-Sac					3
Pleuronectidae						
Pleuronectes americanus	Winter flounder					
	Egg		101	16		
	Yolk-Sac		28			
	Post Yolk-sac			130		
	Unidentified		12			
Sciaenidae						
Cynoscion regalis	Weakfish					
	Egg				2963	1683
	Post Yolk-Sac					83

TABLE E1-4 (Cont'd)

EPIBENTHIC SLED ICTHYOPLANKTON DENSITY (NO./1000 CUBIC METERS) AT HW-4
FEBRUARY 1999 - JUNE 1999

STATION		HW - 4 (Anchorage Channel North)				
MONTH SAMPLED		FEB	MAR	APR	MAY	JUN
FAMILY / SCIENTIFIC NAME	COMMON NAME / LIFE STAGE					
Soleidae						
Trinectes maculatus	Hogchoker					
	Egg				867	28
Unidentified	Post Yolk-Sac					10

NOTE: MONTHS SHADED WERE NOT SAMPLED.

TABLE E1-5

EPIBENTHIC SLED ICTHYOPLANKTON DENSITY (NO./1000 CUBIC METERS) AT HW-5
FEBRUARY 1999 - JUNE 1999

STATION		HW - 5 (Bergen Point East Reach)				
MONTH SAMPLED		FEB	MAR	APR	MAY	JUN
FAMILY / SCIENTIFIC NAME	COMMON NAME / LIFE STAGE					
Ammodytidae						
Ammodytes americanus	American sand lance					
	Post Yolk-Sac	4				
Bothidae						
Paralichthys oblongus	Fourspot flounder				6	70
	Egg					
Scophthalmus aquosus	Windowpane				6	12
	Post Yolk-Sac					
Clupeidae						
Brevoortia tyrannus	Atlantic menhaden			100		
	Egg					214
	Post Yolk-Sac					
Cottidae						
Myoxocephalus sp.	Sculpins		493			
	Egg					
	Yolk-Sac	8	7	24		
	Post Yolk-Sac	8	7	44		
	Unidentified	4				
Engraulidae						
Anchoa mitchilli	Bay anchovy				164	296
	Egg					243
	Post Yolk-Sac					
Gadidae						
Enchelyopus cimbrius	Fourbeard rockling		67	20		
	Egg					
Labridae						
Tautoga onitis	Tautog				44	345
	Egg					
Pleuronectidae						
Pleuronectes americanus	Winter flounder		13			
	Egg			72	13	
	Post Yolk-sac					
Sciaenidae						
Cynoscion regalis	Weakfish				1191	1011
	Egg					8
	Post Yolk-Sac					
Soleidae						
Trinectes maculatus	Hogchoker				13	41
	Egg					
Syngnathidae						
Syngnathus fuscus	Northern pipefish				6	
	Post Yolk-Sac					4
	Juvenile					

NOTE: MONTHS SHADED WERE NOT SAMPLED.

TABLE E1-6

EPIBENTHIC SLED ICTHYOPLANKTON DENSITY (NO./1000 CUBIC METERS) AT HW-6
FEBRUARY 1999 - JUNE 1999

STATION		HW - 6 (N. of Shooters Island Reach)				
MONTH SAMPLED		FEB	MAR	APR	MAY	JUN
FAMILY / SCIENTIFIC NAME	COMMON NAME / LIFE STAGE					
Ammodytidae						
Ammodytes americanus	American sand lance					
	Post Yolk-Sac	5	5			
Bothidae						
Paralichthys oblongus	Fourspot flounder					
	Egg				4	
Scophthalmus aquosus	Windowpane					
	Post Yolk-Sac				4	
Clupeidae						
Brevoortia tyrannus	Atlantic menhaden					
	Egg			206	4	
	Post Yolk-Sac					1852
Clupea harengus	Atlantic herring					
	Post Yolk-Sac	14	5			
Cottidae						
Myoxocephalus sp.	Sculpins					
	Yolk-Sac			17		
	Post Yolk-Sac		5			
Engraulidae						
Anchoa mitchilli	Bay anchovy					
	Egg				383	329
	Post Yolk-Sac					571
Gadidae						
Enchelyopus cimbrius	Fourbeard rockling					
	Egg		38	11		
Gobiidae	Post Yolk-Sac					53
Labridae						
Tautoga onitis	Tautog					
	Egg				269	296
Pleuronectidae						
Pleuronectes americanus	Winter flounder					
	Egg		14	6		
	Post Yolk-sac			67		
Sciaenidae						
Cynoscion regalis	Weakfish					
	Egg				83	1035
	Post Yolk-Sac					53
Soleidae						
Trinectes maculatus	Hogchoker					
	Egg					16
Syngnathidae						
Syngnathus fuscus	Northern pipefish					
	Post Yolk-Sac					16
	Juvenile					12

NOTE: MONTHS SHADED WERE NOT SAMPLED.

TABLE E1-7

EPIBENTHIC SLED ICTHYOPLANKTON DENSITY (NO./1000 CUBIC METERS) AT HW-7
FEBRUARY 1999 - JUNE 1999

STATION		HW - 7 (Elizabeth Reach)				
MONTH SAMPLED		FEB	MAR	APR	MAY	JUN
FAMILY / SCIENTIFIC NAME	COMMON NAME / LIFE STAGE					
Ammodytidae						
Ammodytes americanus	American sand lance					
	Post Yolk-Sac	4				
Bothidae						
Paralichthys oblongus	Fourspot flounder					
	Egg					12
Scophthalmus aquosus	Windowpane					
	Post Yolk-Sac				5	24
Clupeidae						
Brevoortia tyrannus	Atlantic menhaden					
	Egg		19	111		
	Post Yolk-Sac					236
Clupea harengus	Atlantic herring					
	Post Yolk-Sac	4				
Cottidae						
Myoxocephalus sp.	Sculpins					
	Yolk-Sac	8		22		
	Post Yolk-Sac	8	37	45		
	Unidentified	4				
Engraulidae						
Anchoa mitchilli	Bay anchovy					
	Egg				245	18
	Post Yolk-Sac					42
Gadidae						
Enchelyopus cimbrius	Fourbeard rockling					
	Egg		19			
Gobiidae	Post Yolk-Sac					73
Labridae						
Tautoga onitis	Tautog					
	Egg				149	12
Pleuronectidae						
Pleuronectes americanus	Winter flounder					
	Egg		31			
	Post Yolk-sac			56		
Sciaenidae						
Cynoscion regalis	Weakfish					
	Egg				120	48
	Post Yolk-Sac					490
Soleidae						
Trinectes maculatus	Hogchoker					
	Egg					6

TABLE E1-7 (Cont'd)

EPIBENTHIC SLED ICTHYOPLANKTON DENSITY (NO./1000 CUBIC METERS) AT HW-7
FEBRUARY 1999 - JUNE 1999

STATION		HW - 7 (Elizabeth Reach)				
MONTH SAMPLED		FEB	MAR	APR	MAY	JUN
FAMILY / SCIENTIFIC NAME	COMMON NAME / LIFE STAGE					
Syngnathidae						
Syngnathus fuscus	Northern pipefish					
	Post Yolk-Sac					
	Juvenile					12
Unidentified	Post Yolk-Sac					12
						6

NOTE: MONTHS SHADED WERE NOT SAMPLED.

TABLE E1-8

EPIBENTHIC SLED ICTHYOPLANKTON DENSITY (NO./1000 CUBIC METERS) AT HW-8
FEBRUARY 1999 - JUNE 1999

STATION		HW - 8 (Middle Reach)				
MONTH SAMPLED		FEB	MAR	APR	MAY	JUN
FAMILY / SCIENTIFIC NAME	COMMON NAME / LIFE STAGE					
Bothidae						
Paralichthys oblongus	Fourspot flounder					
	Egg	4	288			
Scophthalmus aquosus	Windowpane					
	Post Yolk-Sac	4	51			
Clupeidae						
Brevoortia tyrannus	Atlantic menhaden					
	Egg		16	28		
	Post Yolk-Sac	283				
Clupea harengus	Atlantic herring					
	Post Yolk-Sac					6
Cottidae						
Myoxocephalus sp.	Sculpins					
	Yolk-Sac			8		
	Post Yolk-Sac			16	9	6
Engraulidae						
Anchoa mitchilli	Bay anchovy					
	Egg	829	801			
	Post Yolk-Sac	74				
Gadidae						
Enchelyopus cimbrius	Fourbeard rockling					
	Egg			4	28	
Gobiidae	Post Yolk-Sac	11				
Labridae						
Tautoga onitis	Tautog					
	Egg	197	482			
Pleuronectidae						
Pleuronectes americanus	Winter flounder					
	Egg			4	43	
	Post Yolk-sac		12	36		
Sciaenidae						
Cynoscion regalis	Weakfish					
	Egg	454	132			
	Post Yolk-Sac	22				
Soleidae						
Trinectes maculatus	Hogchoker					
	Egg	7				
Syngnathidae						
Syngnathus fuscus	Northern pipefish					
	Post Yolk-Sac	15				
	Juvenile	4				
Unidentified	Post Yolk-Sac	11				

NOTE: MONTHS SHADED WERE NOT SAMPLED.

TABLE E1-9

EPIBENTHIC SLED ICTHYOPLANKTON DENSITY (NO./1000 CUBIC METERS) AT HW-9
FEBRUARY 1999 - JUNE 1999

STATION		HW - 9 (Newark Bay South Reach)				
MONTH SAMPLED		FEB	MAR	APR	MAY	JUN
FAMILY / SCIENTIFIC NAME	COMMON NAME / LIFE STAGE					
Bothidae						
Paralichthys oblongus	Fourspot flounder					
	Egg				19	39
Scophthalmus aquosus	Windowpane					
	Post Yolk-Sac				13	14
Clupeidae						
Brevoortia tyrannus	Atlantic menhaden					
	Egg			73		
	Post Yolk-Sac				16	365
Clupea harengus	Atlantic herring					
	Post Yolk-Sac		5			
Cottidae						
Myoxocephalus sp.	Sculpins					
	Yolk-Sac		25	9		
	Post Yolk-Sac		35	41		
Engraulidae						
Anchoa mitchilli	Bay anchovy					
	Egg				385	447
	Post Yolk-Sac					54
Gadidae						
Enchelyopus cimbrius	Fourbeard rockling					
	Egg		60			
Gobiidae	Post Yolk-Sac					11
Labridae						
Tautoga onitis	Tautog					
	Egg				87	451
Pleuronectidae						
Pleuronectes americanus	Winter flounder					
	Egg		10			
	Post Yolk-sac			32		
Sciaenidae						
Cynoscion regalis	Weakfish					
	Egg				115	1438
	Post Yolk-Sac					11
Soleidae						
Trinectes maculatus	Hogchoker					
	Egg				3	107
Syngnathidae						
Syngnathus fuscus	Northern pipefish					
	Post Yolk-Sac					14
	Juvenile					4
Unidentified	Post Yolk-Sac					11

NOTE: MONTHS SHADED WERE NOT SAMPLED.

TABLE E1-10

EPIBENTHIC SLED ICTHYOPLANKTON DENSITY (NO./1000 CUBIC METERS) AT HW-10
FEBRUARY 1999 - JUNE 1999

STATION		HW - 10 (Newark Bay / Port Elizabeth)				
MONTH SAMPLED		FEB	MAR	APR	MAY	JUN
FAMILY / SCIENTIFIC NAME	COMMON NAME / LIFE STAGE					
Bothidae						
Paralichthys oblongus	Fourspot flounder					
	Egg				16	60
Scophthalmus aquosus	Windowpane					
	Post Yolk-Sac				31	21
Clupeidae						
Brevoortia tyrannus	Atlantic menhaden					
	Egg		5	61		
	Post Yolk-Sac					316
Clupea harengus	Atlantic herring					
	Post Yolk-Sac		18			
Cottidae						
Myoxocephalus sp.	Sculpins					
	Yolk-Sac		72			
	Post Yolk-Sac		81	9		
Engraulidae						
Anchoa mitchilli	Bay anchovy					
	Egg				175	379
	Post Yolk-Sac					9
Gadidae						
Enchelyopus cimbrius	Fourbeard rockling					
	Egg		23	19		
Labridae						
Tautoga onitis	Tautog					
	Egg				74	269
Pleuronectidae						
Pleuronectes americanus	Winter flounder					
	Egg		9	5		
	Post Yolk-sac			33	31	
Sciaenidae						
Cynoscion regalis	Weakfish					
	Egg				82	1160
Soleidae						
Trinectes maculatus	Hogchoker					
	Egg					94

NOTE: MONTHS SHADED WERE NOT SAMPLED.

TABLE E1-11

EPIBENTHIC SLED ICTHYOPLANKTON DENSITY (NO./1000 CUBIC METERS) AT SB-1
FEBRUARY 1999 - JUNE 1999

STATION		SB - 1 (Gowanus Bay Interpier South)				
MONTH SAMPLED		FEB	MAR	APR	MAY	JUN
FAMILY / SCIENTIFIC NAME	COMMON NAME / LIFE STAGE					
Bothidae						
Paralichthys oblongus	Fourspot flounder					
	Egg					
Scophthalmus aquosus	Windowpane				476	86
	Post Yolk-Sac					
Clupeidae					13	
Brevoortia tyrannus	Atlantic menhaden					
	Egg					
	Post Yolk-Sac		13	3490	50	
Clupea harengus	Atlantic herring					514
	Post Yolk-Sac					
Cottidae			26			
Myoxocephalus sp.	Sculpins					
	Yolk-Sac					
	Post Yolk-Sac			30		
Engraulidae				40		
Anchoa mitchilli	Bay anchovy					
	Egg					
	Post Yolk-Sac				200	800
Gadidae						300
Enchelyopus cimbrius	Fourbeard rockling					
	Egg					
Gobiidae	Post Yolk-Sac		78	120		
Labridae						14
Tautoga onitis	Tautog					
	Egg					
Pleuronectidae					2177	843
Pleuronectes americanus	Winter flounder					
	Egg					
	Yolk-Sac	10	130	60		
	Post Yolk-sac					
Sciaenidae				40		
Cynoscion regalis	Weakfish					
	Egg					
Soleidae					2403	3158
Trinectes maculatus	Hogchoker					
	Egg					
Unidentified	Post Yolk-Sac				25	786
						114

NOTE: MONTHS SHADED WERE NOT SAMPLED.

TABLE E1-12

EPIBENTHIC SLED ICTHYOPLANKTON DENSITY (NO./1000 CUBIC METERS) AT SB-2
FEBRUARY 1999 - JUNE 1999

STATION		SB - 2 (Gowanus Bay Interpier)				
MONTH SAMPLED		FEB	MAR	APR	MAY	JUN
FAMILY / SCIENTIFIC NAME	COMMON NAME / LIFE STAGE					
Ammodytidae						
Ammodytes americanus	American sand lance					
	Post Yolk-Sac					10
Bothidae						
Paralichthys oblongus	Fourspot flounder					
	Egg	418	3022			
Scophthalmus aquosus	Windowpane					
	Post Yolk-Sac		52			
Clupeidae						
Brevoortia tyrannus	Atlantic menhaden					
	Egg		580	4089	14	
	Yolk-Sac		31			
	Post Yolk-Sac	174	1345			
Clupea harengus	Atlantic herring					
	Post Yolk-Sac					20
Cottidae						
Myoxocephalus sp.	Sculpins					
	Yolk-Sac				14	
	Post Yolk-Sac			50	55	10
	Unidentified				14	
Engraulidae						
Anchoa mitchilli	Bay anchovy					
	Egg	1348	331			
	Post Yolk-Sac	186				
Gadidae						
Enchelyopus cimbrius	Fourbeard rockling					
	Egg			446	327	
Microgadus tomcod	Atlantic tomcod					
	Juvenile		10			
Gobiidae	Post Yolk-Sac	35				
Labridae						
Tautoga onitis	Tautog					
	Egg	1534	3518			
Pleuronectidae						
Pleuronectes americanus	Winter flounder					
	Egg			124	55	
	Post Yolk-sac		21	50		
Sciaenidae						
Cynoscion regalis	Weakfish					
	Egg	7765	2691			
	Post Yolk-Sac	12				
Soleidae						
Trinectes maculatus	Hogchoker					
	Egg	1069	124			

NOTE: MONTHS SHADED WERE NOT SAMPLED.

TABLE E1-13

EPIBENTHIC SLED ICTHYOPLANKTON DENSITY (NO./1000 CUBIC METERS) AT SB-3
FEBRUARY 1999 - JUNE 1999

STATION		SB - 3 (Gowanus Bay Interpier North)				
MONTH SAMPLED		FEB	MAR	APR	MAY	JUN
FAMILY / SCIENTIFIC NAME	COMMON NAME / LIFE STAGE					
Ammodytidae						
Ammodytes americanus	American sand lance					
	Post Yolk-Sac	8				
Bothidae						
Paralichthys oblongus	Fourspot flounder					
	Egg				2699	172
Scophthalmus aquosus	Windowpane					
	Post Yolk-Sac				8	
Clupeidae						
Brevoortia tyrannus	Atlantic menhaden					
	Egg		18	2533	135	
	Yolk-Sac				118	
	Post Yolk-Sac				691	86
Clupea harengus	Atlantic herring					
	Post Yolk-Sac	8				
Cottidae						
Myoxocephalus sp.	Sculpins					
	Yolk-Sac		18	11		
	Post Yolk-Sac		82	33		
Engraulidae						
Anchoa mitchilli	Bay anchovy					
	Egg				270	626
Gadidae						
Enchelyopus cimbrius	Fourbeard rockling					
	Egg		448	384		
Pollachius virens	Pollock					
	Egg		9			
Gobiidae	Post Yolk-Sac					39
Labridae						
Tautoga onitis	Tautog					
	Egg				7826	751
	Post Yolk-Sac				8	
Pleuronectidae						
Pleuronectes americanus	Winter flounder					
	Egg		73	22		
	Post Yolk-sac			154		
Sciaenidae						
Cynoscion regalis	Weakfish					
	Egg				3103	1845
Soleidae						
Trinectes maculatus	Hogchoker					
	Egg					266

TABLE E1-13 (Cont'd)

EPIBENTHIC SLED ICTHYOPLANKTON DENSITY (NO./1000 CUBIC METERS) AT SB-3
FEBRUARY 1999 - JUNE 1999

STATION		SB - 3 (Gowanus Bay Interpier North)				
MONTH SAMPLED		FEB	MAR	APR	MAY	JUN
FAMILY / SCIENTIFIC NAME	COMMON NAME / LIFE STAGE					
Syngnathidae						
Syngnathus fuscus	Northern pipefish					
	Post Yolk-Sac					8

NOTE: MONTHS SHADED WERE NOT SAMPLED.

TABLE E1-14

EPIBENTHIC SLED ICTHYOPLANKTON DENSITY (NO./1000 CUBIC METERS) AT SB-4
FEBRUARY 1999 - JUNE 1999

STATION		SB - 4 (Bay Ridge Channel)				
MONTH SAMPLED		FEB	MAR	APR	MAY	JUN
FAMILY / SCIENTIFIC NAME	COMMON NAME / LIFE STAGE					
Bothidae						
Paralichthys oblongus	Fourspot flounder					
	Egg				447	34
Scophthalmus aquosus	Windowpane					
	Post Yolk-Sac				34	
Clupeidae						
Brevoortia tyrannus	Atlantic menhaden					
	Egg		28	1802		
	Post Yolk-Sac				24	124
Clupea harengus	Atlantic herring					
	Post Yolk-Sac	3				
Cottidae						
Myoxocephalus sp.	Sculpins					
	Yolk-Sac	3	35	5		
	Post Yolk-Sac	12	140	28		
Engraulidae						
Anchoa mitchilli	Bay anchovy					
	Egg				97	904
	Post Yolk-Sac					4
Gadidae						
Enchelyopus cimbrius	Fourbeard rockling					
	Egg		119	108		
Pollachius virens	Pollock					
	Egg		14			
Labridae						
Tautoga onitis	Tautog					
	Egg				2486	1177
Pleuronectidae						
Pleuronectes americanus	Winter flounder					
	Egg		98	70		
	Yolk-Sac	3	7			
	Post Yolk-sac			28		
Sciaenidae						
Cynoscion regalis	Weakfish					
	Egg				2253	1364
	Post Yolk-Sac					9
Soleidae						
Trinectes maculatus	Hogchoker					
	Egg				990	68
Syngnathidae						
Syngnathus fuscus	Northern pipefish					
	Post Yolk-Sac					13
	Juvenile					

TABLE E1-14 (Cont'd)

EPIBENTHIC SLED ICTHYOPLANKTON DENSITY (NO./1000 CUBIC METERS) AT SB-4
FEBRUARY 1999 - JUNE 1999

STATION		SB - 4 (Bay Ridge Channel)				
MONTH SAMPLED		FEB	MAR	APR	MAY	JUN
FAMILY / SCIENTIFIC NAME	COMMON NAME / LIFE STAGE					
Tetraodontidae						
Sphoeroides maculatus	Northern puffer					
	Post Yolk-Sac					4
Triglidae						
Prionotussp.	Searobins					
	Post Yolk-Sac					4

NOTE: MONTHS SHADED WERE NOT SAMPLED.

TABLE E1-15

EPIBENTHIC SLED ICTHYOPLANKTON DENSITY (NO./1000 CUBIC METERS) AT PJ-1
FEBRUARY 1999 - JUNE 1999

STATION		PJ - 1 (Jersey Flats)				
MONTH SAMPLED		FEB	MAR	APR	MAY	JUN
FAMILY / SCIENTIFIC NAME	COMMON NAME / LIFE STAGE					
Ammodytidae						
Ammodytes americanus	American sand lance					
	Post Yolk-Sac	5				
Bothidae						
Paralichthys oblongus	Fourspot flounder					
	Egg				80	102
Scophthalmus aquosus	Windowpane					
	Post Yolk-Sac				45	
Clupeidae						
Brevoortia tyrannus	Atlantic menhaden					
	Egg		5	246	1117	
	Yolk-Sac				130	
	Post Yolk-Sac				942	414
Cottidae						
Myoxocephalus sp.	Sculpins					
	Egg		379			
	Yolk-Sac	5	10	43		
	Post Yolk-Sac		31	59		
Engraulidae						
Anchoa mitchilli	Bay anchovy					
	Egg				319	247
Gadidae						
Enchelyopus cimbrius	Fourbeard rockling					
	Egg	5	128	16		
Labridae						
Tautoga onitis	Tautog					
	Egg				1336	1083
Pleuronectidae						
Pleuronectes americanus	Winter flounder					
	Egg		51			
	Post Yolk-sac			777		
Sciaenidae						
Cynoscion regalis	Weakfish					
	Egg				1217	1535
Soleidae						
Trinectes maculatus	Hogchoker					
	Egg					136
Syngnathidae						
Syngnathus fuscus	Northern pipefish					
	Post Yolk-Sac					9

NOTE: MONTHS SHADED WERE NOT SAMPLED.

TABLE E1-16

EPIBENTHIC SLED ICTHYOPLANKTON DENSITY (NO./1000 CUBIC METERS) AT PJ-2
FEBRUARY 1999 - JUNE 1999

STATION		PJ - 2 (Pierhead Channel)				
MONTH SAMPLED		FEB	MAR	APR	MAY	JUN
FAMILY / SCIENTIFIC NAME	COMMON NAME / LIFE STAGE					
Bothidae						
Paralichthys oblongus	Fourspot flounder				526	66
	Egg					
Scophthalmus aquosus	Windowpane				5	
	Post Yolk-Sac					
Clupeidae						
Brevoortia tyrannus	Atlantic menhaden		10	2732	175	
	Egg				5	
	Yolk-Sac				77	204
	Post Yolk-Sac					
Cottidae						
Myoxocephalus sp.	Sculpins		10	16		
	Yolk-Sac		44	22		
	Post Yolk-Sac					
Engraulidae						
Anchoa mitchilli	Bay anchovy				2457	665
	Egg					7
	Post Yolk-Sac					
Gadidae						
Enchelyopus cimbrius	Fourbeard rockling		39	381		
	Egg					
Labridae						
Tautoga onitis	Tautog				8687	382
	Egg					
Pleuronectidae						
Pleuronectes americanus	Winter flounder		39	93		
	Egg			16		
	Yolk-Sac		5	109		
	Post Yolk-sac					
Sciaenidae						
Cynoscion regalis	Weakfish				12021	593
	Egg					3
	Post Yolk-Sac					
Soleidae						
Trinectes maculatus	Hogchoker				175	40
	Egg					
Syngnathidae						
Syngnathus fuscus	Northern pipefish					7
	Post Yolk-Sac					7
	Juvenile					
Tetraodontidae						
Sphoeroides maculatus	Northern puffer					3
	Post Yolk-Sac					3
Unidentified	Post Yolk-Sac					

NOTE: MONTHS SHADED WERE NOT SAMPLED.

TABLE E1-17

EPIBENTHIC SLED ICTHYOPLANKTON DENSITY (NO./1000 CUBIC METERS) AT PJ-3
FEBRUARY 1999 - JUNE 1999

STATION		PJ - 3 (Constable Hook)				
MONTH SAMPLED		FEB	MAR	APR	MAY	JUN
FAMILY / SCIENTIFIC NAME	COMMON NAME / LIFE STAGE					
Bothidae						
Paralichthys oblongus	Fourspot flounder					
	Egg				38	185
Scophthalmus aquosus	Windowpane					
	Post Yolk-Sac				14	
Clupeidae						
Brevoortia tyrannus	Atlantic menhaden					
	Egg			204	86	
	Yolk-Sac				38	
	Post Yolk-Sac				250	327
Cottidae						
Myoxocephalus sp.	Sculpins					
	Yolk-Sac	9	46	5		
	Post Yolk-Sac		168	9		
Engraulidae						
Anchoa mitchilli	Bay anchovy					
	Egg				1100	739
	Post Yolk-Sac					4
Gadidae						
Enchelyopus cimbrius	Fourbeard rockling					
	Egg			5		
Labridae						
Tautoga onitis	Tautog					
	Egg				370	470
Pleuronectidae						
Pleuronectes americanus	Winter flounder					
	Egg		12	1090		
	Yolk-Sac			5		
	Post Yolk-sac			9		
Sciaenidae						
Cynoscion regalis	Weakfish					
	Egg				231	2568
	Post Yolk-Sac					8
Soleidae						
Trinectes maculatus	Hogchoker					
	Egg				10	235
Syngnathidae						
Syngnathus fuscus	Northern pipefish					
	Post Yolk-Sac					38
	Juvenile					8

NOTE: MONTHS SHADED WERE NOT SAMPLED.

TABLE E1-18

EPIBENTHIC SLED ICTHYOPLANKTON DENSITY (NO./1000 CUBIC METERS) AT PJ-4
FEBRUARY 1999 - JUNE 1999

STATION		PJ - 4 (Port Jersey Channel)				
MONTH SAMPLED		FEB	MAR	APR	MAY	JUN
FAMILY / SCIENTIFIC NAME	COMMON NAME / LIFE STAGE					
Ammodytidae						
Ammodytes americanus	American sand lance					
	Post Yolk-Sac		6			
Bothidae						
Paralichthys oblongus	Fourspot flounder					
	Egg				236	95
Scophthalmus aquosus	Windowpane					
	Post Yolk-Sac				4	
Clupeidae						
Brevoortia tyrannus	Atlantic menhaden					
	Egg		11	1879	34	
	Post Yolk-Sac					167
Clupea harengus	Atlantic herring					
	Post Yolk-Sac	4				
Cottidae						
Myoxocephalus sp.	Sculpins					
	Yolk-Sac		17	4		
	Post Yolk-Sac		122	27		
Engraulidae						
Anchoa mitchilli	Bay anchovy					
	Egg				590	1249
	Post Yolk-Sac					29
Gadidae						
Enchelyopus cimbrius	Fourbeard rockling					
	Egg		28	214		
Labridae						
Tautoga onitis	Tautog					
	Egg				2126	153
Pleuronectidae						
Pleuronectes americanus	Winter flounder					
	Egg		6	53		
	Post Yolk-sac			130	8	
Sciaenidae						
Cynoscion regalis	Weakfish					
	Egg				2024	2174
	Post Yolk-Sac					38
Soleidae						
Trinectes maculatus	Hogchoker					
	Egg				67	219
Syngnathidae						
Syngnathus fuscus	Northern pipefish					
	Juvenile					14

NOTE: MONTHS SHADED WERE NOT SAMPLED.

TABLE E1-19

EPIBENTHIC SLED ICTHYOPLANKTON DENSITY (NO./1000 CUBIC METERS) AT PJ-5
FEBRUARY 1999 - JUNE 1999

STATION		PJ - 5 (Global Marine Terminal)				
MONTH SAMPLED		FEB	MAR	APR	MAY	JUN
FAMILY / SCIENTIFIC NAME	COMMON NAME / LIFE STAGE					
Bothidae						
Paralichthys oblongus	Fourspot flounder					
	Egg				416	222
Clupeidae						
Brevoortia tyrannus	Atlantic menhaden					
	Egg		6	189	59	
	Post Yolk-Sac				5	58
Clupea harengus	Atlantic herring					
	Post Yolk-Sac		6			
Cottidae						
Myoxocephalus sp.	Sculpins					
	Yolk-Sac		18	10		
	Post Yolk-Sac		35	51		
	Unidentified		6			
Engraulidae						
Anchoa mitchilli	Bay anchovy					
	Egg				910	525
	Post Yolk-Sac					29
Gadidae						
Enchelyopus cimbrius	Fourbeard rockling					
	Egg		171	10		
Gobiidae	Post Yolk-Sac					35
Labridae						
Tautoga onitis	Tautog					
	Egg				1425	712
	Post Yolk-Sac					6
Pleuronectidae						
Pleuronectes americanus	Winter flounder					
	Egg		59	558		
	Yolk-Sac		6			
Sciaenidae						
Cynoscion regalis	Weakfish					
	Egg				1425	1061
	Post Yolk-Sac					41
Soleidae						
Trinectes maculatus	Hogchoker					
	Egg					257
Tetraodontidae						
Sphoeroides maculatus	Northern puffer					
	Post Yolk-Sac					6

NOTE: MONTHS SHADED WERE NOT SAMPLED.

TABLE E1-20

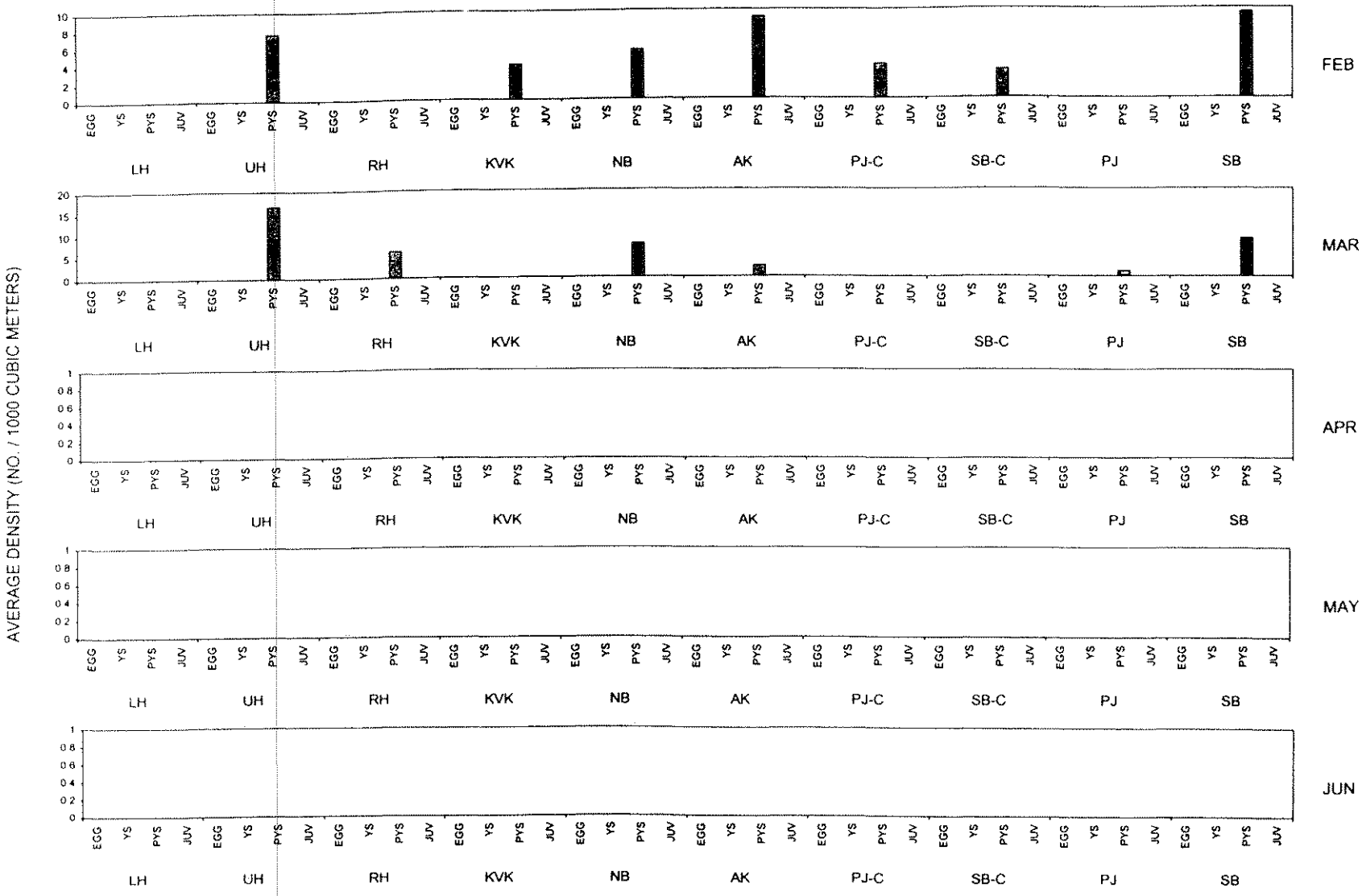
EPIBENTHIC SLED ICTHYOPLANKTON DENSITY (NO./1000 CUBIC METERS) AT PJ-6
FEBRUARY 1999 - JUNE 1999

STATION		PJ - 6 (Claremont Terminal Channel)				
MONTH SAMPLED		FEB	MAR	APR	MAY	JUN
FAMILY / SCIENTIFIC NAME	COMMON NAME / LIFE STAGE					
Ammodytidae						
Ammodytes americanus	American sand lance					
	Post Yolk-Sac	9				
Bothidae						
Paralichthys oblongus	Fourspot flounder					
	Egg				222	110
Scophthalmus aquosus	Windowpane					
	Post Yolk-Sac				12	
	Juvenile				6	
Clupeidae						
Brevoortia tyrannus	Atlantic menhaden					
	Egg		9	2582	99	
	Post Yolk-Sac					104
Cottidae						
Myoxocephalus sp.	Sculpins					
	Yolk-Sac	17	18	13		
	Post Yolk-Sac		4	32		
Engraulidae						
Anchoa mitchilli	Bay anchovy					
	Egg				470	1997
	Post Yolk-Sac					22
Gadidae						
Enchelyopus cimbrius	Fourbeard rockling					
	Egg		26	253		
Labridae						
Tautoga onitis	Tautog					
	Egg				989	878
Pleuronectidae						
Pleuronectes americanus	Winter flounder					
	Egg		18	58		
	Post Yolk-sac			130	6	
Sciaenidae						
Cynoscion regalis	Weakfish					
	Egg				3188	2480
	Post Yolk-Sac					
Soleidae						
Trinectes maculatus	Hogchoker					
	Egg				49	263
Syngnathidae						
Syngnathus fuscus	Northern pipefish					
	Post Yolk-Sac					11
	Juvenile					5
Unidentified	Egg					22

NOTE: MONTHS SHADED WERE NOT SAMPLED.

