



NOAA Technical Memorandum NMFS-F/NEC-47

MARMAP Surveys of the Continental Shelf
from Cape Hatteras, North Carolina,
to Cape Sable, Nova Scotia (1977-1984).
Atlas No. 2. Annual Distribution Patterns
of Fish Larvae

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Northeast Fisheries Center
Woods Hole, Massachusetts

May 1987

NOAA TECHNICAL MEMORANDUM NMFS-F/NEC

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33. *MARMAP Surveys of the Continental Shelf from Cape Hatteras, North Carolina, to Cape Sable, Nova Scotia (1977-1983). Atlas No. 1. Summary of Operations*. By John D. Sibunka and Myron J. Silverman. November 1984. vii + 306 p., 52 figs., 2 tables. NTIS Access. No. PB85-150985/AS.

34. *Oceanology: Biology of the Ocean. Volume 2. Biological Productivity of the Ocean*. By M.E. Vinogradov, editor in chief. First printed by Nauka Press, Moscow, 1977. Translated from the Russian by Albert L. Peabody. January 1985. x + 518 p., 81 figs., 59 tables. NTIS Access. No. PB85-204683/AS.

35. *Annual NEMP Report on the Health of the Northeast Coastal Waters, 1982*. By John B. Pearce, Carl R. Berman, and Marlene R. Rosen, eds., and Robert N. Reid (benthos), Catherine E. Warsh (water quality), and Edith Gould (biological effects), topic coords. January 1985. xi + 68 p., 29 figs., 5 tables. NTIS Access. No. PB85-219129/AS.

36. *Growth and Survival of Larval Fishes in Relation to the Trophodynamics of Georges Bank Cod and Haddock*. By Geoffrey C. Laurence and R. Gregory Lough. January 1985. xvi + 150 p., 67 figs., 15 tables, 1 app. NTIS Access. No. PB85-220093/AS.

(continued on inside back cover)



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MARMAP Surveys of the Continental Shelf from Cape Hatteras, North Carolina, to Cape Sable, Nova Scotia (1977-1984). Atlas No. 2. Annual Distribution Patterns of Fish Larvae

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May 1987

MARMAP ATLAS SERIES

This is the second in a series of atlases containing data on the phytoplankton, zooplankton, ichthyoplankton, hydrography, nutrients, or productivity of the Northeast Continental Shelf ecosystem. The sampling was conducted as part of the Marine Resources Monitoring, Assessment and Prediction (MARMAP) Program of the Northeast Fisheries Center. The cooperating institutions in the program are:

AtlantNIRO, Kaliningrad, USSR
College of the Atlantic, Bar Harbor, ME
Institut fur Hochseefischerei, Rostock, GDR
Manomet Bird Observatory, Manomet, MA
Morski Instytut Rybacki (MIR), Gdynia, POL
School of Oceanography, University of Rhode Island, Narragansett, RI

MARMAP atlases are issued as individual NOAA Technical Memorandums as they become available. They provide processed measurements of variability in key components of the Northeast Continental Shelf Ecosystem. A general description of the MARMAP Program is given in Sherman (1980).

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INTRODUCTION

This is the second in a set of publications dealing with a time series of mesoscale plankton surveys and attendant information from a comprehensive fishery ecosystem monitoring program known as MARMAP¹ (Sherman 1980; 1986). It is intended to summarize survey results pertaining to the principal fish larvae found in coastal waters off northeastern United States by providing pictorial descriptions of the distribution patterns of numerically dominant larvae representing 26 taxa. The time period covered in this report includes the first 7 years of the surveys and extends from the winter of 1977 through spring 1984.

Fishery ecology research at the Northeast Fisheries Center integrates MARMAP survey information with fine scale, process oriented research to determine seasonal and annual variability in biological and environmental components of the ecosystem that influence recruitment. Surveys are conducted at monthly to bimonthly intervals and cover the continental shelf from Cape Hatteras, North Carolina to Cape Sable, Nova Scotia, an area of 260,000 km². They provide a description of the interannual variability in temporal and spatial patterns of distribution, abundance, production and mortality of fish eggs and larvae, along with measurements and/or collections of neuston, zooplankton, phytoplankton, chlorophyll a, temperature and salinity. In addition to their contribution to NEFC's recruitment initiative, ichthyoplankton data are used to derive fishery-independent estimates of adult spawning biomass (Berrien et al. 1984). During the period covered in this report, we completed 50 surveys, collected 15,450 plankton samples for ichthyoplankton/zooplankton analysis and made more than 150,000 ancillary measurements and/or observations.

