

FISH EGGS AND LARVAE NEAR DEEPWATER DUMPSITE 106 (DWD-106)

by

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Spawning Patterns of Coastal Fishes: Larval fishes representing more than 200 taxa are collected annually on coastal surveys between Cape Hatteras, North Carolina and Cape Sable, Nova Scotia (see Figure 1 and Table 1). Most of the young fish originate from pelagic eggs which drift in the water column until hatching takes place. The incubation period requires anywhere from a few days to a few weeks, depending on the species in question. Thereafter the developing larvae are dependent on favorable circulation patterns, water quality and food supply for a time period measured in months. It is these free-floating eggs and larvae that are the most vulnerable stages of development in the life history of marine fishes.

Although spawning goes on year-round, spawning cycles of most coastal species are seasonal and climatic changes are followed closely by changes in the species composition of the ichthyoplankton community. The role of environmental stimuli in the breeding cycles of most marine fishes is poorly understood, but DeVlaming (1974) presented evidence that changing temperatures and photoperiod trigger active spawning in several temperate species and it is widely held that both influence the onset of spawning in coastal fishes off northeastern United States. The significance of temperature and photoperiod in spawning is evident for fishes that spawn in coastal waters between capes Cod and Hatteras, the Middle Atlantic Bight. Here the fish community is comprised of many species that immigrate from the south with spring warming and emigrate as coastal waters cool in autumn. Eggs and larvae of transient species that spawn during seasonal migrations are geographically limited at the outset but their distributions expand as the adult migrations advance. For example, young stages of Atlantic mackerel, Scomber scombrus, first occur off North Carolina and/or Virginia in April,

then continue to spread northward to waters off southern New England and beyond in June (Berrien 1978; Berrien et al. 1981). Conversely, the young of Atlantic menhaden, Brevoortia tyrannus, occur off southern New England in summer and progressively farther south during the autumn months (Kendall and Reintjes 1975). Smith et al. (1975) found similar geographic progressions in the distribution of flatfish larvae, the young of non-migratory fishes, in the Middle Atlantic Bight.

Temporal Trends in Abundance: Species diversity, or the number of taxa contributing to larval fish populations between North Carolina and Nova Scotia, is inversely proportional to increasing latitude. In the Middle Atlantic Bight, where diversity is greatest, the number of taxa increases from a low in winter to a high in summer, then declines during the autumn months. The annual spawning cycle follows a similar pattern. Eggs are most abundant during the warm months, least abundant during the cold months (Figure 2). Despite this disparity in the magnitude of seasonal egg abundance, several economically important species spawn during the late autumn and winter months (Figure 3).

Survey results for the 4-year period between 1977-80 show remarkably similar between-year patterns in relative magnitude of seasonal spawning cycles as measured by the abundance of fish eggs throughout the Bight, and in that part of the Bight potentially influenced by dumping at DWD-106. For most cruises the abundance of eggs in the potential impact area is proportional to the abundance of eggs in the Bight (Figure 4).

Larvae also exhibit seasonal pulses of high and low abundance from year to year but, because of a population explosion in the mid-1970's of sand lance, Ammodytes sp., a taxon that spawns demersal eggs in winter, the annual

abundance curve for larvae does not follow the spawning curve for eggs. Whereas the abundance of eggs has a single annual peak in summer, the standing crop of larvae in the Middle Atlantic Bight peaks in winter, declines in early spring, increases in late spring to a second annual peak in summer, then declines again in autumn (Figure 2).

Within the realm of influence of dumping at DWD-106, the larval fish community is a mix of shelf and slope water species, that continually changes, largely because of the seasonal spawning habits of the fishes, the dynamics of coastal circulation and the inshore-offshore movements of the shelf-slope front. During the course of a year, more than 150 of the 200+ taxa of larvae that occur annually in coastal waters off northeastern United States are found in that part of the Bight that could be influenced by dumping at DWD-106. As with eggs, the proportion of larvae that occurs within the potential impact area at a given time is directly related to the overall abundance of larvae in the Bight (Figure 4).

Despite the dynamic and diverse nature of the larval fish populations in shelf waters adjacent to DWD-106, numerical dominance is shared by a limited number of taxa which maintain their numerical advantage from year to year until they are directly or indirectly reduced through natural or man-induced changes such as: 1) a decline in the size of spawning stocks to a level below that required to produce enough young to maintain a competitive advantage over the developing young stages of other species; 2) shifts in spawning time and/or location which cause shifts in the distribution patterns of eggs and larvae, and have the potential to result in temporal or spatial mismatches between newly hatched larvae and optimal densities of their predators and/or prey; 3) changes in environmental and climatic events which cause mass mortality

by transporting young planktonic stages away from their traditional nursery area; and 4) increased embryonic and larval mortality imposed by the release of pollutants over principal spawning areas. In large part, it is the deviation from average conditions that influence the size of a year class.

During the 4-year period that forms the basis of this report, nine taxa occupied the top five positions of numerical dominance. Three of the top five, Atlantic mackerel, hakes of the genus Urophycis and silver hake, Merluccius bilinearis, are economically important taxa that contribute to the 1.1 billion dollar fishing industry off northeastern United States. Another, sand lance, is an important forage species that provides a principal part of the diet for important piscivorous species such as summer flounder, Paralichthys dentatus, bluefish, Pomatomus saltatrix, weakfish, Cynoscion regalis, striped bass, Morone saxatilis, Atlantic cod, Gadus morhua, bluefin tuna, Thunnus thynnus, etc.

Sand lance, which accounted for 90 to 99.5% of the winter larval population, was the most dominant taxon within that part of the potential impact area lying over the continental shelf. The estimated abundance of sand lance larvae within the 34,336 km² shelf area potentially influenced by dumping at DWD-106 exceeded 1.8 trillion at the time of the 1979 winter survey. This extraordinary biomass is equivalent to 52 million larvae/km² and represents the peak abundance level for a taxon during the 4-year period, although the abundance estimates of hake, Urophycis sp., and Atlantic mackerel were nearly as great in the summer of 1977 and spring of 1980, respectively. Young sand lance remained at or near the forefront of dominance during winters of the other three years when abundance estimates exceeded 470 billion larvae (Table 2).

A slope water myctophid, Benthosema glaciale, was a perennial early spring dominant, although larvae were considerably less abundant than those of the other dominants. Benthosema was succeeded by Atlantic mackerel in late spring of 1977 and 1980 but young mackerel were not abundant in the potential impact area during the intervening years. In summer hakes of the genus Urophycis dominated in 1977 and 1980 and ranked near the top in 1978 and 1979. Silver hake, Merluccius bilinearis, and flatfishes of the genus Citharichthys or Etropus were dominant during late summer and early autumn months of 1977, 1978 and 1979 (Table 2).

Late autumn survey coverage of the potential impact area was adequate only in 1979. Silver hake larvae dominated, although the spawning season of silver hake normally peaks in summer and tapers off to insignificant levels by late autumn. The abundance of silver hake larvae in late autumn of 1979 was only a fraction of that for the dominant taxa during winter, spring and summer (Table 2).

Fish Larvae in Slope Waters: Most of the 112,657 km² area that falls within the realm of influence from ocean dumping at DWD-106 lies east of the continental shelf, beyond the geographic scope of most United States fisheries and, therefore, in an area where fisheries research is seldom done (Figure 1). Because of the paucity of ichthyoplankton research in this area and the lack of standardization in collecting gears and techniques used, results cannot be meaningfully quantified. Larval fishes collected in slope and oceanic waters at and surrounding DWD-106 are, therefore, summarized on the basis of monthly occurrence in Table 3. This listing contains 209 taxa which represent 73 families. Most of the taxa are slope water and/or oceanic fishes but representatives of shelf species occur during all seasons of the year. Some

of these shelf taxa originate in the Middle Atlantic Bight and are subsequently transported off the shelf by currents, others originate south of Cape Hatteras and are transported northward by the Gulf Stream. The likelihood of these wayward larvae finding their way back on the shelf is remote and they eventually succumb to the intolerable environment. But one important species, the bluefish, does occur naturally at early stages of development in slope waters adjacent to the Middle Atlantic Bight (Austin 1975; Kendall and Walford 1979). According to the latter authors, these fish ultimately move shoreward into coastal estuaries and in subsequent years contribute to the popular summer sport fishery for bluefish off northeastern United States.

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Table 1. Listing of MARMAP surveys in the Middle Atlantic Bight, 1977-80. Stations are those falling within area potentially affected by dumping at DWD-106.

Year	Season	Date	Vessel	Cruise	No. Sta.
1977	Late winter	9 Mar-7 Apr	DELAWARE II	77-03	23
	Early spring	14 Apr-28 Apr	DELAWARE II	77-04	24
	Spring	4 May-13 May	DELAWARE II	77-05 I	27
	Spring	18 May-24 May	DELAWARE II	77-05 II	20
	Summer	19 Aug-29 Aug	YUBILEINLY	77-02	20
	Early autumn	19 Oct-29 Oct	ARGUS	77-01	22
	Late autumn	2 Dec-9 Dec	KELEZ	77-11	3
1978	Late winter	16 Feb-14 Mar	DELAWARE II	78-02	28
	Early spring	19 Apr-12 May	ARGUS	78-04	29
	Late spring	24 Jun-12 Jul	ALBATROSS IV	78-07	29
	Summer	12 Aug-3 Sep	BELOGORSK	78-01	30
	Early autumn	19 Oct-27 Oct	BELOGORSK	78-03	19
	Autumn	16 Nov	BELOGORSK	78-04	2
1979	Late winter	25 Feb-4 Mar	DELAWARE II	79-03	17
	Early spring	13 Apr-14 Apr	DELAWARE II	79-04	4
	Spring	6 May-18 May	DELAWARE II	79-05	23
	Late spring	17 June-8 Jul	ALBATROSS IV	79-06	23
	Summer	12 Aug-22 Aug	BELOGORSK	79-01	20
	Early autumn	4 Oct-18 Oct	ALBATROSS IV	79-11	18
	Autumn	12 Dec-19 Dec	ALBATROSS IV	79-13	6
1980	Late winter	29 Feb-19 Mar	ALBATROSS IV	80-02	20
	Early spring	7 Apr-27 Apr	EVRIKA	80-01	22
	Late spring		DELAWARE II	80-03	20
	Summer	17 Jul-26 Jul	EVRIKA	80-06	22
	Early autumn	27 Sep-9 Oct	ALBATROSS IV	80-10	19
	Autumn	20 Nov-7 Dec	ALBATROSS IV	80-12	19

Table 2. Summary of fish larvae collected on MARMAP surveys (1977-80) at shelf and slope water stations (depths 55 to 2200 m) within the potential area of impact from ocean dumping at DWD-106. Dominance represents the number of stations where taxon accounted for ≥50% of the larvae. Abundance is expansion of K mean to reflect the size of the area (see Berrien et al, 1981 for methodology).

LARVAL ASSEMBLAGES NEAR DWD-106
CRUISES=MM7701 & DL7703

YEAR	SEASON	#STA	TXNAME	DOM	PCTDOM	OCCUR	PCTOCCUR	KMEAN	KSTDERR	TOTABUND	PCTABUND
1977	LATE WINTER	23	AMMODYTES	13	56.5	14	60.9	137.0	62.0	470,510,126,923	96.1
			HYGOPHUM BENDITI	3	13.0	5	21.7	3.5	1.9	11,924,947,157	2.4
			UROPHYCIS	0	0.0	2	8.7	0.6	0.4	1,910,873,043	0.4
			PARALEPIDIDAE	0	0.0	2	8.7	0.5	0.3	1,603,341,913	0.3
			CYCLOTHONE	0	0.0	1	4.3	0.3	1.4	994,251,130	0.2
			ETROPLUS MICROSTOMUS	1	4.3	1	4.3	0.2	1.1	788,235,130	0.1
			CONGRIDAE	1	4.3	1	4.3	0.2	1.1	759,870,609	0.1
			BENTHOSEMA GLACIALE	0	0.0	1	4.3	0.2	1.0	707,620,174	0.1
			CERATOSCOPELUS MADERENSIS	0	0.0	1	4.3	0.1	0.5	353,810,087	<0.1
			BENTHOSEMA SIMILE	0	0.0	1	4.3	0.1	0.5	353,810,087	<0.1
			UNKNOWN	0	0.0	0	0.0	0.0	0.0	0	0

CRUISES=607701 & DL7704 (STA 1-94)

YEAR	SEASON	#STA	TXNAME	DOM	PCTDOM	OCCUR	PCTOCCUR	KMEAN	KSTDERR	TOTABUND	PCTABUND
1977	EARLY SPRING	24	AMMODYTES	9	37.5	13	54.2	43.1	20.9	147,966,841,065	48.5
			BENTHOSEMA GLACIALE	3	12.5	8	33.3	15.0	6.8	51,514,747,595	16.9
			HYGOPHUM BENDITI	3	12.5	5	20.8	8.4	5.2	28,739,830,287	9.4
			PARALEPIDIDAE	1	4.2	5	20.8	2.1	0.9	7,126,598,698	2.3
			OPHIDIIDAE	0	0.0	2	8.3	2.1	1.7	7,061,770,667	2.3
			PEPRILUS TRIACANTHUS	0	0.0	2	8.3	1.8	1.4	6,137,560,000	2.0
			TRIGLIDAE	0	0.0	2	8.3	1.7	1.2	5,971,602,667	1.9
			MELANOGRAMMUS AEGLEFINUS	0	0.0	1	4.2	1.6	7.8	5,493,760,000	1.8
			ETRUMEUS TERES	0	0.0	2	8.3	1.4	1.1	4,645,374,667	1.5
			CENTROPRISTIS STRIATUS	0	0.0	1	4.2	1.3	6.6	4,621,053,333	1.5
			SYNODONTIDAE	0	0.0	2	8.3	1.2	0.9	4,289,138,667	1.4
			LOPHIUS AMERICANUS	0	0.0	3	12.5	1.1	0.6	3,617,581,654	1.2
			GOBIIDAE	0	0.0	2	8.3	1.0	0.8	3,530,885,333	1.1
			DIOGENICHTHYS ATLANTICUS	1	4.2	2	8.3	0.9	0.7	3,217,569,333	1.1
			EPINEPHELUS	0	0.0	1	4.2	0.9	4.3	3,033,013,333	1.0
			LIMANDA FERRUGinea	0	0.0	1	4.2	0.5	2.6	1,828,392,000	0.6
			MYCTOPHIDAE	0	0.0	2	8.3	0.5	0.4	1,764,012,000	0.6
			MYCTOPHUM NITIDULUM	0	0.0	1	4.2	0.4	2.2	1,516,506,667	0.5
			SCORPAENIDAE	0	0.0	1	4.2	0.4	2.2	1,516,506,667	0.5
			BATHYLAGIDAE	0	0.0	2	8.3	0.4	0.3	1,460,710,667	0.5
			ETROPLUS MICROSTOMUS	0	0.0	1	4.2	0.3	1.4	948,532,000	0.3
			SYMPHURUS	0	0.0	1	4.2	0.3	1.4	948,532,000	0.3
			DISINTEGRATED	0	0.0	1	4.2	0.3	1.3	944,240,000	0.3
			PARALICHTHYS DENTATUS	0	0.0	1	4.2	0.3	1.3	924,210,667	0.3
			PHOLIS GUNNELLUS	0	0.0	1	4.2	0.3	1.3	914,196,000	0.3
			ENCHELYOPUS CIMBRIUS	0	0.0	1	4.2	0.3	1.3	897,028,000	0.3
			UROPHYCIS	0	0.0	1	4.2	0.2	1.2	851,246,667	0.3
			GADIDAE	0	0.0	1	4.2	0.2	1.2	819,772,000	0.3
			CLUPEIFORMES	0	0.0	1	4.2	0.2	1.1	758,253,333	0.2
			GONOSTOMATIDAE	0	0.0	1	4.2	0.2	1.1	758,253,333	0.2
			HYGOPHUM	0	0.0	1	4.2	0.2	1.1	758,253,333	0.2
			CARAPIDAE	0	0.0	1	4.2	0.2	1.1	758,253,333	0.2
			CITHARICHTHYS ARCTIFRONS	0	0.0	1	4.2	0.2	1.1	758,253,333	0.2
			GADUS MORHUA	0	0.0	1	4.2	0.2	1.0	705,318,667	0.2
			GYNGNATHIDAE	0	0.0	1	4.2	0.2	1.0	705,318,667	0.2
			UNKNOWN	0	0.0	0	0.0	0.0	0.0	0	0

Table 2. (continued)