APPENDIX E2

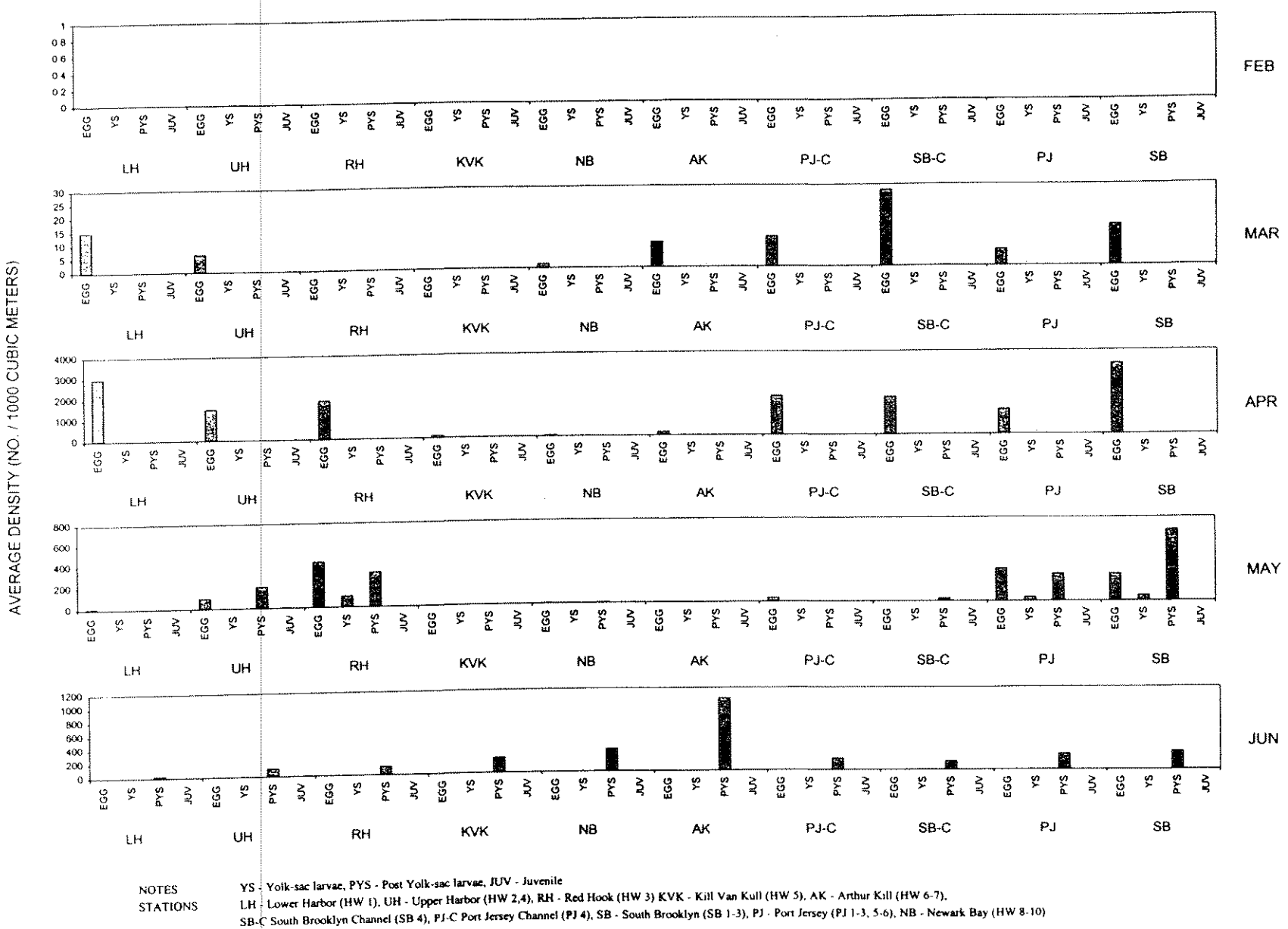
AVERAGE SPECIES ICHTHYOPLANKTON DENSITY



NOTES YS - Yolk-sac larvae, PYS - Post Yolk-sac larvae, JUV - Juvenile

STATIONS LH - Lower Harbor (HW 1), UH - Upper Harbor (HW 2,4), RH - Red Hook (HW 3) KVK - Kill Van Kull (HW 5), AK - Arthur Kill (HW 6-7), SB-C South Brooklyn Channel (SB 4), PJ-C Port Jersey Channel (PJ 4), SB - South Brooklyn (SB 1-3), PJ - Port Jersey (PJ 1-3, 5-6), NB - Newark Bay (HW 8-10)

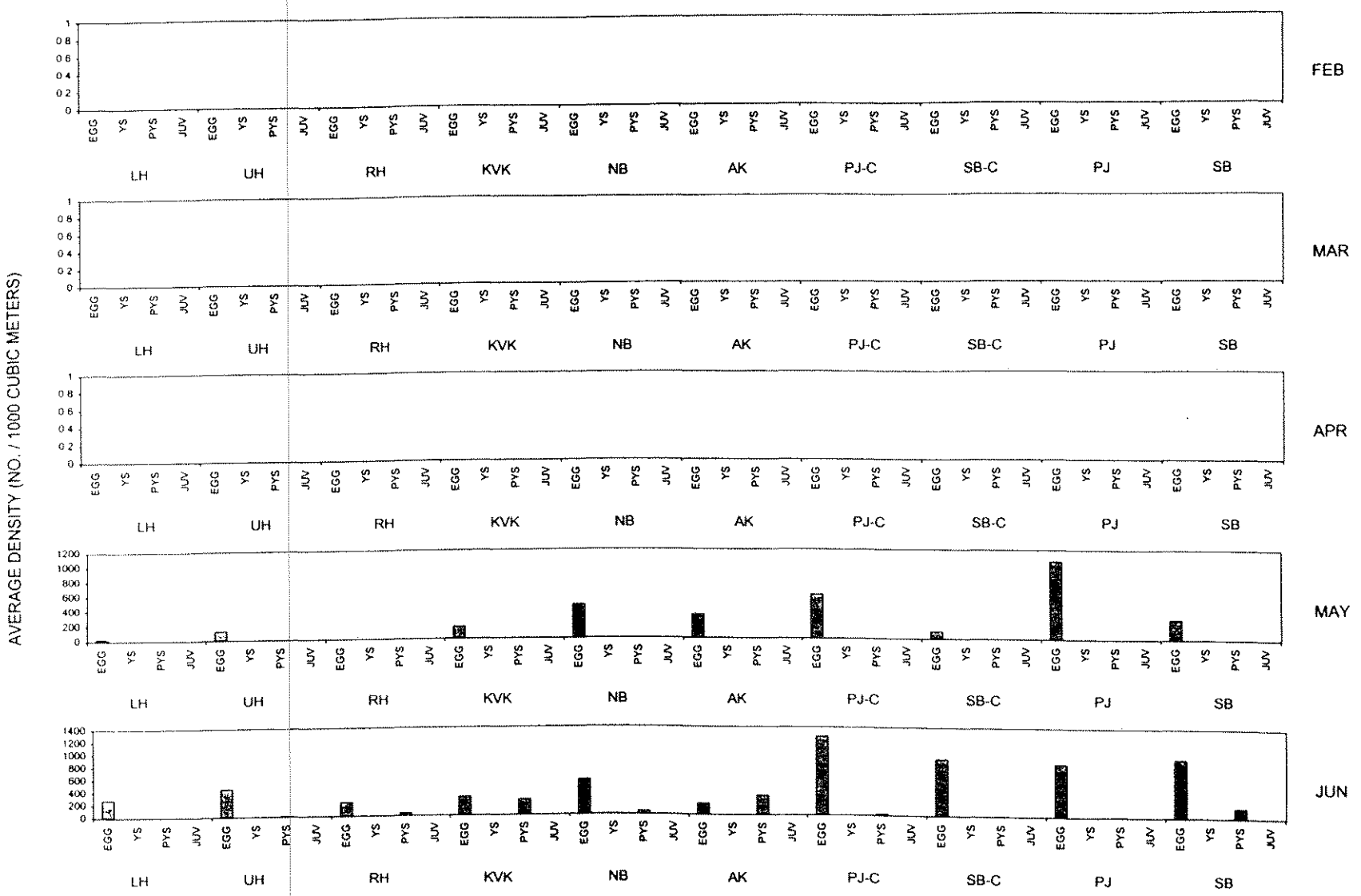
Figure E-1. Average icthyoplankton density (no. / 1000 cubic meters) of Atlantic herring, February - June 1999



NOTES
STATIONS

YS - Yolk-sac larvae, PYS - Post Yolk-sac larvae, JUV - Juvenile
LH - Lower Harbor (HW 1), UH - Upper Harbor (HW 2,4), RH - Red Hook (HW 3) KVK - Kill Van Kull (HW 5), AK - Arthur Kill (HW 6-7),
SB-C South Brooklyn Channel (SB 4), PJ-C Port Jersey Channel (PJ 4), SB - South Brooklyn (SB 1-3), PJ - Port Jersey (PJ 1-3, 5-6), NB - Newark Bay (HW 8-10)

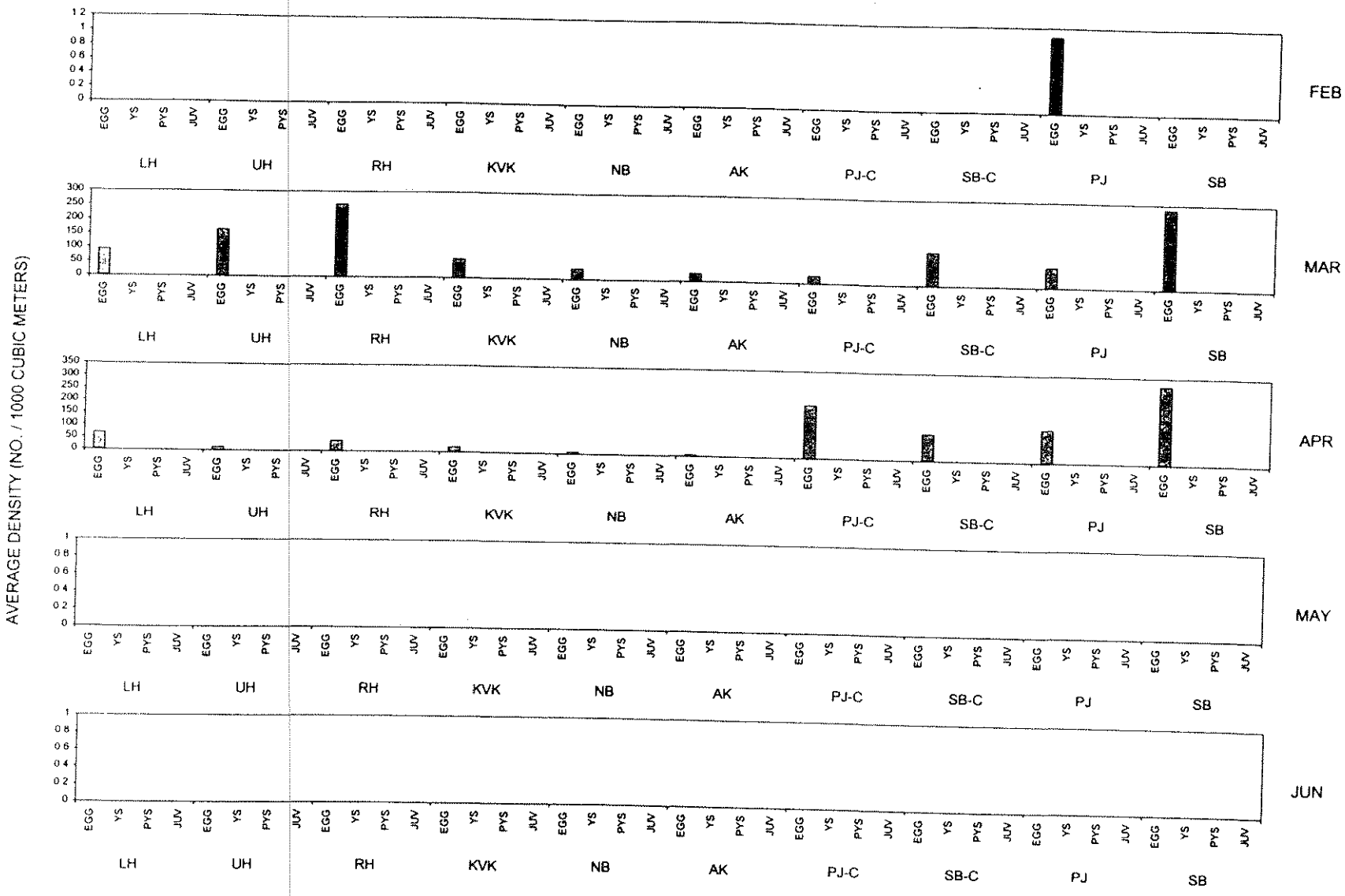
Figure E-2. Average icthyoplankton density (no. / 1000 cubic meters) of Atlantic menhaden, February - June 1999



NOTES YS - Yolk-sac larvae, PYS - Post Yolk-sac larvae, JUV - Juvenile

STATIONS LH - Lower Harbor (HW 1), UH - Upper Harbor (HW 2,4), RH - Red Hook (HW 3) KVK - Kill Van Kull (HW 5), AK - Arthur Kill (HW 6-7), SB-C South Brooklyn Channel (SB 4), PJ-C Port Jersey Channel (PJ 4), SB - South Brooklyn (SB 1-3), PJ - Port Jersey (PJ 1-3, 5-6), NB - Newark Bay (HW 8-10)

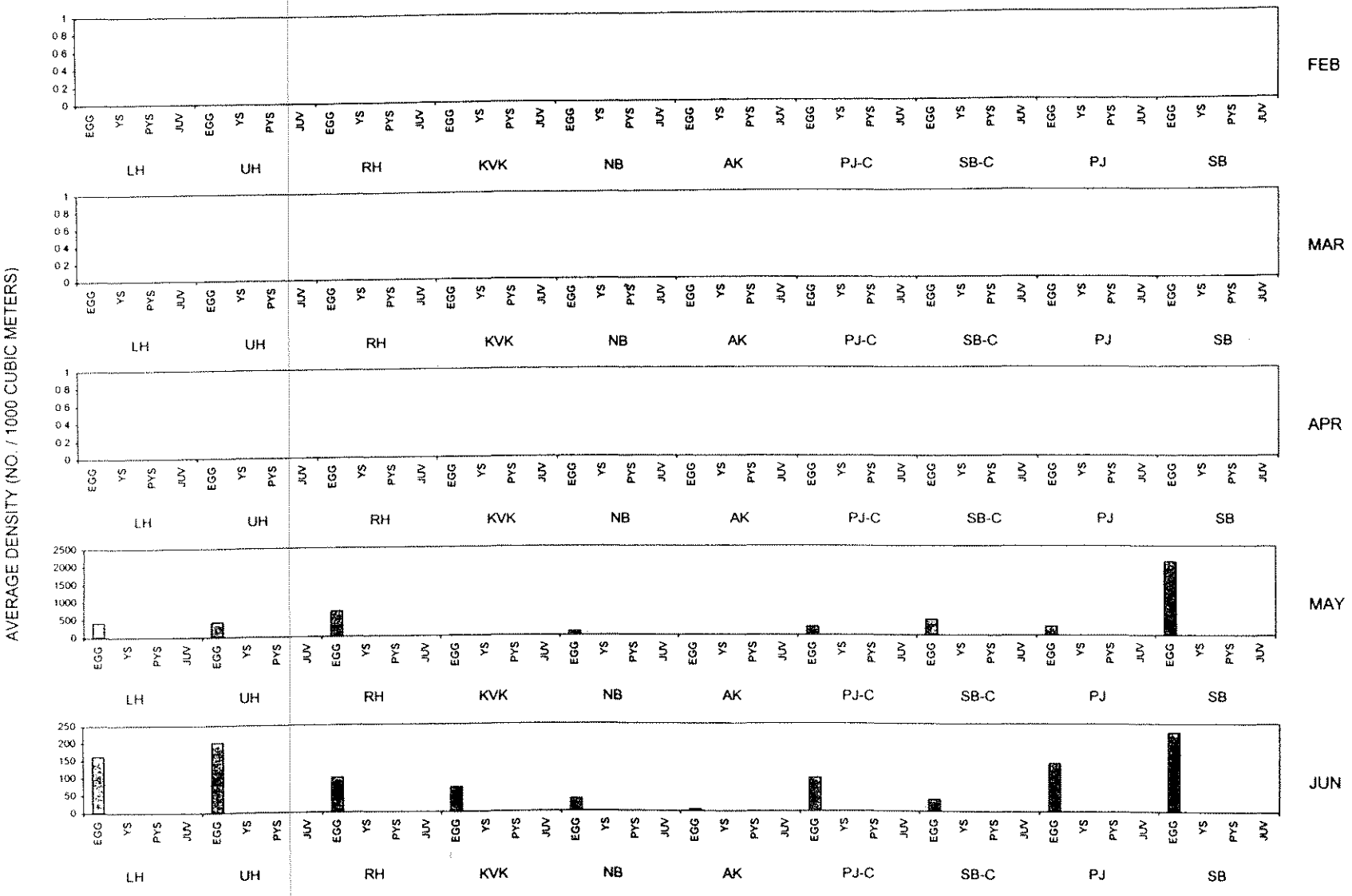
Figure E-3. Average icthyoplankton density (no. / 1000 cubic meters) of bay anchovy, February - June 1999



NOTES YS - Yolk-sac larvae, PYS - Post Yolk-sac larvae, JUV - Juvenile

STATIONS LH - Lower Harbor (HW 1), UH - Upper Harbor (HW 2,4), RH - Red Hook (HW 3) KVK - Kill Van Kull (HW 5), AK - Arthur Kill (HW 6-7), SB-C South Brooklyn Channel (SB 4), PJ-C Port Jersey Channel (PJ 4), SB - South Brooklyn (SB 1-3), PJ - Port Jersey (PJ 1-3, 5-6), NB - Newark Bay (HW 8-10)

Figure E-5. Average icthyoplankton density (no. / 1000 cubic meters) of fourbeard rockling, February - June 1999



NOTES YS - Yolk-sac larvae, PYS - Post Yolk-sac larvae, JUV - Juvenile

STATIONS LH - Lower Harbor (HW 1), UH - Upper Harbor (HW 2,4), RH - Red Hook (HW 3) KVK - Kill Van Kull (HW 5), AK - Arthur Kill (HW 6-7), SB-C South Brooklyn Channel (SB 4), PJ-C Port Jersey Channel (PJ 4), SB - South Brooklyn (SB 1-3), PJ - Port Jersey (PJ 1-3, 5-6), NB - Newark Bay (HW 8-10)

Figure E-4. Average icthyoplankton density (no. / 1000 cubic meters) of fourspot flounder, February - June 1999

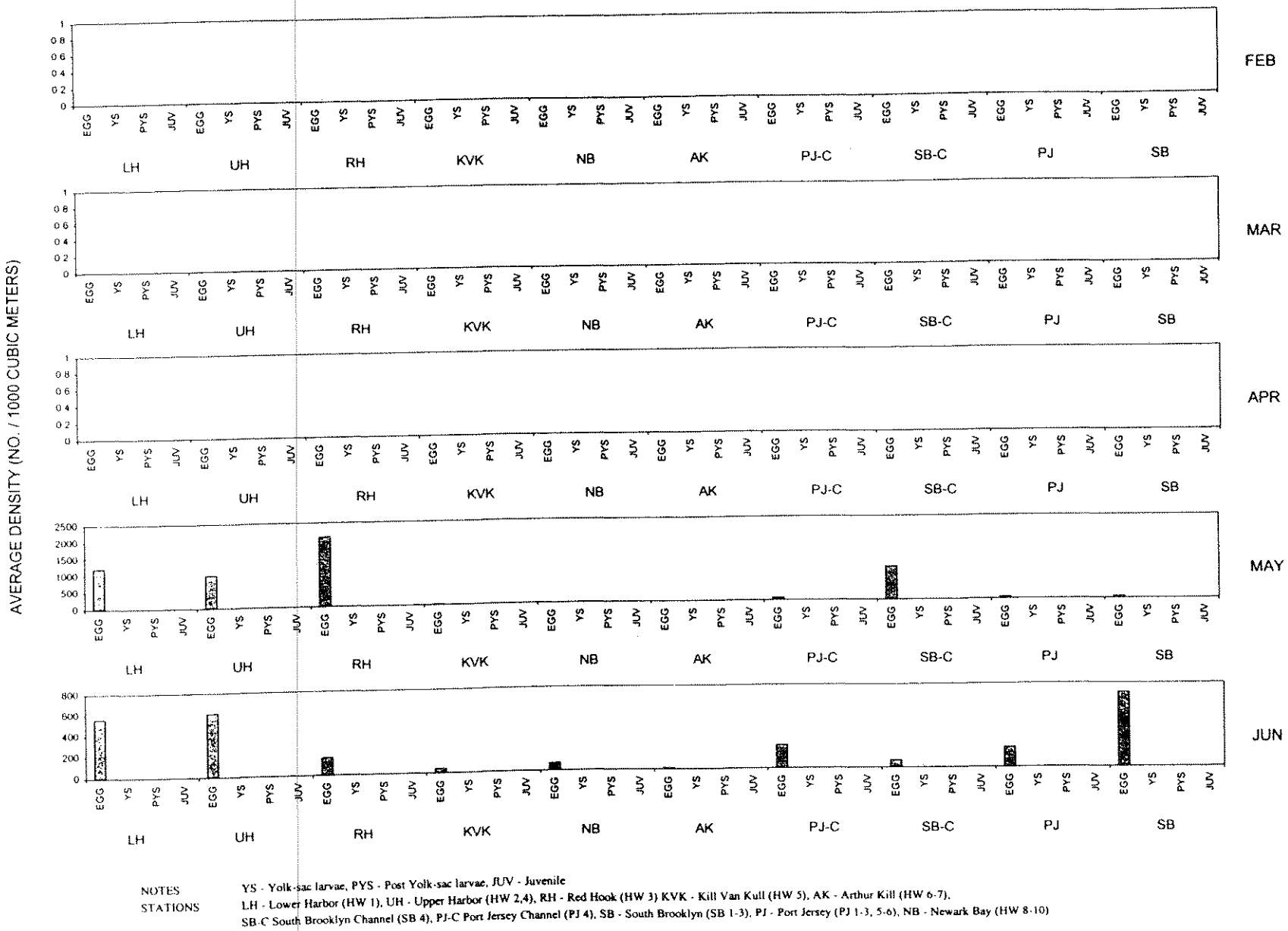
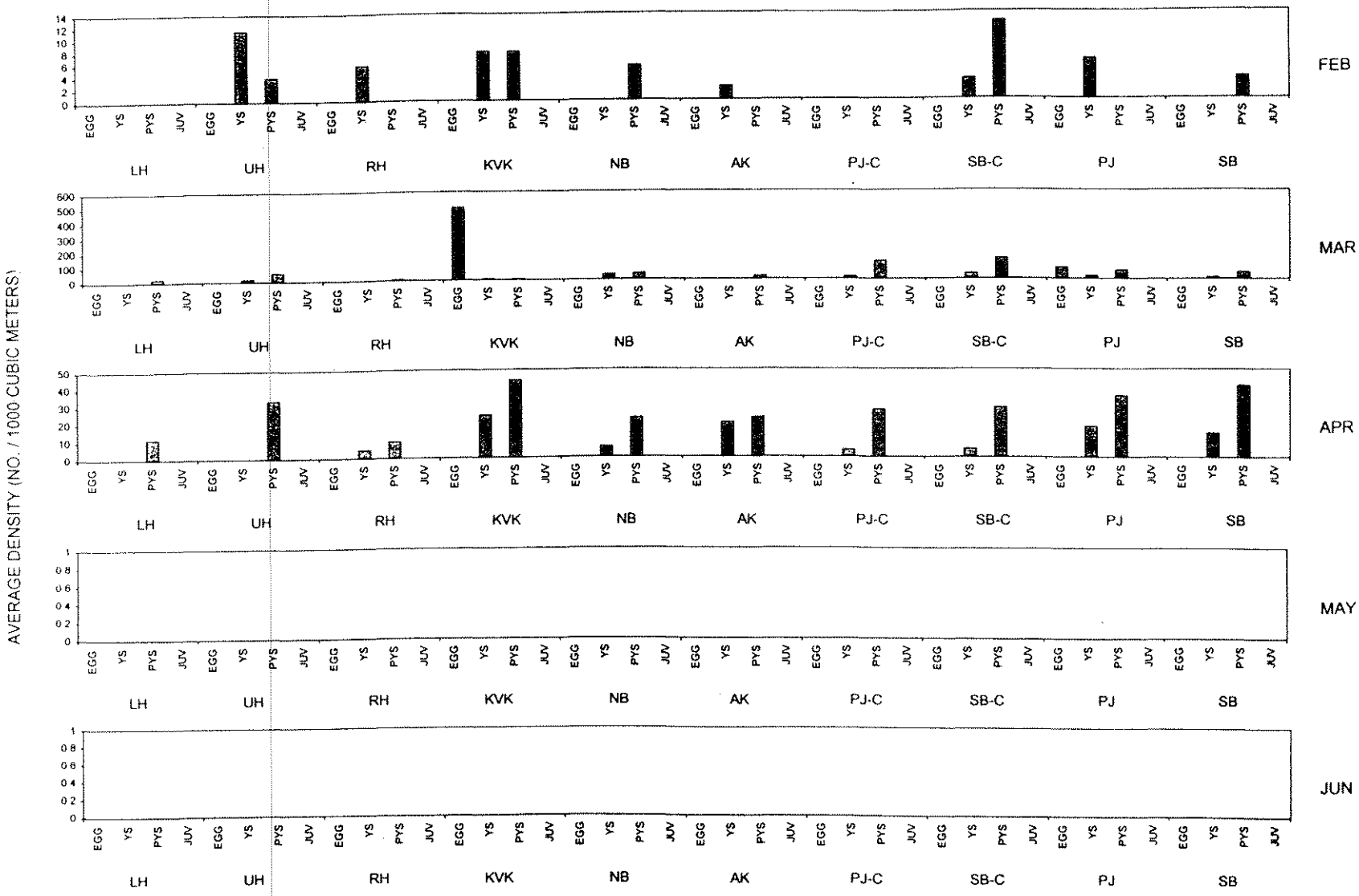


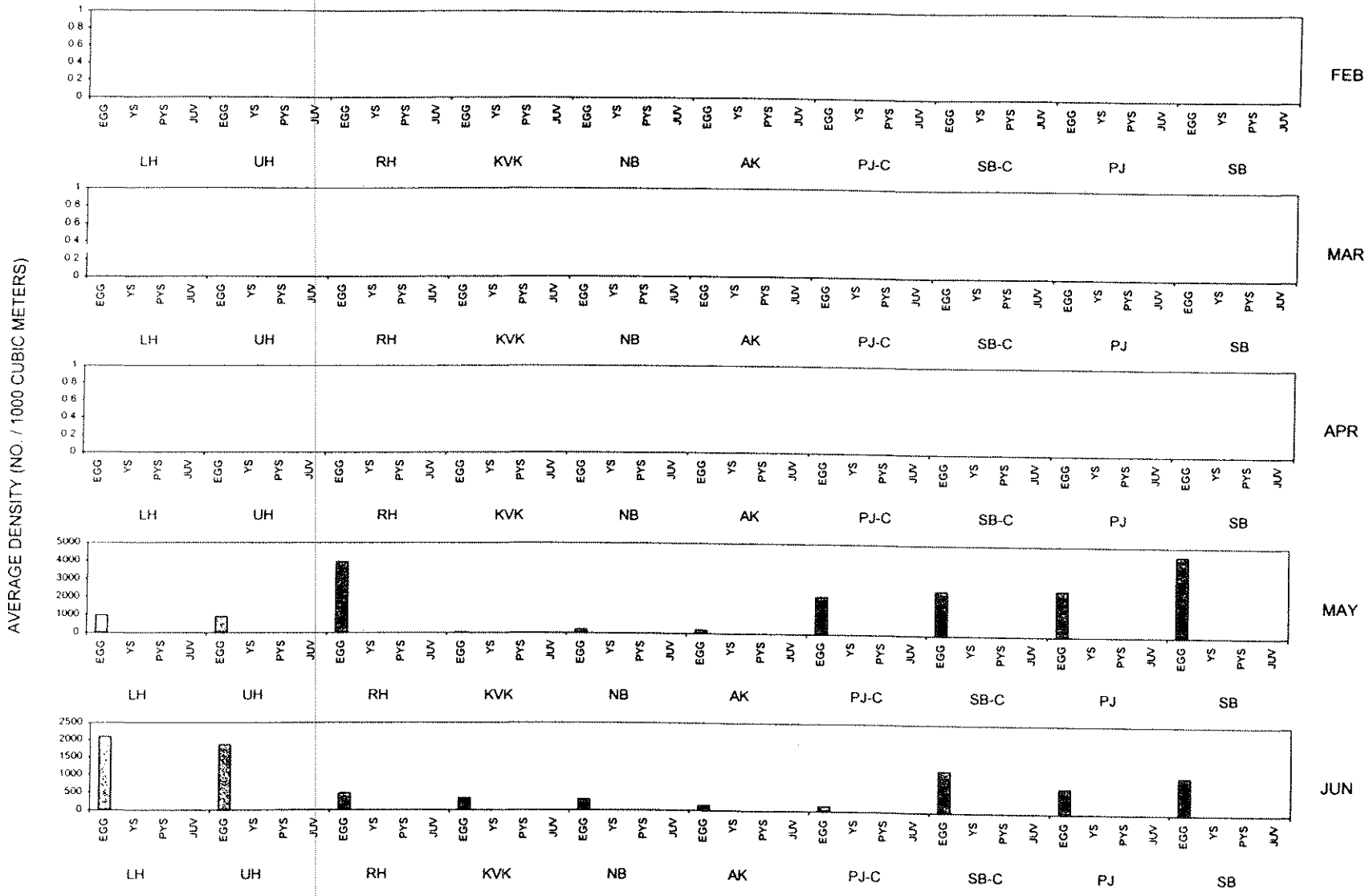
Figure E-6. Average icthyoplankton density (no. / 1000 cubic meters) of hogchoker, February - June 1999



NOTES YS - Yolk-sac larvae, PYS - Post Yolk-sac larvae, JUV - Juvenile

STATIONS LH - Lower Harbor (HW 1), UH - Upper Harbor (HW 2,4), RH - Red Hook (HW 3) KVK - Kill Van Kull (HW 5), AK - Arthur Kill (HW 6-7), SB-C South Brooklyn Channel (SB 4), PJ-C Port Jersey Channel (PJ 4), SB - South Brooklyn (SB 1-3), PJ - Port Jersey (PJ 1-3, 5-6), NB - Newark Bay (HW 8-10)

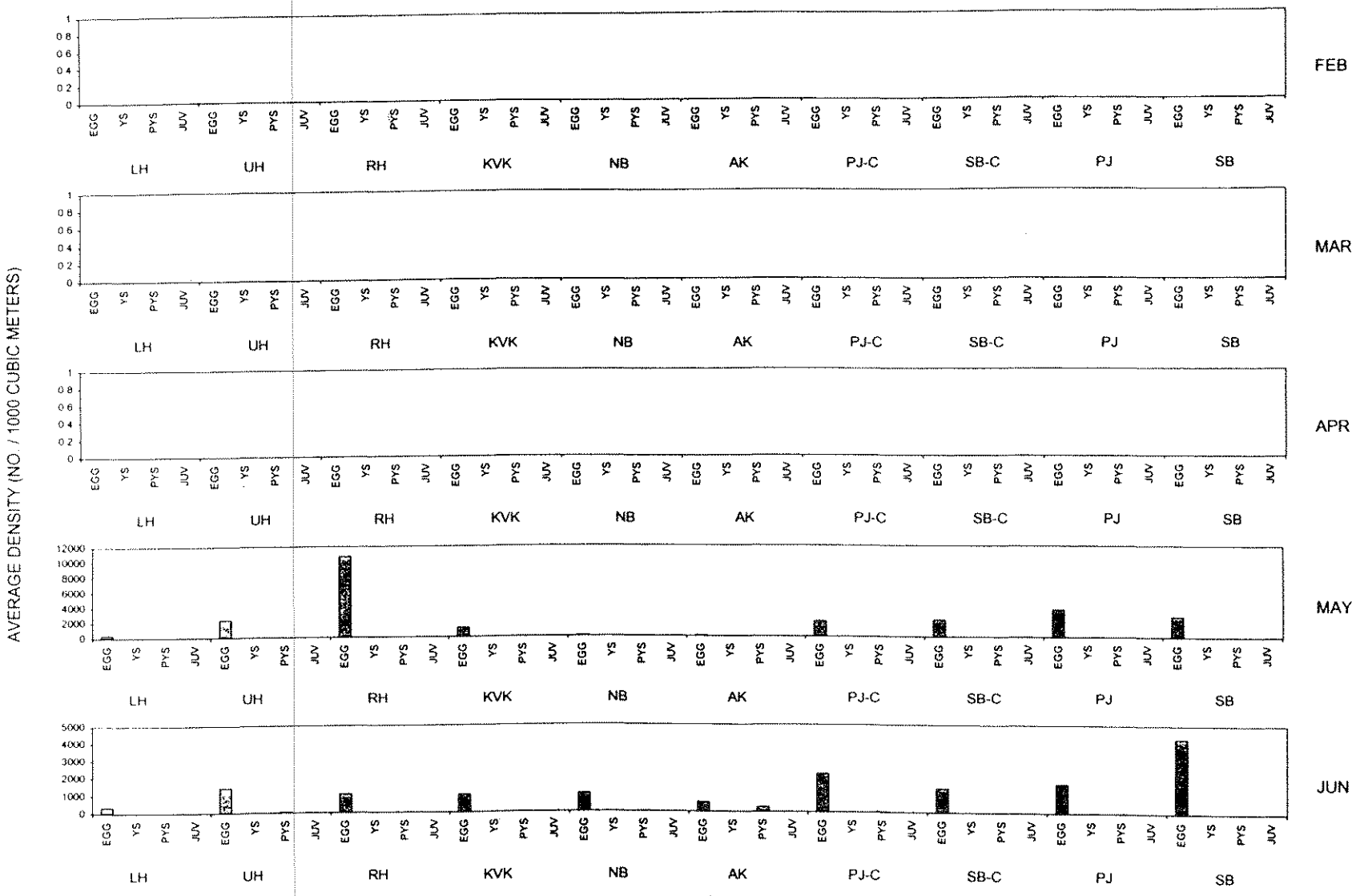
Figure E-7. Average icthyoplankton density (no. / 1000 cubic meters) of sculpins, February - June 1999



NOTES YS - Yolk-sac larvae, PYS - Post Yolk-sac larvae, JUV - Juvenile

STATIONS LH - Lower Harbor (HW 1), UH - Upper Harbor (HW 2,4), RH - Red Hook (HW 3) KVK - Kill Van Kull (HW 5), AK - Arthur Kill (HW 6-7), SB-C South Brooklyn Channel (SB 4), PJ-C Port Jersey Channel (PJ 4), SB - South Brooklyn (SB 1-3), PJ - Port Jersey (PJ 1-3, 5-6), NB - Newark Bay (HW 8-10)

Figure E-8. Average icthyoplankton density (no. / 1000 cubic meters) of tautog, February - June 1999



NOTES YS - Yolk-sac larvae, PYS - Post Yolk-sac larvae, JUV - Juvenile

STATIONS LH - Lower Harbor (HW 1), UH - Upper Harbor (HW 2,4), RH - Red Hook (HW 3) KVK - Kill Van Kull (HW 5), AK - Arthur Kill (HW 6-7), SB-C South Brooklyn Channel (SB 4), PJ-C Port Jersey Channel (PJ 4), SB - South Brooklyn (SB 1-3), PJ - Port Jersey (PJ 1-3, 5-6), NB - Newark Bay (HW 8-10)

Figure E-9. Average icthyoplankton density (no. / 1000 cubic meters) of weakfish, February - June 1999

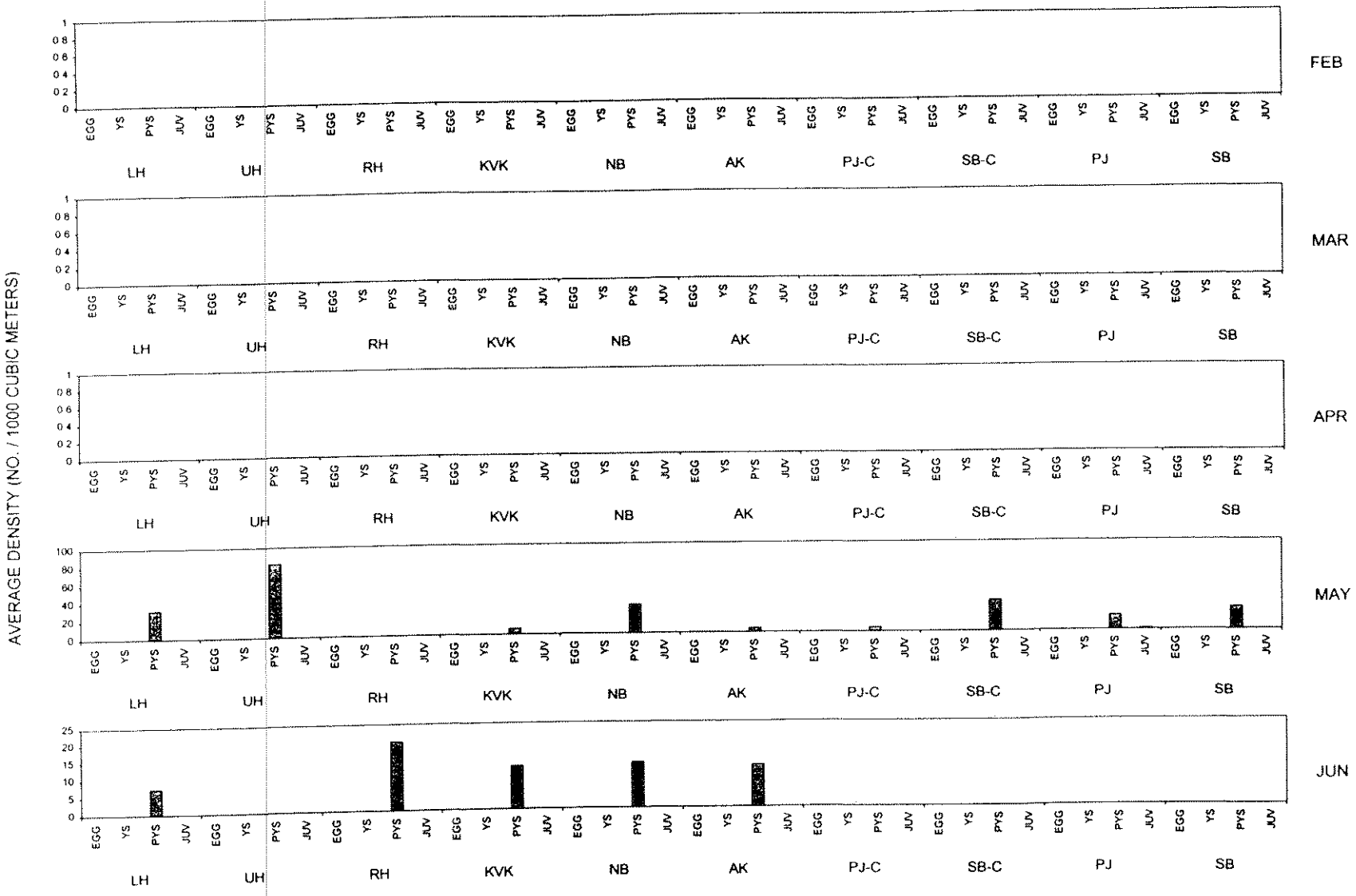
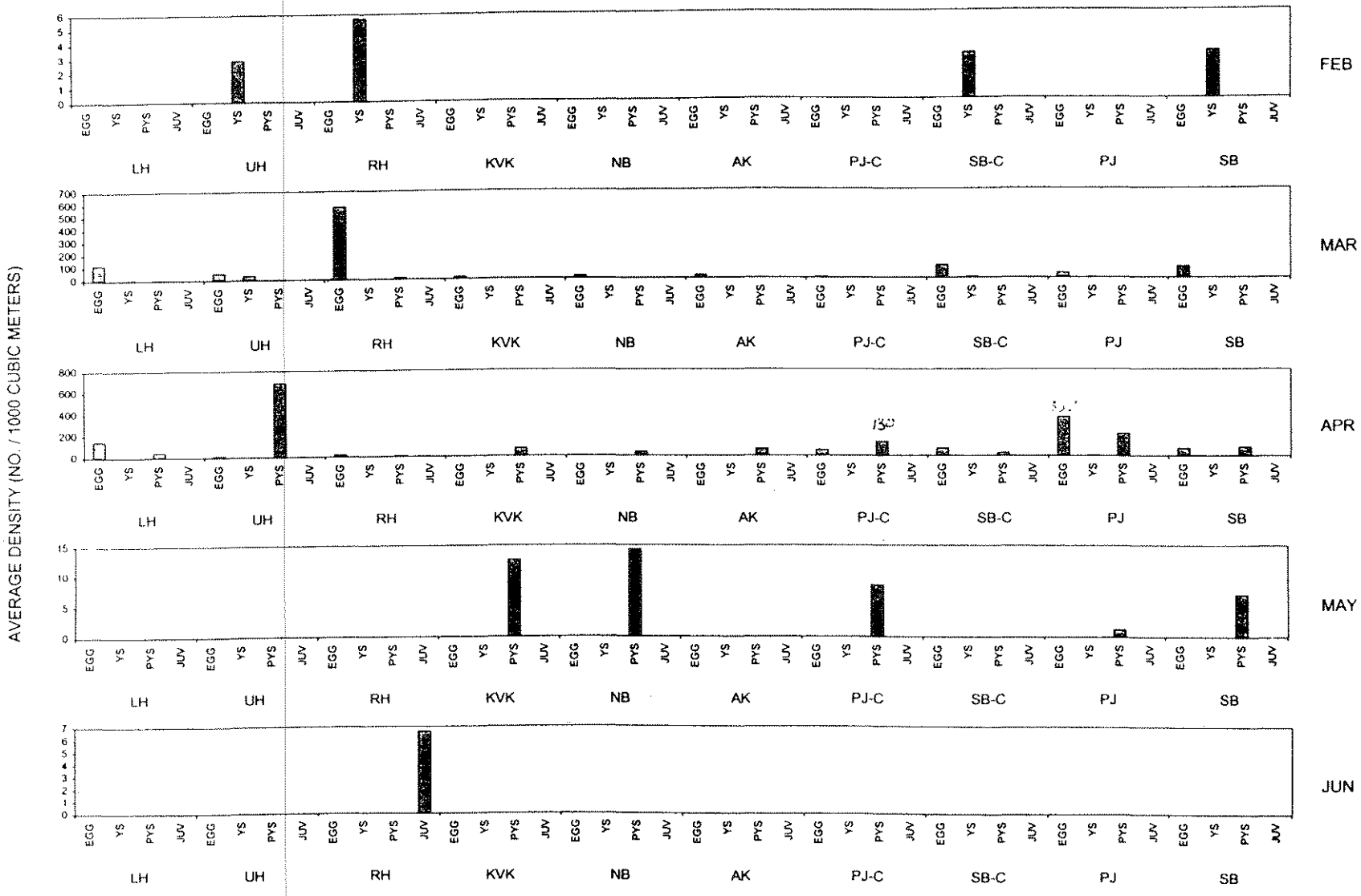


Figure E-10. Average icthyoplankton density (no. / 1000 cubic meters) of windowpane, February - June 1999



NOTES YS - Yolk-sac larvae, PYS - Post Yolk-sac larvae, JUV - Juvenile

STATIONS LH - Lower Harbor (HW 1), UH - Upper Harbor (HW 2,4), RH - Red Hook (HW 3) KVK - Kill Van Kull (HW 5), AK - Arthur Kill (HW 6-7), SB-C South Brooklyn Channel (SB 4), PJ-C Port Jersey Channel (PJ 4), SB - South Brooklyn (SB 1-3), PJ - Port Jersey (PJ 1-3, 5-6), NB - Newark Bay (HW 8-10)

Figure E-11. Average icthyoplankton density (no. / 1000 cubic meters) of winter flounder, February - June 1999

AVERAGE ICTHYOPLANKTON DENSITY (NO./1000 CUBIC METERS) OF ATLANTIC HERRING
FEBRUARY 1999 - JUNE 1999

MONTH	AREA	LIFESTAGE	AVG DENSITY
FEB	Lower Harbor	Egg	0.00
FEB	Lower Harbor	Yolk-sac	0.00
FEB	Lower Harbor	Post yolk-sac	0.00
FEB	Lower Harbor	Juvenile	0.00
FEB	Upper Harbor	Egg	0.00
FEB	Upper Harbor	Yolk-sac	0.00
FEB	Upper Harbor	Post yolk-sac	7.64
FEB	Upper Harbor	Juvenile	0.00
FEB	Red Hook	Egg	0.00
FEB	Red Hook	Yolk-sac	0.00
FEB	Red Hook	Post yolk-sac	0.00
FEB	Red Hook	Juvenile	0.00
FEB	Kill Van Kull	Egg	0.00
FEB	Kill Van Kull	Yolk-sac	3.94
FEB	Kill Van Kull	Post yolk-sac	0.00
FEB	Kill Van Kull	Juvenile	0.00
FEB	Newark Bay	Egg	0.00
FEB	Newark Bay	Yolk-sac	5.53
FEB	Newark Bay	Post yolk-sac	0.00
FEB	Newark Bay	Juvenile	0.00
FEB	Arthur Kill	Egg	0.00
FEB	Arthur Kill	Yolk-sac	9.18
FEB	Arthur Kill	Post yolk-sac	0.00
FEB	Arthur Kill	Juvenile	0.00
FEB	Port Jersey Channel	Egg	0.00
FEB	Port Jersey Channel	Yolk-sac	3.84
FEB	Port Jersey Channel	Post yolk-sac	0.00
FEB	Port Jersey Channel	Juvenile	0.00
FEB	South Brooklyn Channel	Egg	0.00
FEB	South Brooklyn Channel	Yolk-sac	3.12
FEB	South Brooklyn Channel	Post yolk-sac	0.00
FEB	South Brooklyn Channel	Juvenile	0.00
FEB	Port Jersey	Egg	0.00
FEB	Port Jersey	Yolk-sac	0.00
FEB	Port Jersey	Post yolk-sac	0.00
FEB	Port Jersey	Juvenile	0.00
FEB	South Brooklyn	Egg	0.00
FEB	South Brooklyn	Yolk-sac	9.48
FEB	South Brooklyn	Post yolk-sac	0.00
FEB	South Brooklyn	Juvenile	0.00
MAR	Lower Harbor	Egg	0.00
MAR	Lower Harbor	Yolk-sac	0.00
MAR	Lower Harbor	Post yolk-sac	0.00
MAR	Lower Harbor	Juvenile	0.00
MAR	Upper Harbor	Egg	0.00
MAR	Upper Harbor	Yolk-sac	16.63
MAR	Upper Harbor	Post yolk-sac	0.00
MAR	Upper Harbor	Juvenile	0.00
MAR	Red Hook	Egg	0.00
MAR	Red Hook	Yolk-sac	6.09
MAR	Red Hook	Post yolk-sac	0.00
MAR	Red Hook	Juvenile	0.00
MAR	Kill Van Kull	Egg	0.00
MAR	Kill Van Kull	Yolk-sac	0.00
MAR	Kill Van Kull	Post yolk-sac	0.00
MAR	Kill Van Kull	Juvenile	0.00
MAR	Newark Bay	Egg	0.00
MAR	Newark Bay	Yolk-sac	7.67
MAR	Newark Bay	Post yolk-sac	0.00
MAR	Newark Bay	Juvenile	0.00
MAR	Arthur Kill	Egg	0.00
MAR	Arthur Kill	Yolk-sac	2.40
MAR	Arthur Kill	Post yolk-sac	0.00
MAR	Arthur Kill	Juvenile	0.00
MAR	Port Jersey Channel	Egg	0.00
MAR	Port Jersey Channel	Yolk-sac	0.00
MAR	Port Jersey Channel	Post yolk-sac	0.00
MAR	Port Jersey Channel	Juvenile	0.00
MAR	South Brooklyn Channel	Egg	