¹Marine Resources Monitoring, Assessment and Prediction

METHODS

Fish larvae are collected on two types of cruises: those dedicated to broadscale plankton surveys; and those with a primary mission of assessing the distribution and abundance of fish and mollusk populations using trawls or dredges. Station plans on plankton surveys remain largely unchanged between cruises. Sampling sites are spaced at 8 to 18-km intervals along 7 transects. Others are uniformly distributed over the shelf at 25 to 35-km intervals. The survey area is sectioned into four subareas for analytical purposes. (Figure 1). The location of ichthyoplankton stations on trawl and dredge surveys are selected from stratified random station plans and change with each survey (Grosslein 1969). Sampling frequency on trawl and dredge cruises is similar to that on broadscale plankton surveys.

Survey methods and collections through 1983 are described by Sibunka and Silverman (1984). Double oblique tows are made with a 61-cm bongo which is lowered to within a few meters of bottom or to a maximum depth of 200 m at 50 m min⁻¹ and retrieved at 20 m min⁻¹. Ship speed varies between 1 and 2 kts to maintain a 45° wire angle during the tow. One side of the sampler is fitted with a 0.505-mm mesh net for ichthyoplankton studies, the other with a 0.333-mm mesh net for zooplankton monitoring. Initial processing of the 61-cm samples is completed at the Morski Instytut Rybacki, Szczecin, Poland. Larvae are identified and measured at the institute, then returned to NEFC's Sandy Hook Laboratory, along with appropriate log sheets. Quality control procedures are completed at Sandy Hook and the data are computer encoded. Larval abundance is standardized to the number of larvae per 10 m² using methods described by Smith and Richardson (1977).

OVERVIEW OF LARVAL DISTRIBUTION PATTERNS

Surveys conducted from 1977 to spring 1984 have collected over 200 taxa of fish larvae in all areas and seasons of the year. However, the ichthyoplankton on the shelf is dominated by relatively few taxa during each season or within a subarea. Approximately 91% by number of all the fish larvae collected are contained within the 26 taxa in this report. Both sand lance and hakes have each accounted for over 90% of the total collections of larvae during times of peak larval abundance. The annual spawning cycles of all 26 species combined reveal a peak in larval abundance during the warm water months (June - October) and a decrease in both abundance and species diversity during the winter. Table 2 lists the occurrence of each taxa within a subarea and ranks them by average abundance during the spawning season of each taxa. It is clear from Table 2 that the species composition and relative rankings change dramatically from south to north. Over 30% of the taxa in the Mid-Atlantic subarea do not occur at all in the Gulf of Maine subarea. An additional 20% of the taxa in the Gulf of Maine occur in very low numbers there yet are quite abundant in the Mid-Atlantic subarea. Summer migrants into the survey area from southern waters account for much of this difference. Southern New England and Georges Bank may be considered transitional areas where both northern and southern taxa spawn. All 26 taxa occur in Southern New England. Georges Bank closely resembles the Gulf of Maine in species composition except for the occurrence of summer flounder on Georges Bank.

Sand lance larvae dominate the winter collections in three of the four subareas and account for over 90% of the larval fish community during the winter months. Their relatively long hatching period (Nov. - May) and the

persistence of the larval stage within the water column (Reay, 1970) as well as a large spawning biomass have sustained these large collections throughout the 1977-1984 sampling interval. It is the only taxa which maintains a dominant presence in all subareas.

The spring spawning migration of Atlantic mackerel through the survey area produces larval concentrations in all four subareas. They are ranked second in Southern New England after sand lance and remain in the top five in both Mid-Atlantic and Gulf of Maine subareas. In contrast to sand lance, Atlantic mackerel have a relatively short spawning season within each subarea and the larvae do not persist in the plankton community. However, their high spawning biomass and high egg production from large shoals of spawning fish produce significant larval concentrations each spring.

The Mid-Atlantic subarea is a principal spawning area for many taxa which migrate from both southern and northern waters during the spring or fall of the year. Spring migrants from the south include bluefish, searobins, Atlantic croaker, and Atlantic menhaden. Northern fishes which migrate south include silver hake, Atlantic cod, pollock, and Atlantic herring. The remaining taxa are resident within the subarea, though some seasonal migrations are made to offshore areas during the winter.