YEAR 1977	SEASON SPRING	# STA 27	TXNAME	CRUISES=AL7702 & DL7705 (STA 1-91)							TOTABUND	PCTABUND
				DOM	PCTDOM	OCCUR	PCTOCCUR	KMEAN	KSTDBRK			
			BENTHOSEMA GLACIALE	10	37.0	15	55.6	40.6	14.0	139,280,346,837	47.0	
			AMMODYTES	1	3.7	5	18.5	4.0	2.4	13,856,223,761	4.7	
			SYNODONTIDAE	0	0.0	7	25.9	3.2	1.3	10,858,411,680	3.6	
			OPHIDIIDAE	0	0.0	5	18.5	3.0	1.6	10,272,238,630	3.4	
			MYCTOPHIDAE	1	3.7	1	3.7	2.6	13.3	8,790,016,000	2.9	
			PEPRILUS TRIACANTHUS	0	0.0	3	11.1	2.5	1.8	8,741,868,289	2.9	
			BOTHUS	0	0.0	3	11.1	2.5	1.4	8,456,857,277	2.8	
			PARALEPIDIDAE	0	0.0	5	18.5	2.3	1.2	7,854,523,386	2.6	
			LIPARIS	1	3.7	2	7.4	1.9	1.6	6,358,518,519	2.1	
			UROPHYCIS	0	0.0	5	18.5	1.8	0.8	6,057,523,101	2.0	
			LIMANDA FERRUGinea	1	3.7	3	11.1	1.5	0.9	5,056,344,891	1.7	
			SCOMBER SCOMBRUS	1	3.7	3	11.1	1.4	0.9	4,850,639,003	1.6	
			BOTHUS	0	0.0	2	7.4	1.4	1.0	4,690,043,259	1.6	
			TRIGLIDAE	0	0.0	2	7.4	1.1	0.9	3,841,816,889	1.3	
			HYGOPHUM BENOITI	0	0.0	1	3.7	1.1	5.7	3,745,167,407	1.2	
			ETROPLUS/CITHARICHTHYS	0	0.0	1	3.7	0.9	4.7	3,092,783,407	1.0	
			CENTROPRISTIS STRIATUS	0	0.0	1	3.7	0.9	4.7	3,092,783,407	1.0	
			CARAPIDAE	0	0.0	1	3.7	0.9	4.7	3,092,783,407	1.0	
			SYMPHURUS	0	0.0	2	7.4	0.9	0.7	3,091,511,704	1.0	
			SERRANIDAE	0	0.0	3	11.1	0.9	0.5	3,036,655,232	1.0	
			MELANOGRAMMUS AEGLEFINUS	2	7.4	3	11.1	0.8	0.5	2,735,965,018	0.9	
			GADUS MORHUA	0	0.0	3	11.1	0.7	0.4	2,510,810,869	0.8	
			PERCIFORMES	0	0.0	2	7.4	0.7	0.5	2,332,304,593	0.8	
			BALISTIDAE	0	0.0	1	3.7	0.7	3.5	2,319,587,556	0.8	
			SCOMBERESOX SAURUS	0	0.0	1	3.7	0.5	2.5	1,635,410,963	0.5	
			CITHARICHTHYS ARCTIFRONS	0	0.0	1	3.7	0.5	2.5	1,635,410,963	0.5	
			VINCIGUERRIA	0	0.0	2	7.4	0.5	0.3	1,634,139,259	0.5	
			MYCTOPHUM NITIDULUM	0	0.0	2	7.4	0.5	0.3	1,603,618,370	0.5	
			DIOGENICHTHYS ATLANTICUS	0	0.0	1	3.7	0.5	2.3	1,546,391,704	0.5	
			DECAPTERUS	0	0.0	1	3.7	0.5	2.3	1,546,391,704	0.5	
			BLENNIIDAE	0	0.0	1	3.7	0.5	2.3	1,546,391,704	0.5	
			SCORPAENIDAE	0	0.0	1	3.7	0.5	2.3	1,546,391,704	0.5	
			SYACUM	0	0.0	1	3.7	0.5	2.3	1,546,391,704	0.5	
			LOPHIUS AMERICANUS	0	0.0	2	7.4	0.4	0.3	1,523,501,037	0.5	
			CERATOSCOPELUS MADERENSIS	0	0.0	2	7.4	0.4	0.3	1,518,414,222	0.5	
			AGONIDAE	0	0.0	1	3.7	0.3	1.4	946,147,556	0.3	
			MAUROLICUS MUELLERI	0	0.0	1	3.7	0.2	1.2	817,705,481	0.3	
			DIAPHUS DUMERILI	0	0.0	1	3.7	0.2	1.2	785,912,889	0.2	
			GADIFORMES	0	0.0	1	3.7	0.2	1.2	785,912,889	0.2	
			STOMIAS FEROX	0	0.0	1	3.7	0.2	1.2	774,467,556	0.2	
			MYCTOPHUM	0	0.0	1	3.7	0.2	1.2	774,467,556	0.2	
			ARIOMMA	0	0.0	1	3.7	0.2	1.2	773,195,852	0.2	
			CONGRIDAE	0	0.0	1	3.7	0.2	1.2	771,924,148	0.2	
			UNKNOWN	0	0.0	1	3.7	0.2	1.2	770,652,444	0.2	
			MURAENIDAE	0	0.0	1	3.7	0.2	1.2	770,652,444	0.2	
			PISODONOPHIS CRUENTIFER	0	0.0	1	3.7	0.2	1.1	750,305,185	0.2	
			GLYPTOCEPHALUS CYNOGLOSSUS	0	0.0	1	3.7	0.2	1.1	750,305,185	0.2	
			MERLUCCIUS BILINEARIS	0	0.0	1	3.7	0.2	1.1	749,033,481	0.2	
			PSENES CYANOPHRYNS	0	0.0	1	3.7	0.2	1.1	749,033,481	0.2	
			POLLACHIUS VIRENS	0	0.0	1	3.7	0.2	1.1	731,229,630	0.2	
			CALLIONYMIDAE	0	0.0	1	3.7	0.2	1.0	656,199,111	0.2	
			CAULOPHRYNIDAE	0	0.0	1	3.7	0.2	1.0	656,199,111	0.2	
			DISINTEGRATED	0	0.0	1	3.7	0.1	0.7	473,073,778	0.1	
			ANGUILA ROSTRATA	0	0.0	1	3.7	0.1	0.7	473,073,778	0.1	
			ENCHELYOFUS CIMBRIUS	1	3.7	1	3.7	0.1	0.5	319,197,630	0.1	

Table 2. (continued)

YEAR	SEASON	#STA	TXNAME	CRUISE=DL7705 (STA 92-180)							PCTABUND
				DOM	PCTDOM	OCCUR	PCTOCCUR	KMEAN	KSTDERR	TOTABUND	
1977	SPRING	20	SCOMBER SCOMBRUS	4	20.0	7	35.0	27.7	18.2	95,081,795,420	31.3
			BENTHOSEMA GLACIALE	3	15.0	7	35.0	10.1	4.3	34,832,234,628	11.5
			CERATOSCOPELUS MADERENSIS	0	0.0	5	25.0	10.0	7.4	34,460,100,408	11.3
			LIPARIS	1	5.0	1	5.0	5.2	23.3	17,923,392,000	5.9
			BENTHOSEMA SUBORBITALE	2	10.0	2	10.0	5.1	3.5	17,401,484,800	5.7
			HYGOPHUM HYGOMIT	0	0.0	1	5.0	3.0	13.4	10,305,950,400	3.4
			UROPHYCIS	0	0.0	3	15.0	2.9	2.2	10,042,248,306	3.3
			LIMANDA FERRUGINEA	0	0.0	4	20.0	2.6	1.5	8,777,974,162	2.9
			VINCIGUERRIA	0	0.0	3	15.0	2.5	1.8	8,430,740,028	2.8
			SYACIUM PAPILLOSUM	0	0.0	1	5.0	1.7	7.5	5,725,528,000	1.9
			ENCHELYOPUS CINMRIUS	0	0.0	3	15.0	1.4	0.9	4,788,439,260	1.5
			BOTHUS	0	0.0	2	10.0	1.3	1.0	4,441,361,600	1.4
			PARALEPIDIDAE	0	0.0	3	15.0	1.3	0.7	4,307,381,169	1.4
			COTTIDAE	0	0.0	2	10.0	1.2	1.0	4,178,691,200	1.4
			GLYPTOCEPHALUS CYNOGLOSSUS	0	0.0	3	15.0	1.2	0.7	4,039,665,690	1.3
			LAMPANYCTUS ALATUS	0	0.0	1	5.0	1.0	4.5	3,435,316,800	1.1
			POMATOMUS SALTATRIX	1	5.0	1	5.0	1.0	4.5	3,425,016,000	1.1
			AMMODYTES	0	0.0	2	10.0	0.9	0.6	2,935,728,000	1.0
			ARGYROPELECUS	0	0.0	1	5.0	0.7	3.0	2,290,211,200	0.7
			GOBIIDAE	0	0.0	2	10.0	0.6	0.4	2,231,840,000	0.7
			OPHICHTHIDAE	0	0.0	2	10.0	0.6	0.4	2,214,672,000	0.7
			SYNODONTIDAE	0	0.0	2	10.0	0.6	0.4	2,118,531,200	0.7
			MELANOGRAMMUS AEGLEFINUS	1	5.0	1	5.0	0.6	2.6	1,991,488,000	0.6
			LOPHIUS AMERICANUS	0	0.0	2	10.0	0.5	0.4	1,749,419,200	0.6
			DIAPHUS	0	0.0	1	5.0	0.3	1.5	1,145,105,600	0.4
			DIAPHUS PROBLEMATICUS	0	0.0	1	5.0	0.3	1.5	1,145,105,600	0.4
			LAMPANYCTUS	0	0.0	1	5.0	0.3	1.5	1,145,105,600	0.4
			LOBIANCHIA DOFLEINI	0	0.0	1	5.0	0.3	1.5	1,145,105,600	0.4
			DIOGENICHTHYS ATLANTICUS	0	0.0	1	5.0	0.3	1.5	1,145,105,600	0.4
			CENTROPRISTIS STRIATUS	0	0.0	1	5.0	0.3	1.5	1,145,105,600	0.4
			RHOMBOPLITES AURORUBENS	0	0.0	1	5.0	0.3	1.5	1,145,105,600	0.4
			OPHIIDIIDAE	0	0.0	1	5.0	0.3	1.5	1,145,105,600	0.4
			THUNNUS	0	0.0	1	5.0	0.3	1.5	1,145,105,600	0.4
			LEIOSTOMUS XANTHURUS	0	0.0	1	5.0	0.3	1.4	1,086,734,400	0.3
			STERNOPTYCHIDAE	0	0.0	1	5.0	0.3	1.4	1,069,566,400	0.3
			PSEUDOFLEURONECTES AMERICANUS	0	0.0	1	5.0	0.3	1.3	1,006,044,800	0.3
			HYCOTOPIDIAE	0	0.0	1	5.0	0.3	1.3	985,443,200	0.3
			HERLUCCIUS ALBIDUS	0	0.0	1	5.0	0.3	1.3	985,443,200	0.3
			CYCLOTHONE	0	0.0	1	5.0	0.3	1.3	973,425,600	0.3
			PEPRILUS TRIACANTHUS	0	0.0	1	5.0	0.3	1.3	973,425,600	0.3
			GADUS MORHUA	0	0.0	1	5.0	0.3	1.3	969,992,000	0.3
			UNKNOWN	0	0.0	0	0.0	0.0	0.0	0	0

Table 2. (continued)

YEAR 1977	SEASON SUMMER	#STA 20	TXNAME	CRUISES-YU7702 & BL7709						TOTABUND	PCTABUND
				POA	PCTPOA	OCOCUR	PCTOCOCUR	KMEAN	KSTDERR		
			UROPHYCIS	6	30.0	17	85.0	314.2	152.2	1,078,938,525,099	46.0
			CITHARICHTHYS ARCTIFRONS	0	0.0	15	75.0	95.2	38.5	326,987,023,090	13.9
			ETROPLUS MICROSTOMUS	0	0.0	3	15.0	41.5	28.4	142,570,439,458	6.1
			AUXIS	0	0.0	15	75.0	26.5	8.5	91,068,530,705	3.9
			CERATOSCOPELUS MADERENSIS	0	0.0	6	30.0	26.2	19.0	90,077,535,468	3.8
			OPHIDIIDAE	0	0.0	15	75.0	26.1	7.7	89,632,675,880	3.8
			ENGRAULIS EURYSTOLE	0	0.0	8	40.0	17.5	8.4	59,992,613,295	2.6
			LABRIDAE/SCARIIDAE	0	0.0	14	70.0	15.4	6.1	52,896,215,439	2.2
			HIPPOGLOSSINA OBLONGA	0	0.0	12	60.0	14.7	4.7	50,530,984,875	2.2
			SYMPHURUS	0	0.0	3	15.0	14.5	13.3	49,839,425,201	2.1
			ETROPLUS/CITHARICHTHYS	0	0.0	3	15.0	13.1	10.7	45,125,966,134	1.9
			MERLUCCIUS BILINEARIS	0	0.0	10	50.0	11.1	3.8	38,153,128,479	1.6
			POMATOMUS SALTATRIX	0	0.0	4	20.0	10.0	7.7	34,259,110,237	1.5
			BOTHUS	0	0.0	8	40.0	9.3	3.5	31,930,114,077	1.4
			SYACIUM PAPILLOSUM	0	0.0	5	25.0	4.7	2.8	16,107,063,811	0.7
			PEPRILUS TRIACANTHUS	0	0.0	7	35.0	4.1	1.7	13,962,101,353	0.6
			TRIGLIDAЕ	0	0.0	3	15.0	3.9	2.8	13,361,784,985	0.6
			CALLIONYMIDAE	0	0.0	4	20.0	3.6	2.3	12,263,900,307	0.5
			ENGRAULIDAE	0	0.0	2	10.0	2.7	2.5	9,320,507,200	0.4
			CENTROPRISTIS STRIATA	0	0.0	2	10.0	2.7	9.4	7,227,728,000	0.3
			SYNODONTIDAE	0	0.0	1	5.0	2.1	1.3	6,777,985,838	0.3
			UNKNOWN	0	0.0	3	15.0	2.0	1.0	6,528,249,994	0.3
			DISINTEGRATED	0	0.0	4	20.0	1.9	1.0	5,763,297,600	0.2
			CYCLOTHONE	0	0.0	2	10.0	1.7	1.5	5,761,580,800	0.2
			MERLUCCIUS ALBIDUS	0	0.0	2	10.0	1.7	1.2	5,670,590,400	0.2
			CLUPEIFORMES	0	0.0	1	5.0	1.7	7.4	5,217,852,640	0.2
			Gobiidae	0	0.0	5	25.0	1.5	0.6	5,177,868,800	0.2
			EUTHYNNUS ALLETTERATUS	0	0.0	1	5.0	1.5	6.7	4,410,459,200	0.2
			SERRANIDAE	0	0.0	1	5.0	1.3	5.7	3,937,212,791	0.2
			OPHICHTHIDAE	0	0.0	3	15.0	1.1	0.7	3,625,881,600	0.2
			TAUTOGOLABRUS ADSPERSUS	0	0.0	1	5.0	1.1	4.7	3,146,894,400	0.1
			ANGUILLIFORMES	0	0.0	2	10.0	0.9	0.7	2,995,736,380	0.1
			PARALEPIDIDAE	0	0.0	3	15.0	0.9	0.5	2,930,516,363	0.1
			LOPHOLATILUS CHAMAELEONTICEPS	0	0.0	3	15.0	0.9	0.5	2,911,592,800	0.1
			ROTHIDAE	0	0.0	2	10.0	0.8	0.6	2,312,529,600	0.1
			ANCHOA HEPSETUS	0	0.0	1	5.0	0.7	3.0	1,878,179,200	0.1
			GLYPTOCEPHALUS CYNOGLOSSUS	0	0.0	1	5.0	0.5	2.4	1,661,862,400	0.1
			OCCOCEPHALIDAE	0	0.0	1	5.0	0.5	2.2	1,481,598,400	0.1
			SCORPAENIDAE	0	0.0	2	10.0	0.4	0.3	1,294,467,200	0.1
			BALISTIDAE	0	0.0	1	5.0	0.4	1.7	1,067,849,600	<0.1
			TETRAGONURIDAE	0	0.0	1	5.0	0.3	1.4	956,257,600	<0.1
			PISODONOPHIS CRUENTIFER	0	0.0	1	5.0	0.3	1.2	935,456,000	<0.1
			LOPHIUS AMERICANUS	0	0.0	1	5.0	0.3	1.2	880,718,400	<0.1
			NOTOLYCHNUS	0	0.0	1	5.0	0.3	1.1	880,718,400	<0.1
			TETRAGONURUS ATLANTICUS	0	0.0	1	5.0	0.3	1.1	770,843,200	<0.1
			VINCIGUERRIA	0	0.0	1	5.0	0.2	1.1	722,772,800	<0.1
			MURAENIDAE	0	0.0	1	5.0	0.2	1.1	722,772,800	<0.1
			ARGENTINIBAE	0	0.0	1	5.0	0.2	1.1	722,772,800	<0.1
			MYCTOPHIDAE	0	0.0	1	5.0	0.2	1.0	648,950,400	<0.1
			SARDINELLA AURITA	0	0.0	1	5.0	0.2	0.9	647,233,600	<0.1
			CARANX	0	0.0	1	5.0	0.2	0.9	630,065,600	<0.1
			LARIMUS FASCIATUS	0	0.0	1	5.0	0.2	0.9	614,614,400	<0.1
			SCOPELIFORMES	0	0.0	1	5.0	0.2	0.8		
			DIODONICHTHYS ATLANTICUS	0	0.0	1	5.0	0.2	0.8		
			LESTIDIUM ATLANTICUM	0	0.0	1	5.0	0.2	0.8		
			DIAPHUS	0	0.0	1	5.0	0.2	0.8		

Table 2. (continued)

YEAR	SEASON	#STA	TXNAME	CRUISE=AR7701							TOTABUND	PCTABUND
				DOM	PCTDOM	OCUR	PCTOCCUR	KMEAN	KSTDERR			
1977	EARLY AUTUMN	22	CITHARICHTHYS ARCTIFRONS	2	9.1	15	68.2	17.2	5.7	59,091,894,367	21.6	
			UROPHYCIS	2	9.1	18	81.8	15.7	4.2	53,792,714,486	19.7	
			MERLUCCIUS BILINEARIS	2	9.1	9	40.9	13.8	5.7	47,352,226,357	17.4	
			CERATOSCOPELUS MADERENSIS	2	9.1	7	31.8	12.9	7.7	44,239,316,063	16.2	
			PARALEPIDIDAE	1	4.5	9	40.9	6.4	2.3	22,122,074,981	8.1	
			MERLUCCIUS ALBIDUS	0	0.0	5	22.7	3.2	1.7	10,868,870,334	3.9	
			OPHIIDIIDAE	0	0.0	7	31.8	2.0	0.7	6,709,995,408	2.5	
			BOTHUS	0	0.0	4	18.2	1.2	0.6	4,213,268,444	1.5	
			PARALICHTHYS DENTATUS	0	0.0	2	9.1	0.9	0.7	3,093,361,455	1.1	
			BENTHOSEMA GLACIALE	0	0.0	1	4.5	0.9	4.1	2,991,914,182	1.1	
			GOBIIDAE	0	0.0	3	13.6	0.7	0.4	2,362,227,186	0.8	
			MYCTOPHIDAE	0	0.0	2	9.1	0.6	0.4	1,949,348,364	0.7	
			GONOSTOMATIDAE	0	0.0	2	9.1	0.4	0.3	1,445,233,455	0.5	
			LAMPANYCTUS	0	0.0	1	4.5	0.4	1.7	1,208,002,909	0.4	
			LOBIANCHIA DOFLEINI	0	0.0	1	4.5	0.4	1.7	1,208,002,909	0.4	
			SYACIUM PAPILLOSUM	0	0.0	1	4.5	0.3	1.4	997,304,727	0.3	
			CYCLOTHONE	0	0.0	1	4.5	0.3	1.3	970,772,364	0.3	
			MICROPOGONIAS UNDULATUS	1	4.5	1	4.5	0.3	1.3	927,072,000	0.3	
			DIODONTIDAE	0	0.0	1	4.5	0.3	1.3	919,268,364	0.3	
			VINCIGUERRIA	0	0.0	1	4.5	0.2	1.0	741,345,455	0.3	
			SYMBOLOPHORUS VERANYI	0	0.0	1	4.5	0.2	1.0	741,345,455	0.3	
			CARAPIDAE	0	0.0	1	4.5	0.2	1.0	741,345,455	0.3	
			CALLIONYMIDAE	0	0.0	1	4.5	0.2	1.0	741,345,455	0.3	
			GEHFYLIDAE	0	0.0	1	4.5	0.2	1.0	741,345,455	0.3	
			UNKNOWN:FISH/EGGS	0	0.0	1	4.5	0.2	1.0	703,888,000	0.3	
			ENGRAULIS EURYSTOLE	0	0.0	1	4.5	0.2	1.0	697,645,091	0.2	
			SCOPHTHALMUS AQUOSUS	0	0.0	1	4.5	0.2	0.9	692,962,909	0.2	
			AMMODYTES	0	0.0	1	4.5	0.2	0.9	650,823,273	0.2	
			LABRIDAE/SCARIDAE	0	0.0	1	4.5	0.2	0.8	602,440,777	0.2	