TABLE E2-1 (Cont'd)

AVERAGE ICTHYOPLANKTON DENSITY (NO./1000 CUBIC METERS) OF ATLANTIC HERRING
FEBRUARY 1999 - JUNE 1999

MONTH	AREA	LIFESTAGE	AVG DENSITY
MAR	South Brooklyn Channel	Yolk-sac	0.00
MAR	South Brooklyn Channel	Post yolk-sac	0.00
MAR	South Brooklyn Channel	Juvenile	0.00
MAR	Port Jersey	Egg	0.00
MAR	Port Jersey	Yolk-sac	0.00
MAR	Port Jersey	Post yolk-sac	1.18
MAR	Port Jersey	Juvenile	0.00
MAR	South Brooklyn	Egg	0.00
MAR	South Brooklyn	Yolk-sac	0.00
MAR	South Brooklyn	Post yolk-sac	8.66
MAR	South Brooklyn	Juvenile	0.00
APR	Lower Harbor	Egg	0.00
APR	Lower Harbor	Yolk-sac	0.00
APR	Lower Harbor	Post yolk-sac	0.00
APR	Lower Harbor	Juvenile	0.00
APR	Upper Harbor	Egg	0.00
APR	Upper Harbor	Yolk-sac	0.00
APR	Upper Harbor	Post yolk-sac	0.00
APR	Upper Harbor	Juvenile	0.00
APR	Red Hook	Egg	0.00
APR	Red Hook	Yolk-sac	0.00
APR	Red Hook	Post yolk-sac	0.00
APR	Red Hook	Juvenile	0.00
APR	Kill Van Kull	Egg	0.00
APR	Kill Van Kull	Yolk-sac	0.00
APR	Kill Van Kull	Post yolk-sac	0.00
APR	Kill Van Kull	Juvenile	0.00
APR	Newark Bay	Egg	0.00
APR	Newark Bay	Yolk-sac	0.00
APR	Newark Bay	Post yolk-sac	0.00
APR	Newark Bay	Juvenile	0.00
APR	Arthur Kill	Egg	0.00
APR	Arthur Kill	Yolk-sac	0.00
APR	Arthur Kill	Post yolk-sac	0.00
APR	Arthur Kill	Juvenile	0.00
APR	Port Jersey Channel	Egg	0.00
APR	Port Jersey Channel	Yolk-sac	0.00
APR	Port Jersey Channel	Post yolk-sac	0.00
APR	Port Jersey Channel	Juvenile	0.00
APR	South Brooklyn Channel	Egg	0.00
APR	South Brooklyn Channel	Yolk-sac	0.00
APR	South Brooklyn Channel	Post yolk-sac	0.00
APR	South Brooklyn Channel	Juvenile	0.00
APR	Port Jersey	Egg	0.00
APR	Port Jersey	Yolk-sac	0.00
APR	Port Jersey	Post yolk-sac	0.00
APR	Port Jersey	Juvenile	0.00
APR	South Brooklyn	Egg	0.00
APR	South Brooklyn	Yolk-sac	0.00
APR	South Brooklyn	Post yolk-sac	0.00
APR	South Brooklyn	Juvenile	0.00
MAY	Lower Harbor	Egg	0.00
MAY	Lower Harbor	Yolk-sac	0.00
MAY	Lower Harbor	Post yolk-sac	0.00
MAY	Lower Harbor	Juvenile	0.00
MAY	Upper Harbor	Egg	0.00
MAY	Upper Harbor	Yolk-sac	0.00
MAY	Upper Harbor	Post yolk-sac	0.00
MAY	Upper Harbor	Juvenile	0.00
MAY	Red Hook	Egg	0.00
MAY	Red Hook	Yolk-sac	0.00
MAY	Red Hook	Post yolk-sac	0.00
MAY	Red Hook	Juvenile	0.00
MAY	Kill Van Kull	Egg	0.00
MAY	Kill Van Kull	Yolk-sac	0.00
MAY	Kill Van Kull	Post yolk-sac	0.00
MAY	Kill Van Kull	Juvenile	0.00
MAY	Newark Bay	Egg	0.00
MAY	Newark Bay	Yolk-sac	0.00

TABLE E2-1 (Cont'd)

AVERAGE ICTHYOPLANKTON DENSITY (NO./1000 CUBIC METERS) OF ATLANTIC HERRING
FEBRUARY 1999 - JUNE 1999

MONTH	AREA	LIFESTAGE	AVG DENSITY
MAY	Newark Bay	Post yolk-sac	0.00
MAY	Newark Bay	Juvenile	0.00
MAY	Arthur Kill	Egg	0.00
MAY	Arthur Kill	Yolk-sac	0.00
MAY	Arthur Kill	Post yolk-sac	0.00
MAY	Arthur Kill	Juvenile	0.00
MAY	Port Jersey Channel	Egg	0.00
MAY	Port Jersey Channel	Yolk-sac	0.00
MAY	Port Jersey Channel	Post yolk-sac	0.00
MAY	Port Jersey Channel	Juvenile	0.00
MAY	South Brooklyn Channel	Egg	0.00
MAY	South Brooklyn Channel	Yolk-sac	0.00
MAY	South Brooklyn Channel	Post yolk-sac	0.00
MAY	South Brooklyn Channel	Juvenile	0.00
MAY	Port Jersey	Egg	0.00
MAY	Port Jersey	Yolk-sac	0.00
MAY	Port Jersey	Post yolk-sac	0.00
MAY	Port Jersey	Juvenile	0.00
MAY	South Brooklyn	Egg	0.00
MAY	South Brooklyn	Yolk-sac	0.00
MAY	South Brooklyn	Post yolk-sac	0.00
MAY	South Brooklyn	Juvenile	0.00
JUN	Lower Harbor	Egg	0.00
JUN	Lower Harbor	Yolk-sac	0.00
JUN	Lower Harbor	Post yolk-sac	0.00
JUN	Lower Harbor	Juvenile	0.00
JUN	Upper Harbor	Egg	0.00
JUN	Upper Harbor	Yolk-sac	0.00
JUN	Upper Harbor	Post yolk-sac	0.00
JUN	Upper Harbor	Juvenile	0.00
JUN	Red Hook	Egg	0.00
JUN	Red Hook	Yolk-sac	0.00
JUN	Red Hook	Post yolk-sac	0.00
JUN	Red Hook	Juvenile	0.00
JUN	Kill Van Kull	Egg	0.00
JUN	Kill Van Kull	Yolk-sac	0.00
JUN	Kill Van Kull	Post yolk-sac	0.00
JUN	Kill Van Kull	Juvenile	0.00
JUN	Newark Bay	Egg	0.00
JUN	Newark Bay	Yolk-sac	0.00
JUN	Newark Bay	Post yolk-sac	0.00
JUN	Newark Bay	Juvenile	0.00
JUN	Arthur Kill	Egg	0.00
JUN	Arthur Kill	Yolk-sac	0.00
JUN	Arthur Kill	Post yolk-sac	0.00
JUN	Arthur Kill	Juvenile	0.00
JUN	Port Jersey Channel	Egg	0.00
JUN	Port Jersey Channel	Yolk-sac	0.00
JUN	Port Jersey Channel	Post yolk-sac	0.00
JUN	Port Jersey Channel	Juvenile	0.00
JUN	South Brooklyn Channel	Egg	0.00
JUN	South Brooklyn Channel	Yolk-sac	0.00
JUN	South Brooklyn Channel	Post yolk-sac	0.00
JUN	South Brooklyn Channel	Juvenile	0.00
JUN	Port Jersey	Egg	0.00
JUN	Port Jersey	Yolk-sac	0.00
JUN	Port Jersey	Post yolk-sac	0.00
JUN	Port Jersey	Juvenile	0.00
JUN	South Brooklyn	Egg	0.00
JUN	South Brooklyn	Yolk-sac	0.00
JUN	South Brooklyn	Post yolk-sac	0.00
JUN	South Brooklyn	Juvenile	0.00

Areas: Lower Harbor (HW 1), Upper Harbor (HW 2,4), Red Hook (HW 3), Kill Van Kull (HW 5), Newark Bay (HW 8-10), Arthur Kill (HW 6-7), Port Jersey Channel (PJ 4), South Brooklyn Channel (SB 4), Port Jersey (PJ 1-3, 5-6), South Brooklyn (SB 1-3).

Notes: All samples collected with epibenthic sled. Not all stations sampled each month, see sampling schedule for actual months and stations sampled.

TABLE E2-2

AVERAGE ICTHYOPLANKTON DENSITY (NO./1000 CUBIC METERS) OF ATLANTIC MENHADEN
FEBRUARY 1999 - JUNE 1999

MONTH	AREA	LIFESTAGE	AVG DENSITY
FEB	Lower Harbor	Egg	0.00
FEB	Lower Harbor	Yolk-sac	0.00
FEB	Lower Harbor	Post yolk-sac	0.00
FEB	Lower Harbor	Juvenile	0.00
FEB	Upper Harbor	Egg	0.00
FEB	Upper Harbor	Yolk-sac	0.00
FEB	Upper Harbor	Post yolk-sac	0.00
FEB	Upper Harbor	Juvenile	0.00
FEB	Red Hook	Egg	0.00
FEB	Red Hook	Yolk-sac	0.00
FEB	Red Hook	Post yolk-sac	0.00
FEB	Red Hook	Juvenile	0.00
FEB	Kill Van Kull	Egg	0.00
FEB	Kill Van Kull	Yolk-sac	0.00
FEB	Kill Van Kull	Post yolk-sac	0.00
FEB	Kill Van Kull	Juvenile	0.00
FEB	Newark Bay	Egg	0.00
FEB	Newark Bay	Yolk-sac	0.00
FEB	Newark Bay	Post yolk-sac	0.00
FEB	Newark Bay	Juvenile	0.00
FEB	Arthur Kill	Egg	0.00
FEB	Arthur Kill	Yolk-sac	0.00
FEB	Arthur Kill	Post yolk-sac	0.00
FEB	Arthur Kill	Juvenile	0.00
FEB	Port Jersey Channel	Egg	0.00
FEB	Port Jersey Channel	Yolk-sac	0.00
FEB	Port Jersey Channel	Post yolk-sac	0.00
FEB	Port Jersey Channel	Juvenile	0.00
FEB	South Brooklyn Channel	Egg	0.00
FEB	South Brooklyn Channel	Yolk-sac	0.00
FEB	South Brooklyn Channel	Post yolk-sac	0.00
FEB	South Brooklyn Channel	Juvenile	0.00
FEB	Port Jersey	Egg	0.00
FEB	Port Jersey	Yolk-sac	0.00
FEB	Port Jersey	Post yolk-sac	0.00
FEB	Port Jersey	Juvenile	0.00
FEB	South Brooklyn	Egg	0.00
FEB	South Brooklyn	Yolk-sac	0.00
FEB	South Brooklyn	Post yolk-sac	0.00
FEB	South Brooklyn	Juvenile	0.00
MAR	Lower Harbor	Egg	14.91
MAR	Lower Harbor	Yolk-sac	0.00
MAR	Lower Harbor	Post yolk-sac	0.00
MAR	Lower Harbor	Juvenile	0.00
MAR	Upper Harbor	Egg	6.54
MAR	Upper Harbor	Yolk-sac	0.00
MAR	Upper Harbor	Post yolk-sac	0.00
MAR	Upper Harbor	Juvenile	0.00
MAR	Red Hook	Egg	0.00
MAR	Red Hook	Yolk-sac	0.00
MAR	Red Hook	Post yolk-sac	0.00
MAR	Red Hook	Juvenile	0.00
MAR	Kill Van Kull	Egg	0.00
MAR	Kill Van Kull	Yolk-sac	0.00
MAR	Kill Van Kull	Post yolk-sac	0.00
MAR	Kill Van Kull	Juvenile	0.00
MAR	Newark Bay	Egg	1.50
MAR	Newark Bay	Yolk-sac	0.00
MAR	Newark Bay	Post yolk-sac	0.00
MAR	Newark Bay	Juvenile	0.00
MAR	Arthur Kill	Egg	9.26
MAR	Arthur Kill	Yolk-sac	0.00
MAR	Arthur Kill	Post yolk-sac	0.00
MAR	Arthur Kill	Juvenile	0.00
MAR	Port Jersey Channel	Egg	11.05
MAR	Port Jersey Channel	Yolk-sac	0.00
MAR	Port Jersey Channel	Post yolk-sac	0.00
MAR	Port Jersey Channel	Juvenile	0.00
MAR	South Brooklyn Channel	Egg	28.00

TABLE E2-2 (Cont'd)

AVERAGE ICTHYOPLANKTON DENSITY (NO./1000 CUBIC METERS) OF ATLANTIC MENHADEN
FEBRUARY 1999 - JUNE 1999

MONTH	AREA	LIFESTAGE	AVG DENSITY
MAR	South Brooklyn Channel	Yolk-sac	0.00
MAR	South Brooklyn Channel	Post yolk-sac	0.00
MAR	South Brooklyn Channel	Juvenile	0.00
MAR	Port Jersey	Egg	5.93
MAR	Port Jersey	Yolk-sac	0.00
MAR	Port Jersey	Post yolk-sac	0.00
MAR	Port Jersey	Juvenile	0.00
MAR	South Brooklyn	Egg	14.96
MAR	South Brooklyn	Yolk-sac	0.00
MAR	South Brooklyn	Post yolk-sac	0.00
MAR	South Brooklyn	Juvenile	0.00
APR	Lower Harbor	Egg	2978.98
APR	Lower Harbor	Yolk-sac	0.00
APR	Lower Harbor	Post yolk-sac	0.00
APR	Lower Harbor	Juvenile	0.00
APR	Upper Harbor	Egg	1508.84
APR	Upper Harbor	Yolk-sac	0.00
APR	Upper Harbor	Post yolk-sac	0.00
APR	Upper Harbor	Juvenile	0.00
APR	Red Hook	Egg	1857.27
APR	Red Hook	Yolk-sac	0.00
APR	Red Hook	Post yolk-sac	0.00
APR	Red Hook	Juvenile	0.00
APR	Kill Van Kull	Egg	100.09
APR	Kill Van Kull	Yolk-sac	0.00
APR	Kill Van Kull	Post yolk-sac	0.00
APR	Kill Van Kull	Juvenile	0.00
APR	Newark Bay	Egg	54.21
APR	Newark Bay	Yolk-sac	0.00
APR	Newark Bay	Post yolk-sac	0.00
APR	Newark Bay	Juvenile	0.00
APR	Arthur Kill	Egg	158.87
APR	Arthur Kill	Yolk-sac	0.00
APR	Arthur Kill	Post yolk-sac	0.00
APR	Arthur Kill	Juvenile	0.00
APR	Port Jersey Channel	Egg	1879.28
APR	Port Jersey Channel	Yolk-sac	0.00
APR	Port Jersey Channel	Post yolk-sac	0.00
APR	Port Jersey Channel	Juvenile	0.00
APR	South Brooklyn Channel	Egg	1802.24
APR	South Brooklyn Channel	Yolk-sac	0.00
APR	South Brooklyn Channel	Post yolk-sac	0.00
APR	South Brooklyn Channel	Juvenile	0.00
APR	Port Jersey	Egg	1190.82
APR	Port Jersey	Yolk-sac	0.00
APR	Port Jersey	Post yolk-sac	0.00
APR	Port Jersey	Juvenile	0.00
APR	South Brooklyn	Egg	3371.06
APR	South Brooklyn	Yolk-sac	0.00
APR	South Brooklyn	Post yolk-sac	0.00
APR	South Brooklyn	Juvenile	0.00
MAY	Lower Harbor	Egg	10.62
MAY	Lower Harbor	Yolk-sac	0.00
MAY	Lower Harbor	Post yolk-sac	0.00
MAY	Lower Harbor	Juvenile	0.00
MAY	Upper Harbor	Egg	97.84
MAY	Upper Harbor	Yolk-sac	0.00
MAY	Upper Harbor	Post yolk-sac	200.78
MAY	Upper Harbor	Juvenile	0.00
MAY	Red Hook	Egg	430.86
MAY	Red Hook	Yolk-sac	103.23
MAY	Red Hook	Post yolk-sac	327.64
MAY	Red Hook	Juvenile	0.00
MAY	Kill Van Kull	Egg	0.00
MAY	Kill Van Kull	Yolk-sac	0.00
MAY	Kill Van Kull	Post yolk-sac	0.00
MAY	Kill Van Kull	Juvenile	0.00
MAY	Newark Bay	Egg	5.18
MAY	Newark Bay	Yolk-sac	0.00

TABLE E2-2 (Cont'd)

AVERAGE ICTHYOPLANKTON DENSITY (NO./1000 CUBIC METERS) OF ATLANTIC MENHADEN
FEBRUARY 1999 - JUNE 1999

MONTH	AREA	LIFESTAGE	AVG DENSITY
MAY	Newark Bay	Post yolk-sac	5.35
MAY	Newark Bay	Juvenile	0.00
MAY	Arthur Kill	Egg	1.89
MAY	Arthur Kill	Yolk-sac	0.00
MAY	Arthur Kill	Post yolk-sac	0.00
MAY	Arthur Kill	Juvenile	0.00
MAY	Port Jersey Channel	Egg	33.74
MAY	Port Jersey Channel	Yolk-sac	0.00
MAY	Port Jersey Channel	Post yolk-sac	0.00
MAY	Port Jersey Channel	Juvenile	0.00
MAY	South Brooklyn Channel	Egg	0.00
MAY	South Brooklyn Channel	Yolk-sac	0.00
MAY	South Brooklyn Channel	Post yolk-sac	24.27
MAY	South Brooklyn Channel	Juvenile	0.00
MAY	Port Jersey	Egg	307.43
MAY	Port Jersey	Yolk-sac	34.71
MAY	Port Jersey	Post yolk-sac	254.79
MAY	Port Jersey	Juvenile	0.00
MAY	South Brooklyn	Egg	254.83
MAY	South Brooklyn	Yolk-sac	49.70
MAY	South Brooklyn	Post yolk-sac	678.93
MAY	South Brooklyn	Juvenile	0.00
JUN	Lower Harbor	Egg	0.00
JUN	Lower Harbor	Yolk-sac	0.00
JUN	Lower Harbor	Post yolk-sac	25.83
JUN	Lower Harbor	Juvenile	0.00
JUN	Upper Harbor	Egg	0.00
JUN	Upper Harbor	Yolk-sac	0.00
JUN	Upper Harbor	Post yolk-sac	114.38
JUN	Upper Harbor	Juvenile	0.00
JUN	Red Hook	Egg	0.00
JUN	Red Hook	Yolk-sac	0.00
JUN	Red Hook	Post yolk-sac	119.45
JUN	Red Hook	Juvenile	0.00
JUN	Kill Van Kull	Egg	0.00
JUN	Kill Van Kull	Yolk-sac	0.00
JUN	Kill Van Kull	Post yolk-sac	213.79
JUN	Kill Van Kull	Juvenile	0.00
JUN	Newark Bay	Egg	0.00
JUN	Newark Bay	Yolk-sac	0.00
JUN	Newark Bay	Post yolk-sac	320.98
JUN	Newark Bay	Juvenile	0.00
JUN	Arthur Kill	Egg	0.00
JUN	Arthur Kill	Yolk-sac	0.00
JUN	Arthur Kill	Post yolk-sac	1044.02
JUN	Arthur Kill	Juvenile	0.00
JUN	Port Jersey Channel	Egg	0.00
JUN	Port Jersey Channel	Yolk-sac	0.00
JUN	Port Jersey Channel	Post yolk-sac	166.88
JUN	Port Jersey Channel	Juvenile	0.00
JUN	South Brooklyn Channel	Egg	0.00
JUN	South Brooklyn Channel	Yolk-sac	0.00
JUN	South Brooklyn Channel	Post yolk-sac	123.62
JUN	South Brooklyn Channel	Juvenile	0.00
JUN	Port Jersey	Egg	0.00
JUN	Port Jersey	Yolk-sac	0.00
JUN	Port Jersey	Post yolk-sac	221.53
JUN	Port Jersey	Juvenile	0.00
JUN	South Brooklyn	Egg	0.00
JUN	South Brooklyn	Yolk-sac	0.00
JUN	South Brooklyn	Post yolk-sac	258.26
JUN	South Brooklyn	Juvenile	0.00

Areas: Lower Harbor (HW 1), Upper Harbor (HW 2,4), Red Hook (HW 3), Kill Van Kull (HW 5), Newark Bay (HW 8-10), Arthur Kill (HW 6-7), Port Jersey Channel (PJ 4), South Brooklyn Channel (SB 4), Port Jersey (PJ 1-3, 5-6), South Brooklyn (SB 1-3)

Notes: All samples collected with epibenthic sled. Not all stations sampled each month, see sampling schedule for actual months and stations sampled

TABLE E2-3

AVERAGE ICTHYOPLANKTON DENSITY (NO./1000 CUBIC METERS) OF BAY ANCHOVY
FEBRUARY 1999 - JUNE 1999

MONTH	AREA	LIFESTAGE	AVG DENSITY
FEB	Lower Harbor	Egg	0.00
FEB	Lower Harbor	Yolk-sac	0.00
FEB	Lower Harbor	Post yolk-sac	0.00
FEB	Lower Harbor	Juvenile	0.00
FEB	Upper Harbor	Egg	0.00
FEB	Upper Harbor	Yolk-sac	0.00
FEB	Upper Harbor	Post yolk-sac	0.00
FEB	Upper Harbor	Juvenile	0.00
FEB	Red Hook	Egg	0.00
FEB	Red Hook	Yolk-sac	0.00
FEB	Red Hook	Post yolk-sac	0.00
FEB	Red Hook	Juvenile	0.00
FEB	Kill Van Kull	Egg	0.00
FEB	Kill Van Kull	Yolk-sac	0.00
FEB	Kill Van Kull	Post yolk-sac	0.00
FEB	Kill Van Kull	Juvenile	0.00
FEB	Newark Bay	Egg	0.00
FEB	Newark Bay	Yolk-sac	0.00
FEB	Newark Bay	Post yolk-sac	0.00
FEB	Newark Bay	Juvenile	0.00
FEB	Arthur Kill	Egg	0.00
FEB	Arthur Kill	Yolk-sac	0.00
FEB	Arthur Kill	Post yolk-sac	0.00
FEB	Arthur Kill	Juvenile	0.00
FEB	Port Jersey Channel	Egg	0.00
FEB	Port Jersey Channel	Yolk-sac	0.00
FEB	Port Jersey Channel	Post yolk-sac	0.00
FEB	Port Jersey Channel	Juvenile	0.00
FEB	South Brooklyn Channel	Egg	0.00
FEB	South Brooklyn Channel	Yolk-sac	0.00
FEB	South Brooklyn Channel	Post yolk-sac	0.00
FEB	South Brooklyn Channel	Juvenile	0.00
FEB	Port Jersey	Egg	0.00
FEB	Port Jersey	Yolk-sac	0.00
FEB	Port Jersey	Post yolk-sac	0.00
FEB	Port Jersey	Juvenile	0.00
FEB	South Brooklyn	Egg	0.00
FEB	South Brooklyn	Yolk-sac	0.00
FEB	South Brooklyn	Post yolk-sac	0.00
FEB	South Brooklyn	Juvenile	0.00
MAR	Lower Harbor	Egg	0.00
MAR	Lower Harbor	Yolk-sac	0.00
MAR	Lower Harbor	Post yolk-sac	0.00
MAR	Lower Harbor	Juvenile	0.00
MAR	Upper Harbor	Egg	0.00
MAR	Upper Harbor	Yolk-sac	0.00
MAR	Upper Harbor	Post yolk-sac	0.00
MAR	Upper Harbor	Juvenile	0.00
MAR	Red Hook	Egg	0.00
MAR	Red Hook	Yolk-sac	0.00
MAR	Red Hook	Post yolk-sac	0.00
MAR	Red Hook	Juvenile	0.00
MAR	Kill Van Kull	Egg	0.00
MAR	Kill Van Kull	Yolk-sac	0.00
MAR	Kill Van Kull	Post yolk-sac	0.00
MAR	Kill Van Kull	Juvenile	0.00
MAR	Newark Bay	Egg	0.00
MAR	Newark Bay	Yolk-sac	0.00
MAR	Newark Bay	Post yolk-sac	0.00
MAR	Newark Bay	Juvenile	0.00
MAR	Arthur Kill	Egg	0.00
MAR	Arthur Kill	Yolk-sac	0.00
MAR	Arthur Kill	Post yolk-sac	0.00
MAR	Arthur Kill	Juvenile	0.00
MAR	Port Jersey Channel	Egg	0.00
MAR	Port Jersey Channel	Yolk-sac	0.00
MAR	Port Jersey Channel	Post yolk-sac	0.00
MAR	Port Jersey Channel	Juvenile	0.00
MAR	South Brooklyn Channel	Egg	0.00

TABLE E2-3 (Cont'd)

AVERAGE ICTHYOPLANKTON DENSITY (NO./1000 CUBIC METERS) OF BAY ANCHOVY
FEBRUARY 1999 - JUNE 1999

MONTH	AREA	LIFESTAGE	AVG DENSITY
MAR	South Brooklyn Channel	Yolk-sac	0.00
MAR	South Brooklyn Channel	Post yolk-sac	0.00
MAR	South Brooklyn Channel	Juvenile	0.00
MAR	Port Jersey	Egg	0.00
MAR	Port Jersey	Yolk-sac	0.00
MAR	Port Jersey	Post yolk-sac	0.00
MAR	Port Jersey	Juvenile	0.00
MAR	South Brooklyn	Egg	0.00
MAR	South Brooklyn	Yolk-sac	0.00
MAR	South Brooklyn	Post yolk-sac	0.00
MAR	South Brooklyn	Juvenile	0.00
APR	Lower Harbor	Egg	0.00
APR	Lower Harbor	Yolk-sac	0.00
APR	Lower Harbor	Post yolk-sac	0.00
APR	Lower Harbor	Juvenile	0.00
APR	Upper Harbor	Egg	0.00
APR	Upper Harbor	Yolk-sac	0.00
APR	Upper Harbor	Post yolk-sac	0.00
APR	Upper Harbor	Juvenile	0.00
APR	Red Hook	Egg	0.00
APR	Red Hook	Yolk-sac	0.00
APR	Red Hook	Post yolk-sac	0.00
APR	Red Hook	Juvenile	0.00
APR	Kill Van Kull	Egg	0.00
APR	Kill Van Kull	Yolk-sac	0.00
APR	Kill Van Kull	Post yolk-sac	0.00
APR	Kill Van Kull	Juvenile	0.00
APR	Newark Bay	Egg	0.00
APR	Newark Bay	Yolk-sac	0.00
APR	Newark Bay	Post yolk-sac	0.00
APR	Newark Bay	Juvenile	0.00
APR	Arthur Kill	Egg	0.00
APR	Arthur Kill	Yolk-sac	0.00
APR	Arthur Kill	Post yolk-sac	0.00
APR	Arthur Kill	Juvenile	0.00
APR	Port Jersey Channel	Egg	0.00
APR	Port Jersey Channel	Yolk-sac	0.00
APR	Port Jersey Channel	Post yolk-sac	0.00
APR	Port Jersey Channel	Juvenile	0.00
APR	South Brooklyn Channel	Egg	0.00
APR	South Brooklyn Channel	Yolk-sac	0.00
APR	South Brooklyn Channel	Post yolk-sac	0.00
APR	South Brooklyn Channel	Juvenile	0.00
APR	Port Jersey	Egg	0.00
APR	Port Jersey	Yolk-sac	0.00
APR	Port Jersey	Post yolk-sac	0.00
APR	Port Jersey	Juvenile	0.00
APR	South Brooklyn	Egg	0.00
APR	South Brooklyn	Yolk-sac	0.00
APR	South Brooklyn	Post yolk-sac	0.00
APR	South Brooklyn	Juvenile	0.00
MAY	Lower Harbor	Egg	26.56
MAY	Lower Harbor	Yolk-sac	0.00
MAY	Lower Harbor	Post yolk-sac	0.00
MAY	Lower Harbor	Juvenile	0.00
MAY	Upper Harbor	Egg	125.40
MAY	Upper Harbor	Yolk-sac	0.00
MAY	Upper Harbor	Post yolk-sac	0.00
MAY	Upper Harbor	Juvenile	0.00
MAY	Red Hook	Egg	0.00
MAY	Red Hook	Yolk-sac	0.00
MAY	Red Hook	Post yolk-sac	0.00
MAY	Red Hook	Juvenile	0.00
MAY	Kill Van Kull	Egg	163.78
MAY	Kill Van Kull	Yolk-sac	0.00
MAY	Kill Van Kull	Post yolk-sac	0.00
MAY	Kill Van Kull	Juvenile	0.00
MAY	Newark Bay	Egg	453.74
MAY	Newark Bay	Yolk-sac	0.00

TABLE E2-3 (Cont'd)

AVERAGE ICTHYOPLANKTON DENSITY (NO./1000 CUBIC METERS) OF BAY ANCHOVY
FEBRUARY 1999 - JUNE 1999

MONTH	AREA	LIFESTAGE	AVG DENSITY
MAY	Newark Bay	Post yolk-sac	0.00
MAY	Newark Bay	Juvenile	0.00
MAY	Arthur Kill	Egg	313.71
MAY	Arthur Kill	Yolk-sac	0.00
MAY	Arthur Kill	Post yolk-sac	0.00
MAY	Arthur Kill	Juvenile	0.00
MAY	Port Jersey Channel	Egg	590.42
MAY	Port Jersey Channel	Yolk-sac	0.00
MAY	Port Jersey Channel	Post yolk-sac	0.00
MAY	Port Jersey Channel	Juvenile	0.00
MAY	South Brooklyn Channel	Egg	97.09
MAY	South Brooklyn Channel	Yolk-sac	0.00
MAY	South Brooklyn Channel	Post yolk-sac	0.00
MAY	South Brooklyn Channel	Juvenile	0.00
MAY	Port Jersey	Egg	1051.16
MAY	Port Jersey	Yolk-sac	0.00
MAY	Port Jersey	Post yolk-sac	0.00
MAY	Port Jersey	Juvenile	0.00
MAY	South Brooklyn	Egg	267.07
MAY	South Brooklyn	Yolk-sac	0.00
MAY	South Brooklyn	Post yolk-sac	0.00
MAY	South Brooklyn	Juvenile	0.00
JUN	Lower Harbor	Egg	280.43
JUN	Lower Harbor	Yolk-sac	0.00
JUN	Lower Harbor	Post yolk-sac	0.00
JUN	Lower Harbor	Juvenile	0.00
JUN	Upper Harbor	Egg	447.53
JUN	Upper Harbor	Yolk-sac	0.00
JUN	Upper Harbor	Post yolk-sac	8.69
JUN	Upper Harbor	Juvenile	0.00
JUN	Red Hook	Egg	218.99
JUN	Red Hook	Yolk-sac	0.00
JUN	Red Hook	Post yolk-sac	39.82
JUN	Red Hook	Juvenile	0.00
JUN	Kill Van Kull	Egg	296.02
JUN	Kill Van Kull	Yolk-sac	0.00
JUN	Kill Van Kull	Post yolk-sac	242.57
JUN	Kill Van Kull	Juvenile	0.00
JUN	Newark Bay	Egg	551.96
JUN	Newark Bay	Yolk-sac	0.00
JUN	Newark Bay	Post yolk-sac	45.52
JUN	Newark Bay	Juvenile	0.00
JUN	Arthur Kill	Egg	173.33
JUN	Arthur Kill	Yolk-sac	0.00
JUN	Arthur Kill	Post yolk-sac	306.58
JUN	Arthur Kill	Juvenile	0.00
JUN	Port Jersey Channel	Egg	1249.18
JUN	Port Jersey Channel	Yolk-sac	0.00
JUN	Port Jersey Channel	Post yolk-sac	28.61
JUN	Port Jersey Channel	Juvenile	0.00
JUN	South Brooklyn Channel	Egg	903.72
JUN	South Brooklyn Channel	Yolk-sac	0.00
JUN	South Brooklyn Channel	Post yolk-sac	4.26
JUN	South Brooklyn Channel	Juvenile	0.00
JUN	Port Jersey	Egg	834.63
JUN	Port Jersey	Yolk-sac	0.00
JUN	Port Jersey	Post yolk-sac	12.38
JUN	Port Jersey	Juvenile	0.00
JUN	South Brooklyn	Egg	924.71
JUN	South Brooklyn	Yolk-sac	0.00
JUN	South Brooklyn	Post yolk-sac	162.02
JUN	South Brooklyn	Juvenile	0.00

Areas: Lower Harbor (HW 1), Upper Harbor (HW 2,4), Red Hook (HW 3), Kill Van Kull (HW 5), Newark Bay (HW 8-10), Arthur Kill (HW 6-7), Port Jersey Channel (PJ 4), South Brooklyn Channel (SB 4), Port Jersey (PJ 1-3, 5-6), South Brooklyn (SB 1-3).

Notes: All samples collected with epibenthic sled. Not all stations sampled each month, see sampling schedule for actual months and stations sampled.

TABLE E2-4

AVERAGE ICTHYOPLANKTON DENSITY (NO./1000 CUBIC METERS) OF FOURSPOT FLOUNDER
FEBRUARY 1999 - JUNE 1999

MONTH	AREA	LIFESTAGE	AVG DENSITY
FEB	Lower Harbor	Egg	0.00
FEB	Lower Harbor	Yolk-sac	0.00
FEB	Lower Harbor	Post yolk-sac	0.00
FEB	Lower Harbor	Juvenile	0.00
FEB	Upper Harbor	Egg	0.00
FEB	Upper Harbor	Yolk-sac	0.00
FEB	Upper Harbor	Post yolk-sac	0.00
FEB	Upper Harbor	Juvenile	0.00
FEB	Red Hook	Egg	0.00
FEB	Red Hook	Yolk-sac	0.00
FEB	Red Hook	Post yolk-sac	0.00
FEB	Red Hook	Juvenile	0.00
FEB	Kill Van Kull	Egg	0.00
FEB	Kill Van Kull	Yolk-sac	0.00
FEB	Kill Van Kull	Post yolk-sac	0.00
FEB	Kill Van Kull	Juvenile	0.00
FEB	Newark Bay	Egg	0.00
FEB	Newark Bay	Yolk-sac	0.00
FEB	Newark Bay	Post yolk-sac	0.00
FEB	Newark Bay	Juvenile	0.00
FEB	Arthur Kill	Egg	0.00
FEB	Arthur Kill	Yolk-sac	0.00
FEB	Arthur Kill	Post yolk-sac	0.00
FEB	Arthur Kill	Juvenile	0.00
FEB	Port Jersey Channel	Egg	0.00
FEB	Port Jersey Channel	Yolk-sac	0.00
FEB	Port Jersey Channel	Post yolk-sac	0.00
FEB	Port Jersey Channel	Juvenile	0.00
FEB	South Brooklyn Channel	Egg	0.00
FEB	South Brooklyn Channel	Yolk-sac	0.00
FEB	South Brooklyn Channel	Post yolk-sac	0.00
FEB	South Brooklyn Channel	Juvenile	0.00
FEB	Port Jersey	Egg	0.00
FEB	Port Jersey	Yolk-sac	0.00
FEB	Port Jersey	Post yolk-sac	0.00
FEB	Port Jersey	Juvenile	0.00
FEB	South Brooklyn	Egg	0.00
FEB	South Brooklyn	Yolk-sac	0.00
FEB	South Brooklyn	Post yolk-sac	0.00
FEB	South Brooklyn	Juvenile	0.00
MAR	Lower Harbor	Egg	0.00
MAR	Lower Harbor	Yolk-sac	0.00
MAR	Lower Harbor	Post yolk-sac	0.00
MAR	Lower Harbor	Juvenile	0.00
MAR	Upper Harbor	Egg	0.00
MAR	Upper Harbor	Yolk-sac	0.00
MAR	Upper Harbor	Post yolk-sac	0.00
MAR	Upper Harbor	Juvenile	0.00
MAR	Red Hook	Egg	0.00
MAR	Red Hook	Yolk-sac	0.00
MAR	Red Hook	Post yolk-sac	0.00
MAR	Red Hook	Juvenile	0.00
MAR	Kill Van Kull	Egg	0.00
MAR	Kill Van Kull	Yolk-sac	0.00
MAR	Kill Van Kull	Post yolk-sac	0.00
MAR	Kill Van Kull	Juvenile	0.00
MAR	Newark Bay	Egg	0.00
MAR	Newark Bay	Yolk-sac	0.00
MAR	Newark Bay	Post yolk-sac	0.00
MAR	Newark Bay	Juvenile	0.00
MAR	Arthur Kill	Egg	0.00
MAR	Arthur Kill	Yolk-sac	0.00
MAR	Arthur Kill	Post yolk-sac	0.00
MAR	Arthur Kill	Juvenile	0.00
MAR	Port Jersey Channel	Egg	0.00
MAR	Port Jersey Channel	Yolk-sac	0.00
MAR	Port Jersey Channel	Post yolk-sac	0.00
MAR	Port Jersey Channel	Juvenile	0.00
MAR	South Brooklyn Channel	Egg	0.00

TABLE E2-4 (Cont'd)

AVERAGE ICTHYOPLANKTON DENSITY (NO./1000 CUBIC METERS) OF FOURSPOT FLOUNDER
FEBRUARY 1999 - JUNE 1999

MONTH	AREA	LIFESTAGE	AVG DENSITY
MAR	South Brooklyn Channel	Yolk-sac	0.00
MAR	South Brooklyn Channel	Post yolk-sac	0.00
MAR	South Brooklyn Channel	Juvenile	0.00
MAR	Port Jersey	Egg	0.00
MAR	Port Jersey	Yolk-sac	0.00
MAR	Port Jersey	Post yolk-sac	0.00
MAR	Port Jersey	Juvenile	0.00
MAR	South Brooklyn	Egg	0.00
MAR	South Brooklyn	Yolk-sac	0.00
MAR	South Brooklyn	Post yolk-sac	0.00
MAR	South Brooklyn	Juvenile	0.00
APR	Lower Harbor	Egg	0.00
APR	Lower Harbor	Yolk-sac	0.00
APR	Lower Harbor	Post yolk-sac	0.00
APR	Lower Harbor	Juvenile	0.00
APR	Upper Harbor	Egg	0.00
APR	Upper Harbor	Yolk-sac	0.00
APR	Upper Harbor	Post yolk-sac	0.00
APR	Upper Harbor	Juvenile	0.00
APR	Red Hook	Egg	0.00
APR	Red Hook	Yolk-sac	0.00
APR	Red Hook	Post yolk-sac	0.00
APR	Red Hook	Juvenile	0.00
APR	Kill Van Kull	Egg	0.00
APR	Kill Van Kull	Yolk-sac	0.00
APR	Kill Van Kull	Post yolk-sac	0.00
APR	Kill Van Kull	Juvenile	0.00
APR	Newark Bay	Egg	0.00
APR	Newark Bay	Yolk-sac	0.00
APR	Newark Bay	Post yolk-sac	0.00
APR	Newark Bay	Juvenile	0.00
APR	Arthur Kill	Egg	0.00
APR	Arthur Kill	Yolk-sac	0.00
APR	Arthur Kill	Post yolk-sac	0.00
APR	Arthur Kill	Juvenile	0.00
APR	Port Jersey Channel	Egg	0.00
APR	Port Jersey Channel	Yolk-sac	0.00
APR	Port Jersey Channel	Post yolk-sac	0.00
APR	Port Jersey Channel	Juvenile	0.00
APR	South Brooklyn Channel	Egg	0.00
APR	South Brooklyn Channel	Yolk-sac	0.00
APR	South Brooklyn Channel	Post yolk-sac	0.00
APR	South Brooklyn Channel	Juvenile	0.00
APR	Port Jersey	Egg	0.00
APR	Port Jersey	Yolk-sac	0.00
APR	Port Jersey	Post yolk-sac	0.00
APR	Port Jersey	Juvenile	0.00
APR	South Brooklyn	Egg	0.00
APR	South Brooklyn	Yolk-sac	0.00
APR	South Brooklyn	Post yolk-sac	0.00
APR	South Brooklyn	Juvenile	0.00
MAY	Lower Harbor	Egg	424.98
MAY	Lower Harbor	Yolk-sac	0.00
MAY	Lower Harbor	Post yolk-sac	0.00
MAY	Lower Harbor	Juvenile	0.00
MAY	Upper Harbor	Egg	430.93
MAY	Upper Harbor	Yolk-sac	0.00
MAY	Upper Harbor	Post yolk-sac	0.00
MAY	Upper Harbor	Juvenile	0.00
MAY	Red Hook	Egg	718.11
MAY	Red Hook	Yolk-sac	0.00
MAY	Red Hook	Post yolk-sac	0.00
MAY	Red Hook	Juvenile	0.00
MAY	Kill Van Kull	Egg	6.30
MAY	Kill Van Kull	Yolk-sac	0.00
MAY	Kill Van Kull	Post yolk-sac	0.00
MAY	Kill Van Kull	Juvenile	0.00
MAY	Newark Bay	Egg	107.53
MAY	Newark Bay	Yolk-sac	0.00

TABLE E2-4 (Cont'd)

AVERAGE ICTHYOPLANKTON DENSITY (NO./1000 CUBIC METERS) OF FOURSPOT FLOUNDER
FEBRUARY 1999 - JUNE 1999

MONTH	AREA	LIFESTAGE	AVG DENSITY
MAY	Newark Bay	Post yolk-sac	0.00
MAY	Newark Bay	Juvenile	0.00
MAY	Arthur Kill	Egg	1.89
MAY	Arthur Kill	Yolk-sac	0.00
MAY	Arthur Kill	Post yolk-sac	0.00
MAY	Arthur Kill	Juvenile	0.00
MAY	Port Jersey Channel	Egg	236.17
MAY	Port Jersey Channel	Yolk-sac	0.00
MAY	Port Jersey Channel	Post yolk-sac	0.00
MAY	Port Jersey Channel	Juvenile	0.00
MAY	South Brooklyn Channel	Egg	446.62
MAY	South Brooklyn Channel	Yolk-sac	0.00
MAY	South Brooklyn Channel	Post yolk-sac	0.00
MAY	South Brooklyn Channel	Juvenile	0.00
MAY	Port Jersey	Egg	256.53
MAY	Port Jersey	Yolk-sac	0.00
MAY	Port Jersey	Post yolk-sac	0.00
MAY	Port Jersey	Juvenile	0.00
MAY	South Brooklyn	Egg	2065.25
MAY	South Brooklyn	Yolk-sac	0.00
MAY	South Brooklyn	Post yolk-sac	0.00
MAY	South Brooklyn	Juvenile	0.00
JUN	Lower Harbor	Egg	162.35
JUN	Lower Harbor	Yolk-sac	0.00
JUN	Lower Harbor	Post yolk-sac	0.00
JUN	Lower Harbor	Juvenile	0.00
JUN	Upper Harbor	Egg	200.89
JUN	Upper Harbor	Yolk-sac	0.00
JUN	Upper Harbor	Post yolk-sac	0.00
JUN	Upper Harbor	Juvenile	0.00
JUN	Red Hook	Egg	99.54
JUN	Red Hook	Yolk-sac	0.00
JUN	Red Hook	Post yolk-sac	0.00
JUN	Red Hook	Juvenile	0.00
JUN	Kill Van Kull	Egg	69.89
JUN	Kill Van Kull	Yolk-sac	0.00
JUN	Kill Van Kull	Post yolk-sac	0.00
JUN	Kill Van Kull	Juvenile	0.00
JUN	Newark Bay	Egg	34.25
JUN	Newark Bay	Yolk-sac	0.00
JUN	Newark Bay	Post yolk-sac	0.00
JUN	Newark Bay	Juvenile	0.00
JUN	Arthur Kill	Egg	6.05
JUN	Arthur Kill	Yolk-sac	0.00
JUN	Arthur Kill	Post yolk-sac	0.00
JUN	Arthur Kill	Juvenile	0.00
JUN	Port Jersey Channel	Egg	95.36
JUN	Port Jersey Channel	Yolk-sac	0.00
JUN	Port Jersey Channel	Post yolk-sac	0.00
JUN	Port Jersey Channel	Juvenile	0.00
JUN	South Brooklyn Channel	Egg	34.10
JUN	South Brooklyn Channel	Yolk-sac	0.00
JUN	South Brooklyn Channel	Post yolk-sac	0.00
JUN	South Brooklyn Channel	Juvenile	0.00
JUN	Port Jersey	Egg	136.84
JUN	Port Jersey	Yolk-sac	0.00
JUN	Port Jersey	Post yolk-sac	0.00
JUN	Port Jersey	Juvenile	0.00
JUN	South Brooklyn	Egg	225.41
JUN	South Brooklyn	Yolk-sac	0.00
JUN	South Brooklyn	Post yolk-sac	0.00
JUN	South Brooklyn	Juvenile	0.00

Areas: Lower Harbor (HW 1), Upper Harbor (HW 2,4), Red Hook (HW 3), Kill Van Kull (HW 5), Newark Bay (HW 8-10), Arthur Kill (HW 6-7), Port Jersey Channel (PJ 4), South Brooklyn Channel (SB 4), Port Jersey (PJ 1-3, 5-6), South Brooklyn (SB 1-3)

Notes: All samples collected with epibenthic sled. Not all stations sampled each month, see sampling schedule for actual months and stations sampled.