The Southern New England subarea is host to all 26 taxa and contains the highest concentration of fish larvae within the survey area. Spring and summer spawning taxa dominate in this area with a well mixed fauna of both northern and southern migrants. Five species (Atlantic croaker, smallmouth flounder, bluefish, anchovies, and searobins) are at their northern limits of spawning here.

The Georges Bank larval community is dominated by members of the family Gadidae. Georges Bank waters contain significant numbers of silver hake,

hakes, haddock, offshore hake, and Atlantic cod larvae as well as small numbers of pollock larvae. The southern migrants have all but disappeared to be replaced by higher concentrations of gadid and yellowtail flounder larvae.

The Gulf of Maine contains the fewest larvae both in number of taxa and relative abundance. Few larvae are caught within the central basin of the Gulf except for redfishes. Only in this subarea does Atlantic herring produce larvae in any numbers with occurrences mostly along the coasts of Massachusetts and Maine and on the Nova Scotian shelf.

MARMAP Contribution No. FED/NEFC 86-16

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Table 1. Listing of Northeast Fisheries Center MARMAP surveys, winter 1977 through spring 1984.

MARMAP Survey No.	Research Vessel	Cruise No.	Sampling Dates	No. Bongo Stations
<u>1977</u>				
1	<i>Mount Mitchell</i> <i>Delaware II</i>	77-01 77-03	Feb 13-Apr 8	183
2	<i>Goerlitz</i> <i>Delaware II</i>	77-01 77-04 I	Mar 4-Apr 23	189
3	<i>Albatross IV</i> <i>Delaware II</i>	77-02 77-05 I	Apr 14-May 13	189
4	<i>Delaware II</i> <i>Nogliki</i> <i>Delaware II</i>	77-05 II 77-02 77-07	May 18-Jun 22	205
5	<i>Delaware II</i> <i>Yubileiniy</i>	77-09 77-02	Jul 30-Aug 30	160
6	<i>Argus</i>	77-01	Oct 18-Nov 9	142
7	<i>Mount Mitchell</i> <i>George B. Kelez</i>	77-11 77-11	Nov 13-Dec 13	90
<u>1978</u>				
8	<i>Albatross IV</i> <i>Delaware II</i>	78-02 78-02	Feb 15-Mar 17	166
9	<i>Argus</i> <i>Albatross IV</i>	78-04 78-04	Apr 18-May 23	172
10	<i>Albatross IV</i>	78-07	Jun 24-Jul 16	148
11	<i>Belogorsk</i>	78-01	Aug 12-Sep 4	154
12	<i>Belogorsk</i> <i>Wieczno</i> <i>Delaware II</i>	78-03 78-04 78-06	Oct 6-Nov 11	155
13	<i>Belogorsk</i>	78-04	Nov 16-24	74
<u>1979</u>				
14	<i>Delaware II</i>	79-03	Feb 25-Mar 14	102
15	<i>Albatross IV</i> <i>Delaware II</i>	79-03 79-04	Apr 1-May 6	106

Table 1. (continued)

MARMAP Survey No.	Research Vessel	Cruise No.	Sampling Dates	No. Bongo Stations
16	<i>Delaware II</i>	79-05	May 6-29	170
17	<i>Albatross IV</i>	79-06	Jun 17-Jul 12	123
18	<i>Belogorsk</i>	79-01	Aug 11-Sep 2	146
19	<i>Albatross IV</i>	79-11	Oct 4-28	160
20	<i>Albatross IV</i> <i>Wieczno</i>	79-13 79-03	Nov 15-Dec 21	103
<u>1980</u>				
21	<i>Wieczno</i> <i>Albatross IV</i>	80-02 80-02	Feb 20-Apr 4	171
22	<i>Evrika</i> <i>Albatross IV</i> <i>Delaware II</i>	80-01 80-03 80-02	Apr 16-May 12	175
23	<i>Delaware II</i> <i>Evrika</i>	80-03 80-04	May 23-Jun 29	148
24	<i>Evrika</i> <i>Delaware II</i>	80-06 80-05	Jul 16-Aug 9	153
25	<i>Albatross IV</i>	80-10	Sep 26-Oct 29	174
26	<i>Albatross IV</i>	80-12	Nov 19-Dec 21	137
<u>1981</u>				
27	<i>Albatross IV</i>	81-01	Feb 18-Mar 24	152
28	<i>George B. Kelez</i>	81-03	Mar 19-Apr 9	99
29	<i>Delaware II</i>	81-02	Mar 19-May 13	144
30	<i>Delaware II</i>	81-03	May 21-Jun 17	145
31	<i>Delaware II</i>	81-04	Jun 27-Jul 19	78
32	<i>Delaware II</i> <i>Albatross IV</i>	81-05 81-10	Aug 4-Sep 2	96
33	<i>Delaware II</i> <i>Albatross IV</i>	81-06 81-13	Sep 17-Nov 7	169
34	<i>Albatross IV</i>	81-14	Nov 18-Dec 21	88