Table 2. (continued)

YEAR	SEASON	#STA	TXNAME	CRUISES=MM7711 & KE7711							TOTABUND	PCTABUND
				DOM	PCTDOM	OCCUR	PCTOCCUR	KMEAN	KSTDERR			
1977	EARLY WINTER	3	GOBIIDAE	1	33.3	2	66.7	10.0	7.3	34,221,546,667	37.7	
			PARALEPIDIDAE	0	0.0	1	33.3	4.8	8.2	16,321,045,333	18.0	
			LABRIDAE/SCARIDAE	0	0.0	1	33.3	2.4	4.1	8,160,522,667	8.9	
			STOMIAS	0	0.0	1	33.3	2.4	4.1	8,160,522,667	8.9	
			MYCTOPHIDAE	0	0.0	1	33.3	1.9	3.3	6,638,293,333	7.3	
			MERLUCCIUS ALBIDUS	0	0.0	1	33.3	1.9	3.3	6,638,293,333	7.3	
			VINCIGUERRIA	0	0.0	1	33.3	1.6	2.8	5,516,650,667	6.1	
			CALLIONYMIDAE	0	0.0	1	33.3	1.6	2.8	5,516,650,667	6.1	
CRUISE=PL7802												
1978	LATE WINTER	28	AMMODYTES	11	39.3	12	42.9	222.1	128.7	762,512,494,902	89.2	
			PARALEPIDIDAE	4	14.3	9	32.1	11.1	5.1	37,983,661,892	4.4	
			DISINTEGRATED	1	3.6	2	7.1	3.7	3.2	12,692,057,143	1.5	
			UNKNOWN/FISH/EGGS	0	0.0	4	14.3	2.4	1.2	8,184,541,049	0.9	
			BREVOORTIA TIRANNUS	0	0.0	3	10.7	2.1	1.5	7,167,399,176	0.8	
			MYCTOPHIDAE	0	0.0	3	10.7	0.9	0.5	3,020,001,697	0.4	
			GOBIIDAE	0	0.0	2	7.1	0.8	0.6	2,711,317,714	0.3	
			UROPHYCIS	0	0.0	3	10.7	0.7	0.4	2,335,980,029	0.3	
			HYGOPHUM	0	0.0	2	7.1	0.5	0.4	1,807,545,143	0.2	
			CERATOSCOPELUS MADERENSIS	0	0.0	1	3.6	0.5	2.7	1,721,705,143	0.2	
			CITHARICHTHYS ARCTIFRONS	0	0.0	4	3.6	0.5	2.7	1,721,705,143	0.2	
			SCOPHTHALMUS AQUOSUS	0	0.0	1	3.6	0.5	2.7	1,721,705,143	0.2	
			SCIAENIDAE	0	0.0	1	3.6	0.4	2.2	1,449,469,714	0.2	
			OPHICHTHIDAE	0	0.0	2	7.1	0.4	0.3	1,386,929,143	0.2	
			ENCHELYOFUS CIMBRIUS	0	0.0	2	7.1	0.4	0.3	1,386,929,143	0.2	
			CARAFIDAE	0	0.0	1	3.6	0.3	1.5	946,692,571	0.1	
			CYNOGLOSSIDAE	0	0.0	1	3.6	0.3	1.3	860,882,871	0.1	
			PARALICHTHYS DENTATUS	1	3.6	1	3.6	0.2	1.2	767,654,857	<0.1	
			SYMPHURUS	0	0.0	1	3.6	0.2	1.1	724,734,857	<0.1	
			TETRAODONTIDAE	0	0.0	1	3.6	0.2	1.1	724,734,857	<0.1	
			LABRIDAE/SCARIDAE	0	0.0	1	3.6	0.2	1.0	662,194,286	<0.1	
			CYCLOTHONE	0	0.0	1	3.6	0.2	1.0	662,194,286	<0.1	
			DIAPHUS	0	0.0	1	3.6	0.2	1.0	662,194,286	<0.1	
			BREGMACEROTIDAE	0	0.0	1	3.6	0.2	1.0	662,194,286	<0.1	
			DECAPTERUS PUNCTATUS	0	0.0	1	3.6	0.2	1.0	662,194,286	<0.1	
			PEPRILUS TRIACANTHUS	0	0.0	1	3.6	0.2	1.0	662,194,286	<0.1	

Table 2. (continued)

YEAR 1978	SEASON EARLY SPRING	#STA. 29	TXNAME	CRUISES=AR7804 & AL7804						PCTABUND	
				DOM	PCTDOM	OCCUR	PCTOCCUR	KMEAN	KSTDERR		
			BENTHOSEMA GLACIALE	15	51.7	16	55.2	61.1	17.8	209,776,921,462	84.2
			AMMODYTES	5	17.2	10	34.5	5.1	2.2	17,577,903,593	7.0
			NYCTOPHIDAE	3	10.3	3	10.3	3.9	3.2	13,482,161,482	5.4
			PARALEPIDIDAE	0	0.0	3	10.3	0.5	0.3	1,876,293,029	0.7
			CERATOSCOPELUS MADERENSIS	0	0.0	2	6.9	0.5	0.3	1,562,880,000	0.6
			PEPRILUS TRIACANTHUS	0	0.0	1	3.4	0.3	1.6	1,046,658,000	0.4
			ENCHELYOPUS CIMBIUS	0	0.0	1	3.4	0.2	1.2	755,392,000	0.3
			HYGOPHUM	0	0.0	1	3.4	0.2	1.2	738,816,000	0.3
			DISINTEGRATED	0	0.0	1	3.4	0.2	1.0	636,992,000	0.2
			CITHARICHTHYS ARCTIFRONS	0	0.0	1	3.4	0.2	0.9	555,293,000	0.2
			UNKNOWN	0	0.0	1	3.4	0.2	0.8	523,328,000	0.2
			GONOSTOMATIDAE	0	0.0	1	3.4	0.2	0.8	523,328,000	0.2
			CARAPIDAE	0	0.0	1	3.4	0.2	0.8	523,328,000	0.2

YEAR 1978	SEASON LATE SPRING	#STA. 29	TXNAME	CRUISE=AL7807						PCTABUND	
				DOM	PCTDOM	OCCUR	PCTOCCUR	KMEAN	KSTDERR		
			MERLUCCIUS BILINEARIS	3	10.3	11	37.9	15.8	7.8	54,187,605,719	17.5
			UDOPHYCIS	2	6.9	14	48.3	15.4	5.5	52,797,641,503	17.0
			PEPRILUS TRIACANTHUS	1	3.4	8	27.6	12.3	4.8	42,379,410,780	13.7
			CERATOSCOPELUS MADERENSIS	2	6.9	5	17.2	10.0	7.1	34,470,531,174	11.1
			HIPPOGLOSSINA OBLONGA	1	3.4	10	34.5	6.6	2.4	22,601,964,431	7.3
			BENTHOSEMA GLACIALE	3	10.3	11	37.9	6.3	1.9	21,585,339,573	6.9
			SCOMBER SCOMBRUS	0	0.0	5	17.2	4.2	2.5	14,346,749,887	4.6
			POMATOMUS SALTATRIX	1	3.4	1	3.4	3.1	16.9	10,755,456,000	3.5
			LINANDA FERRUGinea	1	3.4	4	13.8	2.2	1.4	7,652,909,817	2.5
			ENGRAULIDAE	0	0.0	2	6.9	1.7	1.5	5,708,064,000	1.8
			UNKNOWN	0	0.0	5	17.2	1.5	0.7	5,237,758,906	1.7
			LOPHIUS AMERICANUS	2	6.9	5	17.2	1.5	0.7	5,074,048,001	1.6
			NYCTOPHIDAE	0	0.0	4	13.8	1.1	0.5	3,744,884,443	1.2
			BOTHUS	0	0.0	3	10.3	1.0	0.6	3,413,720,692	1.1
			DPHIDIIDAE	0	0.0	3	10.3	0.9	0.6	3,105,949,320	1.0
			LABRIDAE/SCARIDAE	0	0.0	3	10.3	0.8	0.5	2,697,247,310	0.8
			SARDA SARDA	0	0.0	2	6.9	0.8	0.6	2,643,872,000	0.8
			GLYPTOCEPHALUS CYNOGLOSSUS	0	0.0	3	10.3	0.7	0.4	2,389,137,176	0.7
			SYNODONTIDAE	0	0.0	2	6.9	0.6	0.4	2,132,384,000	0.7
			MERLUCCIUS	0	0.0	1	3.4	0.4	2.3	1,477,632,000	0.5
			DISINTEGRATED	0	0.0	2	6.9	0.4	0.3	1,466,976,000	0.5
			ETROPLUS MICROSTOMUS	0	0.0	2	6.9	0.4	0.3	1,451,584,000	0.5
			PARALEPIDIDAE	0	0.0	1	3.4	0.4	2.1	1,321,344,000	0.4
			DIAPHUS	0	0.0	2	6.9	0.4	0.3	1,278,720,000	0.4
			LAMPANYCTUS	0	0.0	1	3.4	0.4	1.9	1,236,096,000	0.4
			CARAPIDAE	0	0.0	1	3.4	0.2	1.1	726,976,000	0.2
			SCOMBRIDAE	0	0.0	1	3.4	0.2	1.0	660,672,000	0.2
			GONICHTHYS COCCOI	0	0.0	1	3.4	0.2	1.0	652,384,000	0.2
			HYGOPHUM	0	0.0	1	3.4	0.2	1.0	638,176,000	0.2
			GONOSTOMA ELONGATUM	0	0.0	1	3.4	0.2	1.0	618,048,000	0.2
			CYCLOPSETTA	0	0.0	1	3.4	0.2	1.0	618,048,000	0.2
			SYACIUM	0	0.0	1	3.4	0.2	1.0	618,048,000	0.2

Table 2. (continued)

YEAR 1978	SEASON SUMMER	#STA 30	TXNAME	CRUISE=BE7801							PCTABUND
				DDM	PCTDDM	OCCUR	PCTOCCUR	KMEAN	KSTDERR	TOTABUND	
			ETROPLUS MICROSTOMUS	1	3.3	9	30.0	164.8	125.7	565,832,361,762	36.2
			CITHARICHTHYS ARCTIFRONS	1	3.3	16	53.3	65.2	31.0	223,970,984,356	14.4
			LABRIDAE/SCARIDAE	0	0.0	6	20.0	27.8	18.9	95,610,206,123	6.1
			UROPHYCIS	2	6.7	20	66.7	24.9	7.0	85,515,500,716	5.5
			AUXIS	2	6.7	15	50.0	18.4	6.3	63,292,418,840	4.1
			HIPPOGLOSSINA OBLONGA	1	3.3	16	53.3	17.9	5.2	61,521,913,098	3.9
			OPHIDIIDAE	1	3.3	15	50.0	16.9	5.8	57,872,321,603	3.7
			PEPRILUS TRIACANTHUS	0	0.0	14	46.7	14.8	4.7	50,816,628,732	3.3
			ENGRAULIDAE	0	0.0	7	23.3	14.6	9.1	50,190,858,806	3.2
			TRIGLIDAE	0	0.0	5	16.7	7.9	4.9	27,066,593,267	1.7
			CENTROPRISTIS STRIATUS	0	0.0	5	16.7	7.6	4.9	26,150,241,825	1.7
			SYACIUM	0	0.0	3	10.0	7.3	4.4	25,062,792,928	1.6
			GORIIDAE	0	0.0	5	16.7	5.8	3.4	20,009,609,794	1.3
			ROTIDUS	0	0.0	7	23.3	4.4	2.2	15,091,859,761	1.0
			POMATOMUS SALTATRIX	0	0.0	7	23.3	4.4	1.9	14,960,155,684	1.0
			CALLIONYMIDAE	0	0.0	4	13.3	4.0	2.5	13,783,862,077	0.9
			SYMPHURUS	0	0.0	5	16.7	3.9	2.3	13,248,229,841	0.8
			CERATOSCOPELUS MAIERENSIS	1	3.3	3	10.0	3.0	2.1	10,338,543,287	0.7
			FISONONOPHIS CRUENTIFER	0	0.0	4	13.3	3.0	1.9	10,269,830,989	0.7
			SYNODONTIDAE	0	0.0	5	16.7	2.9	1.6	9,809,585,104	0.6
			ANGUILLIFORMES	0	0.0	3	10.0	2.8	2.1	9,768,041,774	0.6
			MERLUCCIUS	0	0.0	2	6.7	2.1	1.6	7,276,942,933	0.5
			BENTHOSEMA GLACIALE	0	0.0	3	10.0	2.0	1.2	6,900,300,125	0.4
			SCORPAENIDAE	0	0.0	4	13.3	2.0	1.2	6,752,026,405	0.4
			OPHICHTHIDAE	0	0.0	6	20.0	1.8	0.7	6,257,782,295	0.4
			SERRANIDAE	0	0.0	4	13.3	1.7	1.1	5,919,483,645	0.4
			DISINTEGRATED	0	0.0	3	10.0	1.7	1.0	5,916,189,982	0.4
			MERLUCCIUS BILINEARIS	0	0.0	7	23.3	1.6	0.6	5,352,829,651	0.4
			SARDINELLA	0	0.0	1	3.3	1.5	8.2	5,136,665,600	0.4
			DECAPTERUS FUNCTATUS	0	0.0	2	6.7	1.4	1.2	4,910,048,000	0.3
			MERLUCCIUS ALBIDUS	0	0.0	3	10.0	1.3	0.8	4,402,501,808	0.3
			DIAPHUS SUBTILIS	1	3.3	1	3.3	1.2	6.7	4,217,605,333	0.3
			PARALEPIDIDAE	0	0.0	2	6.7	1.2	1.0	4,192,425,600	0.3
			EUTHYNNUS ALLETTERATUS	0	0.0	3	10.0	1.1	0.6	3,813,331,872	0.2
			MICROPOGONIAS UNDULATUS	0	0.0	1	3.3	1.0	5.5	3,424,443,733	0.2
			UNKNOWN FISH/EGGS	0	0.0	3	10.0	0.9	0.6	3,194,066,469	0.2
			DICCOCEPHALIDAE	0	0.0	2	6.7	0.8	0.6	2,788,083,200	0.2
			MAUROLICUS MUELLERI	0	0.0	1	3.3	0.8	4.3	2,669,051,733	0.2
			CYCLOTHONE	0	0.0	2	6.7	0.7	0.5	2,379,484,800	0.1
			HYCNOTHIDAE	0	0.0	2	6.7	0.6	0.5	2,140,277,333	0.1
			LOPHIUS AMERICANUS	0	0.0	3	10.0	0.6	0.3	2,057,027,234	0.1
			SCIENIDAE	0	0.0	1	3.3	0.5	2.9	1,812,940,800	0.1
			CERATOSCOPELUS	0	0.0	1	3.3	0.5	2.7	1,682,464,000	0.1
			MURAENIDAE	0	0.0	2	6.7	0.4	0.3	1,523,373,867	0.1
			CARAPIDAE	0	0.0	2	6.7	0.4	0.3	1,499,338,667	0.1
			MELANOCECTIDAE	0	0.0	2	6.7	0.4	0.3	1,436,389,333	0.1
			DIAPHUS	0	0.0	1	3.3	0.4	2.1	1,334,525,867	0.1
			CARANGIDAE	0	0.0	2	6.7	0.3	0.2	1,184,592,000	0.1
			ARGYROPELECUS HEMIGYMNUS	0	0.0	1	3.3	0.3	1.5	965,986,133	0.1
			MENTICIRRUS	0	0.0	1	3.3	0.3	1.5	965,986,133	0.1
			CYNOSCION REGALIS	0	0.0	1	3.3	0.3	1.4	885,868,800	0.1
			ANTHIINAE	0	0.0	1	3.3	0.2	1.4	856,110,933	0.1
			NANSEMIA GROENLANDICA	0	0.0	1	3.3	0.2	1.4	856,110,933	0.1

Table 2. (continued)

CRUISE=BE7801

TXNAME	DOM	PCTDOM	OCCUR	PCTOCCUR	KMEAN	KSTDERR	TOTABUND	PCTABUND
SCOPELARCHIDAE	0	0.0	1	3.3	0.2	1.4	856,110,933	0.1
MYCTOPHUM NITIDULUM	0	0.0	1	3.3	0.2	1.4	856,110,933	0.1
TETRAODONTIDAE	0	0.0	1	3.3	0.2	1.4	856,110,933	0.1
CUBICEPS PAUCIRADIATUS	0	0.0	1	3.3	0.2	1.3	841,232,000	0.1
BRANCHIOSTEGIDAE	0	0.0	1	3.3	0.2	1.2	743,946,667	<0.1
MYCTOPHUM	0	0.0	1	3.3	0.2	1.1	667,262,933	<0.1
HYGOPHUM REINHARDT	0	0.0	1	3.3	0.2	1.1	667,262,933	<0.1
HOWELLA	0	0.0	1	3.3	0.2	1.1	667,262,933	<0.1
STOMIAS FEROX	0	0.0	1	3.3	0.1	0.8	505,883,733	<0.1
PSENES MACULATUS	0	0.0	1	3.3	0.1	0.8	505,883,733	<0.1
APOGONIDAE	0	0.0	1	3.3	0.1	0.5	302,156,800	<0.1