TABLE E2-5

AVERAGE ICTHYOPLANKTON DENSITY (NO./1000 CUBIC METERS) OF FOURBEARD ROCKLING
FEBRUARY 1999 - JUNE 1999

MONTH	AREA	LIFESTAGE	AVG DENSITY
FEB	Lower Harbor	Egg	0.00
FEB	Lower Harbor	Yolk-sac	0.00
FEB	Lower Harbor	Post yolk-sac	0.00
FEB	Lower Harbor	Juvenile	0.00
FEB	Upper Harbor	Egg	0.00
FEB	Upper Harbor	Yolk-sac	0.00
FEB	Upper Harbor	Post yolk-sac	0.00
FEB	Upper Harbor	Juvenile	0.00
FEB	Red Hook	Egg	0.00
FEB	Red Hook	Yolk-sac	0.00
FEB	Red Hook	Post yolk-sac	0.00
FEB	Red Hook	Juvenile	0.00
FEB	Kill Van Kull	Egg	0.00
FEB	Kill Van Kull	Yolk-sac	0.00
FEB	Kill Van Kull	Post yolk-sac	0.00
FEB	Kill Van Kull	Juvenile	0.00
FEB	Newark Bay	Egg	0.00
FEB	Newark Bay	Yolk-sac	0.00
FEB	Newark Bay	Post yolk-sac	0.00
FEB	Newark Bay	Juvenile	0.00
FEB	Arthur Kill	Egg	0.00
FEB	Arthur Kill	Yolk-sac	0.00
FEB	Arthur Kill	Post yolk-sac	0.00
FEB	Arthur Kill	Juvenile	0.00
FEB	Port Jersey Channel	Egg	0.00
FEB	Port Jersey Channel	Yolk-sac	0.00
FEB	Port Jersey Channel	Post yolk-sac	0.00
FEB	Port Jersey Channel	Juvenile	0.00
FEB	South Brooklyn Channel	Egg	0.00
FEB	South Brooklyn Channel	Yolk-sac	0.00
FEB	South Brooklyn Channel	Post yolk-sac	0.00
FEB	South Brooklyn Channel	Juvenile	0.00
FEB	Port Jersey	Egg	1.07
FEB	Port Jersey	Yolk-sac	0.00
FEB	Port Jersey	Post yolk-sac	0.00
FEB	Port Jersey	Juvenile	0.00
FEB	South Brooklyn	Egg	0.00
FEB	South Brooklyn	Yolk-sac	0.00
FEB	South Brooklyn	Post yolk-sac	0.00
FEB	South Brooklyn	Juvenile	0.00
MAR	Lower Harbor	Egg	94.44
MAR	Lower Harbor	Yolk-sac	0.00
MAR	Lower Harbor	Post yolk-sac	0.00
MAR	Lower Harbor	Juvenile	0.00
MAR	Upper Harbor	Egg	164.06
MAR	Upper Harbor	Yolk-sac	0.00
MAR	Upper Harbor	Post yolk-sac	0.00
MAR	Upper Harbor	Juvenile	0.00
MAR	Red Hook	Egg	255.83
MAR	Red Hook	Yolk-sac	0.00
MAR	Red Hook	Post yolk-sac	0.00
MAR	Red Hook	Juvenile	0.00
MAR	Kill Van Kull	Egg	66.56
MAR	Kill Van Kull	Yolk-sac	0.00
MAR	Kill Van Kull	Post yolk-sac	0.00
MAR	Kill Van Kull	Juvenile	0.00
MAR	Newark Bay	Egg	36.91
MAR	Newark Bay	Yolk-sac	0.00
MAR	Newark Bay	Post yolk-sac	0.00
MAR	Newark Bay	Juvenile	0.00
MAR	Arthur Kill	Egg	28.43
MAR	Arthur Kill	Yolk-sac	0.00
MAR	Arthur Kill	Post yolk-sac	0.00
MAR	Arthur Kill	Juvenile	0.00
MAR	Port Jersey Channel	Egg	27.63
MAR	Port Jersey Channel	Yolk-sac	0.00
MAR	Port Jersey Channel	Post yolk-sac	0.00
MAR	Port Jersey Channel	Juvenile	0.00
MAR	South Brooklyn Channel	Egg	118.98

TABLE E2-5 (Cont'd)

AVERAGE ICTHYOPLANKTON DENSITY (NO./1000 CUBIC METERS) OF FOURBEARD ROCKLING
FEBRUARY 1999 - JUNE 1999

MONTH	AREA	LIFESTAGE	AVG DENSITY
MAR	South Brooklyn Channel	Yolk-sac	0.00
MAR	South Brooklyn Channel	Post yolk-sac	0.00
MAR	South Brooklyn Channel	Juvenile	0.00
MAR	Port Jersey	Egg	73.02
MAR	Port Jersey	Yolk-sac	0.00
MAR	Port Jersey	Post yolk-sac	0.00
MAR	Port Jersey	Juvenile	0.00
MAR	South Brooklyn	Egg	284.19
MAR	South Brooklyn	Yolk-sac	0.00
MAR	South Brooklyn	Post yolk-sac	0.00
MAR	South Brooklyn	Juvenile	0.00
APR	Lower Harbor	Egg	69.01
APR	Lower Harbor	Yolk-sac	0.00
APR	Lower Harbor	Post yolk-sac	0.00
APR	Lower Harbor	Juvenile	0.00
APR	Upper Harbor	Egg	12.80
APR	Upper Harbor	Yolk-sac	0.00
APR	Upper Harbor	Post yolk-sac	0.00
APR	Upper Harbor	Juvenile	0.00
APR	Red Hook	Egg	42.32
APR	Red Hook	Yolk-sac	0.00
APR	Red Hook	Post yolk-sac	0.00
APR	Red Hook	Juvenile	0.00
APR	Kill Van Kull	Egg	20.02
APR	Kill Van Kull	Yolk-sac	0.00
APR	Kill Van Kull	Post yolk-sac	0.00
APR	Kill Van Kull	Juvenile	0.00
APR	Newark Bay	Egg	7.63
APR	Newark Bay	Yolk-sac	0.00
APR	Newark Bay	Post yolk-sac	0.00
APR	Newark Bay	Juvenile	0.00
APR	Arthur Kill	Egg	5.57
APR	Arthur Kill	Yolk-sac	0.00
APR	Arthur Kill	Post yolk-sac	0.00
APR	Arthur Kill	Juvenile	0.00
APR	Port Jersey Channel	Egg	213.90
APR	Port Jersey Channel	Yolk-sac	0.00
APR	Port Jersey Channel	Post yolk-sac	0.00
APR	Port Jersey Channel	Juvenile	0.00
APR	South Brooklyn Channel	Egg	107.67
APR	South Brooklyn Channel	Yolk-sac	0.00
APR	South Brooklyn Channel	Post yolk-sac	0.00
APR	South Brooklyn Channel	Juvenile	0.00
APR	Port Jersey	Egg	132.96
APR	Port Jersey	Yolk-sac	0.00
APR	Port Jersey	Post yolk-sac	0.00
APR	Port Jersey	Juvenile	0.00
APR	South Brooklyn	Egg	316.55
APR	South Brooklyn	Yolk-sac	0.00
APR	South Brooklyn	Post yolk-sac	0.00
APR	South Brooklyn	Juvenile	0.00
MAY	Lower Harbor	Egg	0.00
MAY	Lower Harbor	Yolk-sac	0.00
MAY	Lower Harbor	Post yolk-sac	0.00
MAY	Lower Harbor	Juvenile	0.00
MAY	Upper Harbor	Egg	0.00
MAY	Upper Harbor	Yolk-sac	0.00
MAY	Upper Harbor	Post yolk-sac	0.00
MAY	Upper Harbor	Juvenile	0.00
MAY	Red Hook	Egg	0.00
MAY	Red Hook	Yolk-sac	0.00
MAY	Red Hook	Post yolk-sac	0.00
MAY	Red Hook	Juvenile	0.00
MAY	Kill Van Kull	Egg	0.00
MAY	Kill Van Kull	Yolk-sac	0.00
MAY	Kill Van Kull	Post yolk-sac	0.00
MAY	Kill Van Kull	Juvenile	0.00
MAY	Newark Bay	Egg	0.00
MAY	Newark Bay	Yolk-sac	0.00

TABLE E2-5 (Cont'd)

AVERAGE ICTHYOPLANKTON DENSITY (NO./1000 CUBIC METERS) OF FOURBEARD ROCKLING
FEBRUARY 1999 - JUNE 1999

MONTH	AREA	LIFESTAGE	AVG DENSITY
MAY	Newark Bay	Post yolk-sac	0.00
MAY	Newark Bay	Juvenile	0.00
MAY	Arthur Kill	Egg	0.00
MAY	Arthur Kill	Yolk-sac	0.00
MAY	Arthur Kill	Post yolk-sac	0.00
MAY	Arthur Kill	Juvenile	0.00
MAY	Port Jersey Channel	Egg	0.00
MAY	Port Jersey Channel	Yolk-sac	0.00
MAY	Port Jersey Channel	Post yolk-sac	0.00
MAY	Port Jersey Channel	Juvenile	0.00
MAY	South Brooklyn Channel	Egg	0.00
MAY	South Brooklyn Channel	Yolk-sac	0.00
MAY	South Brooklyn Channel	Post yolk-sac	0.00
MAY	South Brooklyn Channel	Juvenile	0.00
MAY	Port Jersey	Egg	0.00
MAY	Port Jersey	Yolk-sac	0.00
MAY	Port Jersey	Post yolk-sac	0.00
MAY	Port Jersey	Juvenile	0.00
MAY	South Brooklyn	Egg	0.00
MAY	South Brooklyn	Yolk-sac	0.00
MAY	South Brooklyn	Post yolk-sac	0.00
MAY	South Brooklyn	Juvenile	0.00
JUN	Lower Harbor	Egg	0.00
JUN	Lower Harbor	Yolk-sac	0.00
JUN	Lower Harbor	Post yolk-sac	0.00
JUN	Lower Harbor	Juvenile	0.00
JUN	Upper Harbor	Egg	0.00
JUN	Upper Harbor	Yolk-sac	0.00
JUN	Upper Harbor	Post yolk-sac	0.00
JUN	Upper Harbor	Juvenile	0.00
JUN	Red Hook	Egg	0.00
JUN	Red Hook	Yolk-sac	0.00
JUN	Red Hook	Post yolk-sac	0.00
JUN	Red Hook	Juvenile	0.00
JUN	Kill Van Kull	Egg	0.00
JUN	Kill Van Kull	Yolk-sac	0.00
JUN	Kill Van Kull	Post yolk-sac	0.00
JUN	Kill Van Kull	Juvenile	0.00
JUN	Newark Bay	Egg	0.00
JUN	Newark Bay	Yolk-sac	0.00
JUN	Newark Bay	Post yolk-sac	0.00
JUN	Newark Bay	Juvenile	0.00
JUN	Arthur Kill	Egg	0.00
JUN	Arthur Kill	Yolk-sac	0.00
JUN	Arthur Kill	Post yolk-sac	0.00
JUN	Arthur Kill	Juvenile	0.00
JUN	Port Jersey Channel	Egg	0.00
JUN	Port Jersey Channel	Yolk-sac	0.00
JUN	Port Jersey Channel	Post yolk-sac	0.00
JUN	Port Jersey Channel	Juvenile	0.00
JUN	South Brooklyn Channel	Egg	0.00
JUN	South Brooklyn Channel	Yolk-sac	0.00
JUN	South Brooklyn Channel	Post yolk-sac	0.00
JUN	South Brooklyn Channel	Juvenile	0.00
JUN	Port Jersey	Egg	0.00
JUN	Port Jersey	Yolk-sac	0.00
JUN	Port Jersey	Post yolk-sac	0.00
JUN	Port Jersey	Juvenile	0.00
JUN	South Brooklyn	Egg	0.00
JUN	South Brooklyn	Yolk-sac	0.00
JUN	South Brooklyn	Post yolk-sac	0.00
JUN	South Brooklyn	Juvenile	0.00

Areas: Lower Harbor (HW 1), Upper Harbor (HW 2,4,), Red Hook (HW 3), Kill Van Kull (HW 5), Newark Bay (HW 8-10), Arthur Kill (HW 6-7), Port Jersey Channel (PJ 4), South Brooklyn Channel (SB 4), Port Jersey (PJ 1-3, 5-6), South Brooklyn (SB 1-3)

Notes: All samples collected with epibenthic sled. Not all stations sampled each month, see sampling schedule for actual months and stations sampled.

TABLE E2-6 (Cont'd)

AVERAGE ICTHYOPLANKTON DENSITY (NO./1000 CUBIC METERS) OF HOGCHOKER
FEBRUARY 1999 - JUNE 1999

MONTH	AREA	LIFESTAGE	AVG DENSITY
MAY	Newark Bay	Post yolk-sac	0.00
MAY	Newark Bay	Juvenile	0.00
MAY	Arthur Kill	Egg	0.00
MAY	Arthur Kill	Yolk-sac	0.00
MAY	Arthur Kill	Post yolk-sac	0.00
MAY	Arthur Kill	Juvenile	0.00
MAY	Port Jersey Channel	Egg	67.48
MAY	Port Jersey Channel	Yolk-sac	0.00
MAY	Port Jersey Channel	Post yolk-sac	0.00
MAY	Port Jersey Channel	Juvenile	0.00
MAY	South Brooklyn Channel	Egg	990.33
MAY	South Brooklyn Channel	Yolk-sac	0.00
MAY	South Brooklyn Channel	Post yolk-sac	0.00
MAY	South Brooklyn Channel	Juvenile	0.00
MAY	Port Jersey	Egg	46.90
MAY	Port Jersey	Yolk-sac	0.00
MAY	Port Jersey	Post yolk-sac	0.00
MAY	Port Jersey	Juvenile	0.00
MAY	South Brooklyn	Egg	49.74
MAY	South Brooklyn	Yolk-sac	0.00
MAY	South Brooklyn	Post yolk-sac	0.00
MAY	South Brooklyn	Juvenile	0.00
JUN	Lower Harbor	Egg	560.85
JUN	Lower Harbor	Yolk-sac	0.00
JUN	Lower Harbor	Post yolk-sac	0.00
JUN	Lower Harbor	Juvenile	0.00
JUN	Upper Harbor	Egg	605.71
JUN	Upper Harbor	Yolk-sac	0.00
JUN	Upper Harbor	Post yolk-sac	0.00
JUN	Upper Harbor	Juvenile	0.00
JUN	Red Hook	Egg	165.90
JUN	Red Hook	Yolk-sac	0.00
JUN	Red Hook	Post yolk-sac	0.00
JUN	Red Hook	Juvenile	0.00
JUN	Kill Van Kull	Egg	41.11
JUN	Kill Van Kull	Yolk-sac	0.00
JUN	Kill Van Kull	Post yolk-sac	0.00
JUN	Kill Van Kull	Juvenile	0.00
JUN	Newark Bay	Egg	69.51
JUN	Newark Bay	Yolk-sac	0.00
JUN	Newark Bay	Post yolk-sac	0.00
JUN	Newark Bay	Juvenile	0.00
JUN	Arthur Kill	Egg	11.24
JUN	Arthur Kill	Yolk-sac	0.00
JUN	Arthur Kill	Post yolk-sac	0.00
JUN	Arthur Kill	Juvenile	0.00
JUN	Port Jersey Channel	Egg	219.32
JUN	Port Jersey Channel	Yolk-sac	0.00
JUN	Port Jersey Channel	Post yolk-sac	0.00
JUN	Port Jersey Channel	Juvenile	0.00
JUN	South Brooklyn Channel	Egg	68.20
JUN	South Brooklyn Channel	Yolk-sac	0.00
JUN	South Brooklyn Channel	Post yolk-sac	0.00
JUN	South Brooklyn Channel	Juvenile	0.00
JUN	Port Jersey	Egg	186.19
JUN	Port Jersey	Yolk-sac	0.00
JUN	Port Jersey	Post yolk-sac	0.00
JUN	Port Jersey	Juvenile	0.00
JUN	South Brooklyn	Egg	707.06
JUN	South Brooklyn	Yolk-sac	0.00
JUN	South Brooklyn	Post yolk-sac	0.00
JUN	South Brooklyn	Juvenile	0.00

Areas: Lower Harbor (HW 1), Upper Harbor (HW 2,4), Red Hook (HW 3), Kill Van Kull (HW 5), Newark Bay (HW 8 10), Arthur Kill (HW 6-7), Port Jersey Channel (PJ 4), South Brooklyn Channel (SB 4), Port Jersey (PJ 1-3, 5-6), South Brooklyn (SB 1-3)

Notes: All samples collected with epibenthic sled. Not all stations sampled each month, see sampling schedule for actual months and stations sampled.

TABLE E2-7

AVERAGE ICTHYOPLANKTON DENSITY (NO./1000 CUBIC METERS) OF SCULPINS
FEBRUARY 1999 - JUNE 1999

MONTH	AREA	LIFESTAGE	AVG DENSITY
FEB	Lower Harbor	Egg	0.00
FEB	Lower Harbor	Yolk-sac	0.00
FEB	Lower Harbor	Post yolk-sac	0.00
FEB	Lower Harbor	Juvenile	0.00
FEB	Upper Harbor	Egg	0.00
FEB	Upper Harbor	Yolk-sac	11.52
FEB	Upper Harbor	Post yolk-sac	3.77
FEB	Upper Harbor	Juvenile	0.00
FEB	Red Hook	Egg	0.00
FEB	Red Hook	Yolk-sac	5.71
FEB	Red Hook	Post yolk-sac	0.00
FEB	Red Hook	Juvenile	0.00
FEB	Kill Van Kull	Egg	0.00
FEB	Kill Van Kull	Yolk-sac	7.89
FEB	Kill Van Kull	Post yolk-sac	7.89
FEB	Kill Van Kull	Juvenile	0.00
FEB	Newark Bay	Egg	0.00
FEB	Newark Bay	Yolk-sac	0.00
FEB	Newark Bay	Post yolk-sac	5.53
FEB	Newark Bay	Juvenile	0.00
FEB	Arthur Kill	Egg	0.00
FEB	Arthur Kill	Yolk-sac	2.10
FEB	Arthur Kill	Post yolk-sac	0.00
FEB	Arthur Kill	Juvenile	0.00
FEB	Port Jersey Channel	Egg	0.00
FEB	Port Jersey Channel	Yolk-sac	0.00
FEB	Port Jersey Channel	Post yolk-sac	0.00
FEB	Port Jersey Channel	Juvenile	0.00
FEB	South Brooklyn Channel	Egg	0.00
FEB	South Brooklyn Channel	Yolk-sac	3.12
FEB	South Brooklyn Channel	Post yolk-sac	12.47
FEB	South Brooklyn Channel	Juvenile	0.00
FEB	Port Jersey	Egg	0.00
FEB	Port Jersey	Yolk-sac	6.35
FEB	Port Jersey	Post yolk-sac	0.00
FEB	Port Jersey	Juvenile	0.00
FEB	South Brooklyn	Egg	0.00
FEB	South Brooklyn	Yolk-sac	0.00
FEB	South Brooklyn	Post yolk-sac	3.36
FEB	South Brooklyn	Juvenile	0.00
MAR	Lower Harbor	Egg	0.00
MAR	Lower Harbor	Yolk-sac	0.00
MAR	Lower Harbor	Post yolk-sac	24.85
MAR	Lower Harbor	Juvenile	0.00
MAR	Upper Harbor	Egg	0.00
MAR	Upper Harbor	Yolk-sac	17.35
MAR	Upper Harbor	Post yolk-sac	58.60
MAR	Upper Harbor	Juvenile	0.00
MAR	Red Hook	Egg	0.00
MAR	Red Hook	Yolk-sac	0.00
MAR	Red Hook	Post yolk-sac	6.09
MAR	Red Hook	Juvenile	0.00
MAR	Kill Van Kull	Egg	492.54
MAR	Kill Van Kull	Yolk-sac	6.66
MAR	Kill Van Kull	Post yolk-sac	6.66
MAR	Kill Van Kull	Juvenile	0.00
MAR	Newark Bay	Egg	0.00
MAR	Newark Bay	Yolk-sac	32.34
MAR	Newark Bay	Post yolk-sac	41.82
MAR	Newark Bay	Juvenile	0.00
MAR	Arthur Kill	Egg	0.00
MAR	Arthur Kill	Yolk-sac	0.00
MAR	Arthur Kill	Post yolk-sac	20.92
MAR	Arthur Kill	Juvenile	0.00
MAR	Port Jersey Channel	Egg	0.00
MAR	Port Jersey Channel	Yolk-sac	16.58
MAR	Port Jersey Channel	Post yolk-sac	121.57
MAR	Port Jersey Channel	Juvenile	0.00
MAR	South Brooklyn Channel	Egg	0.00

TABLE E2-6

AVERAGE ICTHYOPLANKTON DENSITY (NO./1000 CUBIC METERS) OF HOGCHOKER
FEBRUARY 1999 - JUNE 1999

MONTH	AREA	LIFESTAGE	AVG DENSITY
FEB	Lower Harbor	Egg	0.00
FEB	Lower Harbor	Yolk-sac	0.00
FEB	Lower Harbor	Post yolk-sac	0.00
FEB	Lower Harbor	Juvenile	0.00
FEB	Upper Harbor	Egg	0.00
FEB	Upper Harbor	Yolk-sac	0.00
FEB	Upper Harbor	Post yolk-sac	0.00
FEB	Upper Harbor	Juvenile	0.00
FEB	Red Hook	Egg	0.00
FEB	Red Hook	Yolk-sac	0.00
FEB	Red Hook	Post yolk-sac	0.00
FEB	Red Hook	Juvenile	0.00
FEB	Kill Van Kull	Egg	0.00
FEB	Kill Van Kull	Yolk-sac	0.00
FEB	Kill Van Kull	Post yolk-sac	0.00
FEB	Kill Van Kull	Juvenile	0.00
FEB	Newark Bay	Egg	0.00
FEB	Newark Bay	Yolk-sac	0.00
FEB	Newark Bay	Post yolk-sac	0.00
FEB	Newark Bay	Juvenile	0.00
FEB	Arthur Kill	Egg	0.00
FEB	Arthur Kill	Yolk-sac	0.00
FEB	Arthur Kill	Post yolk-sac	0.00
FEB	Arthur Kill	Juvenile	0.00
FEB	Port Jersey Channel	Egg	0.00
FEB	Port Jersey Channel	Yolk-sac	0.00
FEB	Port Jersey Channel	Post yolk-sac	0.00
FEB	Port Jersey Channel	Juvenile	0.00
FEB	South Brooklyn Channel	Egg	0.00
FEB	South Brooklyn Channel	Yolk-sac	0.00
FEB	South Brooklyn Channel	Post yolk-sac	0.00
FEB	South Brooklyn Channel	Juvenile	0.00
FEB	Port Jersey	Egg	0.00
FEB	Port Jersey	Yolk-sac	0.00
FEB	Port Jersey	Post yolk-sac	0.00
FEB	Port Jersey	Juvenile	0.00
FEB	South Brooklyn	Egg	0.00
FEB	South Brooklyn	Yolk-sac	0.00
FEB	South Brooklyn	Post yolk-sac	0.00
FEB	South Brooklyn	Juvenile	0.00
MAR	Lower Harbor	Egg	0.00
MAR	Lower Harbor	Yolk-sac	0.00
MAR	Lower Harbor	Post yolk-sac	0.00
MAR	Lower Harbor	Juvenile	0.00
MAR	Upper Harbor	Egg	0.00
MAR	Upper Harbor	Yolk-sac	0.00
MAR	Upper Harbor	Post yolk-sac	0.00
MAR	Upper Harbor	Juvenile	0.00
MAR	Red Hook	Egg	0.00
MAR	Red Hook	Yolk-sac	0.00
MAR	Red Hook	Post yolk-sac	0.00
MAR	Red Hook	Juvenile	0.00
MAR	Kill Van Kull	Egg	0.00
MAR	Kill Van Kull	Yolk-sac	0.00
MAR	Kill Van Kull	Post yolk-sac	0.00
MAR	Kill Van Kull	Juvenile	0.00
MAR	Newark Bay	Egg	0.00
MAR	Newark Bay	Yolk-sac	0.00
MAR	Newark Bay	Post yolk-sac	0.00
MAR	Newark Bay	Juvenile	0.00
MAR	Arthur Kill	Egg	0.00
MAR	Arthur Kill	Yolk-sac	0.00
MAR	Arthur Kill	Post yolk-sac	0.00
MAR	Arthur Kill	Juvenile	0.00
MAR	Port Jersey Channel	Egg	0.00
MAR	Port Jersey Channel	Yolk-sac	0.00
MAR	Port Jersey Channel	Post yolk-sac	0.00
MAR	Port Jersey Channel	Juvenile	0.00
MAR	South Brooklyn Channel	Egg	0.00

TABLE E2-6 (Cont'd)

AVERAGE ICTHYOPLANKTON DENSITY (NO./1000 CUBIC METERS) OF HOGCHOKER
FEBRUARY 1999 - JUNE 1999

MONTH	AREA	LIFESTAGE	AVG DENSITY
MAR	South Brooklyn Channel	Yolk-sac	0.00
MAR	South Brooklyn Channel	Post yolk-sac	0.00
MAR	South Brooklyn Channel	Juvenile	0.00
MAR	Port Jersey	Egg	0.00
MAR	Port Jersey	Yolk-sac	0.00
MAR	Port Jersey	Post yolk-sac	0.00
MAR	Port Jersey	Juvenile	0.00
MAR	South Brooklyn	Egg	0.00
MAR	South Brooklyn	Yolk-sac	0.00
MAR	South Brooklyn	Post yolk-sac	0.00
MAR	South Brooklyn	Juvenile	0.00
APR	Lower Harbor	Egg	0.00
APR	Lower Harbor	Yolk-sac	0.00
APR	Lower Harbor	Post yolk-sac	0.00
APR	Lower Harbor	Juvenile	0.00
APR	Upper Harbor	Egg	0.00
APR	Upper Harbor	Yolk-sac	0.00
APR	Upper Harbor	Post yolk-sac	0.00
APR	Upper Harbor	Juvenile	0.00
APR	Red Hook	Egg	0.00
APR	Red Hook	Yolk-sac	0.00
APR	Red Hook	Post yolk-sac	0.00
APR	Red Hook	Juvenile	0.00
APR	Kill Van Kull	Egg	0.00
APR	Kill Van Kull	Yolk-sac	0.00
APR	Kill Van Kull	Post yolk-sac	0.00
APR	Kill Van Kull	Juvenile	0.00
APR	Newark Bay	Egg	0.00
APR	Newark Bay	Yolk-sac	0.00
APR	Newark Bay	Post yolk-sac	0.00
APR	Newark Bay	Juvenile	0.00
APR	Arthur Kill	Egg	0.00
APR	Arthur Kill	Yolk-sac	0.00
APR	Arthur Kill	Post yolk-sac	0.00
APR	Arthur Kill	Juvenile	0.00
APR	Port Jersey Channel	Egg	0.00
APR	Port Jersey Channel	Yolk-sac	0.00
APR	Port Jersey Channel	Post yolk-sac	0.00
APR	Port Jersey Channel	Juvenile	0.00
APR	South Brooklyn Channel	Egg	0.00
APR	South Brooklyn Channel	Yolk-sac	0.00
APR	South Brooklyn Channel	Post yolk-sac	0.00
APR	South Brooklyn Channel	Juvenile	0.00
APR	Port Jersey	Egg	0.00
APR	Port Jersey	Yolk-sac	0.00
APR	Port Jersey	Post yolk-sac	0.00
APR	Port Jersey	Juvenile	0.00
APR	South Brooklyn	Egg	0.00
APR	South Brooklyn	Yolk-sac	0.00
APR	South Brooklyn	Post yolk-sac	0.00
APR	South Brooklyn	Juvenile	0.00
MAY	Lower Harbor	Egg	1211.20
MAY	Lower Harbor	Yolk-sac	0.00
MAY	Lower Harbor	Post yolk-sac	0.00
MAY	Lower Harbor	Juvenile	0.00
MAY	Upper Harbor	Egg	984.48
MAY	Upper Harbor	Yolk-sac	0.00
MAY	Upper Harbor	Post yolk-sac	0.00
MAY	Upper Harbor	Juvenile	0.00
MAY	Red Hook	Egg	2082.51
MAY	Red Hook	Yolk-sac	0.00
MAY	Red Hook	Post yolk-sac	0.00
MAY	Red Hook	Juvenile	0.00
MAY	Kill Van Kull	Egg	12.60
MAY	Kill Van Kull	Yolk-sac	0.00
MAY	Kill Van Kull	Post yolk-sac	0.00
MAY	Kill Van Kull	Juvenile	0.00
MAY	Newark Bay	Egg	1.07
MAY	Newark Bay	Yolk-sac	0.00

TABLE E2-7 (Cont'd)

AVERAGE ICTHYOPLANKTON DENSITY (NO./1000 CUBIC METERS) OF SCULPINS
FEBRUARY 1999 - JUNE 1999

MONTH	AREA	LIFESTAGE	AVG DENSITY
MAR	South Brooklyn Channel	Yolk-sac	35.00
MAR	South Brooklyn Channel	Post yolk-sac	139.98
MAR	South Brooklyn Channel	Juvenile	0.00
MAR	Port Jersey	Egg	75.78
MAR	Port Jersey	Yolk-sac	20.35
MAR	Port Jersey	Post yolk-sac	56.59
MAR	Port Jersey	Juvenile	0.00
MAR	South Brooklyn	Egg	0.00
MAR	South Brooklyn	Yolk-sac	10.63
MAR	South Brooklyn	Post yolk-sac	45.57
MAR	South Brooklyn	Juvenile	0.00
APR	Lower Harbor	Egg	0.00
APR	Lower Harbor	Yolk-sac	0.00
APR	Lower Harbor	Post yolk-sac	11.50
APR	Lower Harbor	Juvenile	0.00
APR	Upper Harbor	Egg	0.00
APR	Upper Harbor	Yolk-sac	0.00
APR	Upper Harbor	Post yolk-sac	32.96
APR	Upper Harbor	Juvenile	0.00
APR	Red Hook	Egg	0.00
APR	Red Hook	Yolk-sac	4.70
APR	Red Hook	Post yolk-sac	9.40
APR	Red Hook	Juvenile	0.00
APR	Kill Van Kull	Egg	0.00
APR	Kill Van Kull	Yolk-sac	24.02
APR	Kill Van Kull	Post yolk-sac	44.04
APR	Kill Van Kull	Juvenile	0.00
APR	Newark Bay	Egg	0.00
APR	Newark Bay	Yolk-sac	5.73
APR	Newark Bay	Post yolk-sac	22.22
APR	Newark Bay	Juvenile	0.00
APR	Arthur Kill	Egg	0.00
APR	Arthur Kill	Yolk-sac	19.51
APR	Arthur Kill	Post yolk-sac	22.30
APR	Arthur Kill	Juvenile	0.00
APR	Port Jersey Channel	Egg	0.00
APR	Port Jersey Channel	Yolk-sac	3.82
APR	Port Jersey Channel	Post yolk-sac	26.74
APR	Port Jersey Channel	Juvenile	0.00
APR	South Brooklyn Channel	Egg	0.00
APR	South Brooklyn Channel	Yolk-sac	4.68
APR	South Brooklyn Channel	Post yolk-sac	28.09
APR	South Brooklyn Channel	Juvenile	0.00
APR	Port Jersey	Egg	0.00
APR	Port Jersey	Yolk-sac	17.39
APR	Port Jersey	Post yolk-sac	34.67
APR	Port Jersey	Juvenile	0.00
APR	South Brooklyn	Egg	0.00
APR	South Brooklyn	Yolk-sac	13.63
APR	South Brooklyn	Post yolk-sac	40.79
APR	South Brooklyn	Juvenile	0.00
MAY	Lower Harbor	Egg	0.00
MAY	Lower Harbor	Yolk-sac	0.00
MAY	Lower Harbor	Post yolk-sac	0.00
MAY	Lower Harbor	Juvenile	0.00
MAY	Upper Harbor	Egg	0.00
MAY	Upper Harbor	Yolk-sac	0.00
MAY	Upper Harbor	Post yolk-sac	0.00
MAY	Upper Harbor	Juvenile	0.00
MAY	Red Hook	Egg	0.00
MAY	Red Hook	Yolk-sac	0.00
MAY	Red Hook	Post yolk-sac	0.00
MAY	Red Hook	Juvenile	0.00
MAY	Kill Van Kull	Egg	0.00
MAY	Kill Van Kull	Yolk-sac	0.00
MAY	Kill Van Kull	Post yolk-sac	0.00
MAY	Kill Van Kull	Juvenile	0.00
MAY	Newark Bay	Egg	0.00
MAY	Newark Bay	Yolk-sac	0.00

TABLE E2-7 (Cont'd)

AVERAGE ICTHYOPLANKTON DENSITY (NO./1000 CUBIC METERS) OF SCULPINS
FEBRUARY 1999 - JUNE 1999

MONTH	AREA	LIFESTAGE	AVG DENSITY
MAY	Newark Bay	Post yolk-sac	0.00
MAY	Newark Bay	Juvenile	0.00
MAY	Arthur Kill	Egg	0.00
MAY	Arthur Kill	Yolk-sac	0.00
MAY	Arthur Kill	Post yolk-sac	0.00
MAY	Arthur Kill	Juvenile	0.00
MAY	Port Jersey Channel	Egg	0.00
MAY	Port Jersey Channel	Yolk-sac	0.00
MAY	Port Jersey Channel	Post yolk-sac	0.00
MAY	Port Jersey Channel	Juvenile	0.00
MAY	South Brooklyn Channel	Egg	0.00
MAY	South Brooklyn Channel	Yolk-sac	0.00
MAY	South Brooklyn Channel	Post yolk-sac	0.00
MAY	South Brooklyn Channel	Juvenile	0.00
MAY	Port Jersey	Egg	0.00
MAY	Port Jersey	Yolk-sac	0.00
MAY	Port Jersey	Post yolk-sac	0.00
MAY	Port Jersey	Juvenile	0.00
MAY	South Brooklyn	Egg	0.00
MAY	South Brooklyn	Yolk-sac	0.00
MAY	South Brooklyn	Post yolk-sac	0.00
MAY	South Brooklyn	Juvenile	0.00
JUN	Lower Harbor	Egg	0.00
JUN	Lower Harbor	Yolk-sac	0.00
JUN	Lower Harbor	Post yolk-sac	0.00
JUN	Lower Harbor	Juvenile	0.00
JUN	Upper Harbor	Egg	0.00
JUN	Upper Harbor	Yolk-sac	0.00
JUN	Upper Harbor	Post yolk-sac	0.00
JUN	Upper Harbor	Juvenile	0.00
JUN	Red Hook	Egg	0.00
JUN	Red Hook	Yolk-sac	0.00
JUN	Red Hook	Post yolk-sac	0.00
JUN	Red Hook	Juvenile	0.00
JUN	Kill Van Kull	Egg	0.00
JUN	Kill Van Kull	Yolk-sac	0.00
JUN	Kill Van Kull	Post yolk-sac	0.00
JUN	Kill Van Kull	Juvenile	0.00
JUN	Newark Bay	Egg	0.00
JUN	Newark Bay	Yolk-sac	0.00
JUN	Newark Bay	Post yolk-sac	0.00
JUN	Newark Bay	Juvenile	0.00
JUN	Arthur Kill	Egg	0.00
JUN	Arthur Kill	Yolk-sac	0.00
JUN	Arthur Kill	Post yolk-sac	0.00
JUN	Arthur Kill	Juvenile	0.00
JUN	Port Jersey Channel	Egg	0.00
JUN	Port Jersey Channel	Yolk-sac	0.00
JUN	Port Jersey Channel	Post yolk-sac	0.00
JUN	Port Jersey Channel	Juvenile	0.00
JUN	South Brooklyn Channel	Egg	0.00
JUN	South Brooklyn Channel	Yolk-sac	0.00
JUN	South Brooklyn Channel	Post yolk-sac	0.00
JUN	South Brooklyn Channel	Juvenile	0.00
JUN	Port Jersey	Egg	0.00
JUN	Port Jersey	Yolk-sac	0.00
JUN	Port Jersey	Post yolk-sac	0.00
JUN	Port Jersey	Juvenile	0.00
JUN	South Brooklyn	Egg	0.00
JUN	South Brooklyn	Yolk-sac	0.00
JUN	South Brooklyn	Post yolk-sac	0.00
JUN	South Brooklyn	Juvenile	0.00

Areas: Lower Harbor (HW 1), Upper Harbor (HW 2,4), Red Hook (HW 3), Kill Van Kull (HW 5), Newark Bay (HW 8-10), Arthur Kill (HW 6-7), Port Jersey Channel (PJ 4), South Brooklyn Channel (SB 4), Port Jersey (PJ 1-3, 5-6), South Brooklyn (SB 1-3).

Notes: All samples collected with epibenthic sled. Not all stations sampled each month, see sampling schedule for actual months and stations sampled.

TABLE E2-8

AVERAGE ICTHYOPLANKTON DENSITY (NO./1000 CUBIC METERS) OF TAUTOG
FEBRUARY 1999 - JUNE 1999

MONTH	AREA	LIFESTAGE	AVG DENSITY
FEB	Lower Harbor	Egg	0.00
FEB	Lower Harbor	Yolk-sac	0.00
FEB	Lower Harbor	Post yolk-sac	0.00
FEB	Lower Harbor	Juvenile	0.00
FEB	Upper Harbor	Egg	0.00
FEB	Upper Harbor	Yolk-sac	0.00
FEB	Upper Harbor	Post yolk-sac	0.00
FEB	Upper Harbor	Juvenile	0.00
FEB	Red Hook	Egg	0.00
FEB	Red Hook	Yolk-sac	0.00
FEB	Red Hook	Post yolk-sac	0.00
FEB	Red Hook	Juvenile	0.00
FEB	Kill Van Kull	Egg	0.00
FEB	Kill Van Kull	Yolk-sac	0.00
FEB	Kill Van Kull	Post yolk-sac	0.00
FEB	Kill Van Kull	Juvenile	0.00
FEB	Newark Bay	Egg	0.00
FEB	Newark Bay	Yolk-sac	0.00
FEB	Newark Bay	Post yolk-sac	0.00
FEB	Newark Bay	Juvenile	0.00
FEB	Arthur Kill	Egg	0.00
FEB	Arthur Kill	Yolk-sac	0.00
FEB	Arthur Kill	Post yolk-sac	0.00
FEB	Arthur Kill	Juvenile	0.00
FEB	Port Jersey Channel	Egg	0.00
FEB	Port Jersey Channel	Yolk-sac	0.00
FEB	Port Jersey Channel	Post yolk-sac	0.00
FEB	Port Jersey Channel	Juvenile	0.00
FEB	South Brooklyn Channel	Egg	0.00
FEB	South Brooklyn Channel	Yolk-sac	0.00
FEB	South Brooklyn Channel	Post yolk-sac	0.00
FEB	South Brooklyn Channel	Juvenile	0.00
FEB	Port Jersey	Egg	0.00
FEB	Port Jersey	Yolk-sac	0.00
FEB	Port Jersey	Post yolk-sac	0.00
FEB	Port Jersey	Juvenile	0.00
FEB	South Brooklyn	Egg	0.00
FEB	South Brooklyn	Yolk-sac	0.00
FEB	South Brooklyn	Post yolk-sac	0.00
FEB	South Brooklyn	Juvenile	0.00
MAR	Lower Harbor	Egg	0.00
MAR	Lower Harbor	Yolk-sac	0.00
MAR	Lower Harbor	Post yolk-sac	0.00
MAR	Lower Harbor	Juvenile	0.00
MAR	Upper Harbor	Egg	0.00
MAR	Upper Harbor	Yolk-sac	0.00
MAR	Upper Harbor	Post yolk-sac	0.00
MAR	Upper Harbor	Juvenile	0.00
MAR	Red Hook	Egg	0.00
MAR	Red Hook	Yolk-sac	0.00
MAR	Red Hook	Post yolk-sac	0.00
MAR	Red Hook	Juvenile	0.00
MAR	Kill Van Kull	Egg	0.00
MAR	Kill Van Kull	Yolk-sac	0.00
MAR	Kill Van Kull	Post yolk-sac	0.00
MAR	Kill Van Kull	Juvenile	0.00
MAR	Newark Bay	Egg	0.00
MAR	Newark Bay	Yolk-sac	0.00
MAR	Newark Bay	Post yolk-sac	0.00
MAR	Newark Bay	Juvenile	0.00
MAR	Arthur Kill	Egg	0.00
MAR	Arthur Kill	Yolk-sac	0.00
MAR	Arthur Kill	Post yolk-sac	0.00
MAR	Arthur Kill	Juvenile	0.00
MAR	Port Jersey Channel	Egg	0.00
MAR	Port Jersey Channel	Yolk-sac	0.00
MAR	Port Jersey Channel	Post yolk-sac	0.00
MAR	Port Jersey Channel	Juvenile	0.00
MAR	South Brooklyn Channel	Egg	0.00

TABLE E2-8 (Cont'd)

AVERAGE ICTHYOPLANKTON DENSITY (NO./1000 CUBIC METERS) OF TAUTOG
FEBRUARY 1999 - JUNE 1999

MONTH	AREA	LIFESTAGE	AVG DENSITY
MAR	South Brooklyn Channel	Yolk-sac	0.00
MAR	South Brooklyn Channel	Post yolk-sac	0.00
MAR	South Brooklyn Channel	Juvenile	0.00
MAR	Port Jersey	Egg	0.00
MAR	Port Jersey	Yolk-sac	0.00
MAR	Port Jersey	Post yolk-sac	0.00
MAR	Port Jersey	Juvenile	0.00
MAR	South Brooklyn	Egg	0.00
MAR	South Brooklyn	Yolk-sac	0.00
MAR	South Brooklyn	Post yolk-sac	0.00
MAR	South Brooklyn	Juvenile	0.00
APR	Lower Harbor	Egg	0.00
APR	Lower Harbor	Yolk-sac	0.00
APR	Lower Harbor	Post yolk-sac	0.00
APR	Lower Harbor	Juvenile	0.00
APR	Upper Harbor	Egg	0.00
APR	Upper Harbor	Yolk-sac	0.00
APR	Upper Harbor	Post yolk-sac	0.00
APR	Upper Harbor	Juvenile	0.00
APR	Red Hook	Egg	0.00
APR	Red Hook	Yolk-sac	0.00
APR	Red Hook	Post yolk-sac	0.00
APR	Red Hook	Juvenile	0.00
APR	Kill Van Kull	Egg	0.00
APR	Kill Van Kull	Yolk-sac	0.00
APR	Kill Van Kull	Post yolk-sac	0.00
APR	Kill Van Kull	Juvenile	0.00
APR	Newark Bay	Egg	0.00
APR	Newark Bay	Yolk-sac	0.00
APR	Newark Bay	Post yolk-sac	0.00
APR	Newark Bay	Juvenile	0.00
APR	Arthur Kill	Egg	0.00
APR	Arthur Kill	Yolk-sac	0.00
APR	Arthur Kill	Post yolk-sac	0.00
APR	Arthur Kill	Juvenile	0.00
APR	Port Jersey Channel	Egg	0.00
APR	Port Jersey Channel	Yolk-sac	0.00
APR	Port Jersey Channel	Post yolk-sac	0.00
APR	Port Jersey Channel	Juvenile	0.00
APR	South Brooklyn Channel	Egg	0.00
APR	South Brooklyn Channel	Yolk-sac	0.00
APR	South Brooklyn Channel	Post yolk-sac	0.00
APR	South Brooklyn Channel	Juvenile	0.00
APR	Port Jersey	Egg	0.00
APR	Port Jersey	Yolk-sac	0.00
APR	Port Jersey	Post yolk-sac	0.00
APR	Port Jersey	Juvenile	0.00
APR	South Brooklyn	Egg	0.00
APR	South Brooklyn	Yolk-sac	0.00
APR	South Brooklyn	Post yolk-sac	0.00
APR	South Brooklyn	Juvenile	0.00
MAY	Lower Harbor	Egg	972.15
MAY	Lower Harbor	Yolk-sac	0.00
MAY	Lower Harbor	Post yolk-sac	0.00
MAY	Lower Harbor	Juvenile	0.00
MAY	Upper Harbor	Egg	898.21
MAY	Upper Harbor	Yolk-sac	0.00
MAY	Upper Harbor	Post yolk-sac	0.00
MAY	Upper Harbor	Juvenile	0.00
MAY	Red Hook	Egg	3949.58
MAY	Red Hook	Yolk-sac	0.00
MAY	Red Hook	Post yolk-sac	0.00
MAY	Red Hook	Juvenile	0.00
MAY	Kill Van Kull	Egg	44.09
MAY	Kill Van Kull	Yolk-sac	0.00
MAY	Kill Van Kull	Post yolk-sac	0.00
MAY	Kill Van Kull	Juvenile	0.00
MAY	Newark Bay	Egg	214.27
MAY	Newark Bay	Yolk-sac	0.00

TABLE E2-8 (Cont'd)

AVERAGE ICTHYOPLANKTON DENSITY (NO./1000 CUBIC METERS) OF TAUTOG
FEBRUARY 1999 - JUNE 1999

MONTH	AREA	LIFESTAGE	AVG DENSITY
MAY	Newark Bay	Post yolk-sac	0.00
MAY	Newark Bay	Juvenile	0.00
MAY	Arthur Kill	Egg	208.89
MAY	Arthur Kill	Yolk-sac	0.00
MAY	Arthur Kill	Post yolk-sac	0.00
MAY	Arthur Kill	Juvenile	0.00
MAY	Port Jersey Channel	Egg	2125.51
MAY	Port Jersey Channel	Yolk-sac	0.00
MAY	Port Jersey Channel	Post yolk-sac	0.00
MAY	Port Jersey Channel	Juvenile	0.00
MAY	South Brooklyn Channel	Egg	2485.54
MAY	South Brooklyn Channel	Yolk-sac	0.00
MAY	South Brooklyn Channel	Post yolk-sac	0.00
MAY	South Brooklyn Channel	Juvenile	0.00
MAY	Port Jersey	Egg	2561.26
MAY	Port Jersey	Yolk-sac	0.00
MAY	Port Jersey	Post yolk-sac	0.00
MAY	Port Jersey	Juvenile	0.00
MAY	South Brooklyn	Egg	4507.19
MAY	South Brooklyn	Yolk-sac	0.00
MAY	South Brooklyn	Post yolk-sac	2.81
MAY	South Brooklyn	Juvenile	0.00
JUN	Lower Harbor	Egg	2095.82
JUN	Lower Harbor	Yolk-sac	0.00
JUN	Lower Harbor	Post yolk-sac	0.00
JUN	Lower Harbor	Juvenile	0.00
JUN	Upper Harbor	Egg	1860.24
JUN	Upper Harbor	Yolk-sac	0.00
JUN	Upper Harbor	Post yolk-sac	0.00
JUN	Upper Harbor	Juvenile	0.00
JUN	Red Hook	Egg	477.80
JUN	Red Hook	Yolk-sac	0.00
JUN	Red Hook	Post yolk-sac	0.00
JUN	Red Hook	Juvenile	0.00
JUN	Kill Van Kull	Egg	345.35
JUN	Kill Van Kull	Yolk-sac	0.00
JUN	Kill Van Kull	Post yolk-sac	0.00
JUN	Kill Van Kull	Juvenile	0.00
JUN	Newark Bay	Egg	305.44
JUN	Newark Bay	Yolk-sac	0.00
JUN	Newark Bay	Post yolk-sac	0.00
JUN	Newark Bay	Juvenile	0.00
JUN	Arthur Kill	Egg	153.88
JUN	Arthur Kill	Yolk-sac	0.00
JUN	Arthur Kill	Post yolk-sac	0.00
JUN	Arthur Kill	Juvenile	0.00
JUN	Port Jersey Channel	Egg	152.57
JUN	Port Jersey Channel	Yolk-sac	0.00
JUN	Port Jersey Channel	Post yolk-sac	0.00
JUN	Port Jersey Channel	Juvenile	0.00
JUN	South Brooklyn Channel	Egg	1176.54
JUN	South Brooklyn Channel	Yolk-sac	0.00
JUN	South Brooklyn Channel	Post yolk-sac	0.00
JUN	South Brooklyn Channel	Juvenile	0.00
JUN	Port Jersey	Egg	704.88
JUN	Port Jersey	Yolk-sac	0.00
JUN	Port Jersey	Post yolk-sac	1.17
JUN	Port Jersey	Juvenile	0.00
JUN	South Brooklyn	Egg	1042.69
JUN	South Brooklyn	Yolk-sac	0.00
JUN	South Brooklyn	Post yolk-sac	0.00
JUN	South Brooklyn	Juvenile	0.00

Areas: Lower Harbor (HW 1), Upper Harbor (HW 2,4), Red Hook (HW 3), Kill Van Kull (HW 5), Newark Bay (HW 8-10), Arthur Kill (HW 6-7), Port Jersey Channel (PJ 4), South Brooklyn Channel (SB 4), Port Jersey (PJ 1-3, 5-6), South Brooklyn (SB 1-3)

Notes: All samples collected with epibenthic sled. Not all stations sampled each month, see sampling schedule for actual months and stations sampled.

TABLE E2-9

AVERAGE ICTHYOPLANKTON DENSITY (NO./1000 CUBIC METERS) OF WEAKFISH
FEBRUARY 1999 - JUNE 1999

MONTH	AREA	LIFESTAGE	AVG DENSITY
FEB	Lower Harbor	Egg	0.00
FEB	Lower Harbor	Yolk-sac	0.00
FEB	Lower Harbor	Post yolk-sac	0.00
FEB	Lower Harbor	Juvenile	0.00
FEB	Upper Harbor	Egg	0.00
FEB	Upper Harbor	Yolk-sac	0.00
FEB	Upper Harbor	Post yolk-sac	0.00
FEB	Upper Harbor	Juvenile	0.00
FEB	Red Hook	Egg	0.00
FEB	Red Hook	Yolk-sac	0.00
FEB	Red Hook	Post yolk-sac	0.00
FEB	Red Hook	Juvenile	0.00
FEB	Kill Van Kull	Egg	0.00
FEB	Kill Van Kull	Yolk-sac	0.00
FEB	Kill Van Kull	Post yolk-sac	0.00
FEB	Kill Van Kull	Juvenile	0.00
FEB	Newark Bay	Egg	0.00
FEB	Newark Bay	Yolk-sac	0.00
FEB	Newark Bay	Post yolk-sac	0.00
FEB	Newark Bay	Juvenile	0.00
FEB	Arthur Kill	Egg	0.00
FEB	Arthur Kill	Yolk-sac	0.00
FEB	Arthur Kill	Post yolk-sac	0.00
FEB	Arthur Kill	Juvenile	0.00
FEB	Port Jersey Channel	Egg	0.00
FEB	Port Jersey Channel	Yolk-sac	0.00
FEB	Port Jersey Channel	Post yolk-sac	0.00
FEB	Port Jersey Channel	Juvenile	0.00
FEB	South Brooklyn Channel	Egg	0.00
FEB	South Brooklyn Channel	Yolk-sac	0.00
FEB	South Brooklyn Channel	Post yolk-sac	0.00
FEB	South Brooklyn Channel	Juvenile	0.00
FEB	Port Jersey	Egg	0.00
FEB	Port Jersey	Yolk-sac	0.00
FEB	Port Jersey	Post yolk-sac	0.00
FEB	Port Jersey	Juvenile	0.00
FEB	South Brooklyn	Egg	0.00
FEB	South Brooklyn	Yolk-sac	0.00
FEB	South Brooklyn	Post yolk-sac	0.00
FEB	South Brooklyn	Juvenile	0.00
MAR	Lower Harbor	Egg	0.00
MAR	Lower Harbor	Yolk-sac	0.00
MAR	Lower Harbor	Post yolk-sac	0.00
MAR	Lower Harbor	Juvenile	0.00
MAR	Upper Harbor	Egg	0.00
MAR	Upper Harbor	Yolk-sac	0.00
MAR	Upper Harbor	Post yolk-sac	0.00
MAR	Upper Harbor	Juvenile	0.00
MAR	Red Hook	Egg	0.00
MAR	Red Hook	Yolk-sac	0.00
MAR	Red Hook	Post yolk-sac	0.00
MAR	Red Hook	Juvenile	0.00
MAR	Kill Van Kull	Egg	0.00
MAR	Kill Van Kull	Yolk-sac	0.00
MAR	Kill Van Kull	Post yolk-sac	0.00
MAR	Kill Van Kull	Juvenile	0.00
MAR	Newark Bay	Egg	0.00
MAR	Newark Bay	Yolk-sac	0.00
MAR	Newark Bay	Post yolk-sac	0.00
MAR	Newark Bay	Juvenile	0.00
MAR	Arthur Kill	Egg	0.00
MAR	Arthur Kill	Yolk-sac	0.00
MAR	Arthur Kill	Post yolk-sac	0.00
MAR	Arthur Kill	Juvenile	0.00
MAR	Port Jersey Channel	Egg	0.00
MAR	Port Jersey Channel	Yolk-sac	0.00
MAR	Port Jersey Channel	Post yolk-sac	0.00
MAR	Port Jersey Channel	Juvenile	0.00
MAR	South Brooklyn Channel	Egg	0.00

TABLE E2-9 (Cont'd)

AVERAGE ICTHYOPLANKTON DENSITY (NO./1000 CUBIC METERS) OF WEAKFISH
FEBRUARY 1999 - JUNE 1999

MONTH	AREA	LIFESTAGE	AVG DENSITY
MAR	South Brooklyn Channel	Yolk-sac	0.00
MAR	South Brooklyn Channel	Post yolk-sac	0.00
MAR	South Brooklyn Channel	Juvenile	0.00
MAR	Port Jersey	Egg	0.00
MAR	Port Jersey	Yolk-sac	0.00
MAR	Port Jersey	Post yolk-sac	0.00
MAR	Port Jersey	Juvenile	0.00
MAR	South Brooklyn	Egg	0.00
MAR	South Brooklyn	Yolk-sac	0.00
MAR	South Brooklyn	Post yolk-sac	0.00
MAR	South Brooklyn	Juvenile	0.00
APR	Lower Harbor	Egg	0.00
APR	Lower Harbor	Yolk-sac	0.00
APR	Lower Harbor	Post yolk-sac	0.00
APR	Lower Harbor	Juvenile	0.00
APR	Upper Harbor	Egg	0.00
APR	Upper Harbor	Yolk-sac	0.00
APR	Upper Harbor	Post yolk-sac	0.00
APR	Upper Harbor	Juvenile	0.00
APR	Red Hook	Egg	0.00
APR	Red Hook	Yolk-sac	0.00
APR	Red Hook	Post yolk-sac	0.00
APR	Red Hook	Juvenile	0.00
APR	Kill Van Kull	Egg	0.00
APR	Kill Van Kull	Yolk-sac	0.00
APR	Kill Van Kull	Post yolk-sac	0.00
APR	Kill Van Kull	Juvenile	0.00
APR	Newark Bay	Egg	0.00
APR	Newark Bay	Yolk-sac	0.00
APR	Newark Bay	Post yolk-sac	0.00
APR	Newark Bay	Juvenile	0.00
APR	Arthur Kill	Egg	0.00
APR	Arthur Kill	Yolk-sac	0.00
APR	Arthur Kill	Post yolk-sac	0.00
APR	Arthur Kill	Juvenile	0.00
APR	Port Jersey Channel	Egg	0.00
APR	Port Jersey Channel	Yolk-sac	0.00
APR	Port Jersey Channel	Post yolk-sac	0.00
APR	Port Jersey Channel	Juvenile	0.00
APR	South Brooklyn Channel	Egg	0.00
APR	South Brooklyn Channel	Yolk-sac	0.00
APR	South Brooklyn Channel	Post yolk-sac	0.00
APR	South Brooklyn Channel	Juvenile	0.00
APR	Port Jersey	Egg	0.00
APR	Port Jersey	Yolk-sac	0.00
APR	Port Jersey	Post yolk-sac	0.00
APR	Port Jersey	Juvenile	0.00
APR	South Brooklyn	Egg	0.00
APR	South Brooklyn	Yolk-sac	0.00
APR	South Brooklyn	Post yolk-sac	0.00
APR	South Brooklyn	Juvenile	0.00
MAY	Lower Harbor	Egg	361.23
MAY	Lower Harbor	Yolk-sac	0.00
MAY	Lower Harbor	Post yolk-sac	0.00
MAY	Lower Harbor	Juvenile	0.00
MAY	Upper Harbor	Egg	2345.14
MAY	Upper Harbor	Yolk-sac	0.00
MAY	Upper Harbor	Post yolk-sac	0.00
MAY	Upper Harbor	Juvenile	0.00
MAY	Red Hook	Egg	10699.77
MAY	Red Hook	Yolk-sac	0.00
MAY	Red Hook	Post yolk-sac	0.00
MAY	Red Hook	Juvenile	0.00
MAY	Kill Van Kull	Egg	1190.55
MAY	Kill Van Kull	Yolk-sac	0.00
MAY	Kill Van Kull	Post yolk-sac	0.00
MAY	Kill Van Kull	Juvenile	0.00
MAY	Newark Bay	Egg	109.83
MAY	Newark Bay	Yolk-sac	0.00

TABLE E2-9 (Cont'd)

AVERAGE ICTHYOPLANKTON DENSITY (NO./1000 CUBIC METERS) OF WEAKFISH
FEBRUARY 1999 - JUNE 1999

MONTH	AREA	LIFESTAGE	AVG DENSITY
MAY	Newark Bay	Post yolk-sac	0.00
MAY	Newark Bay	Juvenile	0.00
MAY	Arthur Kill	Egg	101.65
MAY	Arthur Kill	Yolk-sac	0.00
MAY	Arthur Kill	Post yolk-sac	0.00
MAY	Arthur Kill	Juvenile	0.00
MAY	Port Jersey Channel	Egg	2024.29
MAY	Port Jersey Channel	Yolk-sac	0.00
MAY	Port Jersey Channel	Post yolk-sac	0.00
MAY	Port Jersey Channel	Juvenile	0.00
MAY	South Brooklyn Channel	Egg	2252.52
MAY	South Brooklyn Channel	Yolk-sac	0.00
MAY	South Brooklyn Channel	Post yolk-sac	0.00
MAY	South Brooklyn Channel	Juvenile	0.00
MAY	Port Jersey	Egg	3616.24
MAY	Port Jersey	Yolk-sac	0.00
MAY	Port Jersey	Post yolk-sac	0.00
MAY	Port Jersey	Juvenile	0.00
MAY	South Brooklyn	Egg	2732.18
MAY	South Brooklyn	Yolk-sac	0.00
MAY	South Brooklyn	Post yolk-sac	0.00
MAY	South Brooklyn	Juvenile	0.00
JUN	Lower Harbor	Egg	339.46
JUN	Lower Harbor	Yolk-sac	0.00
JUN	Lower Harbor	Post yolk-sac	0.00
JUN	Lower Harbor	Juvenile	0.00
JUN	Upper Harbor	Egg	1433.30
JUN	Upper Harbor	Yolk-sac	0.00
JUN	Upper Harbor	Post yolk-sac	41.73
JUN	Upper Harbor	Juvenile	0.00
JUN	Red Hook	Egg	1061.78
JUN	Red Hook	Yolk-sac	0.00
JUN	Red Hook	Post yolk-sac	0.00
JUN	Red Hook	Juvenile	0.00
JUN	Kill Van Kull	Egg	1011.39
JUN	Kill Van Kull	Yolk-sac	0.00
JUN	Kill Van Kull	Post yolk-sac	8.22
JUN	Kill Van Kull	Juvenile	0.00
JUN	Newark Bay	Egg	1017.02
JUN	Newark Bay	Yolk-sac	0.00
JUN	Newark Bay	Post yolk-sac	11.01
JUN	Newark Bay	Juvenile	0.00
JUN	Arthur Kill	Egg	541.61
JUN	Arthur Kill	Yolk-sac	0.00
JUN	Arthur Kill	Post yolk-sac	271.85
JUN	Arthur Kill	Juvenile	0.00
JUN	Port Jersey Channel	Egg	2174.15
JUN	Port Jersey Channel	Yolk-sac	0.00
JUN	Port Jersey Channel	Post yolk-sac	38.14
JUN	Port Jersey Channel	Juvenile	0.00
JUN	South Brooklyn Channel	Egg	1364.10
JUN	South Brooklyn Channel	Yolk-sac	0.00
JUN	South Brooklyn Channel	Post yolk-sac	8.53
JUN	South Brooklyn Channel	Juvenile	0.00
JUN	Port Jersey	Egg	1647.45
JUN	Port Jersey	Yolk-sac	0.00
JUN	Port Jersey	Post yolk-sac	10.50
JUN	Port Jersey	Juvenile	0.00
JUN	South Brooklyn	Egg	4256.05
JUN	South Brooklyn	Yolk-sac	0.00
JUN	South Brooklyn	Post yolk-sac	3.87
JUN	South Brooklyn	Juvenile	0.00

Areas: Lower Harbor (HW 1), Upper Harbor (HW 2,4), Red Hook (HW 3), Kill Van Kull (HW 5), Newark Bay (HW 8-10), Arthur Kill (HW 6-7), Port Jersey Channel (PJ 4), South Brooklyn Channel (SB 4), Port Jersey (PJ 1-3, 5-6), South Brooklyn (SB 1-3)

Notes: All samples collected with epibenthic sled. Not all stations sampled each month, see sampling schedule for actual months and stations sampled.

TABLE E2-10

AVERAGE ICTHYOPLANKTON DENSITY (NO./1000 CUBIC METERS) OF WINDOWPANE
FEBRUARY 1999 - JUNE 1999

MONTH	AREA	LIFESTAGE	AVG DENSITY
FEB	Lower Harbor	Egg	0.00
FEB	Lower Harbor	Yolk-sac	0.00
FEB	Lower Harbor	Post yolk-sac	0.00
FEB	Lower Harbor	Juvenile	0.00
FEB	Upper Harbor	Egg	0.00
FEB	Upper Harbor	Yolk-sac	0.00
FEB	Upper Harbor	Post yolk-sac	0.00
FEB	Upper Harbor	Juvenile	0.00
FEB	Red Hook	Egg	0.00
FEB	Red Hook	Yolk-sac	0.00
FEB	Red Hook	Post yolk-sac	0.00
FEB	Red Hook	Juvenile	0.00
FEB	Kill Van Kull	Egg	0.00
FEB	Kill Van Kull	Yolk-sac	0.00
FEB	Kill Van Kull	Post yolk-sac	0.00
FEB	Kill Van Kull	Juvenile	0.00
FEB	Newark Bay	Egg	0.00
FEB	Newark Bay	Yolk-sac	0.00
FEB	Newark Bay	Post yolk-sac	0.00
FEB	Newark Bay	Juvenile	0.00
FEB	Arthur Kill	Egg	0.00
FEB	Arthur Kill	Yolk-sac	0.00
FEB	Arthur Kill	Post yolk-sac	0.00
FEB	Arthur Kill	Juvenile	0.00
FEB	Port Jersey Channel	Egg	0.00
FEB	Port Jersey Channel	Yolk-sac	0.00
FEB	Port Jersey Channel	Post yolk-sac	0.00
FEB	Port Jersey Channel	Juvenile	0.00
FEB	South Brooklyn Channel	Egg	0.00
FEB	South Brooklyn Channel	Yolk-sac	0.00
FEB	South Brooklyn Channel	Post yolk-sac	0.00
FEB	South Brooklyn Channel	Juvenile	0.00
FEB	Port Jersey	Egg	0.00
FEB	Port Jersey	Yolk-sac	0.00
FEB	Port Jersey	Post yolk-sac	0.00
FEB	Port Jersey	Juvenile	0.00
FEB	South Brooklyn	Egg	0.00
FEB	South Brooklyn	Yolk-sac	0.00
FEB	South Brooklyn	Post yolk-sac	0.00
FEB	South Brooklyn	Juvenile	0.00
MAR	Lower Harbor	Egg	0.00
MAR	Lower Harbor	Yolk-sac	0.00
MAR	Lower Harbor	Post yolk-sac	0.00
MAR	Lower Harbor	Juvenile	0.00
MAR	Upper Harbor	Egg	0.00
MAR	Upper Harbor	Yolk-sac	0.00
MAR	Upper Harbor	Post yolk-sac	0.00
MAR	Upper Harbor	Juvenile	0.00
MAR	Red Hook	Egg	0.00
MAR	Red Hook	Yolk-sac	0.00
MAR	Red Hook	Post yolk-sac	0.00
MAR	Red Hook	Juvenile	0.00
MAR	Kill Van Kull	Egg	0.00
MAR	Kill Van Kull	Yolk-sac	0.00
MAR	Kill Van Kull	Post yolk-sac	0.00
MAR	Kill Van Kull	Juvenile	0.00
MAR	Newark Bay	Egg	0.00
MAR	Newark Bay	Yolk-sac	0.00
MAR	Newark Bay	Post yolk-sac	0.00
MAR	Newark Bay	Juvenile	0.00
MAR	Arthur Kill	Egg	0.00
MAR	Arthur Kill	Yolk-sac	0.00
MAR	Arthur Kill	Post yolk-sac	0.00
MAR	Arthur Kill	Juvenile	0.00
MAR	Port Jersey Channel	Egg	0.00
MAR	Port Jersey Channel	Yolk-sac	0.00
MAR	Port Jersey Channel	Post yolk-sac	0.00
MAR	Port Jersey Channel	Juvenile	0.00
MAR	South Brooklyn Channel	Egg	0.00

TABLE E2-10 (Cont'd)

AVERAGE ICTHYOPLANKTON DENSITY (NO./1000 CUBIC METERS) OF WINDOWPANE
FEBRUARY 1999 - JUNE 1999

MONTH	AREA	LIFESTAGE	AVG DENSITY
MAR	South Brooklyn Channel	Yolk-sac	0.00
MAR	South Brooklyn Channel	Post yolk-sac	0.00
MAR	South Brooklyn Channel	Juvenile	0.00
MAR	Port Jersey	Egg	0.00
MAR	Port Jersey	Yolk-sac	0.00
MAR	Port Jersey	Post yolk-sac	0.00
MAR	Port Jersey	Juvenile	0.00
MAR	South Brooklyn	Egg	0.00
MAR	South Brooklyn	Yolk-sac	0.00
MAR	South Brooklyn	Post yolk-sac	0.00
MAR	South Brooklyn	Juvenile	0.00
APR	Lower Harbor	Egg	0.00
APR	Lower Harbor	Yolk-sac	0.00
APR	Lower Harbor	Post yolk-sac	0.00
APR	Lower Harbor	Juvenile	0.00
APR	Upper Harbor	Egg	0.00
APR	Upper Harbor	Yolk-sac	0.00
APR	Upper Harbor	Post yolk-sac	0.00
APR	Upper Harbor	Juvenile	0.00
APR	Red Hook	Egg	0.00
APR	Red Hook	Yolk-sac	0.00
APR	Red Hook	Post yolk-sac	0.00
APR	Red Hook	Juvenile	0.00
APR	Kill Van Kull	Egg	0.00
APR	Kill Van Kull	Yolk-sac	0.00
APR	Kill Van Kull	Post yolk-sac	0.00
APR	Kill Van Kull	Juvenile	0.00
APR	Newark Bay	Egg	0.00
APR	Newark Bay	Yolk-sac	0.00
APR	Newark Bay	Post yolk-sac	0.00
APR	Newark Bay	Juvenile	0.00
APR	Arthur Kill	Egg	0.00
APR	Arthur Kill	Yolk-sac	0.00
APR	Arthur Kill	Post yolk-sac	0.00
APR	Arthur Kill	Juvenile	0.00
APR	Port Jersey Channel	Egg	0.00
APR	Port Jersey Channel	Yolk-sac	0.00
APR	Port Jersey Channel	Post yolk-sac	0.00
APR	Port Jersey Channel	Juvenile	0.00
APR	South Brooklyn Channel	Egg	0.00
APR	South Brooklyn Channel	Yolk-sac	0.00
APR	South Brooklyn Channel	Post yolk-sac	0.00
APR	South Brooklyn Channel	Juvenile	0.00
APR	Port Jersey	Egg	0.00
APR	Port Jersey	Yolk-sac	0.00
APR	Port Jersey	Post yolk-sac	0.00
APR	Port Jersey	Juvenile	0.00
APR	South Brooklyn	Egg	0.00
APR	South Brooklyn	Yolk-sac	0.00
APR	South Brooklyn	Post yolk-sac	0.00
APR	South Brooklyn	Juvenile	0.00
MAY	Lower Harbor	Egg	0.00
MAY	Lower Harbor	Yolk-sac	0.00
MAY	Lower Harbor	Post yolk-sac	31.87
MAY	Lower Harbor	Juvenile	0.00
MAY	Upper Harbor	Egg	0.00
MAY	Upper Harbor	Yolk-sac	0.00
MAY	Upper Harbor	Post yolk-sac	82.02
MAY	Upper Harbor	Juvenile	0.00
MAY	Red Hook	Egg	0.00
MAY	Red Hook	Yolk-sac	0.00
MAY	Red Hook	Post yolk-sac	0.00
MAY	Red Hook	Juvenile	0.00
MAY	Kill Van Kull	Egg	0.00
MAY	Kill Van Kull	Yolk-sac	0.00
MAY	Kill Van Kull	Post yolk-sac	6.30
MAY	Kill Van Kull	Juvenile	0.00
MAY	Newark Bay	Egg	0.00
MAY	Newark Bay	Yolk-sac	0.00

TABLE E2-10 (Cont'd)

AVERAGE ICTHYOPLANKTON DENSITY (NO./1000 CUBIC METERS) OF WINDOWPANE
FEBRUARY 1999 - JUNE 1999

MONTH	AREA	LIFESTAGE	AVG DENSITY
MAY	Newark Bay	Post yolk-sac	31.52
MAY	Newark Bay	Juvenile	0.00
MAY	Arthur Kill	Egg	0.00
MAY	Arthur Kill	Yolk-sac	0.00
MAY	Arthur Kill	Post yolk-sac	4.29
MAY	Arthur Kill	Juvenile	0.00
MAY	Port Jersey Channel	Egg	0.00
MAY	Port Jersey Channel	Yolk-sac	0.00
MAY	Port Jersey Channel	Post yolk-sac	4.22
MAY	Port Jersey Channel	Juvenile	0.00
MAY	South Brooklyn Channel	Egg	0.00
MAY	South Brooklyn Channel	Yolk-sac	0.00
MAY	South Brooklyn Channel	Post yolk-sac	33.98
MAY	South Brooklyn Channel	Juvenile	0.00
MAY	Port Jersey	Egg	0.00
MAY	Port Jersey	Yolk-sac	0.00
MAY	Port Jersey	Post yolk-sac	15.43
MAY	Port Jersey	Juvenile	1.24
MAY	South Brooklyn	Egg	0.00
MAY	South Brooklyn	Yolk-sac	0.00
MAY	South Brooklyn	Post yolk-sac	24.23
MAY	South Brooklyn	Juvenile	0.00
JUN	Lower Harbor	Egg	0.00
JUN	Lower Harbor	Yolk-sac	0.00
JUN	Lower Harbor	Post yolk-sac	7.38
JUN	Lower Harbor	Juvenile	0.00
JUN	Upper Harbor	Egg	0.00
JUN	Upper Harbor	Yolk-sac	0.00
JUN	Upper Harbor	Post yolk-sac	0.00
JUN	Upper Harbor	Juvenile	0.00
JUN	Red Hook	Egg	0.00
JUN	Red Hook	Yolk-sac	0.00
JUN	Red Hook	Post yolk-sac	19.91
JUN	Red Hook	Juvenile	0.00
JUN	Kill Van Kull	Egg	0.00
JUN	Kill Van Kull	Yolk-sac	0.00
JUN	Kill Van Kull	Post yolk-sac	12.33
JUN	Kill Van Kull	Juvenile	0.00
JUN	Newark Bay	Egg	0.00
JUN	Newark Bay	Yolk-sac	0.00
JUN	Newark Bay	Post yolk-sac	13.11
JUN	Newark Bay	Juvenile	0.00
JUN	Arthur Kill	Egg	0.00
JUN	Arthur Kill	Yolk-sac	0.00
JUN	Arthur Kill	Post yolk-sac	12.11
JUN	Arthur Kill	Juvenile	0.00
JUN	Port Jersey Channel	Egg	0.00
JUN	Port Jersey Channel	Yolk-sac	0.00
JUN	Port Jersey Channel	Post yolk-sac	0.00
JUN	Port Jersey Channel	Juvenile	0.00
JUN	South Brooklyn Channel	Egg	0.00
JUN	South Brooklyn Channel	Yolk-sac	0.00
JUN	South Brooklyn Channel	Post yolk-sac	0.00
JUN	South Brooklyn Channel	Juvenile	0.00
JUN	Port Jersey	Egg	0.00
JUN	Port Jersey	Yolk-sac	0.00
JUN	Port Jersey	Post yolk-sac	0.00
JUN	Port Jersey	Juvenile	0.00
JUN	South Brooklyn	Egg	0.00
JUN	South Brooklyn	Yolk-sac	0.00
JUN	South Brooklyn	Post yolk-sac	0.00
JUN	South Brooklyn	Juvenile	0.00

Areas: Lower Harbor (HW 1), Upper Harbor (HW 2,4), Red Hook (HW 3), Kill Van Kull (HW 5), Newark Bay (HW 8-10), Arthur Kill (HW 6-7), Port Jersey Channel (PJ 4), South Brooklyn Channel (SB 4), Port Jersey (PJ 1-3, 5-6), South Brooklyn (SB 1-3)

Notes: All samples collected with epibenthic sled. Not all stations sampled each month, see sampling schedule for actual months and stations sampled.