CRUISES=WJ7804 & BE7803

YEAR	SEASON	#STA	TXNAME	DOM	PCTDOM	OCCUR	PCTOCCUR	KMEAN	KSTDERR	TOTABUND	PCTABUND
1978	EARLY	19	CERATOSCOPELUS MADERENSIS	7	36.8	15	78.9	55.6	22.5	190,993,995,969	53.1
	AUTUMN		UROPHYCIS	2	10.5	10	52.6	11.8	4.1	40,414,965,224	11.2
			PARALEPIDIDAE	1	5.3	7	36.8	6.2	2.8	21,129,985,665	5.9
			MERLUCCIUS KILINEARIS	0	0.0	6	31.6	5.9	3.0	20,375,290,595	5.6
			BOTHUS	0	0.0	12	63.2	5.3	1.3	18,077,343,219	5.0
			Gobiidae	0	0.0	7	36.8	3.3	1.2	11,278,943,148	3.1
			SYACIUM	0	0.0	9	47.4	2.8	0.8	9,658,547,446	2.7
			CARAPIDAE	0	0.0	4	31.6	1.9	0.7	6,443,135,186	1.8
			HYCNOTHIDAE	0	0.0	2	10.5	1.8	1.5	6,306,981,053	1.8
			LABRIDAE/SCARIIDAE	0	0.0	7	36.8	1.7	0.5	5,798,932,711	1.6
			CITHARICHTHYS ARCTIFRONS	0	0.0	4	21.1	1.2	0.6	3,981,860,928	1.0
			OPHIDIIDAE	0	0.0	4	21.1	1.1	0.6	3,766,003,573	1.0
			CERATOSCOPELUS WARMINGI	0	0.0	2	10.5	0.8	0.6	2,665,557,895	0.7
			CYCLOTHONE	0	0.0	2	10.5	0.6	0.4	2,125,217,684	0.6
			MERLUCCIUS ALBIDUS	0	0.0	2	10.5	0.6	0.5	2,063,774,316	0.6
			SYMBOLOPHORUS VERANYI	0	0.0	1	5.3	0.6	2.5	1,958,959,158	0.5
			SCORPAENIDAE	0	0.0	2	10.5	0.6	0.4	1,890,287,158	0.5
			CALLIONYMIDAE	0	0.0	2	10.5	0.5	0.3	1,711,378,526	0.5
			ICHTHYOCOCCUS OVATUS	0	0.0	1	5.3	0.3	1.3	1,051,765,895	0.3
			OGCOcephalidae	0	0.0	1	5.3	0.3	1.3	1,051,765,895	0.3
			ENGRaulidae	0	0.0	1	5.3	0.3	1.3	1,019,237,053	0.3
			ETROPLUS/CITHARICHTHYS	0	0.0	1	5.3	0.3	1.2	954,179,368	0.3
			MAUROLICUS MUELLERI	0	0.0	1	5.3	0.3	1.2	954,179,368	0.3
			PEPRILUS TRIACANTHUS	0	0.0	1	5.3	0.3	1.2	939,722,105	0.3
			SYNODONTIDAE	0	0.0	1	5.3	0.2	1.0	751,777,684	0.2
			MURAENIDAE	0	0.0	1	5.3	0.2	1.0	751,777,684	0.2
			MICROPOGONIAS UNDULATUS	0	0.0	1	5.3	0.2	1.0	751,777,684	0.2
			SERRANIDAE	0	0.0	1	5.3	0.2	0.7	751,777,684	0.2
			SYMPHURUS	0	0.0	1	5.3	0.2	0.7	562,026,105	0.1
			CERATIIDIDEA	0	0.0	1	5.3	0.2	0.7	560,218,947	0.1
			OPHICHTHIDAE	0	0.0	1	5.3	0.2	0.7	560,218,947	0.1
			UNKNOWN	0	0.0	0	0.0	0.0	0.0	0	0

Table 2. (continued)

YEAR	SEASON	#STA	TXNAME	CRUISE=DE7804						TOTABUND	PCTABUND		
				DOM	PCTDOM	OCCUR	PCTOCCUR	KMEAN	KSTDERR				
1978	AUTUMN	2	PARALEPIDIDAE	1	50.0	1	50.0	7.6	10.7	26,095,360,000	38.2		
			LABRIDAE/SCARIDAE	0	0.0	1	50.0	4.1	5.8	14,026,256,000	20.6		
			CARAPIDAE	0	0.0	1	50.0	4.1	5.8	14,026,256,000	20.6		
			BOTHUS	0	0.0	1	50.0	4.1	5.8	14,026,256,000	20.6		
CRUISE=DL7903													
1979	WINTER	17	TXNAME	DOM	PCTDOM	OCCUR	PCTOCCUR	KMEAN	KSTDERR	TOTABUND	PCTABUND		
			AMMODYTES	10	58.8	10	58.8	538.8	394.8	1,850,172,341,270	99.4		
			PARALEPIDIDAE	2	11.8	3	17.6	1.0	0.6	3,479,138,476	0.2		
			BENTHOSEMA GLACIALE	1	5.9	1	5.9	0.8	3.3	2,726,682,353	0.1		
			DISINTEGRATED	0	0.0	2	11.8	0.7	0.5	2,393,421,176	0.1		
			CRYPTACANTHODES MACULATUS	1	5.9	1	5.9	0.3	1.3	1,112,890,353	0.1		
			MERLUCCIUS BILINEARIS	0	0.0	1	5.9	0.3	1.1	929,091,765	<0.1		
			PARALICHTHYS DENTATUS	0	0.0	1	5.9	0.2	0.9	777,609,412	<0.1		
UNKNOWN													
CRUISES=AL7903 & DL7904													
1979	EARLY SPRING	4	TXNAME	DOM	PCTDOM	OCCUR	PCTOCCUR	KMEAN	KSTDERR	TOTABUND	PCTABUND		
			AMMODYTES	3	75.0	3	75.0	31.4	22.9	107,699,779,541	67.7		
			BENTHOSEMA GLACIALE	1	25.0	2	50.0	13.6	8.3	46,436,872,000	29.3		
			MERLUCCIUS BILINEARIS	0	0.0	1	25.0	1.4	2.8	4,849,960,000	3.0		
CRUISE=DL7905													
1979	SPRING	23	TXNAME	DOM	PCTDOM	OCCUR	PCTOCCUR	KMEAN	KSTDERR	TOTABUND	PCTABUND		
			BENTHOSEMA GLACIALE	12	52.2	15	65.2	67.1	23.8	230,358,199,994	74.5		
			LIMANDA FERRUGinea	3	13.0	4	17.4	4.6	2.8	15,918,929,828	5.1		
			SCOMBER SCOMBRUS	0	0.0	3	13.0	2.5	1.8	8,541,344,760	2.8		
			MICROPOGONIAS UNDULATUS	0	0.0	1	4.3	2.2	10.8	7,715,149,913	2.5		
			OPHIIDIIDAE	0	0.0	1	4.3	1.7	8.1	5,786,362,435	1.8		
			SYNODONTIDAE	0	0.0	1	4.3	1.4	6.7	4,821,968,696	1.6		
			MERLUCCIUS BILINEARIS	0	0.0	2	8.7	1.2	0.9	4,248,706,783	1.4		
			GLYPTOCEPHALUS CYNOGLOSSUS	0	0.0	3	13.0	1.1	0.7	3,923,937,645	1.3		
			CITHARICHTHYS ARCTIFRONS	0	0.0	1	4.3	1.1	5.4	3,857,574,957	1.2		
			MERLUCCIUS ALBIDUS	0	0.0	3	13.0	0.8	0.4	2,737,933,781	0.9		
			PARALEPIDIDAE	0	0.0	2	8.7	0.8	0.6	2,715,529,739	0.9		
			MELANOGRAMMUS AEGLEFINUS	0	0.0	1	4.3	0.7	3.5	2,516,978,087	0.8		
			PEPRILUS TRIACANTHUS	0	0.0	1	4.3	0.6	2.7	1,928,787,478	0.6		
			SCOPHTHALMUS AQUOSUS	0	0.0	1	4.3	0.6	2.7	1,928,787,478	0.6		
			UNKNOWN	0	0.0	2	8.7	0.5	0.4	1,803,386,435	0.6		
			AMMODYTES	1	4.3	2	8.7	0.5	0.3	1,585,427,478	0.5		
			ENCHELYOPUS CIMBRIUS	0	0.0	1	4.3	0.4	2.0	1,398,816,783	0.4		
			PROTOMYCTOPHUM	0	0.0	1	4.3	0.3	1.5	1,089,794,783	0.3		
			DISINTEGRATED	0	0.0	1	4.3	0.3	1.3	964,393,739	0.3		
			PARALICHTHYS DENTATUS	0	0.0	1	4.3	0.3	1.3	964,393,739	0.3		
			SYMPHURUS	0	0.0	1	4.3	0.3	1.3	964,393,739	0.3		
			BROSME BROSME	0	0.0	1	4.3	0.3	1.3	962,900,870	0.3		
			LOPHIUS AMERICANUS	0	0.0	1	4.3	0.3	1.3	900,200,348	0.3		
			SEBASTES	0	0.0	1	4.3	0.2	1.2	856,907,130	0.3		
			ETROFUS MICROSTOMUS	1	4.3	1	4.3	0.2	1.2	853,921,391	0.3		
			CYCLOCOTERIDAE	0	0.0	1	4.3	0.2	1.2	836,006,957	0.3		

Table 2. (continued)

YEAR 1979	SEASON LATE SPRING	#STA 23	TXNAME	CRUISE=AL7906							PCTABUND
				DOM	PCTDOM	OCCUR	PCTOCCUR	KMEAN	KSTDERR	TOTABUND	
			MERLUCCIUS BILINEARIS	3	13.0	12	52.2	33.5	15.3	115,193,166,937	23.6
			PEPRILUS TRIACANTHUS	1	4.3	11	47.8	24.3	11.3	83,336,338,302	17.1
			UROPHYCIS	0	0.0	11	47.8	23.0	8.5	79,058,147,911	16.2
			CERATOSCOPELUS MADERENSIS	2	8.7	6	26.1	16.4	12.0	56,168,031,893	11.5
			ETROFUS/CITHARICHTHYS	0	0.0	6	26.1	6.2	3.6	21,124,107,815	4.3
			POMATOMUS SALTATRIX	0	0.0	7	30.4	5.9	2.6	20,110,221,657	4.1
			HIPPOGLOSSINA OBLONGA	0	0.0	10	43.5	5.5	1.9	18,827,709,818	3.9
			LIMANDA FERRUGINEA	0	0.0	5	21.7	5.5	2.8	18,749,875,615	3.8
			GLYPTOCEPHALUS CYNOGLOSSUS	0	0.0	6	26.1	2.9	1.2	9,938,166,678	2.0
			OPHIDIIDAE	1	4.3	4	17.4	2.4	1.4	8,131,244,543	1.7
			EUTHYNNUS ALLETTERATUS	0	0.0	3	13.0	2.4	1.6	8,079,196,738	1.6
			SCOMBRIDAE	0	0.0	4	17.4	2.3	1.3	7,904,966,802	1.6
			TAUTOGOLABRUS ADSPERSUS	0	0.0	4	17.4	2.1	1.1	7,188,656,025	1.5
			BENTHOSEMA GLACIALE	1	4.3	3	13.0	2.0	1.1	6,787,132,576	1.4
			DISINTEGRATED	0	0.0	3	13.0	1.8	1.1	6,204,205,804	1.3
			LOPHIUS AMERICANUS	0	0.0	4	17.4	1.6	0.8	5,501,297,083	1.1
			SCOMBER SCOMBRUS	0	0.0	3	13.0	1.0	0.6	3,298,305,079	0.7
			AUXIS	0	0.0	2	8.7	0.6	0.4	1,904,901,565	0.4
			MERLUCCIUS ALBIDUS	0	0.0	2	8.7	0.5	0.4	1,769,050,435	0.3
			ANGUILLIFORMES	0	0.0	2	8.7	0.5	0.4	1,763,078,957	0.3
			ENGRAULIDAE	0	0.0	2	8.7	0.5	0.3	1,627,227,826	0.3
			OPHICHTHIDAE	1	4.3	1	4.3	0.4	2.1	1,477,940,870	0.3
			ENGRAULIS EURYSTOLE	0	0.0	1	4.3	0.3	1.4	1,022,615,652	0.2
			LAMPANYCTUS	0	0.0	1	4.3	0.3	1.4	1,001,715,478	0.2
			BROSME BROSME	0	0.0	1	4.3	0.3	1.2	882,285,913	0.2
			MYCTOPHIDAE	0	0.0	1	4.3	0.2	1.1	821,078,261	0.2
			LAMPANYCTUS ALATUS	0	0.0	1	4.3	0.2	1.1	821,078,261	0.2
			CONGRIDAE	0	0.0	1	4.3	0.2	1.1	821,078,261	0.2
			UNKNOWN	0	0.0	0	0.0	0.0	0.0	0	0

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YEAR 1979	SEASON SUMMER	#STA 20	TXNAME	CRUISE=BE7901							PCTABUND
				DOM	PCTDOM	OCCUR	PCTOCCUR	KMEAN	KSTDERR	TOTABUND	
			ETROFUS/CITHARICHTHYS	8	40.0	18	90.0	296.5	127.3	1,017,900,975,165	53.1
			POMATOMUS SALTATRIX	0	0.0	7	35.0	47.2	30.9	161,917,985,737	8.5
			UROPHYCIS	0	0.0	14	70.0	37.0	13.8	127,042,401,100	6.6
			TRIGLIDAE	0	0.0	2	10.0	29.1	26.7	99,780,416,000	5.2
			OPHIDIIDAE	0	0.0	12	60.0	24.0	11.9	82,383,726,410	4.3
			HIPPOGLOSSINA OBLONGA	0	0.0	15	75.0	23.2	6.5	79,793,829,920	4.2
			AUXIS	0	0.0	12	60.0	20.7	8.1	70,962,214,825	3.7
			PEPRILUS TRIACANTHUS	0	0.0	17	85.0	14.9	3.8	51,326,668,080	2.7
			SCOMBRIDAE	0	0.0	4	20.0	8.0	5.1	27,447,239,887	1.4
			OPHICHTHIDAE	0	0.0	8	40.0	6.6	3.2	22,792,224,054	1.2
			TAUTOGOLABRUS ADSPERSUS	0	0.0	2	10.0	6.3	6.2	21,758,723,200	1.1
			MERLUCCIUS ALBIDUS	0	0.0	5	25.0	6.1	3.2	20,908,192,763	1.1
			ENGRAULIDAE	0	0.0	4	20.0	5.4	3.6	18,539,875,406	1.0
			LARIDAE/SCARIDAE	1	5.0	4	20.0	4.9	3.5	16,839,092,520	0.9
			ANGUILLIFORMES	0	0.0	5	25.0	3.9	2.1	13,470,865,109	0.7
			FISODONOPHIS CRUENTIFER	0	0.0	3	15.0	3.7	2.1	12,652,800,847	0.7
			BENTHOSEMA GLACIALE	0	0.0	2	10.0	3.4	0.6	11,722,310,400	0.6
			MERLUCCIUS BILINEARIS	0	0.0	8	40.0	2.1	0.9	7,067,788,758	0.4
			DISINTEGRATED	0	0.0	6	30.0	2.0	0.9	7,028,039,667	0.4

Table 2. (continued)

CRUISE=BE7901								
TXNAME	DOM	PCTDOM	OCCUR	PCTOCCUR	KMEAN	KSTDERR	TOTABUND	PCTABUND
CENTROPRISTIS STRIATUS	0	0.0	2	10.0	1.6	1.4	5,366,716,800	0.3
UNKNOWN	0	0.0	4	20.0	1.3	0.6	4,603,975,771	0.2
PEPRILUS	0	0.0	1	5.0	1.3	5.8	4,420,760,000	0.2
BOTHUS	0	0.0	3	15.0	1.1	0.6	3,899,195,319	0.2
ENCHELYOPUS CIMBRIUS	0	0.0	2	10.0	0.9	0.6	3,038,736,000	0.2
ENGRAULIS EURYSTOLE	0	0.0	1	5.0	0.8	3.4	2,642,155,200	0.1
CUBICEPS	0	0.0	1	5.0	0.8	3.4	2,642,155,200	0.1
GOBIIDAE	0	0.0	1	5.0	0.8	3.4	2,642,155,200	0.1
ETROPLUS MICROSTOMUS	0	0.0	1	5.0	0.6	2.7	2,091,062,400	0.1
CARANGIDAE	0	0.0	1	5.0	0.5	2.3	1,761,436,800	0.1
URANOSCOPIDAE	0	0.0	1	5.0	0.5	2.2	1,716,800,000	0.1
BRANCHIOSTEGIDAE	0	0.0	2	10.0	0.4	0.3	1,541,686,400	0.1
SYMPHURUS	0	0.0	2	10.0	0.4	0.3	1,370,006,400	0.1
COTTIDAE	0	0.0	1	5.0	0.3	1.4	1,050,681,600	0.1
SYNODONTIDAE	0	0.0	1	5.0	0.3	1.1	880,718,400	<0.1
LAMPANYCTUS	0	0.0	1	5.0	0.3	1.1	880,718,400	<0.1
SERRANIDAE	0	0.0	1	5.0	0.3	1.1	880,718,400	<0.1
HIMANTOLOPHIDAE	0	0.0	1	5.0	0.3	1.1	880,718,400	<0.1
SCORPAENIDAE	0	0.0	1	5.0	0.2	1.1	849,816,000	<0.1
LOPHIUS AMERICANUS	0	0.0	1	5.0	0.2	0.8	645,516,800	<0.1
TAUTOGA ONITIS	0	0.0	1	5.0	0.2	0.7	528,774,400	<0.1
BLENNIIDAE	0	0.0	1	5.0	0.1	0.6	489,288,000	<0.1
CARAPIDAE	0	0.0	1	5.0	0.1	0.6	489,288,000	<0.1
SYACIUM	0	0.0	1	5.0	0.1	0.6	489,288,000	<0.1
LIMANDA FERRUGinea	0	0.0	1	5.0	0.1	0.6	482,420,800	<0.1
HIPPOCAMPUS	0	0.0	1	5.0	0.1	0.3	264,387,200	<0.1

YEAR	SEASON	#STA	CRUISE=AL7911							PCTABUND	
			TXNAME	DOM	PCTDOM	OCCUR	PCTOCCUR	KMEAN	KSTDERR		
1979	EARLY	18	ETROPLUS/CITHARICHTHYS	3	16.7	13	72.2	18.9	7.4	64,811,970,936	27.1
	AUTUMN		UROPHYCIS	7	38.9	15	83.3	15.1	3.8	51,971,521,151	21.7
			TRIGLIDAE	0	0.0	2	11.1	11.7	10.6	40,104,448,000	16.8
			OPHIDIIDAE	0	0.0	5	27.8	4.1	2.1	14,148,549,401	5.9
			ENGRAULIS EURYSTOLE	0	0.0	2	11.1	3.2	3.0	11,090,528,000	4.6
			ENGRAULIDAE	0	0.0	1	5.6	3.0	12.7	10,255,018,667	4.3
			MICROPOGONIAS UNDULATUS	0	0.0	2	11.1	1.5	1.1	5,207,626,667	2.2
			GOBIIDAE	0	0.0	5	27.8	1.4	0.6	4,782,719,916	2.0
			BOTHUS	0	0.0	4	22.2	1.4	0.7	4,678,731,526	1.9
			UNKNOWN	0	0.0	1	5.6	1.1	4.8	3,845,632,000	1.6
			SERRANIDAE	0	0.0	2	11.1	1.0	0.8	3,544,238,222	1.5
			CERATOSCOPELUS MADERENSIS	0	0.0	1	5.6	0.7	2.8	2,266,176,000	0.9
			OPHICHTHIDAE	0	0.0	2	11.1	0.6	0.4	2,031,546,667	0.8
			MYCTOPHIDAE	0	0.0	2	11.1	0.6	0.4	1,945,706,667	0.8
			SYNODONTIDAE	0	0.0	2	11.1	0.5	0.4	1,806,455,111	0.8
			LABRIDAE/SCARIDAE	0	0.0	2	11.1	0.5	0.3	1,644,312,889	0.7
			URANOSCOPIDAE	0	0.0	1	5.6	0.4	1.9	1,510,784,000	0.6
			HIPPOGLOSSINA OBLONGA	0	0.0	1	5.6	0.4	1.9	1,510,784,000	0.6
			PEPRILUS TRIACANTHUS	0	0.0	1	5.6	0.4	1.6	1,281,877,333	0.5
			SCOPHTHALMUS AQUOSUS	0	0.0	1	5.6	0.4	1.6	1,281,877,333	0.5
			BENTHOSEMA GLACIALE	0	0.0	1	5.6	0.3	1.4	1,155,978,667	0.5
			MURAENIDAE	0	0.0	1	5.6	0.3	1.3	1,051,063,111	0.4
			MYLIOBATIDAE	0	0.0	1	5.6	0.3	1.2	980,483,556	0.4
			DIOPENICHTHYS ATLANTICUS	0	0.0	1	5.6	0.3	1.2	980,483,556	0.4
			SCIAENIDAE	0	0.0	1	5.6	0.3	1.2	980,483,556	0.4