TABLE E2-11

AVERAGE ICTHYOPLANKTON DENSITY (NO./1000 CUBIC METERS) OF WINTER FLOUNDER
FEBRUARY 1999 - JUNE 1999

MONTH	AREA	LIFESTAGE	AVG DENSITY
FEB	Lower Harbor	Egg	0.00
FEB	Lower Harbor	Yolk-sac	0.00
FEB	Lower Harbor	Post yolk-sac	0.00
FEB	Lower Harbor	Juvenile	0.00
FEB	Upper Harbor	Egg	0.00
FEB	Upper Harbor	Yolk-sac	2.88
FEB	Upper Harbor	Post yolk-sac	0.00
FEB	Upper Harbor	Juvenile	0.00
FEB	Red Hook	Egg	0.00
FEB	Red Hook	Yolk-sac	5.71
FEB	Red Hook	Post yolk-sac	0.00
FEB	Red Hook	Juvenile	0.00
FEB	Kill Van Kull	Egg	0.00
FEB	Kill Van Kull	Yolk-sac	0.00
FEB	Kill Van Kull	Post yolk-sac	0.00
FEB	Kill Van Kull	Juvenile	0.00
FEB	Newark Bay	Egg	0.00
FEB	Newark Bay	Yolk-sac	0.00
FEB	Newark Bay	Post yolk-sac	0.00
FEB	Newark Bay	Juvenile	0.00
FEB	Arthur Kill	Egg	0.00
FEB	Arthur Kill	Yolk-sac	0.00
FEB	Arthur Kill	Post yolk-sac	0.00
FEB	Arthur Kill	Juvenile	0.00
FEB	Port Jersey Channel	Egg	0.00
FEB	Port Jersey Channel	Yolk-sac	0.00
FEB	Port Jersey Channel	Post yolk-sac	0.00
FEB	Port Jersey Channel	Juvenile	0.00
FEB	South Brooklyn Channel	Egg	0.00
FEB	South Brooklyn Channel	Yolk-sac	3.12
FEB	South Brooklyn Channel	Post yolk-sac	0.00
FEB	South Brooklyn Channel	Juvenile	0.00
FEB	Port Jersey	Egg	0.00
FEB	Port Jersey	Yolk-sac	0.00
FEB	Port Jersey	Post yolk-sac	0.00
FEB	Port Jersey	Juvenile	0.00
FEB	South Brooklyn	Egg	0.00
FEB	South Brooklyn	Yolk-sac	3.20
FEB	South Brooklyn	Post yolk-sac	0.00
FEB	South Brooklyn	Juvenile	0.00
MAR	Lower Harbor	Egg	119.29
MAR	Lower Harbor	Yolk-sac	4.97
MAR	Lower Harbor	Post yolk-sac	4.97
MAR	Lower Harbor	Juvenile	0.00
MAR	Upper Harbor	Egg	54.99
MAR	Upper Harbor	Yolk-sac	34.47
MAR	Upper Harbor	Post yolk-sac	2.26
MAR	Upper Harbor	Juvenile	0.00
MAR	Red Hook	Egg	578.67
MAR	Red Hook	Yolk-sac	0.00
MAR	Red Hook	Post yolk-sac	12.18
MAR	Red Hook	Juvenile	0.00
MAR	Kill Van Kull	Egg	13.31
MAR	Kill Van Kull	Yolk-sac	0.00
MAR	Kill Van Kull	Post yolk-sac	0.00
MAR	Kill Van Kull	Juvenile	0.00
MAR	Newark Bay	Egg	20.52
MAR	Newark Bay	Yolk-sac	0.00
MAR	Newark Bay	Post yolk-sac	0.00
MAR	Newark Bay	Juvenile	0.00
MAR	Arthur Kill	Egg	22.63
MAR	Arthur Kill	Yolk-sac	0.00
MAR	Arthur Kill	Post yolk-sac	0.00
MAR	Arthur Kill	Juvenile	0.00
MAR	Port Jersey Channel	Egg	5.53
MAR	Port Jersey Channel	Yolk-sac	0.00
MAR	Port Jersey Channel	Post yolk-sac	0.00
MAR	Port Jersey Channel	Juvenile	0.00
MAR	South Brooklyn Channel	Egg	97.99

TABLE E2-11 (Cont'd)

AVERAGE ICTHYOPLANKTON DENSITY (NO./1000 CUBIC METERS) OF WINTER FLOUNDER
FEBRUARY 1999 - JUNE 1999

MONTH	AREA	LIFESTAGE	AVG DENSITY
MAR	South Brooklyn Channel	Yolk-sac	7.00
MAR	South Brooklyn Channel	Post yolk-sac	0.00
MAR	South Brooklyn Channel	Juvenile	0.00
MAR	Port Jersey	Egg	35.75
MAR	Port Jersey	Yolk-sac	1.18
MAR	Port Jersey	Post yolk-sac	0.98
MAR	Port Jersey	Juvenile	0.00
MAR	South Brooklyn	Egg	85.82
MAR	South Brooklyn	Yolk-sac	0.00
MAR	South Brooklyn	Post yolk-sac	0.00
MAR	South Brooklyn	Juvenile	0.00
APR	Lower Harbor	Egg	149.52
APR	Lower Harbor	Yolk-sac	0.00
APR	Lower Harbor	Post yolk-sac	46.01
APR	Lower Harbor	Juvenile	0.00
APR	Upper Harbor	Egg	13.88
APR	Upper Harbor	Yolk-sac	0.00
APR	Upper Harbor	Post yolk-sac	685.23
APR	Upper Harbor	Juvenile	0.00
APR	Red Hook	Egg	18.81
APR	Red Hook	Yolk-sac	0.00
APR	Red Hook	Post yolk-sac	9.40
APR	Red Hook	Juvenile	0.00
APR	Kill Van Kull	Egg	0.00
APR	Kill Van Kull	Yolk-sac	0.00
APR	Kill Van Kull	Post yolk-sac	72.06
APR	Kill Van Kull	Juvenile	0.00
APR	Newark Bay	Egg	2.91
APR	Newark Bay	Yolk-sac	0.00
APR	Newark Bay	Post yolk-sac	33.74
APR	Newark Bay	Juvenile	0.00
APR	Arthur Kill	Egg	2.79
APR	Arthur Kill	Yolk-sac	0.00
APR	Arthur Kill	Post yolk-sac	61.32
APR	Arthur Kill	Juvenile	0.00
APR	Port Jersey Channel	Egg	53.48
APR	Port Jersey Channel	Yolk-sac	0.00
APR	Port Jersey Channel	Post yolk-sac	129.87
APR	Port Jersey Channel	Juvenile	0.00
APR	South Brooklyn Channel	Egg	70.22
APR	South Brooklyn Channel	Yolk-sac	0.00
APR	South Brooklyn Channel	Post yolk-sac	28.09
APR	South Brooklyn Channel	Juvenile	0.00
APR	Port Jersey	Egg	359.66
APR	Port Jersey	Yolk-sac	4.17
APR	Port Jersey	Post yolk-sac	204.89
APR	Port Jersey	Juvenile	0.00
APR	South Brooklyn	Egg	68.56
APR	South Brooklyn	Yolk-sac	0.00
APR	South Brooklyn	Post yolk-sac	81.00
APR	South Brooklyn	Juvenile	0.00
MAY	Lower Harbor	Egg	0.00
MAY	Lower Harbor	Yolk-sac	0.00
MAY	Lower Harbor	Post yolk-sac	0.00
MAY	Lower Harbor	Juvenile	0.00
MAY	Upper Harbor	Egg	0.00
MAY	Upper Harbor	Yolk-sac	0.00
MAY	Upper Harbor	Post yolk-sac	0.00
MAY	Upper Harbor	Juvenile	0.00
MAY	Red Hook	Egg	0.00
MAY	Red Hook	Yolk-sac	0.00
MAY	Red Hook	Post yolk-sac	0.00
MAY	Red Hook	Juvenile	0.00
MAY	Kill Van Kull	Egg	0.00
MAY	Kill Van Kull	Yolk-sac	0.00
MAY	Kill Van Kull	Post yolk-sac	12.60
MAY	Kill Van Kull	Juvenile	0.00
MAY	Newark Bay	Egg	0.00
MAY	Newark Bay	Yolk-sac	0.00

TABLE E2-11 (Cont'd)

AVERAGE ICTHYOPLANKTON DENSITY (NO./1000 CUBIC METERS) OF WINTER FLOUNDER
FEBRUARY 1999 - JUNE 1999

MONTH	AREA	LIFESTAGE	AVG DENSITY
MAY	Newark Bay	Post yolk-sac	14.28
MAY	Newark Bay	Juvenile	0.00
MAY	Arthur Kill	Egg	0.00
MAY	Arthur Kill	Yolk-sac	0.00
MAY	Arthur Kill	Post yolk-sac	0.00
MAY	Arthur Kill	Juvenile	0.00
MAY	Port Jersey Channel	Egg	0.00
MAY	Port Jersey Channel	Yolk-sac	0.00
MAY	Port Jersey Channel	Post yolk-sac	8.43
MAY	Port Jersey Channel	Juvenile	0.00
MAY	South Brooklyn Channel	Egg	0.00
MAY	South Brooklyn Channel	Yolk-sac	0.00
MAY	South Brooklyn Channel	Post yolk-sac	0.00
MAY	South Brooklyn Channel	Juvenile	0.00
MAY	Port Jersey	Egg	0.00
MAY	Port Jersey	Yolk-sac	0.00
MAY	Port Jersey	Post yolk-sac	1.24
MAY	Port Jersey	Juvenile	0.00
MAY	South Brooklyn	Egg	0.00
MAY	South Brooklyn	Yolk-sac	0.00
MAY	South Brooklyn	Post yolk-sac	6.90
MAY	South Brooklyn	Juvenile	0.00
JUN	Lower Harbor	Egg	0.00
JUN	Lower Harbor	Yolk-sac	0.00
JUN	Lower Harbor	Post yolk-sac	0.00
JUN	Lower Harbor	Juvenile	0.00
JUN	Upper Harbor	Egg	0.00
JUN	Upper Harbor	Yolk-sac	0.00
JUN	Upper Harbor	Post yolk-sac	0.00
JUN	Upper Harbor	Juvenile	0.00
JUN	Red Hook	Egg	0.00
JUN	Red Hook	Yolk-sac	0.00
JUN	Red Hook	Post yolk-sac	0.00
JUN	Red Hook	Juvenile	6.64
JUN	Kill Van Kull	Egg	0.00
JUN	Kill Van Kull	Yolk-sac	0.00
JUN	Kill Van Kull	Post yolk-sac	0.00
JUN	Kill Van Kull	Juvenile	0.00
JUN	Newark Bay	Egg	0.00
JUN	Newark Bay	Yolk-sac	0.00
JUN	Newark Bay	Post yolk-sac	0.00
JUN	Newark Bay	Juvenile	0.00
JUN	Arthur Kill	Egg	0.00
JUN	Arthur Kill	Yolk-sac	0.00
JUN	Arthur Kill	Post yolk-sac	0.00
JUN	Arthur Kill	Juvenile	0.00
JUN	Port Jersey Channel	Egg	0.00
JUN	Port Jersey Channel	Yolk-sac	0.00
JUN	Port Jersey Channel	Post yolk-sac	0.00
JUN	Port Jersey Channel	Juvenile	0.00
JUN	South Brooklyn Channel	Egg	0.00
JUN	South Brooklyn Channel	Yolk-sac	0.00
JUN	South Brooklyn Channel	Post yolk-sac	0.00
JUN	South Brooklyn Channel	Juvenile	0.00
JUN	Port Jersey	Egg	0.00
JUN	Port Jersey	Yolk-sac	0.00
JUN	Port Jersey	Post yolk-sac	0.00
JUN	Port Jersey	Juvenile	0.00
JUN	South Brooklyn	Egg	0.00
JUN	South Brooklyn	Yolk-sac	0.00
JUN	South Brooklyn	Post yolk-sac	0.00
JUN	South Brooklyn	Juvenile	0.00

Areas: Lower Harbor (HW 1), Upper Harbor (HW 2,4), Red Hook (HW 3), Kill Van Kull (HW 5), Newark Bay (HW 8-10), Arthur Kill (HW 6-7), Port Jersey Channel (PJ 4), South Brooklyn Channel (SB 4), Port Jersey (PJ 1-3, 5-6), South Brooklyn (SB 1-3)

Notes: All samples collected with epibenthic sled. Not all stations sampled each month, see sampling schedule for actual months and stations sampled.

APPENDIX F

BENTHIC GRAB MACROINVERTEBRATE DENSITY
NOVEMBER 1998, FEBRUARY 1999, MAY 1999, AUGUST 1999

APPENDIX F1

STATION MACROINVERTEBRATE DENSITY

TABLE F1-1
BENTHIC GRAB MACROINVERTEBRATE DENSITY (NO./0.1 SQ.METER) AT STATION HW-1
OCTOBER 1998 - SEPTEMBER 1999

STATION	HW - 1 (Ambrose Channel North)											
MONTH SAMPLED	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
Nematoda					3							
Nemertea		1									1	
Ampharetidae					1			8				
Capitellidae					1							
Pherusa sp.								1				
Glycera sp.					3							
Lumbrinereidae								1				
Magelona rosea		1						2			2	
Nephtys sp.		4			4			14			6	
Nereis sp.					3							
Paraonidae					2							
Aricidea sp.											2	
Phyllodocidae					7							
Harmothoe sp.					2							
Lepidametria commensalis					1							
Lepidonotus sp.					1							
Sigalionidae											1	
Spionidae					1			14				
Streblospio benedicti					8							
Polydora ligni		1										
Syllidae		1			7							
Gammaridea					4			1				
Gammarus sp.		1									1	
Corophium sp.					1							
Melita sp.					2							
Phoxocephalus holbolli					3							
Protohaustorius spp.		3									1	
Pagurus sp.					11			1				
Cancer irroratus					2							
Ovalipes ocellatus											1	
Crangon septimspinosa											1	
Strongylocentrotidae								22				
Bivalvia		1										
Mulinia lateralis											5	
Mya arenaria		1			1							
Mytilus edulis					1			1				
Solenidae								1				
Ensis directus								1				
Siliqua costata								4				
Tellina sp.					8			22			4	
Mercenaria mercenaria								2				
Crepidula fornicata					1							
Crepidula plana					3							
Ilyanassa trivittata					3			1				

NOTE: MONTHS SHADED WERE NOT SAMPLED.
DENSITY IS AVERAGE DENSITY OF MONTHLY REPLICATES (2).

TABLE F1-2
BENTHIC GRAB MACROINVERTEBRATE DENSITY (NO./0.1 SQ.METER) AT STATION HW-2
OCTOBER 1998 - SEPTEMBER 1999

STATION	HW - 2 (Ambrose Channel South)											
MONTH SAMPLED	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
Ampharetidae								1				
Nemertea											1	
Glycera sp.								1				
Magelona rosea											1	
Nephtys sp.		7			10			14			12	
Diopatra cuprea		1									1	
Leitoscoloplos fragilis											1	
Lepidonotus sp.					1							
Spionidae					1			1				
Polydora ligni		1										
Spiophanes bombyx											1	
Gammaridea					1							
Ampelisca abdita								1				
Unciola sp.											1	
Unciola dissimilis								1				
Corophium sp.		1						1			1	
Erichthonius braziliensis											2	
Gammarus sp.		1										
Melitidae					1							
Melita sp.											1	
Paraphoxus spinosus								1				
Trichophoxus epistomus					1						1	
Pagurus sp.		1			1							
Cancer sp.											1	
Ovalipes ocellatus		1										
Crangon septemspinosa		1										
Edotea triloba								1				
Idotea baltica					1							
Mulinia lateralis								1				
Mya arenaria		6										
Mytilidae					1							
Mytilus edulis								6				
Ensis directus											1	
Siliqua costata								1				
Solen viridis					2							
Tellina sp.					6			12			5	
Crepidula plana					1							
Ilyanassa trivittata		1			2							

NOTE: MONTHS SHADED WERE NOT SAMPLED.
DENSITY IS AVERAGE DENSITY OF MONTHLY REPLICATES (2).

TABLE F1-3
BENTHIC GRAB MACROINVERTEBRATE DENSITY (NO./0.1 SQ.METER) AT STATION HW-3
OCTOBER 1998 - SEPTEMBER 1999

STATION	HW - 3 (Red Hook Channel)											
MONTH SAMPLED	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
Actiniaria		1										
Nematoda		1										
Platyhelminthes		1			1						1	
Nemertea		1										
Oligochaeta		1			6			6				
Ampharetidae					3			12			6	
Cirratulidae					1							
Pherusa sp.								1				
Glycera sp.		3			9			2			4	
Nephtys sp.		2			2			4				
Nereis sp.		1									2	
Orbiniidae					16			3				
Leitoscoloplos fragilis		4			14			11			10	
Paraonidae		3			5			6			3	
Pectinaria gouldii		3			5			2			2	
Phyllodocidae		2			2			2				
Polynoidae											1	
Lepidonotus squamatus		1										
Sabellidae											1	
Spionidae					1							
Streblospio benedicti		31			48			22			10	
Polydora ligni											2	
Scolecolepides viridis								1				
Gammaridea		12			3							
Ampelisca abdita		2			29			20			4	
Corophium sp.											2	
Gammarus sp.					1							
Melita sp.		2									6	
Diastylis quadrispinosa								1				
Libinia spp.		1			1							
Edotea triloba					2			6				
Ostracoda					2			1				
Xanthidae											1	
Crangon septemspinosa											1	
Lyonsia hyalina					2			1			1	
Mulinia lateralis		50			141			49			4	
Mya arenaria					2							
Mytilidae					1							
Mytilus edulis								3			11	
Solen viridis					1							
Tellina sp.		9			26			18			11	
Mercenaria mercenaria					1						1	
Crepidula fornicata											4	
Crepidula plana		1			1						4	
Ilyanassa trivittata		2			2			1			2	
Acteocina canaliculata					2			2				
Molgula manhattensis											1	

NOTE: MONTHS SHADED WERE NOT SAMPLED.
DENSITY IS AVERAGE DENSITY OF MONTHLY REPLICATES (2).

TABLE F1-4
BENTHIC GRAB MACROINVERTEBRATE DENSITY (NO./0.1 SQ.METER) AT STATION HW-4
OCTOBER 1998 - SEPTEMBER 1999

STATION	HW - 4 (Anchorage Channel North)											
MONTH SAMPLED	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
Platyhelminthes					1							
Oligochaeta		1			6			3				
Ampharetidae					2			37			4	
Cirratulidae											2	
Pherusa sp.								1				
Glycera sp.		4			2			10			1	
Nephtys sp.					5			1				
Orbiniidae		1						2				
Leitoscoloplos fragilis		2			1			6			4	
Paraonidae		1			3			9			1	
Pectinaria gouldii		12			8			6			1	
Phyllodocidae								5			1	
Polynoidae											2	
Spionidae		1			1			1			1	
Streblospio benedicti		2			1			42			2	
Polydora ligni								1			2	
Scolecolepides viridis								2				
Syllidae								2			1	
Caprellidae					1							
Gammaridea		1			1			6				
Ampelisca abdita		2			2			16			4	
Corophium sp.											2	
Gammarus sp.								1				
Melita sp.											3	
Diastylis quadrispinosa		1						2				
Leucon americanus								1				
Pagurus sp.								1				
Pinnixa sayana								1				
Xanthidae											2	
Hexapanopeus angustifrons											1	
Edotea triloba		3			1			2				
Ostracoda					2			1				
Lyonsia hyalina					2			2				
Mulinia lateralis		121			601			116			1	
Mya arenaria		4			1							
Mytilus edulis								11			76	
Ensis directus								1				
Solen viridis					1			1				
Tellina sp.					18			114			1	
Mercenaria mercenaria					4			2			2	
Gastropoda		2										
Crepidula fornicata											10	
Crepidula plana					1			1			6	
Lacuna vincta					2			1				
Ilyanassa trivittata		2			1			2			1	
Acteocina canaliculata					2			4				
Molgula manhattensis											1	

NOTE: MONTHS SHADED WERE NOT SAMPLED. DENSITY IS AVERAGE DENSITY OF MONTHLY REPLICATES (2).

TABLE F1-5
BENTHIC GRAB MACROINVERTEBRATE DENSITY (NO./0.1 SQ.METER) AT STATION HW-5
OCTOBER 1998 - SEPTEMBER 1999

STATION	HW - 5 (Bergen Point East Reach/ Constable Hook Reach)											
MONTH SAMPLED	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
Actiniaria		1						1				
Glycera sp.		6			1			7			1	
Nephtys sp.		4			2			8			10	
Nereis sp.		4			3			2			2	
Orbiniidae								1				
Paraonidae		8						3			1	
Pectinaria gouldii		1										
Phyllodocidae		26			1			2				
Lepidonotus squamatus		1										
Sabellaria vulgaris		1						1				
Streblospio benedicti		30										
Scolecolepides viridis		236			86			117			116	
Syllidae		4										
Gammaridea		20			1			4				
Diastylis quadrispinosa								1				
Crangon septemspinosa					1						1	
Cyathura polita		4			1			2				
Edotea triloba								1				
Bivalvia		6										
Mulinia lateralis		3			1						1	
Mya arenaria		3						1				
Mytilus edulis								1				
Tellina sp.					1			7			8	

NOTE: MONTHS SHADED WERE NOT SAMPLED.
DENSITY IS AVERAGE DENSITY OF MONTHLY REPLICATES (2).

TABLE F1-6
BENTHIC GRAB MACROINVERTEBRATE DENSITY (NO./0.1 SQ.METER) AT STATION HW-6
OCTOBER 1998 - SEPTEMBER 1999

STATION	HW - 6 (North of Shooters Island Reach)											
MONTH SAMPLED	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
Nemertea		3										
Oligochaeta		1						1			1	
Ampharetidae								1			30	
Capitellidae					1							
Cirratulidae		1										
Glycera sp.					1			1				
Nephtys sp.					1			1				
Diopatra cuprea											3	
Orbiniidae		1			1							
Leitoscoloplos fragilis		6			3			7			6	
Paraonidae		2			1			1			1	
Phyllodocidae		2						1			1	
Pectinaria gouldii											1	
Sabellariidae								1				
Spionidae		2			2			1				
Streblospio benedicti		58			13			8			24	
Scolecolepides viridis								1				
Ampelisca abdita		1			1						2	
Gammarus sp.								1				
Leucon americanus		8						12			6	
Neomysis americana		1										
Mulinia lateralis					1			4			12	
Mya arenaria		1			1			6				
Tellina sp.								1				

NOTE: MONTHS SHADED WERE NOT SAMPLED.
DENSITY IS AVERAGE DENSITY OF MONTHLY REPLICATES (2).

TABLE F1-7
BENTHIC GRAB MACROINVERTEBRATE DENSITY (NO./0.1 SQ.METER) AT STATION HW-7
OCTOBER 1998 - SEPTEMBER 1999

STATION	HW - 7 (Elizabeth Reach)											
MONTH SAMPLED	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
Actiniaria											1	
Nemertea		4										
Oligochaeta		1			3						2	
Ampharetidae								2			7	
Cirratulidae		1										
Glycera sp.								1				
Nephtys sp.					1							
Nereis sp.					1			1				
Diopatra cuprea											2	
Orbiniidae		1			2			1				
Leitoscoloplos fragilis		4			2			5			3	
Paraonidae					2			1				
Phyllodocidae		1			6			1			1	
Pectinaria gouldii											2	
Sabellaria vulgaris					3							
Spionidae					2			2				
Streblospio benedicti		6			40			14			9	
Polydora ligni					4			1				
Gammaridea		1										
Ampelisca abdita								1				
Corophium sp.					2							
Diastylis quadrispinosa					1							
Leucon americanus		4						28			12	
Idotea metallica											1	
Mulinia lateralis								1			3	
Mya arenaria					4							
Tellinidae		1										
Tellina sp.											2	
Lacuna vincta					1							
Molgula manhattensis					2							

NOTE: MONTHS SHADED WERE NOT SAMPLED.
DENSITY IS AVERAGE DENSITY OF MONTHLY REPLICATES (2).

TABLE F1-8
BENTHIC GRAB MACROINVERTEBRATE DENSITY (NO./0.1 SQ.METER) AT STATION HW-8
OCTOBER 1998 - SEPTEMBER 1999

STATION	HW - 8 (Middle Reach)											
MONTH SAMPLED	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
Nemertea		1										
Oligochaeta		1										
Ampharetidae		2						2			42	
Glycera sp.		1			1			2			1	
Nephtys sp.					1			1				
Nereis sp.					1							
Diopatra cuprea											1	
Orbiniidae		2			2			15				
Haploscoloplos robustus		2										
Leitoscoloplos fragilis		4						17			4	
Paraonidae		2						1			1	
Phyllodocidae											1	
Spionidae		1										
Streblospio benedicti		4									4	
Syllidae								1				
Ampelisca abdita											1	
Diastylis quadrispinosa											1	
Leucon americanus								6			4	
Callinectes sapidus											1	
Crangon septemspinosa								1				
Upogebiidae					1							
Idoteidae								1				
Edotea triloba								2				
Ostracoda											1	
Lyonsia hyalina											2	
Mulinia lateralis		1			1			4			29	
Mya arenaria					2			4				
Tellina sp.								1			1	
Mercenaria mercenaria								1				
Acteocina canaliculata					1			1			1	

NOTE: MONTHS SHADED WERE NOT SAMPLED.
DENSITY IS AVERAGE DENSITY OF MONTHLY REPLICATES (2).

TABLE F1-9
BENTHIC GRAB MACROINVERTEBRATE DENSITY (NO./0.1 SQ.METER) AT STATION HW-9
OCTOBER 1998 - SEPTEMBER 1999

STATION	HW - 9 (Newark Bay South Reach)											
MONTH SAMPLED	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
Ampharetidae								15			66	
Glycera sp.								4			4	
Nephtys sp.								1				
Nereis sp.								1				
Diopatra cuprea								1			1	
Orbiniidae								8				
Leitoscoloplos fragilis								10			6	
Paraonidae								1				
Phyllodocidae								1			4	
Pectinaria gouldii											12	
Sabellaria vulgaris								2				
Streblospio benedicti								16			14	
Syllidae								4				
Gammaridea								4				
Ampelisca abdita								6			4	
Corophium sp.								1				
Gammarus sp.								2				
Melita sp.											3	
Diastylis quadrispinosa								1			2	
Leucon americanus								8				
Edotea triloba								2			1	
Idotea metallica											1	
Ostracoda								1				
Lyonsia hyalina								1			4	
Mulinia lateralis								2			19	
Mya arenaria											1	
Mytilus edulis								4				
Yoldia sp.								1				
Tellina sp.								7			11	
Mercenaria mercenaria											1	
Crepidula fornicata											1	
Crepidula plana								1				
Lacuna vincta								1				
Acteocina canaliculata											1	
Molgula manhattensis								1			1	

NOTE: MONTHS SHADED WERE NOT SAMPLED.
DENSITY IS AVERAGE DENSITY OF MONTHLY REPLICATES (2).

TABLE F1-10
BENTHIC GRAB MACROINVERTEBRATE DENSITY (NO./0.1 SQ.METER) AT STATION HW-10
OCTOBER 1998 - SEPTEMBER 1999

STATION	HW - 10 (Newark Bay / Port Elizabeth)											
MONTH SAMPLED	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
Ampharetidae								2			46	
Glycera sp.								1			2	
Nephtys sp.								1				
Nereis sp.								1				
Diopatra cuprea											2	
Orbiniidae								8				
Leitoscoloplos fragilis								12			9	
Pectinaria gouldii											2	
Streblospio benedicti								1			2	
Gammaridea								1				
Ampelisca abdita								1			1	
Gammarus sp.								8				
Cumacea											1	
Diastylis quadrispinosa											1	
Leucon americanus								10			1	
Brachyura											1	
Edotea triloba								1				
Lyonsia hyalina											2	
Mulinia lateralis								65			32	
Mya arenaria								10				
Yoldia sp.								1				
Acteocina canaliculata											1	

NOTE: MONTHS SHADED WERE NOT SAMPLED.
DENSITY IS AVERAGE DENSITY OF MONTHLY REPLICATES (2).

TABLE F1-11
BENTHIC GRAB MACROINVERTEBRATE DENSITY (NO./0.1 SQ.METER) AT STATION SB-1
OCTOBER 1998 - SEPTEMBER 1999

STATION	SB - 1 (Gowanus Bay Interpier South)											
MONTH SAMPLED	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
Oligochaeta		1			2			2			22	
Capitellidae					16							
Flabelligeridae		1										
Glycera sp.					1						1	
Nephtys sp.												
Nereis sp.					18			10				
Orbiniidae					4			1				
Leitoscoloplos fragilis		1			16			2			2	
Phyllodocidae					2			1				
Streblospio benedicti					50			8			3	
Gammaridea					1							
Ampelisca abdita					2						1	
Corophiidae								1				
Upogebia affinis											1	
Mulinia lateralis								1			1	
Tellina sp.								1				
Lacuna vincta		1										
Ilyanassa trivittata					1							
Acteocina canaliculata		1										

NOTE: MONTHS SHADED WERE NOT SAMPLED.
DENSITY IS AVERAGE DENSITY OF MONTHLY REPLICATES (2).

TABLE F1-12
BENTHIC GRAB MACROINVERTEBRATE DENSITY (NO./0.1 SQ.METER) AT STATION SB-2
OCTOBER 1998 - SEPTEMBER 1999

STATION	SB - 2 (Gowanus Bay Interpier)											
MONTH SAMPLED	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
Oligochaeta								1			2	
Ampharetidae		1										
Glycera sp.		2										
Maldanidae								1				
Nephtys sp.								3			1	
Nereis sp.		8										
Diopatra cuprea		1										
Orbiniidae								1				
Leitoscoloplos fragilis		1						1			1	
Phyllodocidae		2									1	
Sabella sp.		1										
Streblospio benedicti		16			1						1	
Polydora ligni											1	
Scolecolepides viridis		4										
Ampelisca abdita								1			1	
Gammarus sp.		2						1				
Leucon americanus					1			1				
Pagurus sp.		1										
Brachyura		1										
Dyspanopeus sayi		1										
Upogebia affinis		1										
Mulinia lateralis		1			6			2			14	
Mya arenaria		1			1						1	
Tellina sp.											1	
Crepidula plana		2										
Lacuna vincta		3										
Ilyanassa trivittata		1										
Acteocina canaliculata								2				

NOTE: MONTHS SHADED WERE NOT SAMPLED.
DENSITY IS AVERAGE DENSITY OF MONTHLY REPLICATES (2).

TABLE F1-13
BENTHIC GRAB MACROINVERTEBRATE DENSITY (NO./0.1 SQ.METER) AT STATION SB-3
OCTOBER 1998 - SEPTEMBER 1999

STATION	SB - 3 (Gowanus Bay Interpier North)											
MONTH SAMPLED	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
Oligochaeta		4			3						6	
Glycera sp.		1										
Nephtys sp.					2			1			1	
Nereis sp.		12										
Diopatra cuprea		1										
Orbiniidae					2			1				
Leitoscoloplos fragilis		3			3							
Paraonidae					1							
Sabella sp.		1										
Streblospio benedicti		78										
Ampelisca abdita		9			1							
Ostracoda											1	
Strongylocentrotidae								1				
Mulinia lateralis					1						2	
Mytilidae								1				
Lacuna vincta					1							
Ilyanassa obsoleta		3										
Ilyanassa trivittata		1										
Acteocina canaliculata					1			1			1	

NOTE: MONTHS SHADED WERE NOT SAMPLED.
DENSITY IS AVERAGE DENSITY OF MONTHLY REPLICATES (2).

TABLE F1-14
BENTHIC GRAB MACROINVERTEBRATE DENSITY (NO./0.1 SQ.METER) AT STATION SB-4
OCTOBER 1998 - SEPTEMBER 1999

STATION	SB - 4 (Bay Ridge Channel)											
MONTH SAMPLED	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
Oligochaeta								1				
Ampharetidae		1									6	
Glycera sp.		1						1			1	
Nephtys sp.		4			6			8			1	
Nereis sp.								1				
Leitoscoloplos fragilis					4						1	
Pectinaria gouldii		1										
Streblospio benedicti											2	
Polydora ligni											1	
Syllidae		1										
Ampelisca abdita								2			1	
Melita sp.											1	
Crangon septemspinosa											1	
Edotea triloba		1										
Bivalvia					2							
Lyonsia hyalina					1							
Mulinia lateralis		52			290			85			384	
Mya arenaria					2							
Yoldia sp.								2			2	
Tellina sp.					3			2			1	
Lacuna vincta					4			1				
Ilyanassa trivittata		1										
Acteocina canaliculata					4			1				

NOTE: MONTHS SHADED WERE NOT SAMPLED.
DENSITY IS AVERAGE DENSITY OF MONTHLY REPLICATES (2).

TABLE F1-15
BENTHIC GRAB MACROINVERTEBRATE DENSITY (NO./0.1 SQ.METER) AT STATION PJ-1
OCTOBER 1998 - SEPTEMBER 1999

STATION	PJ - 1 (Jersey Flats)											
MONTH SAMPLED	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
Nematoda											1	
Platyhelminthes		26			12						1	
Oligochaeta		1									10	
Ampharetidae		18			16			2			3	
Glycera sp.		34			60			2			2	
Nereis sp.		1						6			4	
Diopatra cuprea		3			10							
Orbiniidae		16			11			2				
Leitoscoloplos fragilis		70			50			5			20	
Paraonidae		5			4			12			18	
Pectinaria gouldii		30			32			2				
Phyllodocidae		1			1			2			6	
Lepidonotus squamatus		2			1							
Sabellidae								1				
Spionidae		246						1			1	
Streblospio benedicti					212			18				
Polydora ligni		1									10	
Syllidae					1			2			2	
Caprellidae		13						1				
Gammaridea		2			14			6				
Ampelisca abdita					6			4				
Aoridae											2	
Unciola irrorata					6						2	
Corophium sp.												
Gammarus sp.					5			1			3	
Melitidae		14			6							
Melita sp.											1	
Paraphoxus spinosus		2										
Trichophoxus epistomus											1	
Paguridae												
Phoxocephalidae											1	
Cumacea								1				
Diastylis quadrispinosa								1				
Callinectes sapidus		1			5			1				
Libinia emarginata												
Xanthidae		2			1							
Dyspanopeus sayii					4							
Panopeus herbstii		1			1						4	
Crangon septimspinosa												
Cyathura polita		4			1							
Neomysis americana		4			14							
Ostracoda		1									1	
					1							
											1	

NOTE: MONTHS SHADED WERE NOT SAMPLED
DENSITY IS AVERAGE DENSITY OF MONTHLY REPLICATES (2).

TABLE F1-15 (Cont'd)
BENTHIC GRAB MACROINVERTEBRATE DENSITY (NO./0.1 SQ.METER) AT STATION PJ-1
OCTOBER 1998 - SEPTEMBER 1999

STATION	PJ - 1 (Jersey Flats) *Cont'd*											
MONTH SAMPLED	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
Anomia simplex		1										
Lyonsia hyalina		2			2			2			1	
Mulinia lateralis		1			8			4			6	
Mya arenaria		1			10			1			3	
Mytilidae					5							
Mytilus edulis								1				
Yoldia sp.											2	
Solen viridis					1			1				
Tellina sp.		1			1			8			23	
Mercenaria mercenaria		1			3			2			2	
Crepidula fornicata		14			16			18			20	
Crepidula plana		26			26			14			4	
Acteocina canaliculata								1				
Molgula manhattensis											122	

NOTE: MONTHS SHADED WERE NOT SAMPLED.
DENSITY IS AVERAGE DENSITY OF MONTHLY REPLICATES (2).

TABLE F1-16
BENTHIC GRAB MACROINVERTEBRATE DENSITY (NO./0.1 SQ.METER) AT STATION PJ-2
OCTOBER 1998 - SEPTEMBER 1999

STATION	PJ - 2 (Pierhead Channel)											
MONTH SAMPLED	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
Platyhelminthes											1	
Nematoda					1							
Nemertea		1										
Oligochaeta											1	
Ampharetidae		1										
Pherusa sp.								1				
Glycera sp.		6			4			10			1	
Nephtys sp.								1				
Nereis sp.		2			2			2				
Orbiniidae		1						4				
Diopatra cuprea		1			1							
Leitoscoloplos fragilis		4			1			2			1	
Paraonidae		1						2				
Pectinaria gouldii		6			6			2			1	
Phyllodocidae		3			1			2			1	
Harmothoe sp.					1							
Lepidonotus squamatus					1							
Sabellaria vulgaris					1							
Sabellidae								1			1	
Spionidae								2				
Streblospio benedicti		18			4			2			6	
Polydora ligni											1	
Syllidae								14				
Gammaridea		2			4			10				
Ampelisca abdita		1			7			8			10	
Unciola sp.											1	
Corophiidae								1				
Corophium sp.					2							
Erichthonius rubricornis								1			1	
Melita sp.								1			1	
Diastylis quadrispinosa		1						2			1	
Pagurus sp.								1				
Callinectes sapidus											1	
Xanthidae		1										
Dyspanopeus sayi								2				
Upogebia affinis											1	
Edotea triloba					4			2				
Ostracoda		1			1			2				
Lyonsia hyalina					2			2			2	
Mulinia lateralis		13			82			333			69	

NOTE: MONTHS SHADED WERE NOT SAMPLED.
DENSITY IS AVERAGE DENSITY OF MONTHLY REPLICATES (2).

TABLE F1-16 (Cont'd)
BENTHIC GRAB MACROINVERTEBRATE DENSITY (NO./0.1 SQ.METER) AT STATION PJ-2
OCTOBER 1998 - SEPTEMBER 1999

STATION	PJ - 2 (Pierhead Channel) *cont'd*											
MONTH SAMPLED	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
Mya arenaria					3			4				
Mytilus edulis								478				
Solenidae								1				
Ensis directus								1				
Tellina sp.		2			6			32			4	
Gemma gemma								9				
Crepidula fornicata		2			4			6			1	
Crepidula plana		4			14			2			1	
Ilyanassa trivittata					1			2			1	
Acteocina canaliculata					4			9				
Molgula manhattensis											4	

NOTE: MONTHS SHADED WERE NOT SAMPLED.
DENSITY IS AVERAGE DENSITY OF MONTHLY REPLICATES (2).

TABLE F1-17
BENTHIC GRAB MACROINVERTEBRATE DENSITY (NO./0.1 SQ.METER) AT STATION PJ-3
OCTOBER 1998 - SEPTEMBER 1999

STATION	PJ - 3 (Constable Hook)											
MONTH SAMPLED	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
Oligochaeta											2	
Ampharetidae								1			1	
Glycera sp.		10			4			5			1	
Nephtys sp.					1			1				
Nereis sp.		1						1				
Orbiniidae		6			16			19				
Leitoscoloplos fragilis		22			18			61			50	
Paraonidae		1										
Phyllodocidae		1									1	
Streblospio benedicti											8	
Caprellidae		1										
Ampelisca abdita		1			1						2	
Corophium sp.					1							
Diastylis quadrispinosa					1							
Crangon septimspinosa		1						1				
Astarte sp.		1										
Mulinia lateralis		30			10			36			34	
Mya arenaria					2							
Tellina sp.								2				
Mercenaria mercenaria		1										
Haminoea solitaria		2			1			7				
Lacuna vincta		32			2			1				
Ilyanassa trivittata		1										
Acteocina canaliculata		6			2			1			2	

NOTE: MONTHS SHADED WERE NOT SAMPLED.
DENSITY IS AVERAGE DENSITY OF MONTHLY REPLICATES (2).

TABLE F1-18
BENTHIC GRAB MACROINVERTEBRATE DENSITY (NO./0.1 SQ.METER) AT STATION PJ-4
OCTOBER 1998 - SEPTEMBER 1999

STATION	PJ - 4 (Port Jersey Channel)											
MONTH SAMPLED	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
Oligochaeta					1							
Nephtys sp.		2			3			1			2	
Nereis sp.		1										
Leitoscoloplos fragilis					2			1				
Pectinaria gouldii		1										
Streblospio benedicti					1							
Ostracoda											1	
Mulinia lateralis		5			28						4	
Mya arenaria					2							
Tellina sp.		1										
Lacuna vincta		5			8							
Ilyanassa trivittata					1						1	
Acteocina canaliculata		5			6							

NOTE: MONTHS SHADED WERE NOT SAMPLED.
DENSITY IS AVERAGE DENSITY OF MONTHLY REPLICATES (2).

TABLE F1-19
BENTHIC GRAB MACROINVERTEBRATE DENSITY (NO./0.1 SQ.METER) AT STATION PJ-5
OCTOBER 1998 - SEPTEMBER 1999

STATION	PJ - 5 (Global Marine Terminal)											
MONTH SAMPLED	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
Oligochaeta					1							
Ampharetidae											1	
Glycera sp.					2							
Nephtys sp.		1			1			2			3	
Orbiniidae					2							
Leitoscoloplos fragilis					7			1				
Streblospio benedicti					6						1	
Polydora ligni					1							
Ampelisca abdita		1			2							
Gammarus sp.					1							
Lyonsia hyalina					1							
Mulinia lateralis		1			10			2			34	
Tellina sp.								1				
Lacuna vincta		8			3							
Acteocina canaliculata		3			5			1				
Nudibranchia		1										

NOTE: MONTHS SHADED WERE NOT SAMPLED.
DENSITY IS AVERAGE DENSITY OF MONTHLY REPLICATES (2).

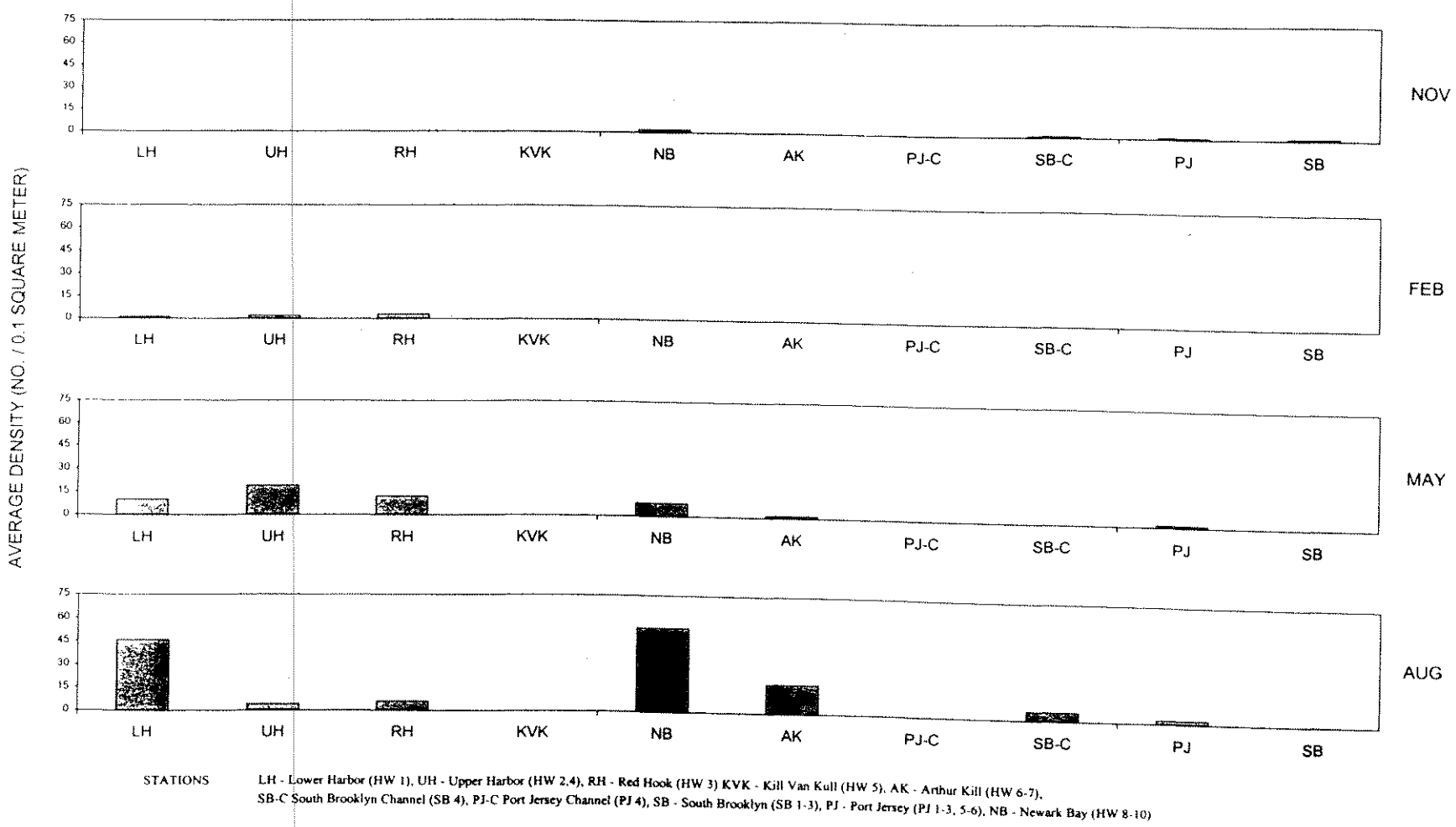


Figure F-1. Average benthic grab density (no. / 0.1 square meter) of Ampharetidae: November 1998, February 1999, May 1999, August 1999

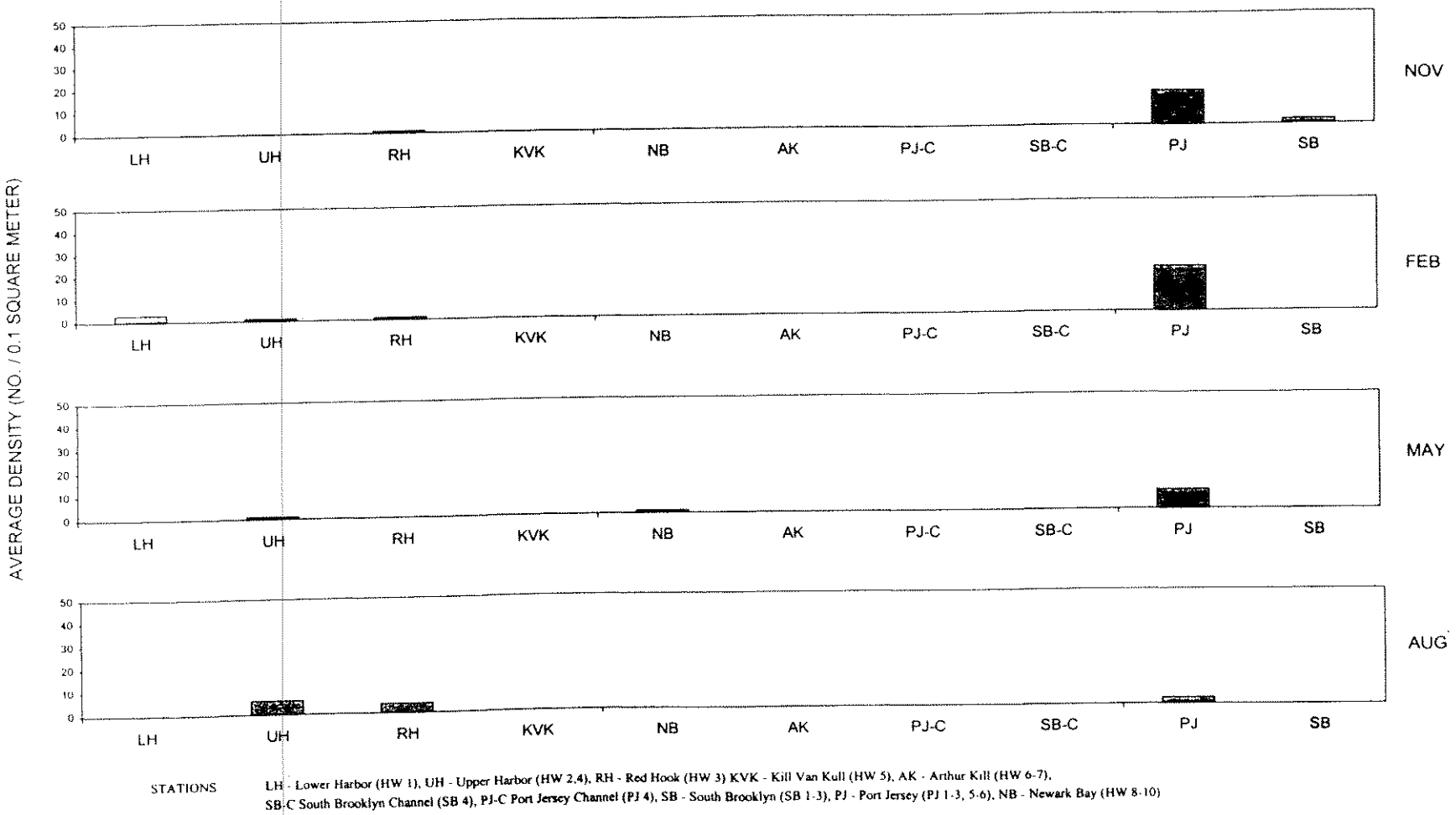


Figure F-2. Average benthic grab density (no. / 0.1 square meter) of *Crepidula plana:* November 1998, February 1999, May 1999, August 1999

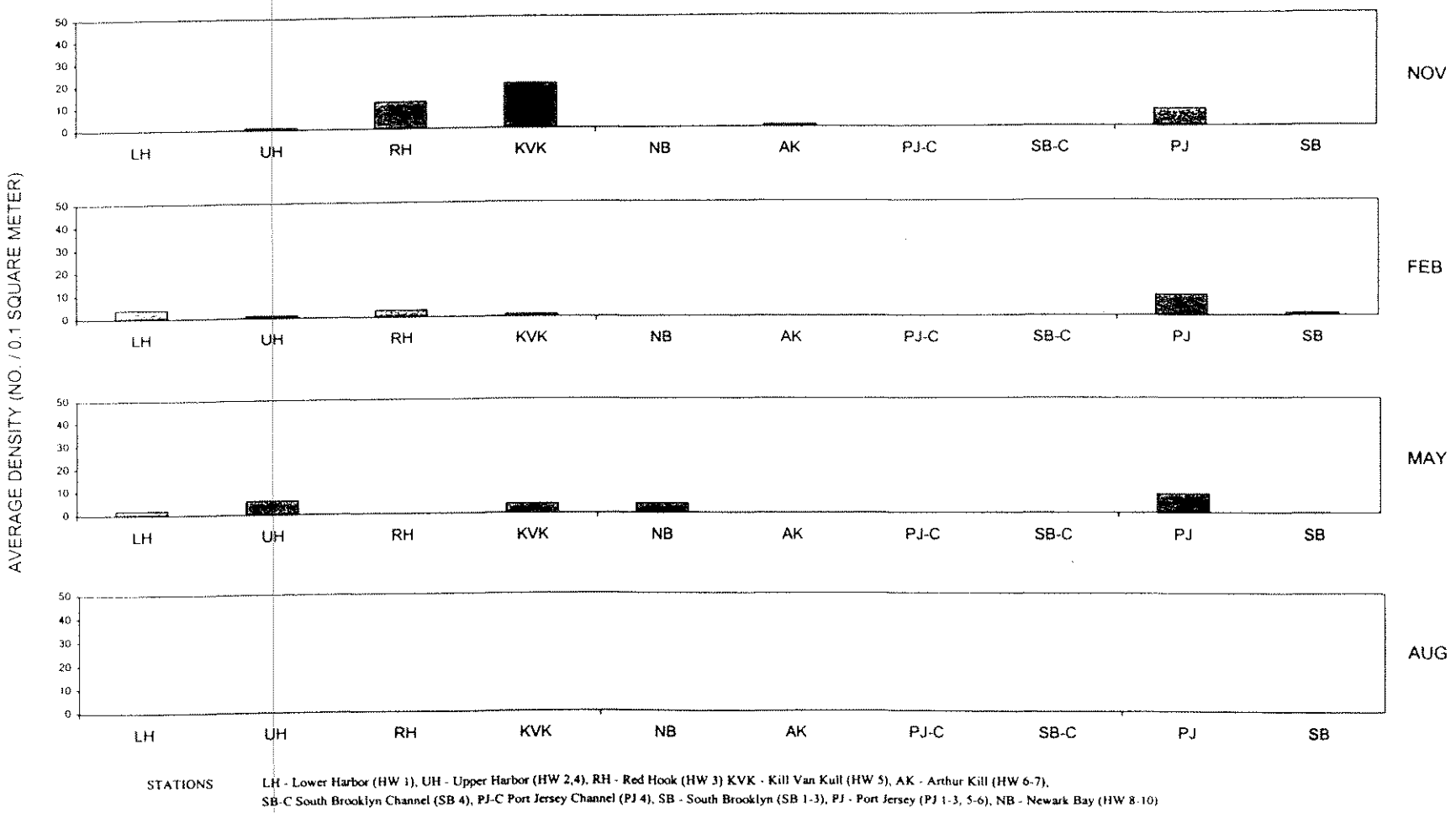


Figure F-3. Average benthic grab density (no. / 0.1 square meter) of Gammaridea: November 1998, February 1999, May 1999, August 1999

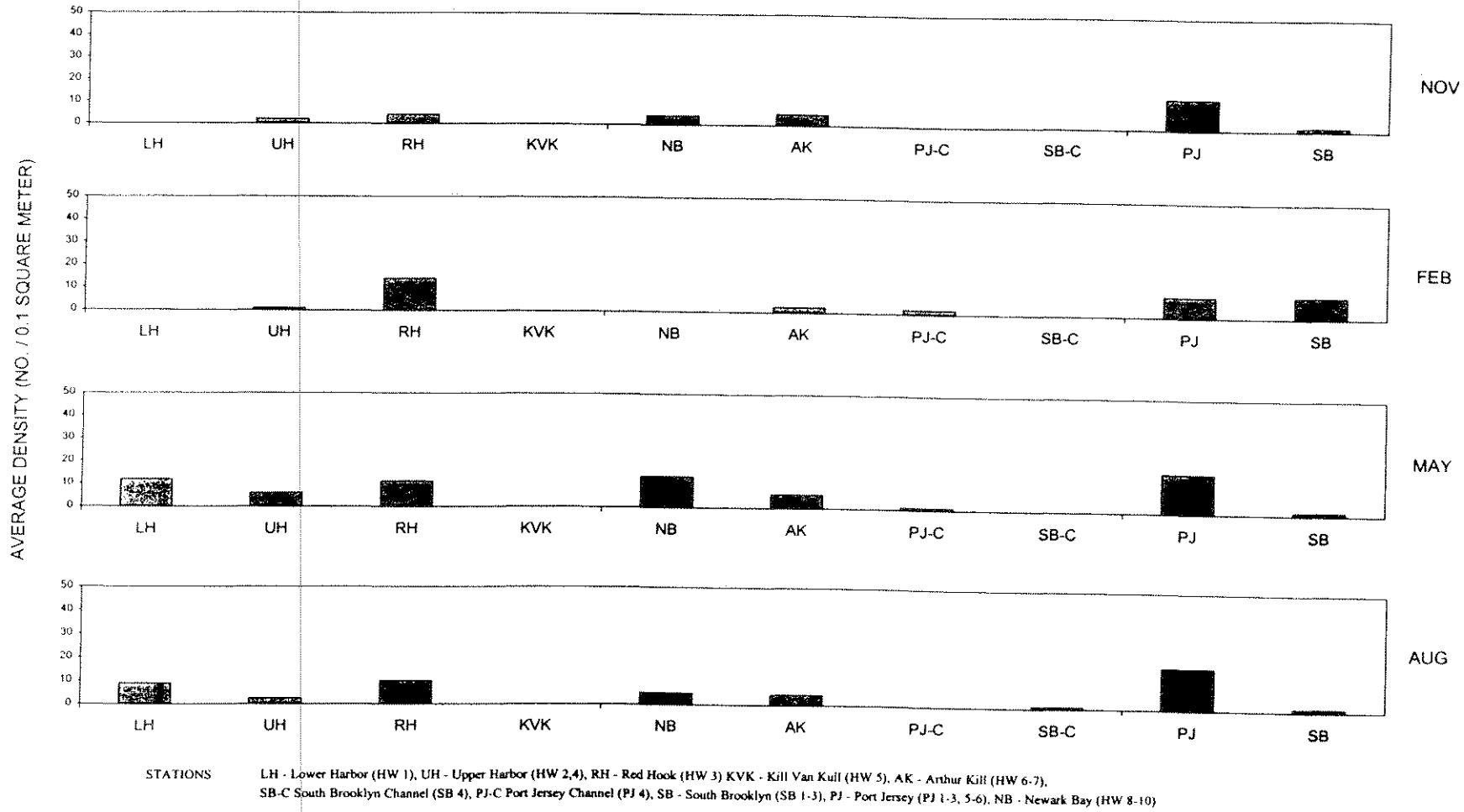


Figure F-4. Average benthic grab density (no. / 0.1 square meter) of *Leitoscoloplos fragilis*: November 1998, February 1999, May 1999, August 1999

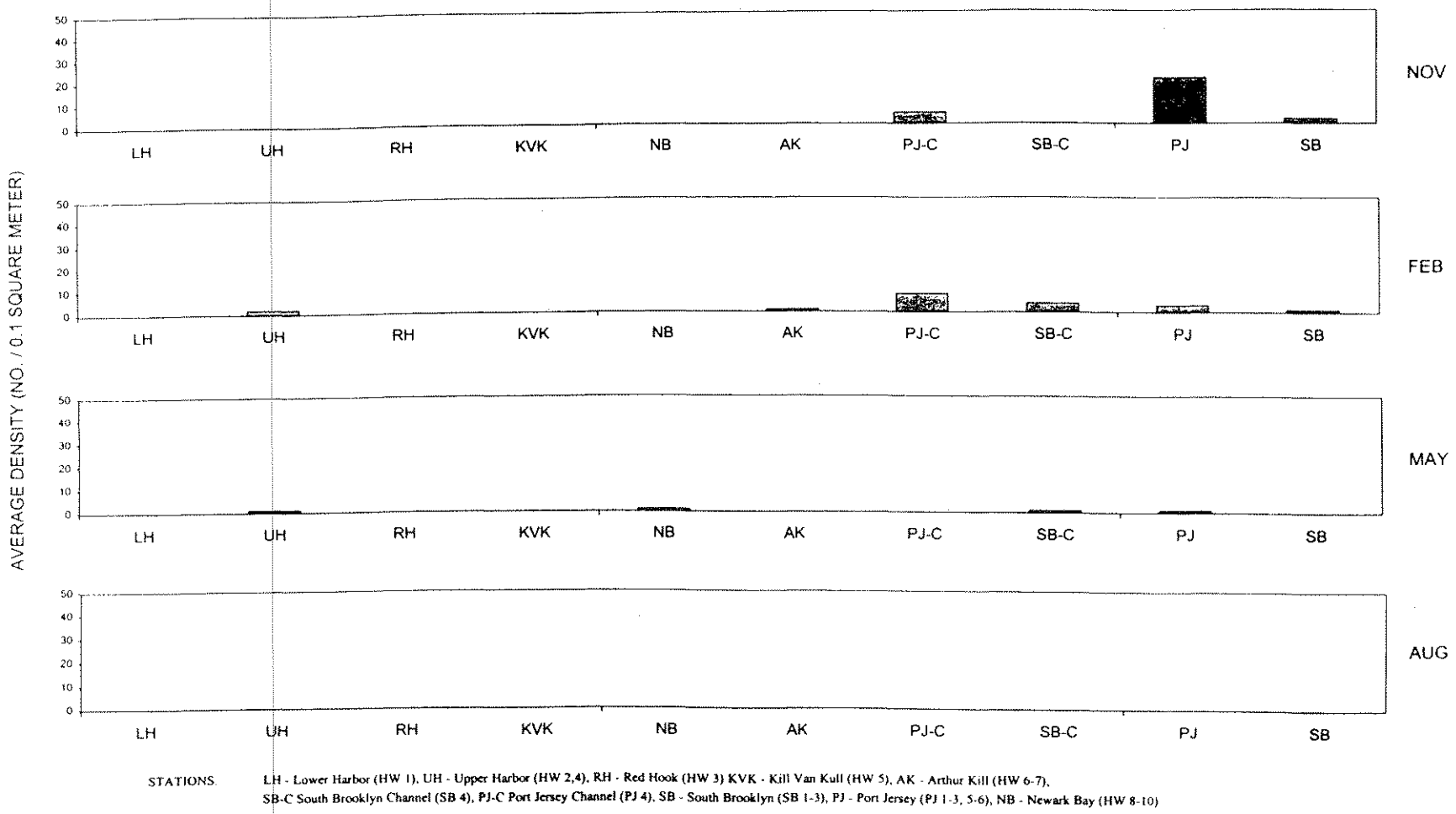
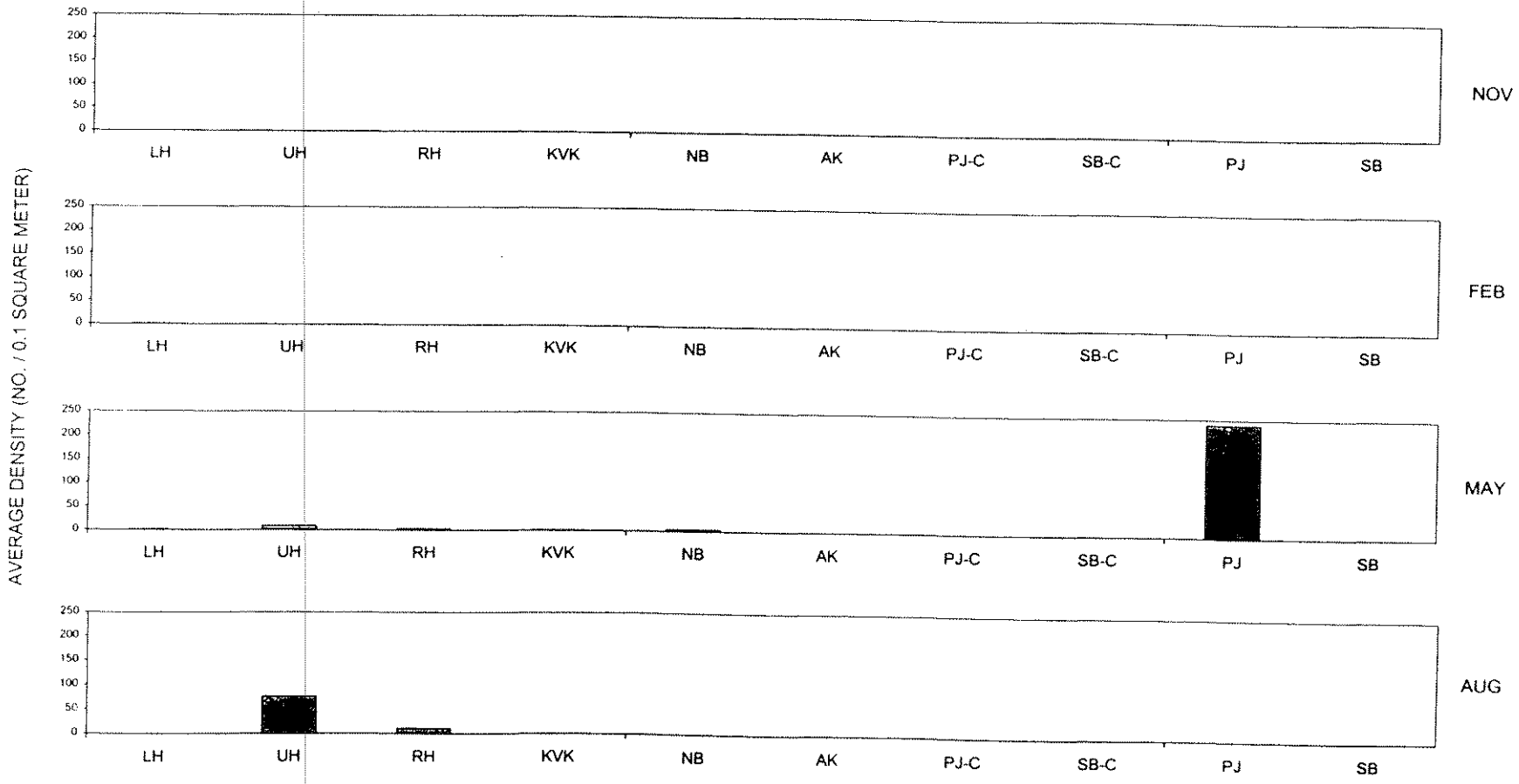


Figure F-5. Average benthic grab density (no. / 0.1 square meter) of *Lacuna vincta:* November 1998, February 1999, May 1999, August 1999



STATIONS: LH - Lower Harbor (HW 1), UH - Upper Harbor (HW 2,4), RH - Red Hook (HW 3) KVK - Kill Van Kull (HW 5), AK - Arthur Kill (HW 6-7), SB-C South Brooklyn Channel (SB 4), PJ-C Port Jersey Channel (PJ 4), SB - South Brooklyn (SB 1-3), PJ - Port Jersey (PJ 1-3, 5-6), NB - Newark Bay (HW 8-10)

Figure F-6. Average benthic grab density (no. / 0.1 square meter) of *Mytilus edulis*: November 1998, February 1999, May 1999, August 1999

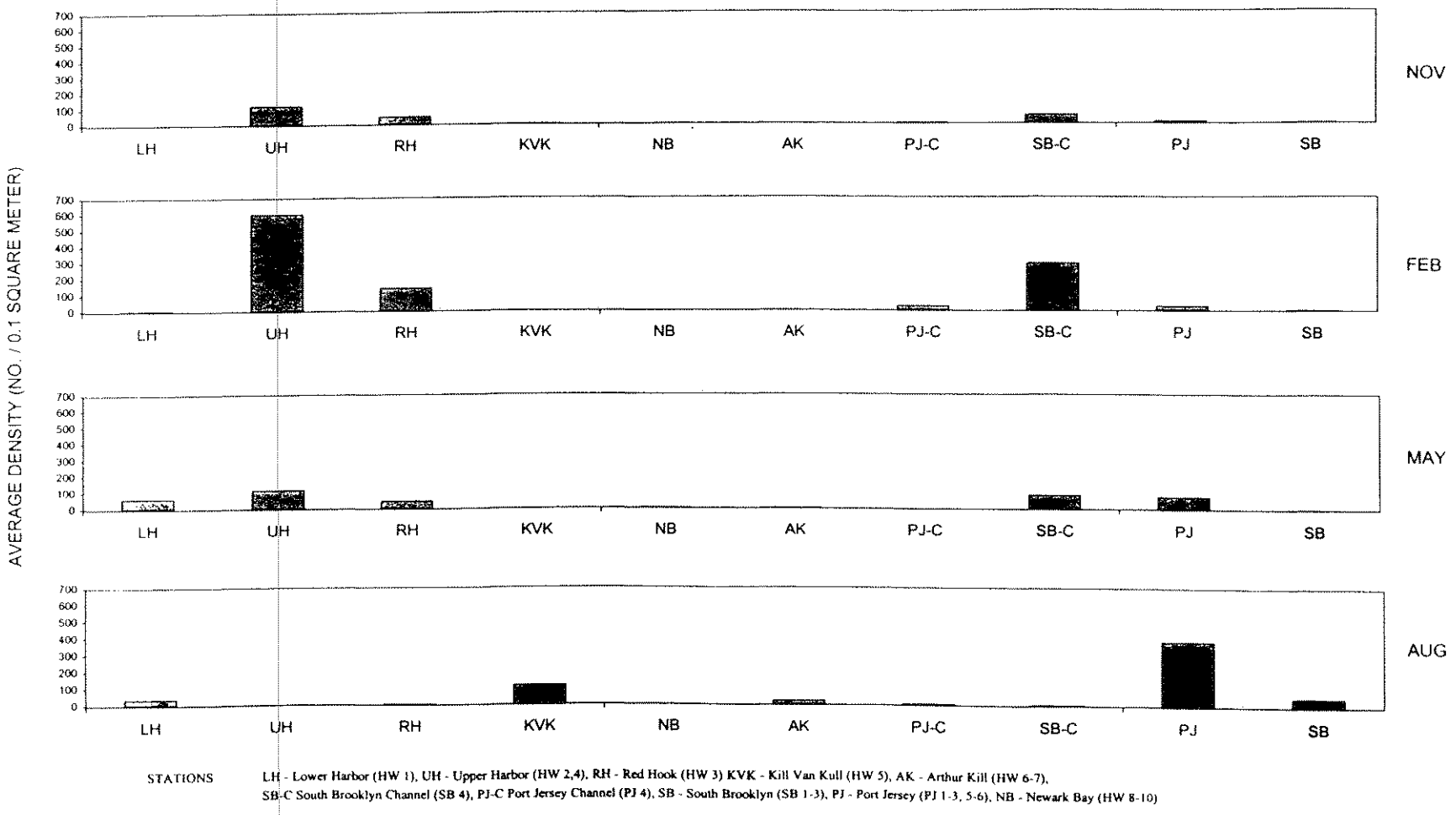


Figure F-7. Average benthic grab density (no. / 0.1 square meter) of *Mulinia lateralis:* November 1998, February 1999, May 1999, August 1999

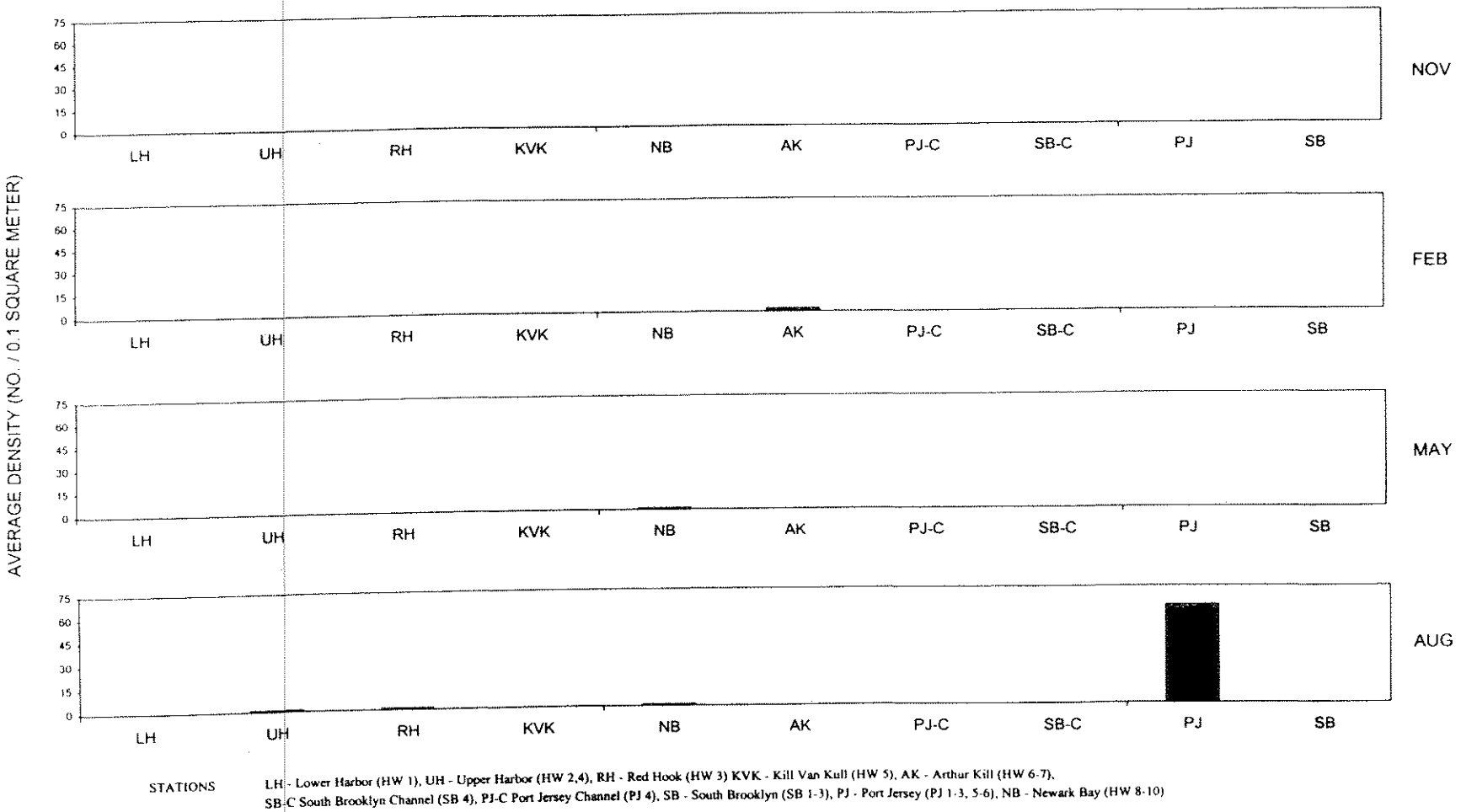


Figure F-8. Average benthic grab density (no. / 0.1 square meter) of *Molgula manhattensis:* November 1998, February 1999, May 1999, August 1999

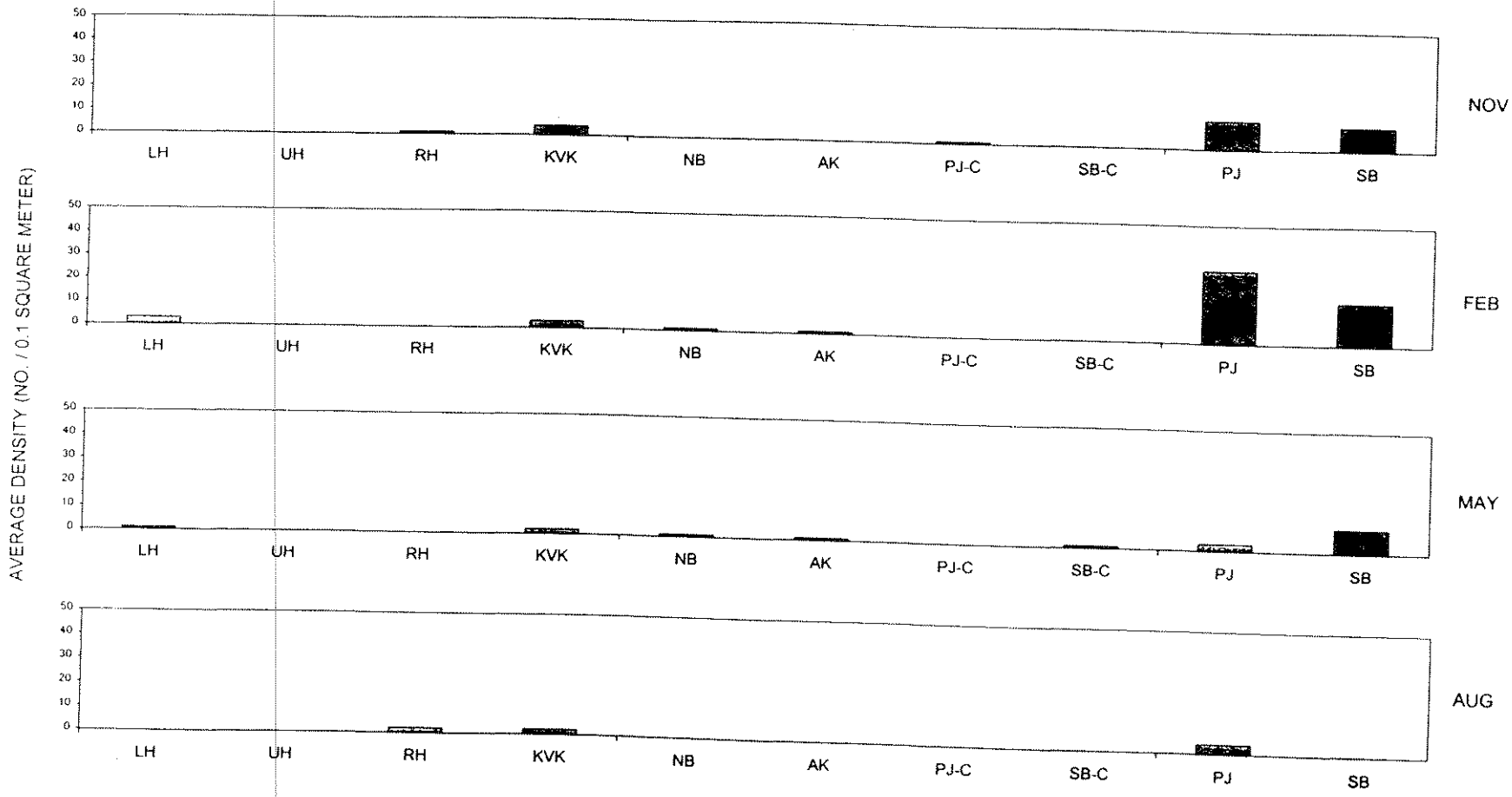


Figure F-9. Average benthic grab density (no. / 0.1 square meter) of *Nereis* sp.: November 1998, February 1999, May 1999, August 1999

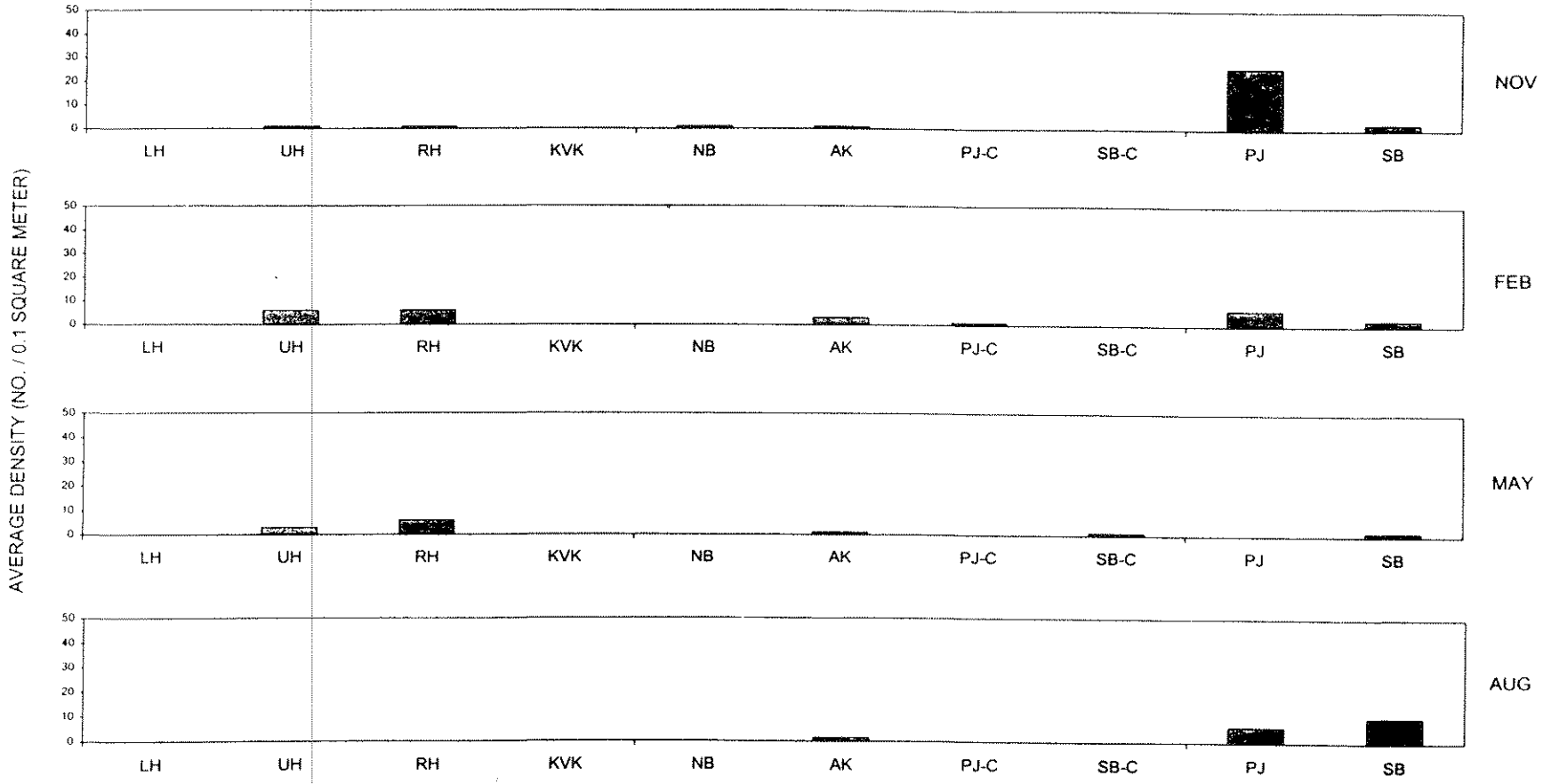


Figure F-10. Average benthic grab density (no. / 0.1 square meter) of Oligochaeta: November 1998, February 1999, May 1999, August 1999

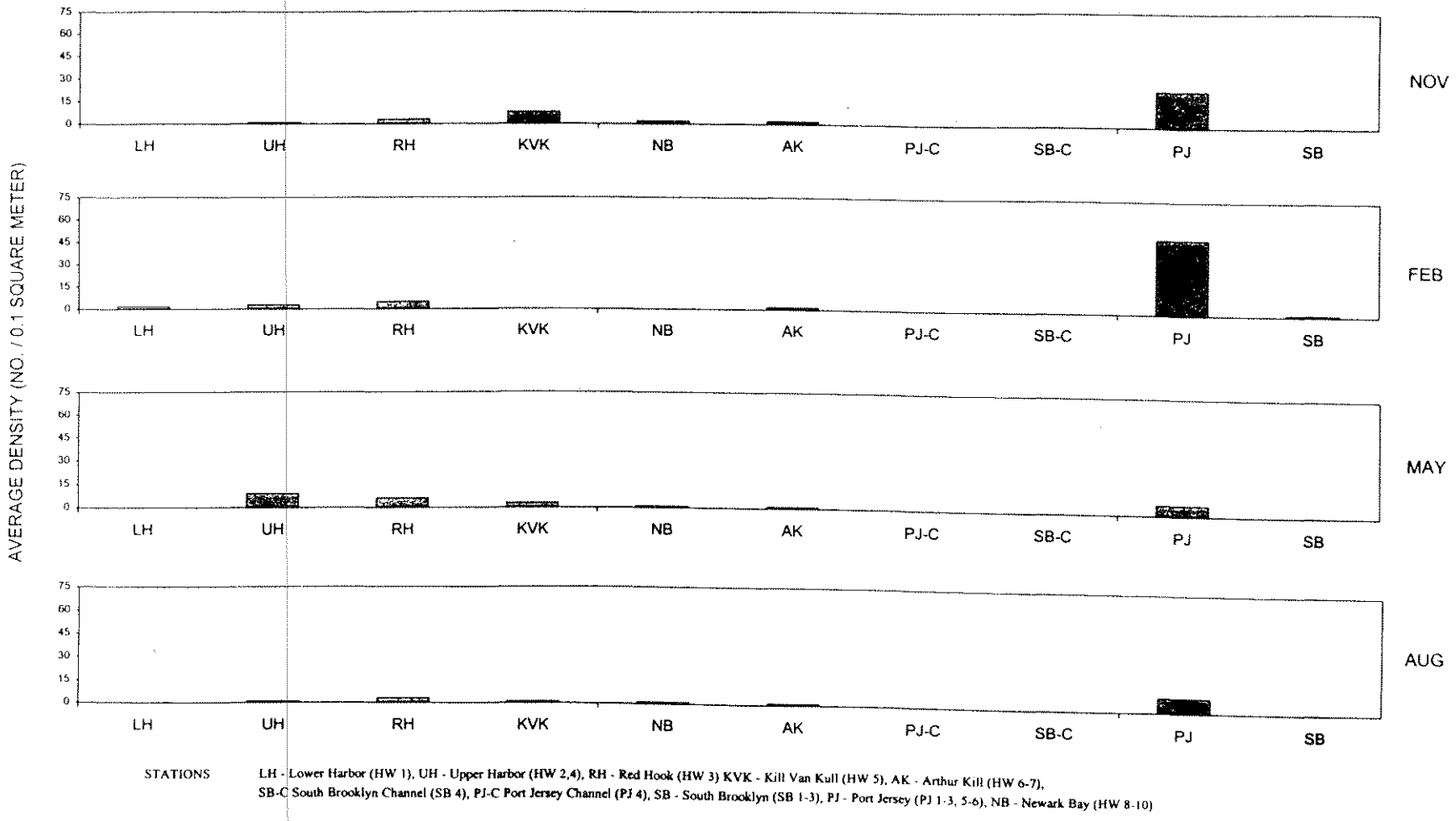


Figure F-11. Average benthic grab density (no. / 0.1 square meter) of Paraonidae: November 1998, February 1999, May 1999, August 1999

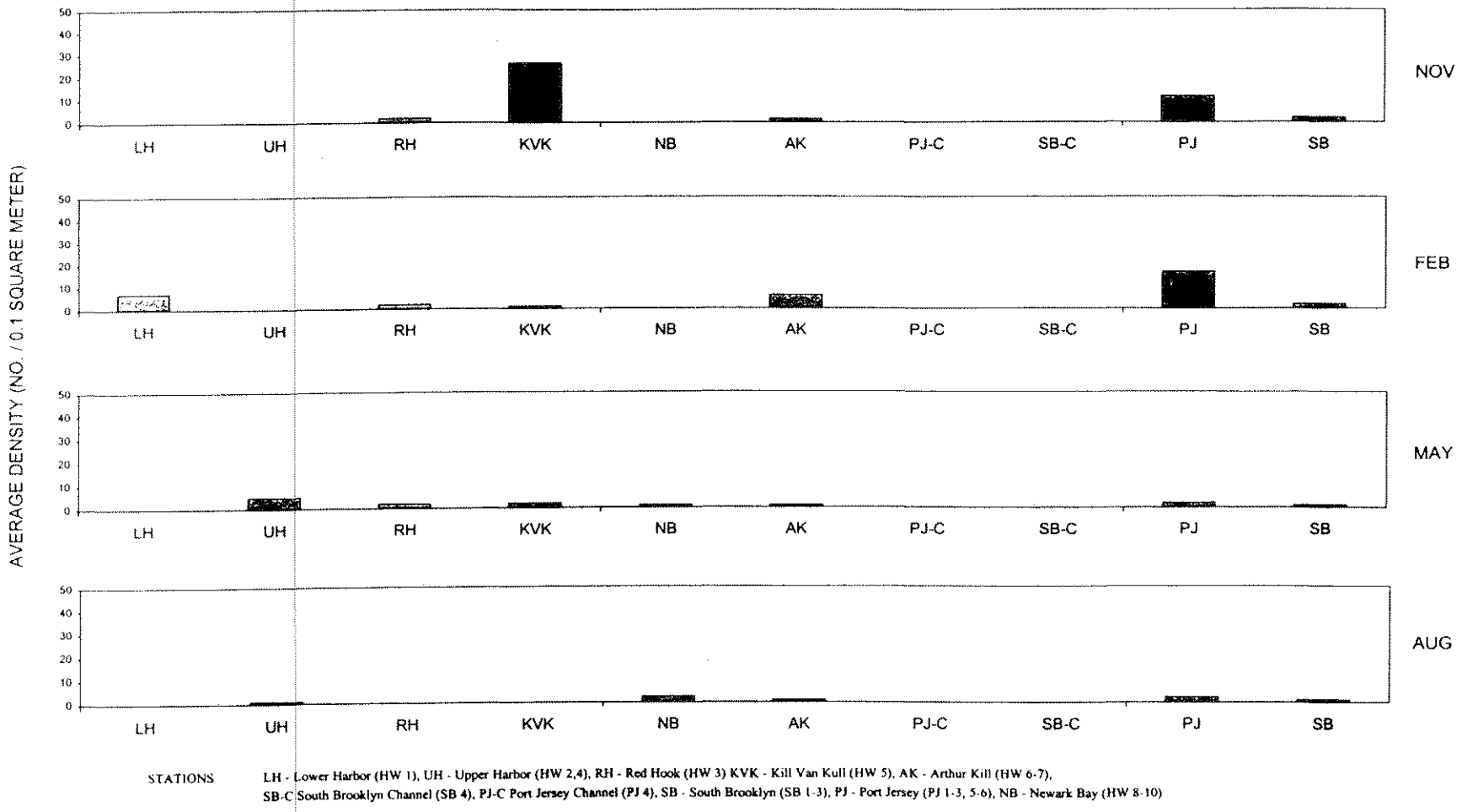


Figure F-12. Average benthic grab density (no. / 0.1 square meter) of Phyllodocidae: November 1998, February 1999, May 1999, August 1999