Table 2. (continued)

CRUISE=BE7901								
TXNAME	DOM	PCTDOM	OCCUR	PCTOCCUR	KMEAN	KSTDERR	TOTABUND	PCTABUND
CENTROPRISTIS STRIATUS	0	0.0	2	10.0	1.6	1.4	5,366,716,800	0.3
UNKNOWN	0	0.0	4	20.0	1.3	0.6	4,603,975,771	0.2
PEPRILUS	0	0.0	1	5.0	1.3	5.8	4,420,760,000	0.2
BOTHUS	0	0.0	3	15.0	1.1	0.6	3,899,195,319	0.2
ENCHELYOPUS CIMBRIUS	0	0.0	2	10.0	0.9	0.6	3,038,736,000	0.2
ENGRAULIS EURYSTOLE	0	0.0	1	5.0	0.8	3.4	2,642,155,200	0.1
CUBICEPS	0	0.0	1	5.0	0.8	3.4	2,642,155,200	0.1
GOBIIDAE	0	0.0	1	5.0	0.8	3.4	2,642,155,200	0.1
ETROPLUS MICROSTOMUS	0	0.0	1	5.0	0.6	2.7	2,091,062,400	0.1
CARANGIDAE	0	0.0	1	5.0	0.5	2.3	1,761,436,800	0.1
URANOSCOPIDAE	0	0.0	1	5.0	0.5	2.2	1,716,800,000	0.1
BRANCHIOSTEGIDAE	0	0.0	2	10.0	0.4	0.3	1,541,686,400	0.1
SYMPHURUS	0	0.0	2	10.0	0.4	0.3	1,370,006,400	0.1
COTTIDAE	0	0.0	1	5.0	0.3	1.4	1,050,681,600	0.1
SYNODONTIDAE	0	0.0	1	5.0	0.3	1.1	880,718,400	<0.1
LAMPANYCTUS	0	0.0	1	5.0	0.3	1.1	880,718,400	<0.1
SERRANIDAE	0	0.0	1	5.0	0.3	1.1	880,718,400	<0.1
HIMANTOLOPHIDAE	0	0.0	1	5.0	0.3	1.1	880,718,400	<0.1
SCORPAENIDAE	0	0.0	1	5.0	0.2	1.1	849,816,000	<0.1
LOPHIUS AMERICANUS	0	0.0	1	5.0	0.2	0.8	645,516,800	<0.1
TAUTOBA ONITIS	0	0.0	1	5.0	0.2	0.7	528,774,400	<0.1
BLENNIIDAE	0	0.0	1	5.0	0.1	0.6	489,288,000	<0.1
CARAFIDAE	0	0.0	1	5.0	0.1	0.6	489,288,000	<0.1
SYACIUM	0	0.0	1	5.0	0.1	0.6	489,288,000	<0.1
LIMANDA FERRUGinea	0	0.0	1	5.0	0.1	0.6	482,420,800	<0.1
HIPPOCAMPUS	0	0.0	1	5.0	0.1	0.3	264,387,200	<0.1

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YEAR	SEASON	#STA	TXNAME	DOM	PCTDOM	OCCUR	PCTOCCUR	KMEAN	KSTDERR	TOTABUND	PCTABUND
1979	EARLY	18	ETROPLUS/CITHARICHTHYS	3	16.7	13	72.2	18.9	7.4	64,811,970,936	27.1
	AUTUMN		UDOPHYCIS	7	38.9	15	83.3	15.1	3.8	51,971,521,151	21.7
			TRIGLIDAE	0	0.0	2	11.1	11.7	10.6	40,104,448,000	16.8
			OPHIDIIDAE	0	0.0	5	27.8	4.1	2.1	14,148,549,401	5.9
			ENGRAULIS EURYSTOLE	0	0.0	2	11.1	3.2	3.0	11,090,528,000	4.6
			ENGRAULIDAE	0	0.0	1	5.6	3.0	12.7	10,255,018,667	4.3
			MICROPOGONIAS UNDULATUS	0	0.0	2	11.1	1.5	1.1	5,207,626,667	2.2
			GOBIIDAE	0	0.0	5	27.8	1.4	0.6	4,782,719,916	2.0
			BOTHUS	0	0.0	4	22.2	1.4	0.7	4,678,731,526	1.9
			UNKNOWN	0	0.0	1	5.6	1.1	4.8	3,845,632,000	1.6
			SERRANIDAE	0	0.0	2	11.1	1.0	0.8	3,544,238,222	1.5
			CERATOSCOPELUS HADERENSIS	0	0.0	1	5.6	0.7	2.8	2,266,176,000	0.9
			OPHICHTHIDAE	0	0.0	2	11.1	0.6	0.4	2,031,546,667	0.8
			MYCTOPHIDAE	0	0.0	2	11.1	0.6	0.4	1,945,706,667	0.8
			SYNODONTIDAE	0	0.0	2	11.1	0.5	0.4	1,806,455,111	0.8
			LABRIDAE/SCARIDAE	0	0.0	2	11.1	0.5	0.3	1,644,312,889	0.7
			URANOSCOPIDAE	0	0.0	1	5.6	0.4	1.9	1,510,784,000	0.6
			HIPPOGLOSSINA OBLONGA	0	0.0	1	5.6	0.4	1.9	1,510,784,000	0.6
			PEPRILUS TRIACANTHUS	0	0.0	1	5.6	0.4	1.6	1,281,877,333	0.5
			SCOPHTHALMUS AQUOSUS	0	0.0	1	5.6	0.4	1.6	1,281,877,333	0.5
			BENTHOSEMA GLACIALE	0	0.0	1	5.6	0.3	1.4	1,155,978,667	0.5
			MURAENIDAE	0	0.0	1	5.6	0.3	1.3	1,051,063,111	0.4
			MYLIOBATIDAE	0	0.0	1	5.6	0.3	1.2	980,483,556	0.4
			DIOPENICHTHYS ATLANTICUS	0	0.0	1	5.6	0.3	1.2	980,483,556	0.4
			SCIAENIDAE	0	0.0	1	5.6	0.3	1.2	980,483,556	0.4

Table 2. (continued)

CRUISES=EK8001 & ALB003 & DLB002											
YEAR	SEASON	#STA	TXNAME	DOM	PCTDOM	OCCUR	PCTOCCUR	KMEAN	KSTDERR	TOTABUND	PCTABUND
1980	EARLY SPRING	22	BENTHOSEMA GLACIALE	9	40.9	11	50.0	46.4	23.6	159,360,522,772	76.7
			AMMODYTES	5	22.7	5	22.7	4.7	2.6	16,283,312,021	7.8
			LOPHIUS AMERICANUS	0	0.0	4	18.2	3.5	2.1	11,995,050,273	5.7
			CERATOSCOPELUS WARMINGI	1	4.5	1	4.5	1.1	5.3	3,909,621,818	1.9
			PARALEPIDIDAE	0	0.0	4	18.2	1.0	0.5	3,562,099,671	1.7
			UROPHYCIS	0	0.0	3	13.6	0.9	0.5	2,964,664,903	1.3
			CYCLOPTERIDAE	0	0.0	1	4.5	0.5	2.2	1,582,577,455	0.7
			NYCTOPHIDAE	0	0.0	1	4.5	0.3	1.6	1,162,741,818	0.5
			TRIGLIDAE	0	0.0	1	4.5	0.3	1.6	1,162,741,818	0.5
			UNKNOWN	0	0.0	1	4.5	0.3	1.4	1,019,154,909	0.5
			STOMIATIDAE	0	0.0	1	4.5	0.3	1.4	1,019,154,909	0.5
			COTTIDAE	0	0.0	1	4.5	0.3	1.3	953,604,364	0.4
			PARALEPIS ATLANTICA	0	0.0	1	4.5	0.2	1.1	777,242,182	0.3
			PARALICHTHYS DENTATUS	1	4.5	1	4.5	0.2	1.0	763,195,636	0.3
			GONOSTOMATIDAE	0	0.0	1	4.5	0.2	1.0	758,313,455	0.3
			HACROURIDAE	0	0.0	1	4.5	0.2	1.0	758,513,455	0.3
			GADUS MORHUA	1	4.5	1	4.5	0.2	0.9	653,944,727	0.3

CRUISES=DLB003 & EK8004											
YEAR	SEASON	#STA	TXNAME	DOM	PCTDOM	OCCUR	PCTOCCUR	KMEAN	KSTDERR	TOTABUND	PCTABUND
1980	SPRING	20	SCOMBER SCOMBRUS	10	50.0	17	85.0	302.7	160.5	1,039,504,478,930	82.5
			LIMANDA FERRUGINEA	0	0.0	8	40.0	15.7	8.1	53,993,385,426	4.2
			BENTHOSEMA GLACIALE	2	10.0	7	35.0	13.6	6.3	46,707,264,745	3.7
			MERLUCCIUS BILINEARIS	0	0.0	10	50.0	11.6	5.0	39,683,144,972	3.1
			BENTHOSEMA	1	5.0	1	5.0	3.9	17.6	13,514,649,600	1.1
			NYCTOPHUM	0	0.0	1	5.0	2.6	11.7	8,968,563,200	0.7
			ENCHELYOPUS CIMBIUS	0	0.0	6	30.0	2.5	1.0	8,467,731,190	0.6
			GLYPTOCEPHALUS CYNOGLOSSUS	0	0.0	8	40.0	2.3	0.7	8,066,716,072	0.6
			LOPHIUS AMERICANUS	0	0.0	5	25.0	2.1	1.0	7,361,929,204	0.5
			UROPHYCIS	0	0.0	4	20.0	2.0	1.0	6,815,451,926	0.5
			MERLUCCIUS ALBIDUS	0	0.0	3	15.0	2.0	1.2	6,790,527,052	0.2
			SYNODONTIDAE	0	0.0	3	15.0	0.9	0.5	2,994,135,166	0.2
			GADUS MORHUA	0	0.0	1	5.0	0.8	3.6	2,765,764,800	0.2
			PEPRILUS TRIACANTHUS	0	0.0	2	10.0	0.7	0.5	2,329,697,600	0.2
			CYCLOPTERIDAE	0	0.0	1	5.0	0.6	2.6	1,977,753,600	0.1
			PARALEPIDIDAE	0	0.0	1	5.0	0.4	1.8	1,345,971,200	0.1
			NETTASTOMATIDAE	0	0.0	1	5.0	0.4	1.8	1,345,971,200	0.1
			DISINTEGRATED	0	0.0	1	5.0	0.4	1.6	1,203,476,800	0.1
			CERATOSCOPELUS MADERENSIS	0	0.0	1	5.0	0.3	1.5	1,126,220,800	0.1
			UNKNOWN	0	0.0	1	5.0	0.3	1.5	1,121,070,400	0.1
			CONGRIDAE	0	0.0	1	5.0	0.3	1.5	1,121,070,400	0.1
			SYMPHURUS	0	0.0	1	5.0	0.3	1.3	1,014,628,800	0.1
			SYMBOLOPHORUS VERANYI	0	0.0	1	5.0	0.3	1.3	1,011,195,200	0.1
			CITHARICHTHYS ARCTIFRONS	0	0.0	1	5.0	0.3	1.3	1,011,195,200	0.1
			CONGER OCEANICUS	0	0.0	1	5.0	0.3	1.3	1,007,761,600	0.1

Table 2. (continued)

YEAR 1980	SEASON SUMMER	#STA 22	TXNAME	CRUISES=EK8006 & DL8005						TOTABUND	PCTABUND
				DOM	PCTDOM	OCCUR	PCTOCCUR	KMEAN	ESTDERR		
			UROPHYCIS	3	13.6	14	63.6	111.7	57.6	383,650,423,581	26.2
			FOMATOMUS SALTATRIX	2	9.1	16	72.7	91.5	38.1	314,118,759,314	21.4
			PEPRILUS TRIACANTHUS	2	9.1	16	72.7	91.1	35.7	312,745,061,858	21.3
			HIPPOGLOSSINA DBLONGA	0	0.0	15	68.2	33.7	12.7	115,870,963,777	7.9
			CITHARICHTHYS ARCTIFRONS	0	0.0	14	63.6	21.0	7.7	72,037,929,627	4.9
			MERLUCCIUS BILINEARIS	0	0.0	12	54.5	16.9	5.9	58,177,433,965	3.9
			LABRIDAE/SCARIDAE	1	4.5	9	40.9	8.2	3.3	28,027,632,591	1.9
			SCOMBRIDAE	0	0.0	10	45.5	6.8	2.3	23,455,990,619	1.6
			ETROPUS MICROSTOMUS	0	0.0	5	22.7	6.3	3.6	21,703,514,783	1.5
			TAUTOGOLABRUS ADSPERSUS	0	0.0	6	27.3	5.6	3.1	19,201,270,596	1.3
			OPHICHTHIDAE	0	0.0	5	22.7	4.4	2.3	15,263,371,300	1.0
			AUXIS	0	0.0	2	9.1	4.2	3.0	14,481,988,364	1.0
			OPHIDIIDAE	0	0.0	8	36.4	2.7	0.9	9,344,196,882	0.6
			BOTHUS	0	0.0	7	31.8	2.3	0.8	7,813,670,286	0.5
			LOPHIUS AMERICANUS	0	0.0	6	27.3	2.2	0.9	7,427,483,070	0.5
			BISINTEGRATED	0	0.0	4	18.2	1.8	1.0	6,155,952,252	0.4
			BENTHOSEMA	0	0.0	1	4.5	1.4	6.4	4,719,639,273	0.3
			GLYPTOCEPHALUS CYNOGLOSSUS	0	0.0	4	18.2	1.3	0.6	4,471,168,355	0.3
			ENGRAULIDAE	0	0.0	5	22.7	1.2	0.5	3,983,160,122	0.3
			CONGRIDAE	0	0.0	3	13.6	0.9	0.5	2,994,430,874	0.2
			STERNOPTYCHIDAE	0	0.0	2	9.1	0.8	0.6	2,737,515,636	0.2
			SYACIUM	0	0.0	1	4.5	0.8	3.7	2,696,936,727	0.2
			SYNODONTIDAE	0	0.0	3	13.6	0.7	0.4	2,397,400,799	0.2
			Gobiidae	0	0.0	3	13.6	0.7	0.4	2,397,383,331	0.2
			UNKNOWN	0	0.0	3	13.6	0.7	0.4	2,269,342,263	0.2
			HYCOTOPHIDAE	0	0.0	2	9.1	0.7	0.5	2,258,372,364	0.2
			MERLUCCIUS ALBIDUS	0	0.0	3	13.6	0.7	0.4	2,238,555,589	0.2
			LIMANDA FERRUGINEA	0	0.0	2	9.1	0.6	0.5	2,208,429,091	0.2
			SCIAENIDAE	0	0.0	2	9.1	0.5	0.4	1,724,603,636	0.1
			SCOPHTHALMUS AQUOSUS	0	0.0	1	4.5	0.4	2.1	1,513,905,485	0.1
			SERRANIDAE	0	0.0	2	9.1	0.4	0.3	1,389,047,273	0.1
			SYMBOLOPHORUS VERANYI	0	0.0	1	4.5	0.4	1.8	1,348,468,364	0.1
			TAUTOGA ONITIS	0	0.0	1	4.5	0.3	1.4	1,009,790,545	0.1
			CALLECHELYS MURAENA	0	0.0	1	4.5	0.2	1.2	849,035,636	0.1
			CENTROPRISTIS STRIATUS	0	0.0	1	4.5	0.2	1.2	849,035,636	0.1
			CYCLOTHONE	0	0.0	1	4.5	0.2	1.1	828,746,182	0.1
			HOWELLA	0	0.0	1	4.5	0.2	1.1	828,746,182	0.1
			MERLUCCIUS	0	0.0	1	4.5	0.2	1.1	817,821,091	<0.1
			PERCIFORMES	0	0.0	1	4.5	0.2	1.1	817,821,091	<0.1
			URANOSCOPIDAE	0	0.0	1	4.5	0.2	1.1	785,045,818	<0.1
			TRIGLIDAE	0	0.0	1	4.5	0.2	1.0	756,952,727	<0.1
			CERATOSCOPELUS MADERENSIS	0	0.0	1	4.5	0.2	1.0	714,813,091	<0.1
			HOLOCENTRIDAE	0	0.0	1	4.5	0.2	1.0	714,813,091	<0.1
			ARGENTINIDAE	0	0.0	1	4.5	0.2	0.9	674,234,182	<0.1
			CARANGIDAE	0	0.0	1	4.5	0.2	0.9	674,234,182	<0.1
			CALLIONYMIDAE	0	0.0	1	4.5	0.2	0.9	674,234,182	<0.1
			CYCLOPSETTA	0	0.0	1	4.5	0.2	0.9	674,234,182	<0.1
			SYMPHURUS	0	0.0	1	4.5	0.2	0.9	674,234,182	<0.1

Table 2. (continued)

YEAR	SEASON	#STA	TXNAME	CRUISE=ALB010							TOTABUND	PCTABUND
				DOM	PCTDOM	OCCUR	PCTOCCUR	KMEAN	KSTDERR			
1980	EARLY AUTUMN	19	UROPHYCIS	7	36.8	17	.89.5	147.2	64.0	505,434,083,488	60.8	
			CITHARICHTHYS ARCTIFRONS	4	21.1	12	63.2	52.8	21.7	181,363,368,512	21.7	
			OPHIIDIIDAE	0	0.0	9	47.4	12.0	4.6	41,098,778,261	4.9	
			HIPPOGLOSSINA OBLONGA	0	0.0	7	36.8	5.8	2.4	19,909,699,292	2.4	
			MERLUCCIUS ALBIDUS	1	5.3	9	47.4	4.5	1.3	15,386,193,592	1.8	
			CERATOSCOPELUS MADERENSIS	0	0.0	3	15.8	4.1	2.4	14,224,354,336	1.7	
			MERLUCCIUS BILINEARIS	0	0.0	5	26.3	3.9	2.2	13,360,158,056	1.6	
			BOTHUS	0	0.0	6	31.6	2.7	1.1	9,276,461,962	1.1	
			LOPHIUS AMERICANUS	0	0.0	6	31.6	1.6	0.6	5,591,167,643	0.6	
			ETROPLUS MICROSTOMUS	0	0.0	3	15.8	1.3	0.8	4,353,207,575	0.5	
			DISINTEGRATED	0	0.0	2	10.5	1.2	0.9	4,073,333,895	0.5	
			Gobiidae	0	0.0	2	10.5	0.7	0.4	2,239,068,632	0.3	
			BENTHOSEMA GLACIALE	0	0.0	1	5.3	0.6	2.8	2,226,418,526	0.3	
			GADUS	0	0.0	1	5.3	0.6	2.5	1,969,802,105	0.2	
			MERLUCCIUS	0	0.0	1	5.3	0.6	2.5	1,969,802,105	0.2	
			PISODONOPHIS CRUENTIFER	0	0.0	1	5.3	0.5	2.2	1,734,871,579	0.2	
			DIAPHUS	0	0.0	1	5.3	0.3	1.5	1,181,881,263	0.1	
			CYNOSCION REGALIS	0	0.0	1	5.3	0.3	1.5	1,181,881,263	0.1	
			FOLLACHIUS VIRENS	0	0.0	1	5.3	0.3	1.5	1,154,773,895	0.1	
			SYACIUM PAPILLOSUM	0	0.0	1	5.3	0.3	1.5	1,154,773,895	0.1	
			CONGRIDAE	0	0.0	1	5.3	0.3	1.4	1,125,859,368	0.1	
			SYACIUM	0	0.0	1	5.3	0.3	1.4	1,125,859,368	0.1	
			LABRIDAE/SCARIIDAE	0	0.0	1	5.3	0.3	1.3	1,013,815,579	0.1	
			SYNGNATHIDAE	0	0.0	1	5.3	0.3	1.3	1,008,394,105	0.1	
			PEPRILUS TRIACANTHUS	0	0.0	1	5.3	0.3	1.2	961,408,000	0.1	
			BRANCHIOSTEGIDAE	0	0.0	1	5.3	0.2	0.9	713,827,368	<0.1	
			ENGRAULIDAE	0	0.0	1	5.3	0.2	0.9	688,527,158	<0.1	

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YEAR	SEASON	#STA	TXNAME	CRUISE=ALB012							TOTABUND	PCTABUND
				DOM	PCTDOM	OCCTR	PCTOCCUR	KMEAN	KSTDERR			
1980	LATE AUTUMN	19	MERLUCCIUS BILINEARIS	7	36.8	11	57.9	21.8	9.0	75,008,244,396	45.8	
			PARALICHTHYS DENTATUS	1	5.3	4	21.1	12.1	8.4	41,696,288,245	25.4	
			UROPHYCIS	0	0.0	8	42.1	4.1	1.5	13,942,727,830	8.5	
			SCOPHTHALMUS AQUOSUS	0	0.0	3	15.8	2.0	1.4	6,905,564,674	4.2	
			CITHARICHTHYS ARCTIFRONS	0	0.0	3	15.8	1.3	0.8	4,530,293,787	2.8	
			DISINTEGRATED	0	0.0	2	10.5	0.7	0.5	2,394,484,211	1.4	
			Gobiidae	0	0.0	2	10.5	0.7	0.4	2,242,682,947	1.3	
			PARALEPIDIDAE	1	5.3	2	10.5	0.6	0.4	2,177,625,263	1.2	
			CLUPEIDAE	0	0.0	2	10.5	0.6	0.4	2,119,796,211	1.2	
			ETROPLUS MICROSTOMUS	0	0.0	2	10.5	0.6	0.4	2,094,496,000	1.2	
			CONGRIDAE	0	0.0	2	10.5	0.6	0.4	2,074,617,263	1.2	
			BOTHUS	0	0.0	2	10.5	0.6	0.4	1,935,466,105	1.2	
			MERLUCCIUS ALBIDUS	0	0.0	1	5.3	0.5	2.2	1,709,571,368	1.0	
			CENTROPRISTIS STRIATUS	0	0.0	1	5.3	0.3	1.4	1,140,316,632	0.7	
			OPHIIDIIDAE	0	0.0	1	5.3	0.3	1.4	1,084,294,737	0.6	
			HYCOTOPHUM	0	0.0	1	5.3	0.3	1.1	896,350,316	0.5	
			HYGOPHUM	0	0.0	1	5.3	0.3	1.1	896,350,316	0.5	
			DIAPHUS	0	0.0	1	5.3	0.2	1.0	820,449,684	0.5	
			OPHICHTHIDAE	0	0.0	1	5.3	0.2	1.0	820,449,684	0.5	
			UNKNOWN	0	0.0	0	0.0	0.0	0.0	0	0	

Table 3. Listing of larval fishes collected in slope waters off Middle Atlantic and northeastern United States, February through December. Information from Austin (1975), Sherman et al. (1977), MARMAP surveys 1977-79, and McKenney (1981). Phylogenetic sequence follows Nelson (1976).

	J	F	M	A	M	J	J	A	S	O	N	D		J	F	M	A	M	J	J	A	S	O	N	D	
CLUPEIFORMES																										
Unidentified					✓																					
CLUPEIDAE																										
<i>Brevoortia tyrannus</i>	✓	✓		✓			✓	✓																		
<i>Brevoortia</i> sp.																										
<i>Harengus jaquana</i>																										
Unidentified																										
ENGRAULIDAE																										
<i>Anchoa hepsetus</i>																										
<i>Anchoa</i> sp.																										
<i>Engraulis eurystole</i>	✓	✓			✓																					
<i>Sardinella anchovia</i>																										
<i>Sardinella aurita</i>																										
<i>Sardinella</i> sp.																										
Unidentified																										
ANGUILLIFORMES																										
ANGUILLIDAE																										
<i>Anguilla rostrata</i>	✓	✓	✓	✓																						
Unidentified	✓	✓																								
MURAENIDAE																										
Unidentified																										
SYNAPHOBRANCHIDAE																										
<i>Nettodarwus brevirostrus</i>																										
CONGRIDAE																										
<i>Ariosoma balearicum</i>																										
<i>Ariosoma</i> sp.																										
<i>Conger oceanicus</i>																										
Unidentified	✓	✓	✓	✓			✓																			

NETTASTOMATIDAE
Saurenchalya cancrivora
 Unidentified

OPHICHTHIDAE
Myrophis punctatus
Ophichthus gomesii
Ophichthus melanophorus
Ophichthus ocellatus
Ophichthus sp.
Pisodonophis curentifer
 Unidentified

ARGENTINIDAE
Nansenia groenlandica
Nansenia sp.
 Unidentified

BATHYLAGIDAE
 Unidentified

SALMONIFORMES
GONOSTOMATIDAE
Bonapartia pedaliota
Cycrothone sp.
Gonostoma elongatum
Ichthyococcus ovatus
Maurolicus muelleri
Valenciennellus tripunctulatus
 Unidentified

STERNOPTYCHIDAE
Argyropelecus hemigymnus
Argyropelecus sp.
 Unidentified

Table 3. (continued)

	J	F	M	A	M	J	J	A	S	O	N	D		J	F	M	A	M	J	J	A	S	O	N	D
STOMIATIDAE																									
<i>Stomias ferox</i>	✓	✓		✓				✓	✓		✓	✓											✓	✓	
<i>Stomias</i> sp.	✓	✓	✓																						
Unidentified																									
NYCTOPHIFORMES																									
SYNODONTIDAE																									
<i>Saurida</i> sp.				✓																					
<i>Trachinocephalus myops</i>				✓	✓	✓	✓	✓	✓	✓	✓	✓													
Unidentified																									
MYCTOPHIDAE																									
<i>Benthosema glaciale</i>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓													
<i>Benthosema suborbitalis</i>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓													
<i>Centrobranchus nigro-ocellatus</i>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓													
<i>Centrobranchus</i> sp.																									
<i>Ceratoscopelus maderensis</i>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓													
<i>Ceratoscopelus warmingii</i>																									
<i>Ceratoscopelus</i> sp.																									
<i>Diaphus dumerili</i>	✓		✓					✓	✓		✓	✓													
<i>Diaphus holti</i>																									
<i>Diaphus mollis</i>	✓	✓																							
<i>Diaphus problematicus</i>																									
<i>Diaphus rafinesquei</i>	✓	✓																							
<i>Diaphus subtilis</i>																									
<i>Diaphus taaningi</i>																									
<i>Diaphus</i> sp.	✓	✓																							
<i>Diogenichthys atlanticus</i>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓													
<i>Gonichthys coco</i>																									
<i>Hygophum benoiti</i>	✓	✓	✓																						
<i>Hygophum hygomi</i>																									
<i>Hygophum reinhardtii</i>																									
<i>Hygophum</i> sp.																									
<i>Lampanyctus alatus</i>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓													
<i>Lampanyctus</i> sp.																									
<i>Lepidophanes guentheri</i>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓													
<i>Lobianchia dolfieini</i>																									
<i>Myctophum affine</i>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓													
Myctophidae																									
<i>Myctophum asperum</i>																									
<i>Myctophum humboldti</i>																									
<i>Myctophum nitidulum</i>																									
<i>Myctophum punctatum</i>																									
<i>Myctophum</i> sp.																									
<i>Protomyctophum</i> sp.																									
<i>Symbolophorus veranyi</i>																									
Unidentified																									
PARALEPIDIDAE																									
<i>Leptidium atlanticum</i>																									
<i>Notolepis rissoii</i>																									
<i>Paralepis coregonoides</i>																									
<i>Sudis hyalina</i>																									
Unidentified																									
PHOTICHTHYIDAE																									
<i>Vinciguerria nimbaria</i>																									
<i>Vinciguerria powerai</i>																									
<i>Vinciguerria</i> sp.																									
EVERMANNELLIDAE																									
Unidentified																									
SCOPELARCHIDAE																									
Unidentified																									
GADIFORMES																									
Unidentified																									
MORIDAE																									
Unidentified																									
BREGMACEROTIDAE																									
<i>Bragmaceros</i> sp.																									
Unidentified																									

Table 3. (continued)

	J	F	M	A	M	J	J	A	S	O	N	D		J	F	M	A	M	J	J	A	S	O	N	D
GADIDAE													MELANOCETIDAE Unidentified												
<i>Brama brama</i>	✓	✓	✓	✓	✓	✓																✓	✓		
<i>Enchelyopus cimbrius</i>																									
<i>Gadus morhua</i>																									
<i>Melanogrammus aeglefinus</i>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓													
<i>Urophycis</i> sp.																									
Unidentified	✓	✓	✓																						
MERLUCCIIDAE													SCOMBERESOCIDAE <i>Scomberesox saurus</i>												
<i>Merluccius albidus</i>					✓	✓	✓	✓	✓	✓	✓	✓									✓	✓			
<i>Merluccius bilinearis</i>					✓	✓	✓	✓	✓	✓	✓	✓													
<i>Merluccius</i> sp.																									
MACROURIDAE													BERYCIIFORMES MELAMPHAEIDAE Unidentified												
Unidentified																									
OPHIDIIDAE													HOLOCENTRIDAE Unidentified												
Unidentified																									
CARAPODIDAE													CAPROIDAE <i>Antogonia</i> sp. Unidentified												
<i>Carapus bermudensis</i>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓									✓	✓	✓	✓	
Unidentified																									
LOPHIIFORMES													SYNGNATHIFORMES SYNGNATHIDAE												
LOPHIDAE													<i>Syngnathus elongatus</i>									✓			
<i>Lophius americanus</i>													<i>Syngnathus fuscus</i>												
ANTENNARIIDAE													SCORPAENIFORMES SCORPAENIDAE												
<i>Histrio histrio</i>													<i>Pontinia</i> sp.									✓	✓	✓	✓
Unidentified													<i>Scorpaena</i> sp.												
OGCOcephalidae													Unidentified												
Unidentified																									
CAULOPHYRNIDAE													TRIGLIDAE									✓	✓	✓	✓
<i>Caulophryne jordoni</i>													<i>Prionotus</i> sp.												
Unidentified													Unidentified												
COTTIDAE													COTTIDAE Unidentified									✓	✓		
Unidentified																									

Table 3. (continued)

	J	F	M	A	M	J	J	A	S	O	N	D		J	F	M	A	M	J	J	A	S	O	N	D
AGONIDAE													GERRIDAE												
Unidentified						✓							<i>Eutinostomus gula</i>												✓
CYCLOPTERIDAE													SPARIDAE												
Unidentified													<i>Stenotomus chrysops</i>												
PERCIFORMES													SCIAENIDAE												
Unidentified													<i>Cynoglossus regalis</i>												
SERRANIDAE													<i>Larimus fasciatus</i>												
Anthiinae													<i>Leiostomus xanthurus</i>												
<i>Anthias</i> sp.													<i>Menticirrhus saxatilis</i>												
<i>Centropristes striata</i>													<i>Micropogonias undulatus</i>												
<i>Centropristes</i> sp.													Unidentified												
<i>Diplectrum</i> sp.													MULLIDAE												
<i>Mycteroperca</i> sp.													<i>Mullus auratus</i>												
<i>Sebastes</i> sp.													POMACENTRIDAE												
Unidentified													Unidentified												
APOGONIDAE													MUGILIDAE												
Unidentified													<i>Mugil curema</i>												
POMATOMIDAE													LABRIDAE												
<i>Pomatomus saltatrix</i>													<i>Tautoga adspersus</i>												
CARANGIDAE													Unidentified												
<i>Caranx</i> sp.													✓	✓											
<i>Decapterus punctatus</i>													✓	✓											
<i>Decapterus</i> sp.													✓	✓											
<i>Seriola</i> sp.													✓	✓											
Unidentified													✓												
CORYphaenidae													SCARIDAE												
<i>Coryphaena hippurus</i>													Unidentified												
LUTJANIDAE													URANOSCOPIDAE												
<i>Rhomboplites aurorubens</i>													Unidentified												
													CRYPTOCANTHODIDAE												
													<i>Cryptocanthoides maculatus</i>												
													✓	✓											

Table 3. (continued)

	J	F	M	A	M	J	J	A	S	O	N	D		J	F	M	A	M	J	J	A	S	O	N	D
PHOLIDAE																									
Unidentified	✓	✓																							
AMMODYTIDAE																									
Ammodytes sp.	✓	✓	✓	✓	✓																				✓
GOBIIDAE																									
Unidentified	✓	✓	✓	✓	✓				✓	✓	✓	✓													✓
GEMPYLIDAE																									
Unidentified																									
TRICHIURIDAE																									
Diplospinus multistriatus																									
Unidentified																									
SCOMBRIDAE																									
Auxis sp.																									
Euthynnus alletteratus																									
Sarda sarda																									
Scomber scombrus																									
Thunnus sp.																									
Unidentified	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓													
ISTIOPHORIDAE																									
Unidentified																									
NOMEIDAE																									
Unidentified																									
TETRAGONURIDAE																									
Unidentified																									
STROMATEIDAE																									
Pepritis triacanthus	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓													
Psenes maculatus																									
Unidentified																									
GOBIESOCIFORMES																									
CALLIONYMIDAE																									
Callionymus sp.																									
Unidentified																									
PLEURONECTIFORMES																									
BOTHIDAE																									
Bothus sp.																									
Citharichthys aratifrons																									
Citharichthys sp.																									
Cyclopaetta fimbriata																									
Cyclopsetta sp.																									
Etropus microstomus																									
Hippoglossina oblonga																									
Paralichthys dentatus																									
Scophthalmus aquosus																									
Syacium papillosum																									
Syacium sp.																									
Unidentified																									
PLEURONECTIDAE																									
Glyptocephalus cynoglossus																									
Limanda ferruginea																									
Pseudopleuronectes americanus																									
CYNOGLOSSIDAE																									
Symphurus sp.																									
TETRAODONTIFORMES																									
BALISTIDAE																									
Monacanthus ciliatus																									
Monacanthus hispidus																									
Unidentified																									
TETRAODONTIDAE																									
Unidentified																									

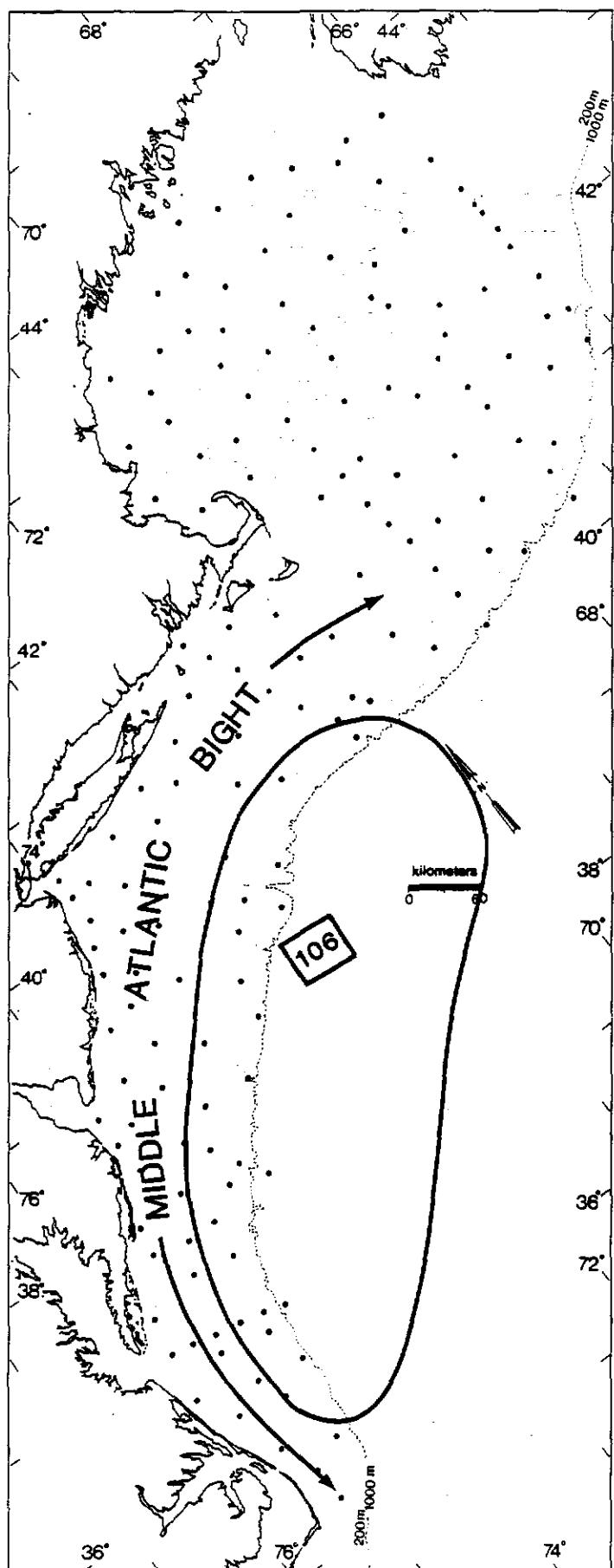


Figure 1. MARMAP (Marine Resources Monitoring Assessment and Prediction) plankton stations off northeastern United States during 1980 (see Sherman 1980 for description of MARMAP Program). DWD-106 and potential impact area from dumping at DWD-106 are shown off Middle Atlantic states.