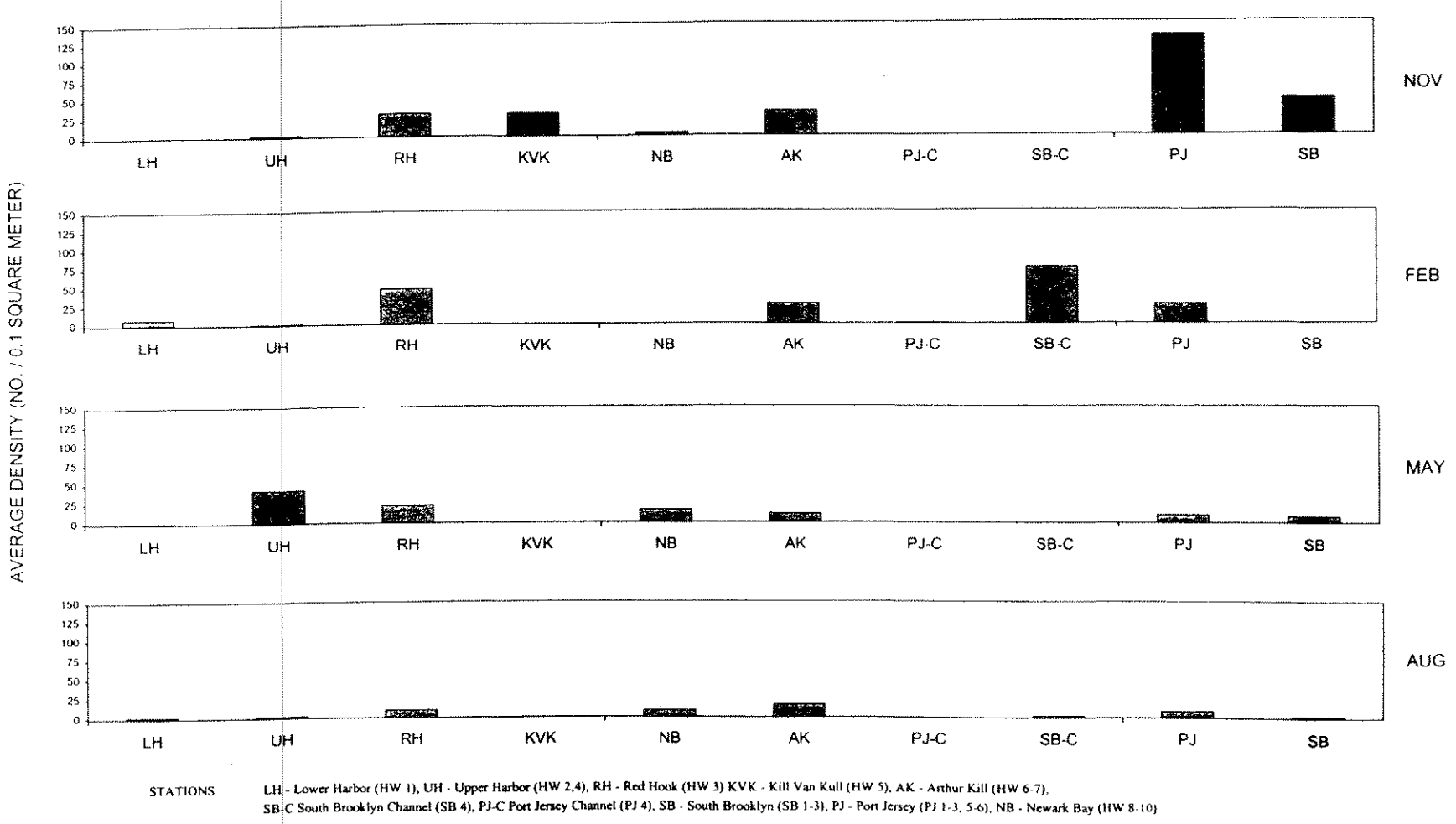


Figure F-13. Average benthic grab density (no. / 0.1 square meter) of *Streblospio benedicti*: November 1998, February 1999, May 1999, August 1999

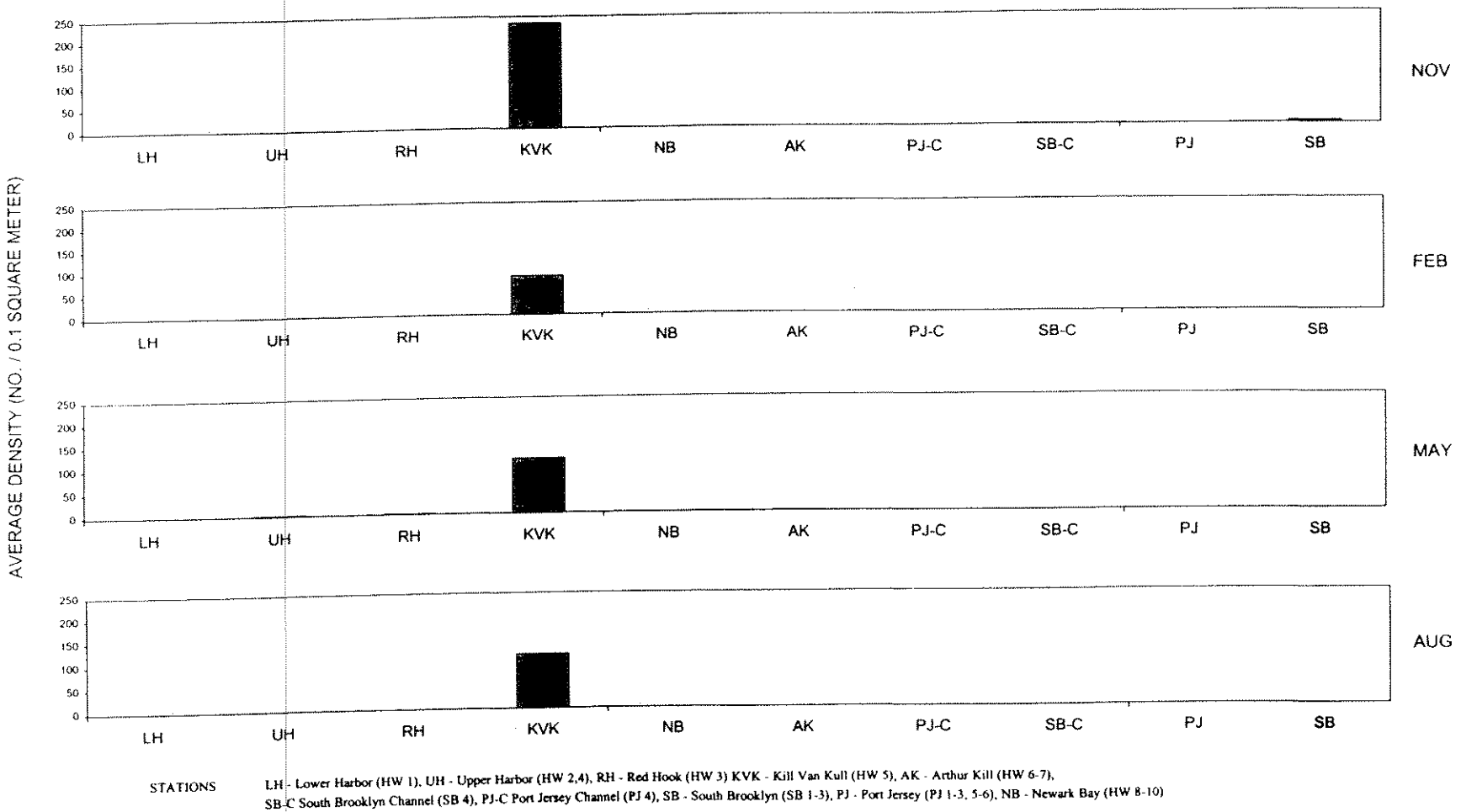


Figure F-14. Average benthic grab density (no. / 0.1 square meter) of *Scolecolepides viridis:* November 1998, February 1999, May 1999, August 1999

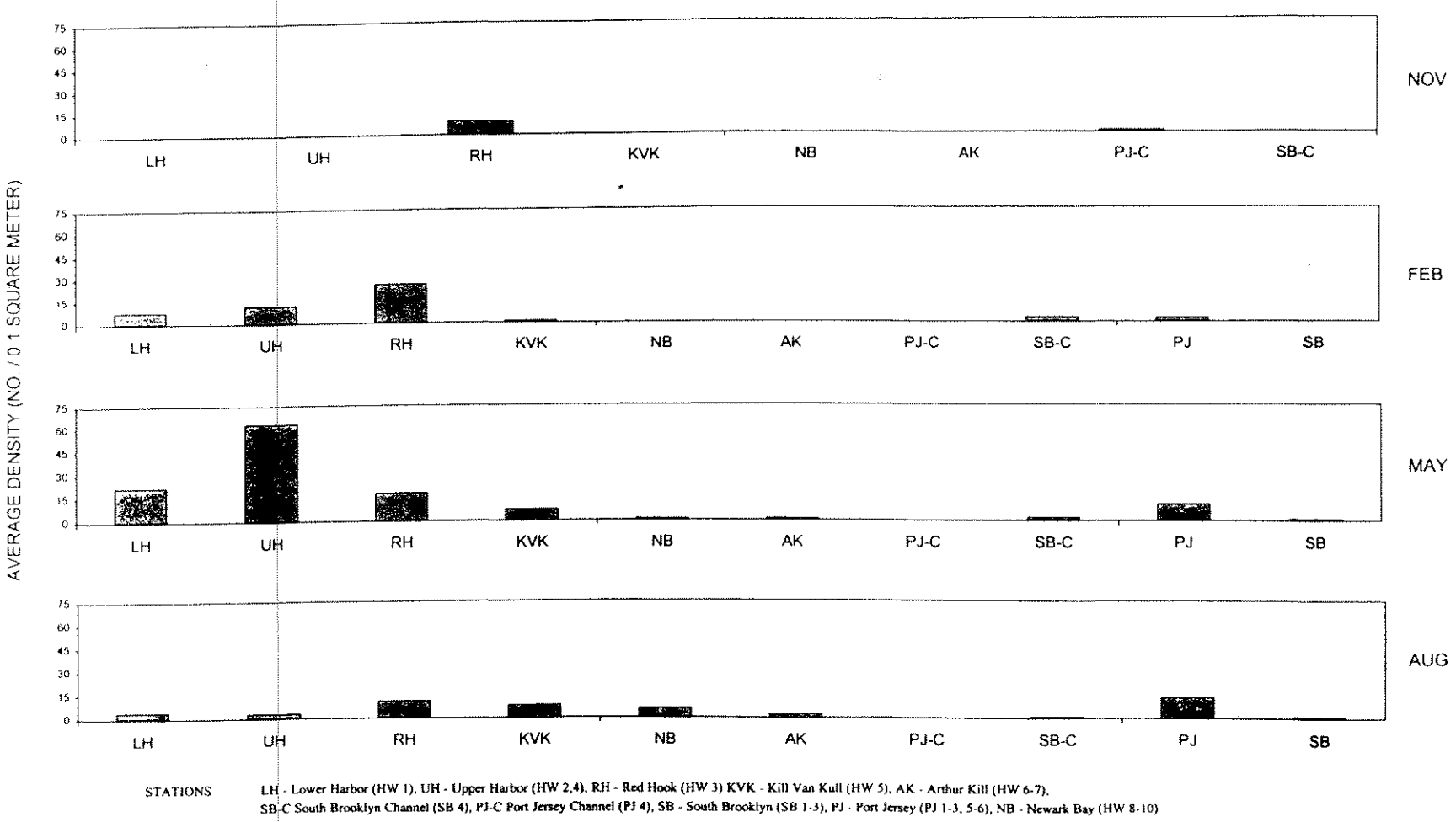


Figure F-15. Average benthic grab density (no. / 0.1 square meter) of *Tellina* sp.: November 1998, February 1999, May 1999, August 1999

TABLE F2-1

AVERAGE BENTHIC INVERTEBRATE DENSITY (NUMBER/0.1 SQ. METER) AT NAVIGATION CHANNEL AREAS DURING NOVEMBER 1998

	HARBOR AREA							
TAXONOMIC LISTING	LH	UH	RH	KVK	NB	AK	PJ-C	SB-C
Acteocina canaliculata							5.0	
Actiniaria			1.0	1.0				
Ampelisca abdita		2.0	2.0			1.0		
Ampharetidae					2.0			1.0
Bivalvia	1.0			6.0				
Cirratulidae						1.0		
Corophium sp.		1.0						
Crangon septemspinosa		1.0						
Crepidula plana			1.0					
Cyathura polita				4.0				
Diastylis quadrispinosa		1.0						
Diopatra cuprea		1.0						
Edotea triloba		3.0						1.0
Gammaridea		1.0	12.0	20.0		1.0		
Gammarus sp.	1.0	1.0						
Gastropoda		2.0						
Glycera sp.		4.0	3.0	6.0	1.0			1.0
Haploscoloplos robustus					2.0			
Ilyanassa trivittata		1.5	2.0					1.0
Lacuna vincta							5.0	
Leitoscoloplos fragilis		2.0	4.0		4.0	5.0		
Lepidonotus squamatus			1.0	1.0				
Leucon americanus						6.0		
Libinia spp.			1.0					
Magelona rosea	1.0							
Melita sp.			2.0					
Mulinia lateralis		121.0	50.0	3.0	1.0		5.0	52.0
Mya arenaria	1.0	5.0		3.0		1.0		
Nematoda			1.0					
Nemertea	1.0		1.0		1.0	3.5		
Neomysis americana						1.0		
Nephtys sp.	4.0	7.0	2.0	4.0			2.0	4.0
Nereis sp.			1.0	4.0			1.0	
Oligochaeta		1.0	1.0		1.0	1.0		
Orbiniidae		1.0			2.0	1.0		
Ovalipes ocellatus		1.0						
Pagurus sp.		1.0						
Paraonidae		1.0	3.0	8.0	2.0	2.0		
Pectinaria gouldii		12.0	3.0	1.0			1.0	1.0
Phyllodocidae			2.0	26.0		1.5		

TABLE F2-1 (Cont'd)

AVERAGE BENTHIC INVERTEBRATE DENSITY (NUMBER/0.1 SQ. METER) AT NAVIGATION CHANNEL AREAS DURING NOVEMBER 1998

	HARBOR AREA							
TAXONOMIC LISTING	LH	UH	RH	KVK	NB	AK	PJ-C	SB-C
Platyhelminthes			1.0					
Polydora ligni	1.0	1.0						
Protohaustorius spp.	3.0							
Sabellaria vulgaris				1.0				
Scolecolepides viridis				236.0				
Spionidae		1.0			1.0	2.0		
Streblospio benedicti		2.0	31.0	30.0	4.0	32.0		
Syllidae	1.0			4.0				1.0
Tellina sp.			9.0				1.0	
Tellinidae						1.0		

Areas: LH - Lower Harbor (HW 1), UH - Upper Harbor (HW 2, HW 4), RH - Red Hook (HW 3), KVK - Kill Van Kull (HW 5), NB - Newark Bay (HW 8, HW 9, HW 10), AK - Arthur Kill (HW 6, HW 7), PJ-C - Port Jersey Channel(PJ 4), SB-C - South Brooklyn Channel(SB 4).

Note: Not all stations sampled each month, see sampling scedule for actual months and stations sampled.

TABLE F2-2

AVERAGE BENTHIC INVERTEBRATE DENSITY (NUMBER/0.1 SQ. METER) AT NAVIGATION CHANNEL AREAS DURING FEBRUARY 1998

	HARBOR AREA							
TAXONOMIC LISTING	LH	UH	RH	KVK	NB	AK	PJ-C	SB-C
Acteocina canaliculata		2.0	2.0		1.0		6.0	4.0
Ampelisca abdita		2.0	29.0			1.0		
Ampharetidae	1.0	2.0	3.0					
Bivalvia								2.0
Cancer irroratus	2.0							
Capitellidae	1.0					1.0		
Caprellidae		1.0						
Cirratulidae			1.0					
Corophium sp.	1.0					2.0		
Crangon septemspinosa				1.0				
Crepidula fornicata	1.0							
Crepidula plana	3.0	1.0	1.0					
Cyathura polita				1.0				
Diastylis quadrispinosa						1.0		
Edotea triloba		1.0	2.0					
Gammaridea	4.0	1.0	3.0	1.0				
Gammarus sp.			1.0					
Glycera sp.	3.0	2.0	9.0	1.0	1.0	1.0		
Harmothoe sp.	2.0							
Idotea baltica		1.0						
Ilyanassa trivittata	3.0	1.5	2.0				1.0	
Lacuna vincta		2.0				1.0	8.0	4.0
Leitoscoloplos fragilis		1.0	14.0			2.5	2.0	
Lepidametria commensalis	1.0							
Lepidonotus sp.	1.0	1.0						
Libinia spp.			1.0					
Lyonsia hyalina		2.0	2.0					1.0
Melita sp.	2.0							
Melitidae		1.0						
Mercenaria mercenaria		4.0	1.0					
Molgula manhattensis						2.0		
Mulinia lateralis		601.0	141.0	1.0	1.0	1.0	28.0	290.0
Mya arenaria	1.0	1.0	2.0		2.0	2.5	2.0	2.0
Mytilidae		1.0	1.0					
Mytilus edulis	1.0							
Nematoda	3.0							
Nephtys sp.	4.0	7.5	2.0	2.0	1.0	1.0	3.0	6.0
Nereis sp.	3.0			3.0	1.0	1.0		
Oligochaeta		6.0	6.0			3.0	1.0	
Orbiniidae			16.0		2.0	1.5		
Ostracoda		2.0	2.0					
Pagurus sp.	11.0	1.0						

TABLE F2-2 (Cont'd)

AVERAGE BENTHIC INVERTEBRATE DENSITY (NUMBER/0.1 SQ. METER) AT NAVIGATION CHANNEL AREAS DURING FEBRUARY 1998

	HARBOR AREA							
TAXONOMIC LISTING	LH	UH	RH	KVK	NB	AK	PJ-C	SB-C
Paraonidae	2.0	3.0	5.0			1.5		
Pectinaria gouldii		8.0	5.0					4.0
Phoxocephalus holbolli	3.0							
Phyllodocidae	7.0		2.0	1.0		6.0		
Platyhelminthes		1.0	1.0					
Polydora ligni						4.0		
Sabellaria vulgaris						3.0		
Scolecolepides viridis				86.0				
Solen viridis		1.5	1.0					
Spionidae	1.0	1.0	1.0			2.0		
Streblospio benedicti	8.0	1.0	48.0			26.5	1.0	
Syllidae	7.0							
Tellina sp.	8.0	12.0	26.0	1.0				3.0
Trichophoxus epistomus		1.0						
Upogebiidae					1.0			

Areas: LH - Lower Harbor (HW 1), UH - Upper Harbor (HW 2, HW 4), RH - Red Hook (HW 3), KVK - Kill Van Kull (HW 5), NB - Newark Bay (HW 8, HW 9, HW 10), AK - Arthur Kill (HW 6, HW 7), PJ-C - Port Jersey Channel(PJ 4), SB-C - South Brooklyn Channel(SB 4).

Note: Not all stations sampled each month, see sampling scedule for actual months and stations sampled.

TABLE F2-3

AVERAGE BENTHIC INVERTEBRATE DENSITY (NUMBER/0.1 SQ. METER) AT NAVIGATION CHANNEL AREAS DURING MAY 1998

	HARBOR AREA							
TAXONOMIC LISTING	LH	UH	RH	KVK	NB	AK	PJ-C	SB-C
Acteocina canaliculata		4.0	2.0		1.0			1.0
Actiniaria				1.0				
Ampelisca abdita	1.0	8.5	20.0		6.0	1.0		2.0
Ampharetidae	10.0	19.0	12.0		8.5	1.5		
Corophium sp.		1.0			1.0			
Crangon septemspinosa					1.0			
Crepidula plana		1.0			1.0			
Cyathura polita				2.0				
Diastylis quadrispinosa		2.0		1.0	1.0			
Diopatra cuprea					1.0			
Edotea triloba	1.0	1.5	6.0	1.0	2.0			
Ensis directus	1.0	1.0						
Gammaridea	2.0	6.0		4.0	4.0			
Gammarus sp.	8.0	1.0			2.0	1.0		
Glycera sp.	1.0	5.5	2.0	7.0	3.0	1.0		1.0
Idoteidae					1.0			
Ilyanassa trivittata	1.0	2.0	1.0					
Lacuna vincta		1.0			1.0			1.0
Leitoscoloplos fragilis	12.0	6.0	11.0		13.5	6.0	1.0	
Leucon americanus	10.0	1.0			7.0	20.0		
Lumbrinereidae	1.0							
Lyonsia hyalina		2.0	1.0		1.0			
Magelona rosea	2.0							
Mercenaria mercenaria	2.0	2.0						
Molgula manhattensis					1.0			
Mulinia lateralis	65.0	116.0	49.0		3.0	2.5		85.0
Mya arenaria	10.0			1.0	4.0	6.0		
Mytilus edulis	1.0	8.5	3.0	1.0	4.0			
Nephtys sp.	15.0	7.5	4.0	8.0	1.0	1.0	1.0	8.0
Nereis sp.	1.0			2.0	1.0	1.0		1.0
Oligochaeta		3.0	6.0			1.0		1.0
Orbiniidae	8.0	2.0	3.0	1.0	11.5	1.0		
Ostracoda		1.0	1.0		1.0			
Pagurus sp.	1.0	1.0						
Paraonidae		9.0	6.0	3.0	1.0	1.0		
Paraphoxus spinosus		1.0						
Pectinaria gouldii		6.0	2.0					
Pherusa sp.	1.0	1.0	1.0					
Phyllodocidae		5.0	2.0	2.0	1.0	1.0		
Pinnixa sayana		1.0						
Polydora ligni		1.0				1.0		
Sabellaria vulgaris				1.0	2.0			

TABLE F2-3 (Cont'd)

AVERAGE BENTHIC INVERTEBRATE DENSITY (NUMBER/0.1 SQ. METER) AT NAVIGATION CHANNEL AREAS DURING MAY 1998

	HARBOR AREA							
TAXONOMIC LISTING	LH	UH	RH	KVK	NB	AK	PJ-C	SB-C
Sabellariidae						1.0		
Scolecolepides viridis		2.0	1.0	117.0		1.0		
Siliqua costata	4.0	1.0						
Solen viridis		1.0						
Solenidae	1.0							
Spionidae	14.0	1.0				1.5		
Streblospio benedicti	1.0	42.0	22.0		16.0	11.0		
Strongylocentrotidae	22.0							
Syllidae		2.0			2.5			
Tellina sp.	22.0	63.0	18.0	7.0	1.0	1.0		2.0
Unciola dissimilis		1.0						
Yoldia sp.	1.0				1.0			2.0

Areas: LH - Lower Harbor (HW 1), UH - Upper Harbor (HW 2, HW 4), RH - Red Hook (HW 3), KVK - Kill Van Kull (HW 5), NB - Newark Bay (HW 8, HW 9, HW 10), AK - Arthur Kill (HW 6, HW 7), PJ-C - Port Jersey Channel(PJ 4), SB-C - South Brooklyn Channel(SB 4).

Note: Not all stations sampled each month, see sampling scedule for actual months and stations sampled.

TABLE F2-4

AVERAGE BENTHIC INVERTEBRATE DENSITY (NUMBER/0.1 SQ. METER) AT NAVIGATION CHANNEL AREAS DURING AUGUST 1998

	HARBOR AREA							
TAXONOMIC LISTING	LH	UH	RH	KVK	NB	AK	PJ-C	SB-C
Acteocina canaliculata	1.0				1.0			
Actiniaria						1.0		
Ampelisca abdita	1.0	4.0	4.0		2.5	2.0		1.0
Ampharetidae	46.0	4.0	6.0		54.0	18.5		6.0
Aricidea sp.	2.0							
Brachyura	1.0				1.0			
Callinectes sapidus								
Cancer sp.		1.0						
Cirratulidae		2.0						
Corophium sp.		1.5	2.0					1.0
Crangon septemspinosa			1.0	1.0				
Crangon septimspinosa	1.0							
Crepidula fornicata		10.0	4.0		1.0			
Crepidula plana		6.0	4.0					
Cumacea	1.0				1.5			
Diastylis quadrispinosa	1.0				1.0	2.5		
Diopatra cuprea	2.0	1.0			1.0			
Edotea triloba								
Ensis directus		1.0						
Erichthonius braziliensis		2.0						
Gammarus sp.	1.0							1.0
Glycera sp.	2.0	1.0	4.0	1.0	2.5			
Hexapanopeus angustifrons		1.0						
Idotea metallica					1.0	1.0		
Ilyanassa trivittata		1.0	2.0				1.0	
Leitoscoloplos fragilis	9.0	2.5	10.0		5.0	4.5		1.0
Leucon americanus	1.0				4.0	9.0		
Lyonsia hyalina	2.0		1.0		3.0			
Magelona rosea	2.0	1.0						
Melita sp.		2.0	6.0		3.0			1.0
Mercenaria mercenaria		2.0	1.0		1.0			
Molgula manhattensis		1.0	1.0		1.0			
Mulinia lateralis	37.0	1.0	4.0	1.0	24.0	7.5	4.0	384.0
Mya arenaria					1.0			
Mytilus edulis		76.0	11.0					
Nemertea	1.0	1.0	1.0				2.0	1.0
Nephtys sp.	6.0	12.0		10.0				
Nereis sp.			2.0	2.0		1.5		
Oligochaeta								

TABLE F2-4 (Cont'd)

AVERAGE BENTHIC INVERTEBRATE DENSITY (NUMBER/0.1 SQ. METER) AT NAVIGATION CHANNEL AREAS DURING AUGUST 1998

	HARBOR AREA							
TAXONOMIC LISTING	LH	UH	RH	KVK	NB	AK	PJ-C	SB-C
Ostracoda					1.0		1.0	
Ovalipes ocellatus	1.0							
Paraonidae		1.0	3.0	1.0	1.0	1.0		
Pectinaria gouldii	2.0	1.0	2.0		12.0	1.5		
Phyllodocidae		1.0			2.5	1.0		
Polydora ligni		2.0	2.0					1.0
Polynoidae		2.0	1.0					
Protohaustorius spp.	1.0							
Sabellidae			1.0					
Scolecolepides viridis				116.0				
Sigalionidae	1.0							
Spionidae		1.0						
Spiophanes bombyx		1.0						
Streblospio benedicti	2.0	2.0	10.0		9.0	16.5		2.0
Syllidae		1.0						
Tellina sp.	4.0	3.0	11.0	8.0	6.0	2.0		1.0
Trichophoxus epistomus		1.0						
Unciola sp.		1.0						
Xanthidae		2.0	1.0					
Yoldia sp.								2.0

Areas: LH - Lower Harbor (HW 1), UH - Upper Harbor (HW 2, HW 4), RH - Red Hook (HW 3), KVK - Kill Van Kull (HW 5), NB - Newark Bay (HW 8, HW 9, HW 10), AK - Arthur Kill (HW 6, HW 7), PJ-C - Port Jersey Channel(PJ 4), SB-C - South Brooklyn Channel(SB 4).

Note: Not all stations sampled each month, see sampling scedule for actual months and stations sampled.

TABLE F2-5

AVERAGE BENTHIC INVERTEBRATE DENSITY (NUMBER/0.1 SQ. METER) AT INTERPIER / SHOAL AREAS - NOVEMBER 1998

	HARBOR AREA	
TAXONOMIC LISTING	PJ	SB
Acteocina canaliculata	4.5	1.0
Ampelisca abdita	1.3	9.0
Ampharetidae	1.0	1.0
Anomia simplex	1.0	
Astarte sp.	1.0	
Brachyura		1.0
Callinectes sapidus	1.0	
Caprellidae	1.0	
Crangon septimspinosa	1.0	
Crepidula fornicata	8.0	
Crepidula plana	15.0	2.0
Cyathura polita	4.0	
Diastylis quadrispinosa	1.0	
Diopatra cuprea	1.0	1.0
Dyspanopeus sayi		1.0
Flabelligeridae		1.0
Gammaridea	7.5	
Gammarus sp.		2.0
Glycera sp.	11.3	1.5
Haminoea solitaria	2.0	
Ilyanassa obsoleta		3.0
Ilyanassa trivittata	1.0	1.0
Lacuna vincta	20.0	2.0
Leitoscoloplos fragilis	14.0	1.7
Lepidonotus squamatus	1.0	
Lyonsia hyalina	2.0	
Melita sp.	14.0	
Mercenaria mercenaria	1.0	
Mulinia lateralis	11.3	1.0
Mya arenaria	1.0	1.0
Nemertea	1.0	
Neomysis americana	4.0	
Nephtys sp.	1.0	
Nereis sp.	12.3	10.0
Nudibranchia	1.0	
Oligochaeta	26.0	2.5
Orbiniidae	3.3	
Ostracoda	1.0	
Pagurus sp.		1.0
Panopeus herbstii	1.0	
Paraonidae	24.0	

TABLE F2-5 (Cont'd)

AVERAGE BENTHIC INVERTEBRATE DENSITY (NUMBER/0.1 SQ. METER) AT INTERPIER / SHOAL AREAS - NOVEMBER 1998

	HARBOR AREA	
TAXONOMIC LISTING	PJ	SB
Pectinaria gouldii	5.5	
Phyllodocidae	11.3	2.0
Sabella sp.		1.0
Sabellidae	2.0	
Scolecolepides viridis		4.0
Streblospio benedicti	132.0	47.0
Syllidae	1.0	
Tellina sp.	1.5	
Trichophoxus epistomus	2.0	
Upogebia affinis		1.0
Xanthidae	1.5	

Areas: PJ - Port Jersey (PJ 1-3, PJ 5, PJ6), SB - South Brooklyn (SB 1-3).
Note: Not all stations sampled each month, see sampling schedule for actual months and stations sampled.

TABLE F2-6

AVERAGE BENTHIC INVERTEBRATE DENSITY (NUMBER/0.1 SQ. METER) AT INTERPIER / SHOAL AREAS - FEBRUARY 1999

	HARBOR AREA	
TAXONOMIC LISTING	PJ	SB
Acteocina canaliculata	5.8	1.0
Ampelisca abdita	3.4	1.5
Capitellidae		16.0
Corophium sp.	1.5	
Crangon septimspinosa	1.0	
Crepidula fornicata	10.0	
Crepidula plana	20.0	
Cyathura polita	14.0	
Diastylis quadrispinosa	3.0	
Diopatra cuprea	1.0	
Dyspanopeus sayii	1.0	
Edotea triloba	4.0	
Gammaridea	9.0	1.0
Gammarus sp.	3.0	
Glycera sp.	6.5	1.0
Haminoea solitaria	1.0	
Harmothoe sp.	1.0	
Ilyanassa trivittata	1.0	1.0
Lacuna vincta	3.0	1.0
Leitoscoloplos fragilis	9.3	9.5
Lepidonotus squamatus	1.0	
Leucon americanus		1.0
Libinia emarginata	1.0	
Lyonsia hyalina	1.5	
Melitidae	6.0	
Mercenaria mercenaria	3.0	
Mulinia lateralis	27.8	3.5
Mya arenaria	4.3	1.0
Mytilidae	5.0	
Nematoda	1.0	
Nephtys sp.	2.0	2.0
Nereis sp.	31.0	18.0
Oligochaeta	6.5	2.5
Orbiniidae	9.3	3.0
Ostracoda	1.0	
Paraonidae	50.0	1.0
Pectinaria gouldii	3.7	
Phyllodocidae	16.5	2.0
Polydora ligni	1.0	
Sabellaria vulgaris	1.0	
Sabellidae	1.0	
Solen viridis	1.0	
Streblospio benedicti	74.0	25.5

TABLE F2-6 (Cont'd)

AVERAGE BENTHIC INVERTEBRATE DENSITY (NUMBER/0.1 SQ. METER) AT INTERPIER / SHOAL AREAS - FEBRUARY 1999

	HARBOR AREA	
TAXONOMIC LISTING	PJ	SB
Syllidae	1.0	
Tellina sp.	2.7	
Unciola irrorata	6.0	
Xanthidae	4.0	

Areas: PJ - Port Jersey (PJ 1-3, PJ 5, PJ6), SB - South Brooklyn (SB 1-3).
Note: Not all stations sampled each month, see sampling schedule for actual months and stations sampled.

TABLE F2-7

AVERAGE BENTHIC INVERTEBRATE DENSITY (NUMBER/0.1 SQ. METER) AT INTERPIER / SHOAL AREAS - MAY 1999

	HARBOR AREA	
TAXONOMIC LISTING	PJ	SB
Acteocina canaliculata	2.6	1.5
Ampelisca abdita	6.0	1.0
Ampharetidae	1.5	
Caprellidae	1.0	
Corophiidae	1.0	1.0
Crangon septimspinosa	1.0	
Crepidula fornicata	12.0	
Crepidula plana	8.0	
Cumacea	1.0	
Diastylis quadrispinosa	1.5	
Dyspanopeus sayi	2.0	
Edotea triloba	2.0	
Ensis directus	1.0	
Gammaridea	8.0	
Gammarus sp.	1.0	1.0
Gemma gemma	9.0	
Glycera sp.	5.7	
Haminoea solitaria	7.0	
Ilyanassa trivittata	2.0	
Lacuna vincta	1.0	
Leitoscoloplos fragilis	17.3	1.5
Leucon americanus	1.0	1.0
Lyonsia hyalina	2.0	
Maldanidae		1.0
Melita sp.	1.0	
Mercenaria mercenaria	1.5	
Mulinia lateralis	76.2	1.5
Mya arenaria	2.0	
Mytilidae		1.0
Mytilus edulis	239.5	
Nephtys sp.	2.0	2.0
Nereis sp.	3.0	10.0
Oligochaeta		1.5
Orbiniidae	8.3	1.0
Ostracoda	2.0	
Pagurus sp.	1.0	
Paraonidae	7.0	
Pectinaria gouldii	2.0	
Pherusa sp.	1.0	
Phoxocephalidae	1.0	
Phyllodocidae	2.0	1.0
Sabellidae	1.0	
Solen viridis	1.0	

TABLE F2-7 (Cont'd)

AVERAGE BENTHIC INVERTEBRATE DENSITY (NUMBER/0.1 SQ. METER) AT INTERPIER / SHOAL AREAS - MAY 1999

	HARBOR AREA	
TAXONOMIC LISTING	PJ	SB
Solenidae	1.0	
Spionidae	1.5	
Streblospio benedicti	10.0	8.0
Strongylocentrotidae		1.0
Syllidae	8.0	
Tellina sp.	10.8	1.0

Areas: PJ - Port Jersey (PJ 1-3, PJ 5, PJ6), SB - South Brooklyn (SB 1-3).
Note: Not all stations sampled each month, see sampling schedule for actual months and stations sampled.

TABLE F2-8

AVERAGE BENTHIC INVERTEBRATE DENSITY (NUMBER/0.1 SQ. METER) AT INTERPIER / SHOAL AREAS - AUGUST 1999

	HARBOR AREA	
TAXONOMIC LISTING	PJ	SB
Acteocina canaliculata	2.0	1.0
Ampelisca abdita	4.0	1.0
Ampharetidae	2.5	
Aoridae	2.0	
Callinectes sapidus	1.0	
Corophium sp.	3.0	
Crepidula fornicata	10.5	
Crepidula plana	2.5	
Cyathura polita	1.0	
Diastylis quadrispinosa	1.0	
Erichthonius rubricornis	1.0	
Glycera sp.	1.3	
Ilyanassa trivittata	1.5	
Leitoscoloplos fragilis	18.0	1.5
Leucon americanus	1.0	
Lyonsia hyalina	1.5	
Melita sp.	1.0	
Melitidae	1.0	
Mercenaria mercenaria	2.0	
Molgula manhattensis	63.0	
Mulinia lateralis	50.2	5.7
Mya arenaria	2.0	1.0
Nematoda	1.0	
Nephtys sp.	2.5	1.0
Nereis sp.	4.0	
Oligochaeta	6.3	10.0
Ostracoda	1.0	1.0
Paguridae	1.0	
Paraonidae	9.5	
Paraphoxus spinosus	1.0	
Pectinaria gouldii	1.0	
Phyllodocidae	2.3	1.0
Platyhelminthes	1.0	
Polydora ligni	1.7	1.0
Sabellidae	1.0	
Streblospio benedicti	8.6	2.0
Tellina sp.	13.5	1.0
Unciola sp.	1.0	
Upogebia affinis	1.0	1.0
Xanthidae	4.0	
Yoldia sp.	2.0	

Areas: PJ - Port Jersey (PJ 1-3, PJ 5, PJ6), SB - South Brooklyn (SB 1-3).
Note: Not all stations sampled each month, see sampling schedule for actual months and stations sampled.

APPENDIX G

CRAB DREDGE CATCH PER UNIT EFFORT (CPUE)
FEBRUARY 1999 – APRIL 1999

TABLE G-1

CRAB DREDGE CPUE (NO./5-MIN TOW)
FEBRUARY - APRIL 1999

STATION	HW-1		
SPECIES	FEB	MAR	APR
Horseshoe crab	1		
Lady crab			1
Rock crab		1	1

Note: Months shaded were not sampled.

TABLE G-2

CRAB DREDGE CPUE (NO./5-MIN TOW)
FEBRUARY - APRIL 1999

STATION	HW-2		
SPECIES	FEB	MAR	APR
Blue crab			1
Horseshoe crab	1		
Spider crab			2

Note: Months shaded were not sampled.

TABLE G-3

CRAB DREDGE CPUE (NO./5-MIN TOW)
FEBRUARY - APRIL 1999

STATION	HW-3		
SPECIES	FEB	MAR	APR
Blue crab		2	1
Green crab	1		1
Horseshoe crab	1	1	1
Rock crab	2	204	
Spider crab		1	2

Note: Months shaded were not sampled.

TABLE G-4

CRAB DREDGE CPUE (NO./5-MIN TOW)
FEBRUARY - APRIL 1999

STATION	HW-4		
SPECIES	FEB	MAR	APR
Blue crab	1		
Horseshoe crab	1		
Rock crab	20		2
Spider crab	2		

Note: Months shaded were not sampled.

TABLE G-5

CRAB DREDGE CPUE (NO./5-MIN TOW)
FEBRUARY - APRIL 1999

STATION	HW-5		
SPECIES	FEB	MAR	APR
Mud crab	1		

Note: Months shaded were not sampled.

TABLE G-6

CRAB DREDGE CPUE (NO./5-MIN TOW)
FEBRUARY - APRIL 1999

STATION	HW-6		
SPECIES	FEB	MAR	APR
Blue crab	3	1	3
Rock crab	1		

Note: Months shaded were not sampled.

TABLE G-7

CRAB DREDGE CPUE (NO./5-MIN TOW)
FEBRUARY - APRIL 1999

STATION	HW-7		
SPECIES	FEB	MAR	APR
Blue crab	1	1	1

Note: Months shaded were not sampled.

TABLE G-8

CRAB DREDGE CPUE (NO./5-MIN TOW)
FEBRUARY - APRIL 1999

STATION	HW-8		
SPECIES	FEB	MAR	APR
Blue crab	1	1	2

Note: Months shaded were not sampled.

TABLE G-9

CRAB DREDGE CPUE (NO./5-MIN TOW)
FEBRUARY - APRIL 1999

STATION	HW-9		
SPECIES	FEB	MAR	APR
Blue crab		10	

Note: Months shaded were not sampled.

TABLE G-10

CRAB DREDGE CPUE (NO./5-MIN TOW)
FEBRUARY - APRIL 1999

STATION	HW-10		
SPECIES	FEB	MAR	APR
Blue crab		4	

Note: Months shaded were not sampled.

TABLE G-11

CRAB DREDGE CPUE (NO./5-MIN TOW)
FEBRUARY - APRIL 1999

STATION	SB-1		
SPECIES	FEB	MAR	APR
Blue crab	4	2	1

Note: Months shaded were not sampled.

TABLE G-12

CRAB DREDGE CPUE (NO./5-MIN TOW)
FEBRUARY - APRIL 1999

STATION	SB-2		
SPECIES	FEB	MAR	APR
Blue crab	1	5	12
Horseshoe crab			1

Note: Months shaded were not sampled.

TABLE G-13

CRAB DREDGE CPUE (NO./5-MIN TOW)
FEBRUARY - APRIL 1999

STATION	SB-3		
SPECIES	FEB	MAR	APR
Blue crab	19	20	7
Rock crab		1	1

Note: Months shaded were not sampled.

TABLE G-14

CRAB DREDGE CPUE (NO./5-MIN TOW)
FEBRUARY - APRIL 1999

STATION	SB-4		
SPECIES	FEB	MAR	APR
Blue crab	1	12	1
Horseshoe crab		1	
Rock crab	1	225	1

Note: Months shaded were not sampled.

TABLE G-15

CRAB DREDGE CPUE (NO./5-MIN TOW)
FEBRUARY - APRIL 1999

STATION	PJ-1		
SPECIES	FEB	MAR	APR
Blue crab	10	10	5
Spider crab	1		

Note: Months shaded were not sampled.

TABLE G-16

CRAB DREDGE CPUE (NO./5-MIN TOW)
FEBRUARY - APRIL 1999

STATION	PJ-2		
SPECIES	FEB	MAR	APR
Blue crab	1	23	3
Horseshoe crab	2		1

Note: Months shaded were not sampled.

TABLE G-17

CRAB DREDGE CPUE (NO./5-MIN TOW)
FEBRUARY - APRIL 1999

STATION	PJ-3		
SPECIES	FEB	MAR	APR
Blue crab	5	19	6
Horseshoe crab		5	1

Note: Months shaded were not sampled.

TABLE G-18

CRAB DREDGE CPUE (NO./5-MIN TOW)
FEBRUARY - APRIL 1999

STATION	PJ-4		
SPECIES	FEB	MAR	APR
Blue crab	6	2	1
Horseshoe crab	1		2

Note: Months shaded were not sampled.

TABLE G-19

CRAB DREDGE CPUE (NO./5-MIN TOW)
FEBRUARY - APRIL 1999

STATION	PJ-5		
SPECIES	FEB	MAR	APR
Blue crab	48	3	11
Mud crab	5		

Note: Months shaded were not sampled.

TABLE G-20

CRAB DREDGE CPUE (NO./5-MIN TOW)
FEBRUARY - APRIL 1999

STATION	PJ-6		
SPECIES	FEB	MAR	APR
Blue crab	7	12	3
Lady crab			3
Mud crab	2		

Note: Months shaded were not sampled.