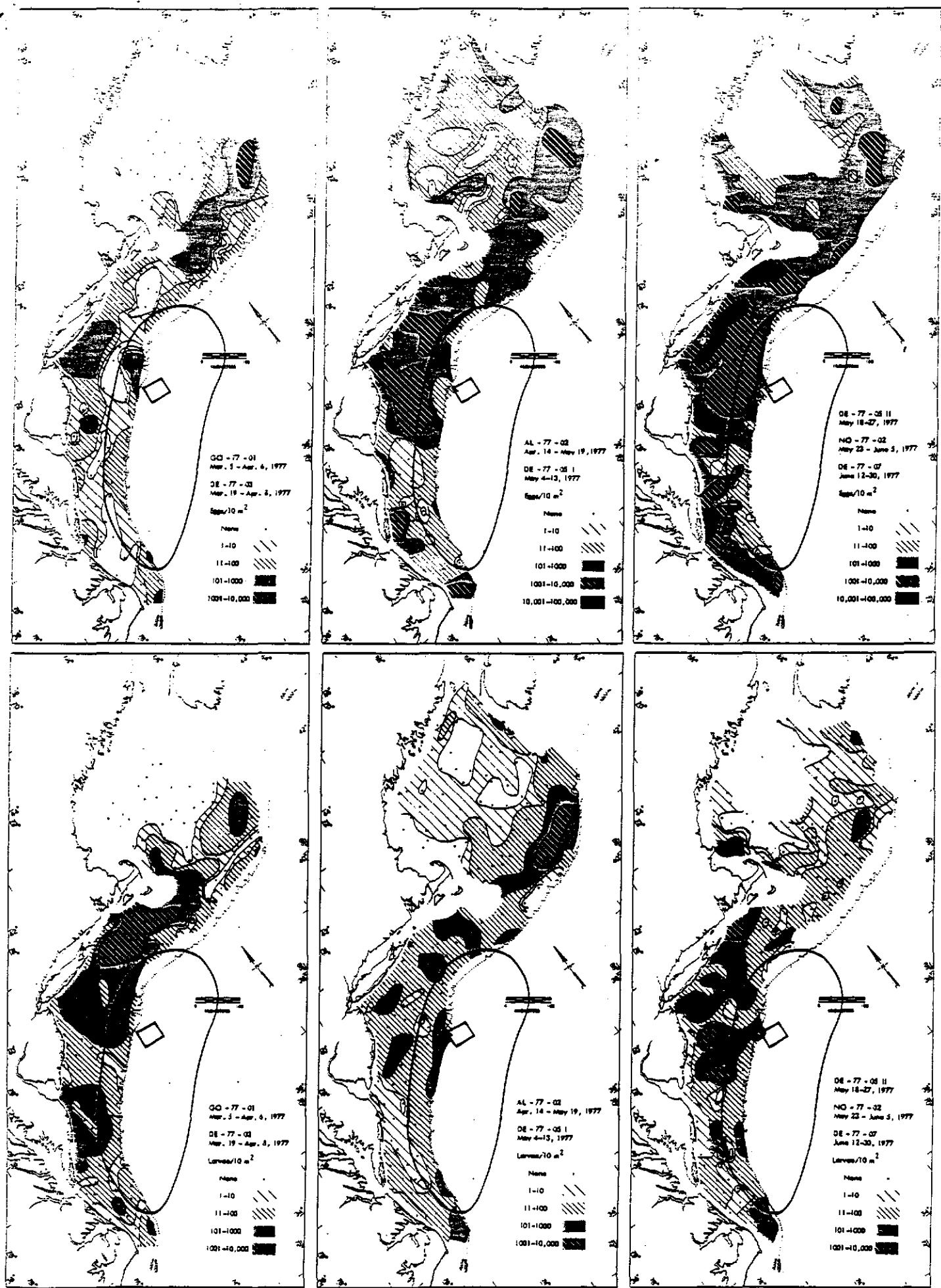


Figure 2. Distribution and abundance of fish eggs (top) and fish larvae (bottom) off northeastern United States as determined from MARMAP surveys, 1977-80.

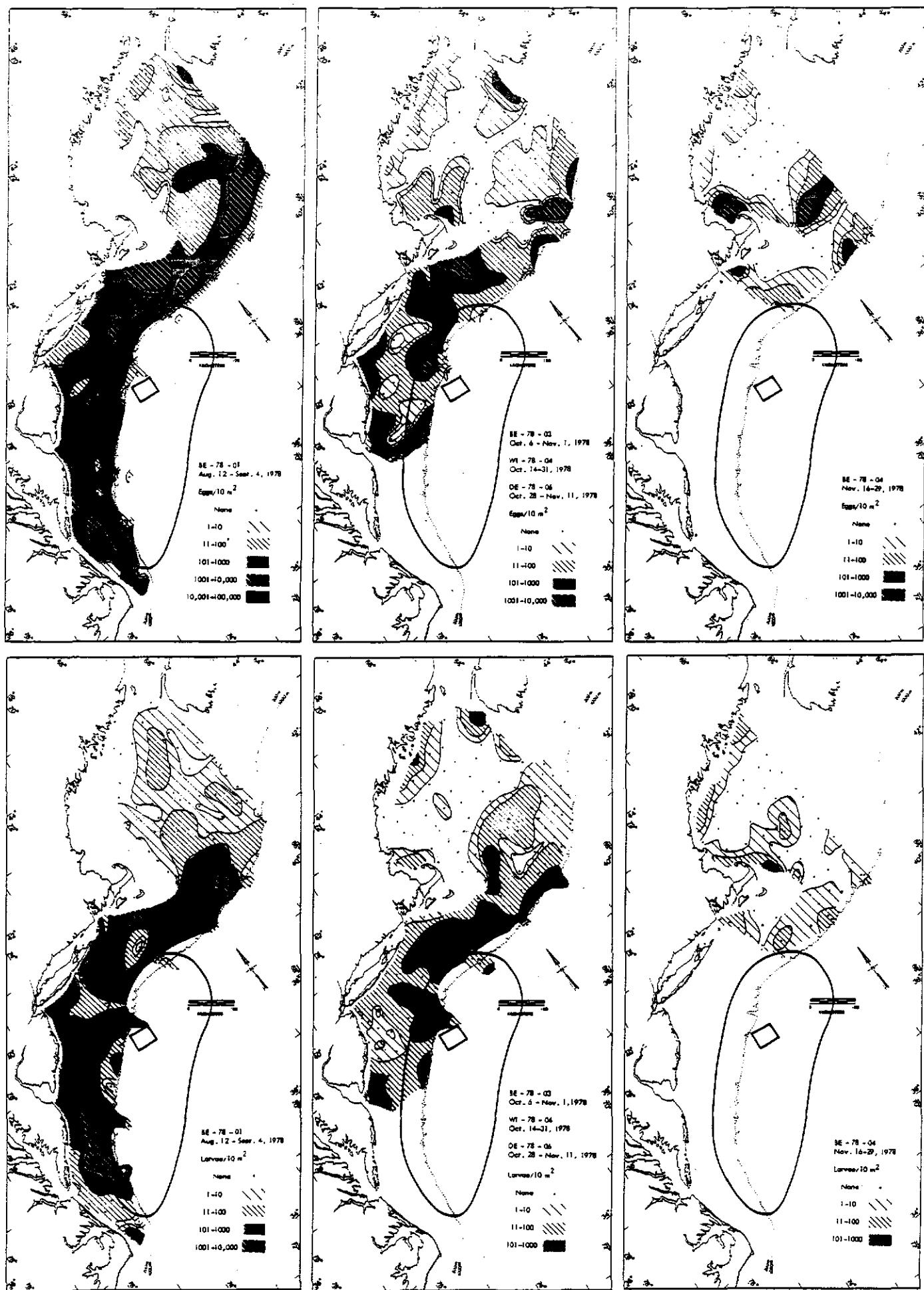


Figure 2. (continued)

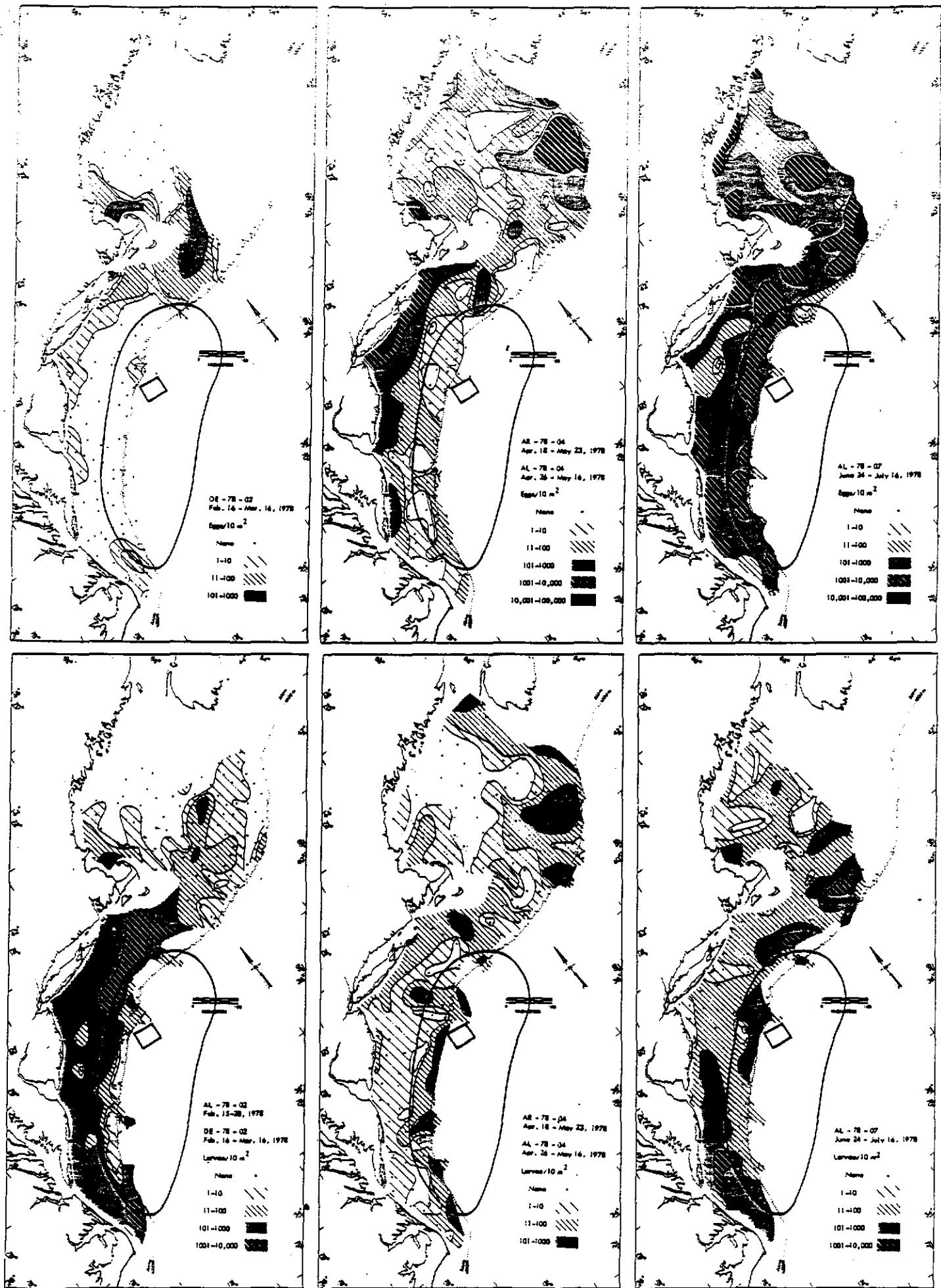


Figure 2. (continued)

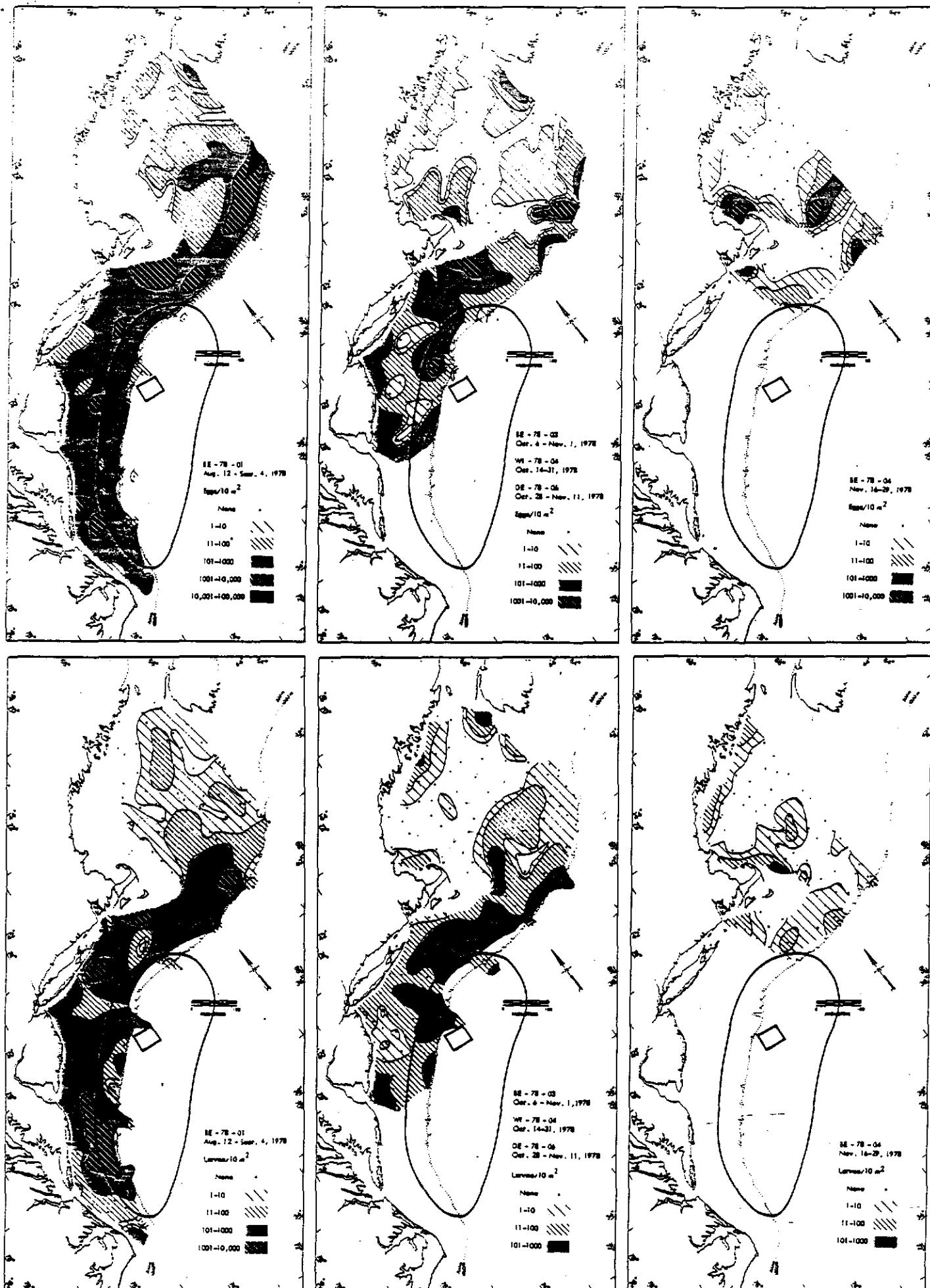


Figure 2. (continued)

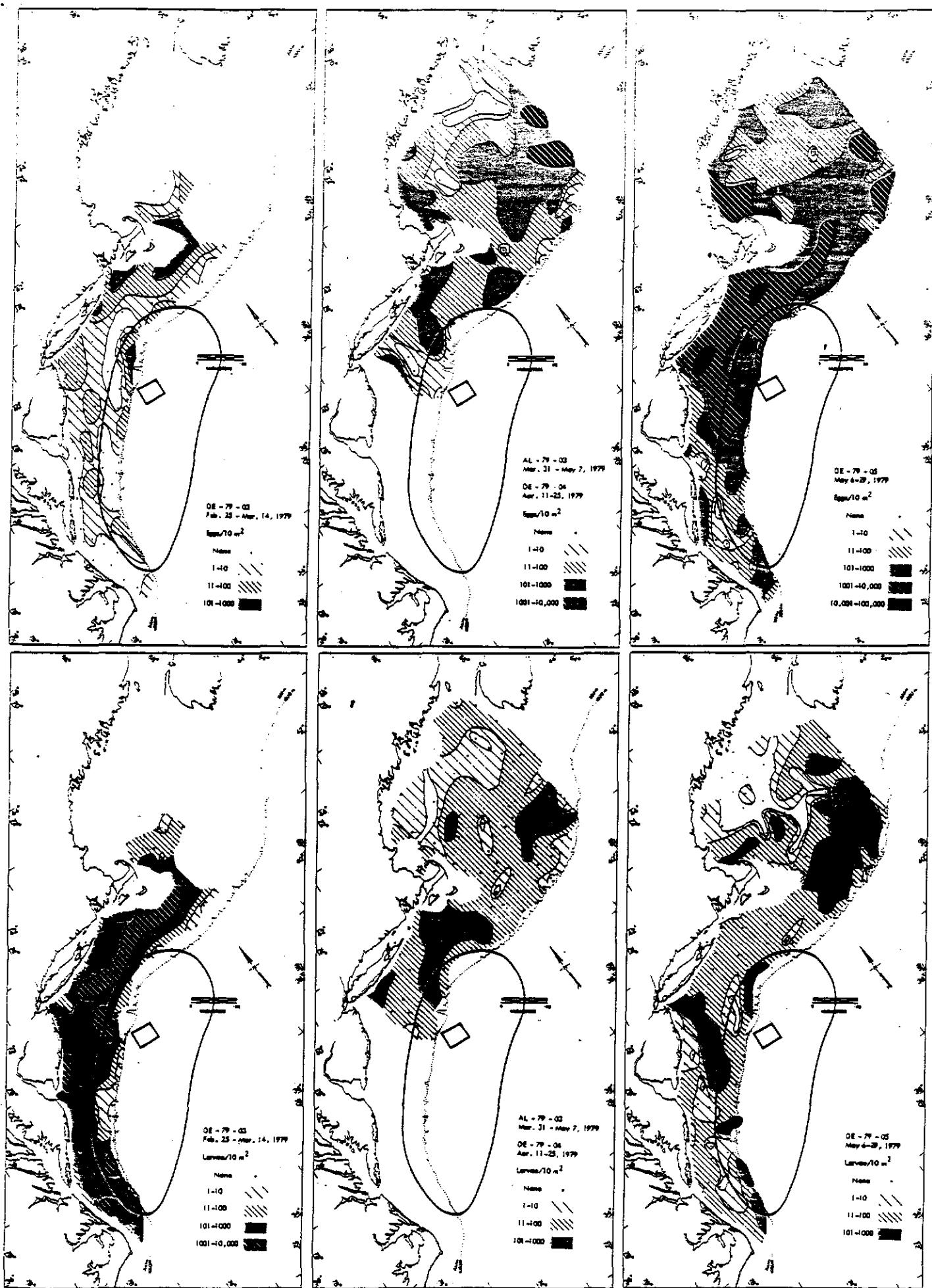


Figure 2. (continued)

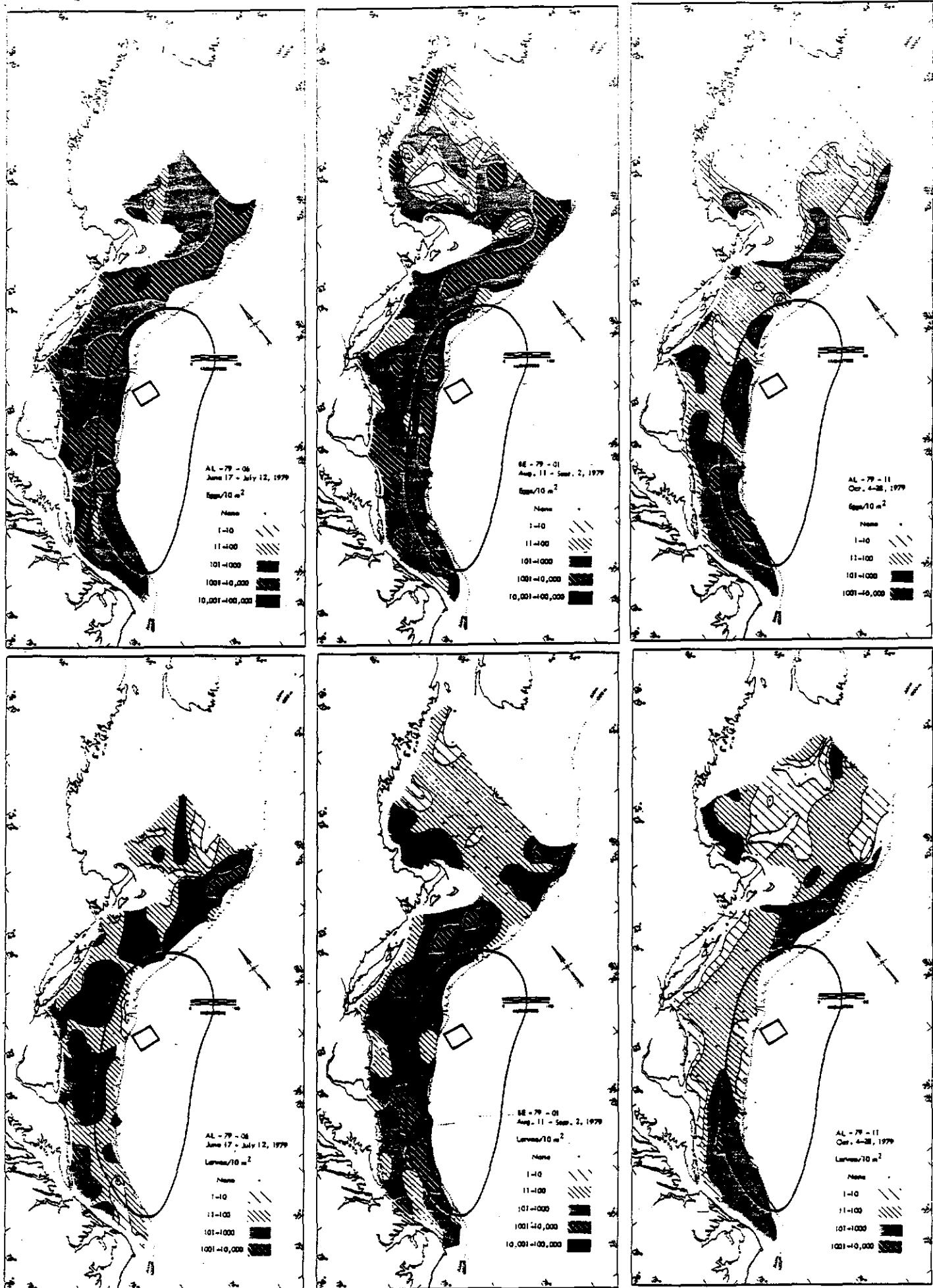


Figure 2. (continued)

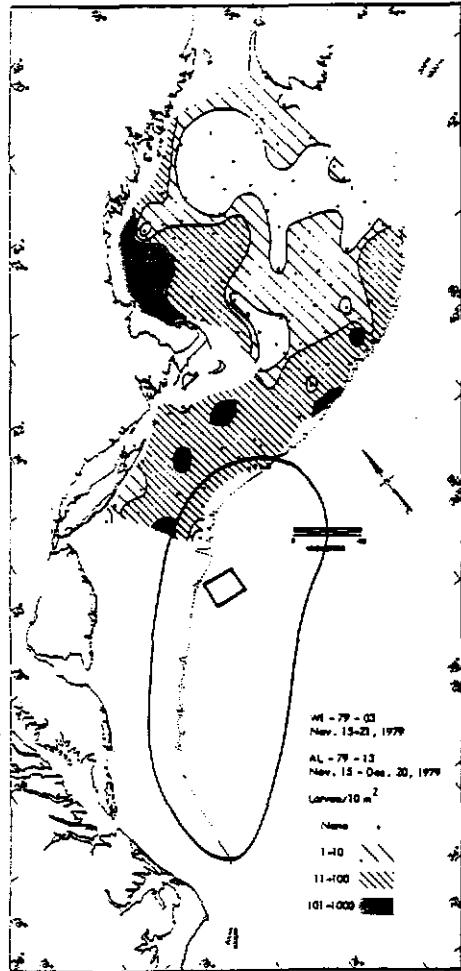
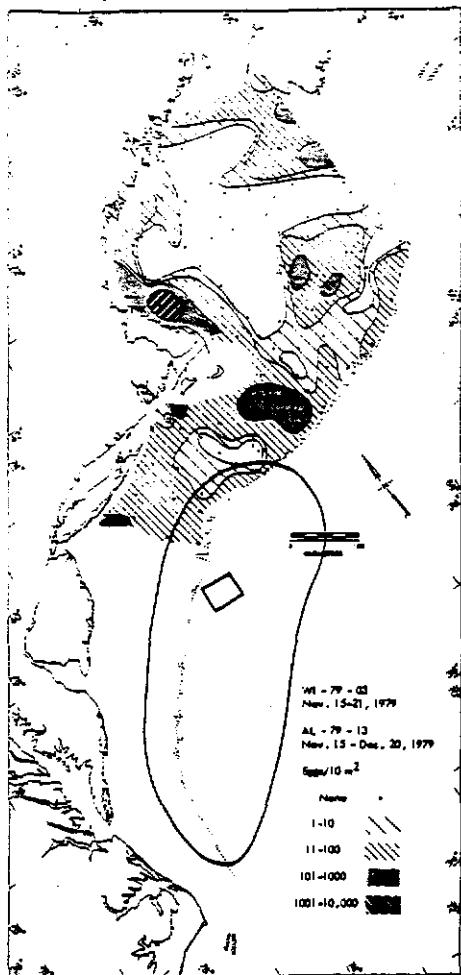


Figure 2. (continued)

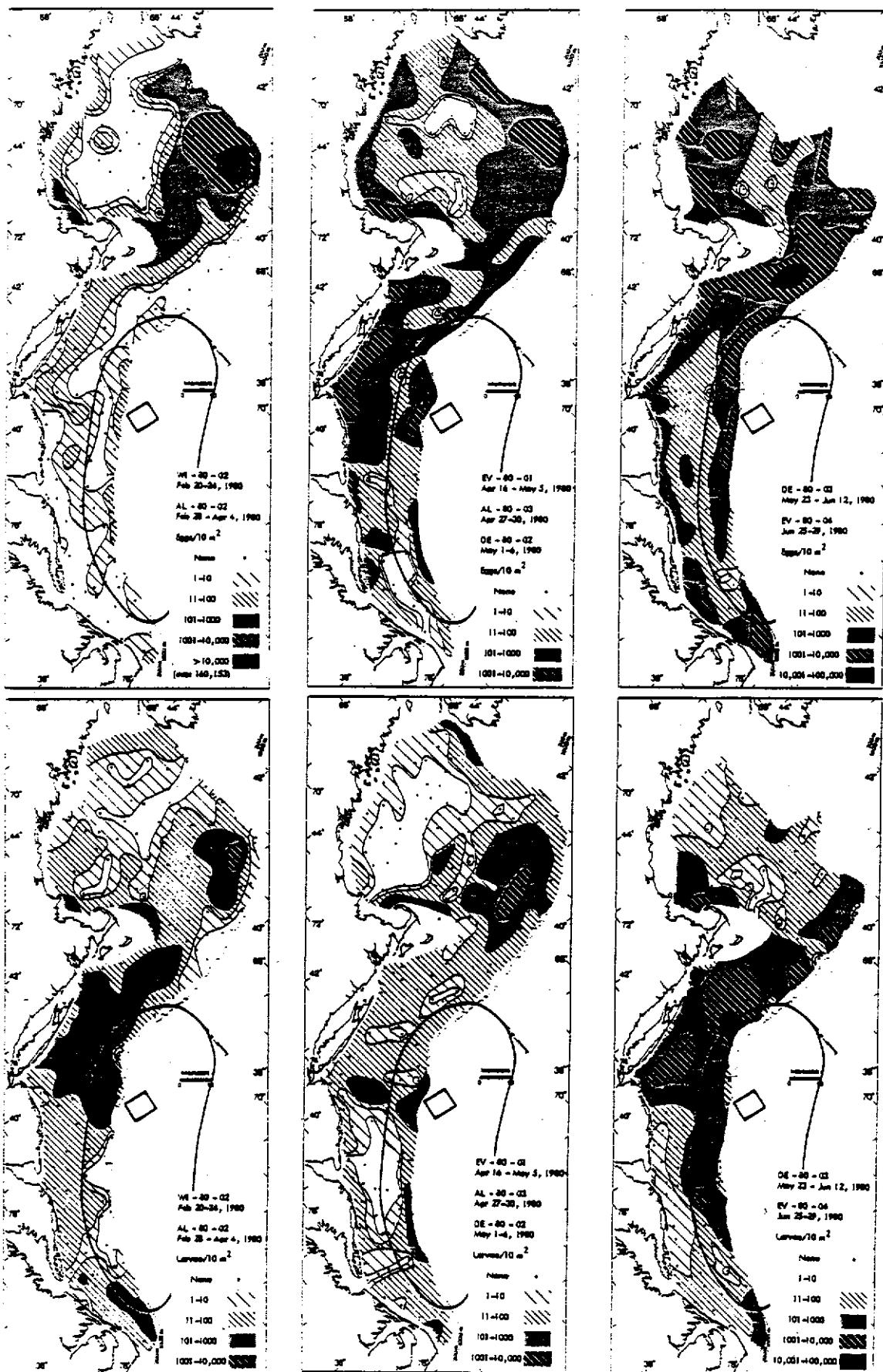


Figure 2. (continued)

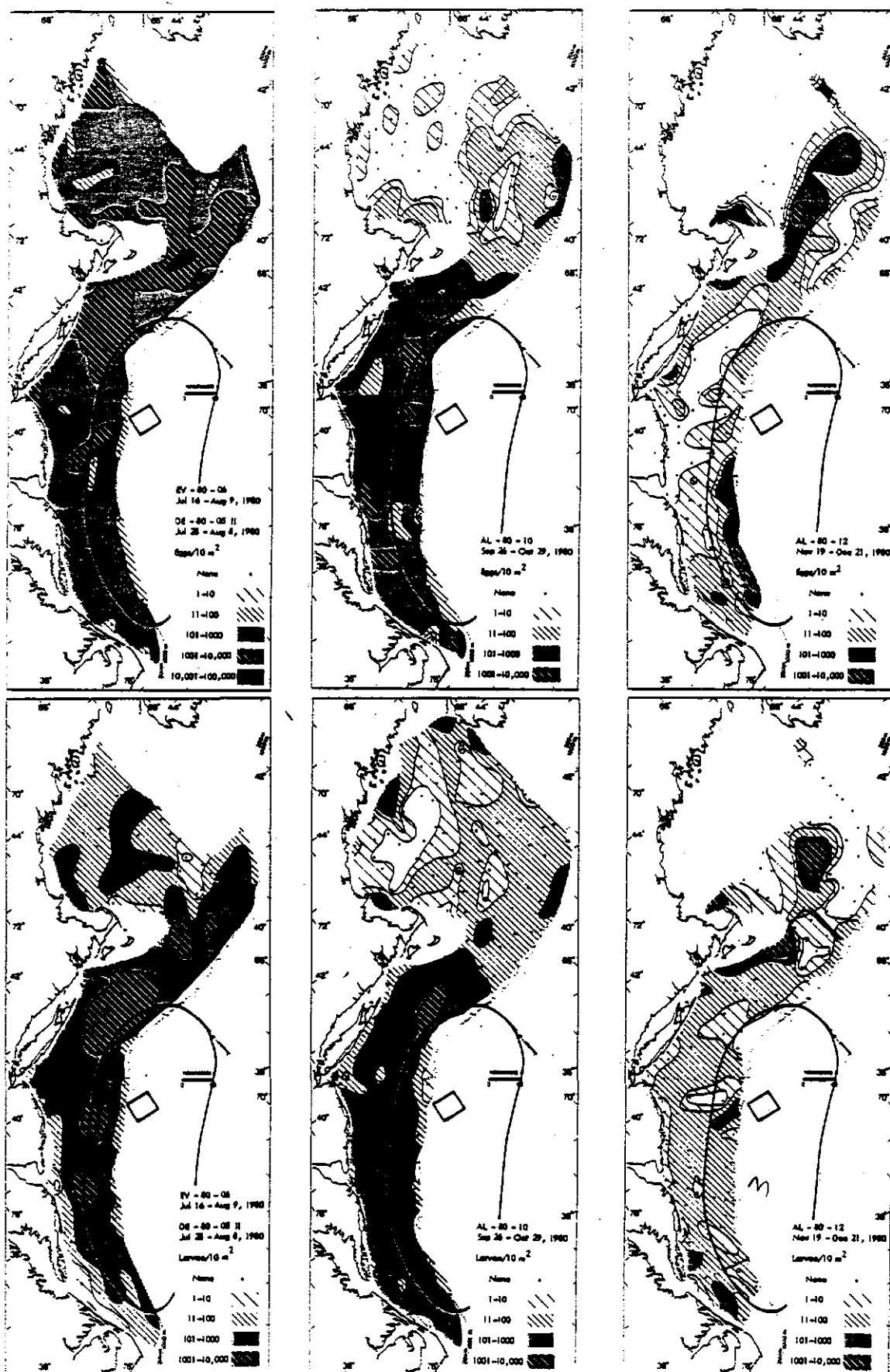


Figure 2. (continued)

Figure 3. Spawning seasons of principal species, based on larval occurrences, in four analytical subareas of northeastern United States (after Colton et al. 1979).

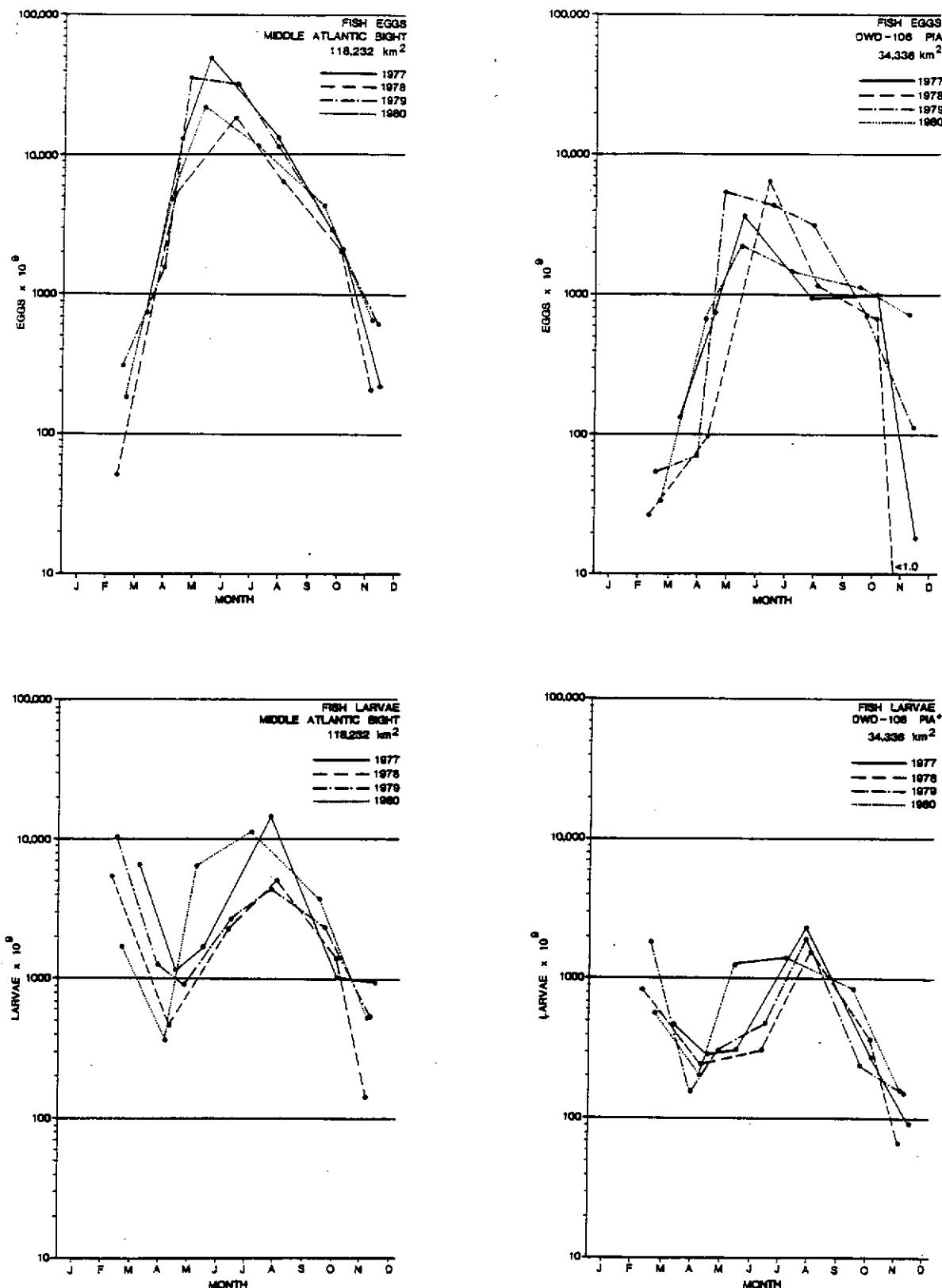


Figure 4. Seasonal changes in abundance of fish eggs in the Middle Atlantic Bight (1977-80) and in the potential impact area * of ocean dumping at DWD-106 (top). Seasonal changes in abundance of fish larvae in the Bight (1977-80) and in the potential impact area of dumping at DWD-106 (bottom).