Table 1. (continued)

MARMAP Survey No.	Research Vessel	Cruise No.	Sampling Dates	No. Bongo Stations
<u>1982</u>				
35	<i>Albatross IV</i>	82-02	Feb 17-Mar 23	145
36	<i>Delaware II</i>	82-02	Mar 11-May 8	166
37	<i>Delaware II</i> <i>Albatross IV</i>	82-03 82-06	May 18-Jun 11	132
38	<i>Albatross IV</i> <i>Delaware II</i>	82-08 82-05	Jul 13-Aug 7	124
39	<i>Albatross IV</i>	82-11	Sep 15-Nov 11	151
40	<i>Delaware II</i>	82-09	Nov 17-Dec 20	152
<u>1983</u>				
41	<i>Delaware II</i> <i>Delaware II</i> <i>Albatross IV</i>	83-01 83-02 83-01	Jan 18-Mar 1	153
42	<i>Albatross IV</i>	83-02	Mar 9-Apr 30	139
43	<i>Albatross IV</i>	83-04	May 26-Jun 21	176
44	<i>Albatross IV</i>	83-07	Jul 27-Aug 30	117
45	<i>Delaware II</i>	83-07	Aug 16-Sep 4	62
46	<i>Albatross IV</i>	83-08	Sep 14-Nov 9	165
47	<i>Delaware II</i>	83-09	Nov 16-Dec 20	151
<u>1984</u>				
48	<i>Delaware II</i>	84-01	Jan 10-Feb 8	160
49	<i>Albatross IV</i>	84-02	Mar 2-Apr 15	156
50	<i>Albatross IV</i>	84-03	May 9-Jun 2	178

Table 2. Rankings in order of abundance for numerically dominant fish larvae in four coastal subareas off northeastern United States as determined from MARMAP surveys, 1977-84.

MID-ATLANTIC Taxa	SOUTHERN NEW ENGLAND Taxa
Sand lances	Sand lances
Bluefish	Atlantic mackerel
Anchovies	Hakes (<i>Urophycis</i> spp.)
Gulfstream flounder	Silver hake
Atlantic mackerel	Cunner
Searobins	Gulfstream flounder
Smallmouth flounder	Butterfish
Hakes (<i>Urophycis</i> spp.)	Yellowtail flounder
Butterfish	Bluefish
Atlantic croaker	<i>Ceratoscopelus maderensis</i>
Yellowtail flounder	Summer flounder
<i>Benthosema glaciale</i>	Anchovies
Windowpane	Offshore hake
<i>Ceratoscopelus maderensis</i>	Windowpane
Silver hake	<i>Benthosema glaciale</i>
Atlantic menhaden	Smallmouth flounder
Summer flounder	Atlantic cod
Cunner	Witch flounder
Offshore hake	Haddock
Atlantic cod	Atlantic menhaden
Pollock	Atlantic herring
Atlantic herring	American plaice
Haddock	Pollock
	Searobins
	Redfishes
	Atlantic croaker
GEORGES BANK Taxa	GULF OF MAINE Taxa
Silver hake	Sand lance
Hakes (<i>Urophycis</i> spp.)	Atlantic herring
Sand lances	Atlantic mackerel
Haddock	Cunner
Yellowtail flounder	Redfishes
Atlantic cod	Silver hake
Offshore hake	Hakes (<i>Urophycis</i> spp.)
Windowpane flounder	Haddock
American plaice	Witch flounder
Atlantic herring	Butterfish
<i>Ceratoscopelus maderensis</i>	Pollock
Atlantic mackerel	American plaice
Cunner	Offshore hake
<i>Benthosema glaciale</i>	Yellowtail flounder
Pollock	Atlantic cod
Redfishes	<i>Benthosema glaciale</i>
Witch flounder	Gulfstream flounder
Butterfish	Windowpane
Gulfstream flounder	<i>Ceratoscopelus maderensis</i>
Summer flounder	

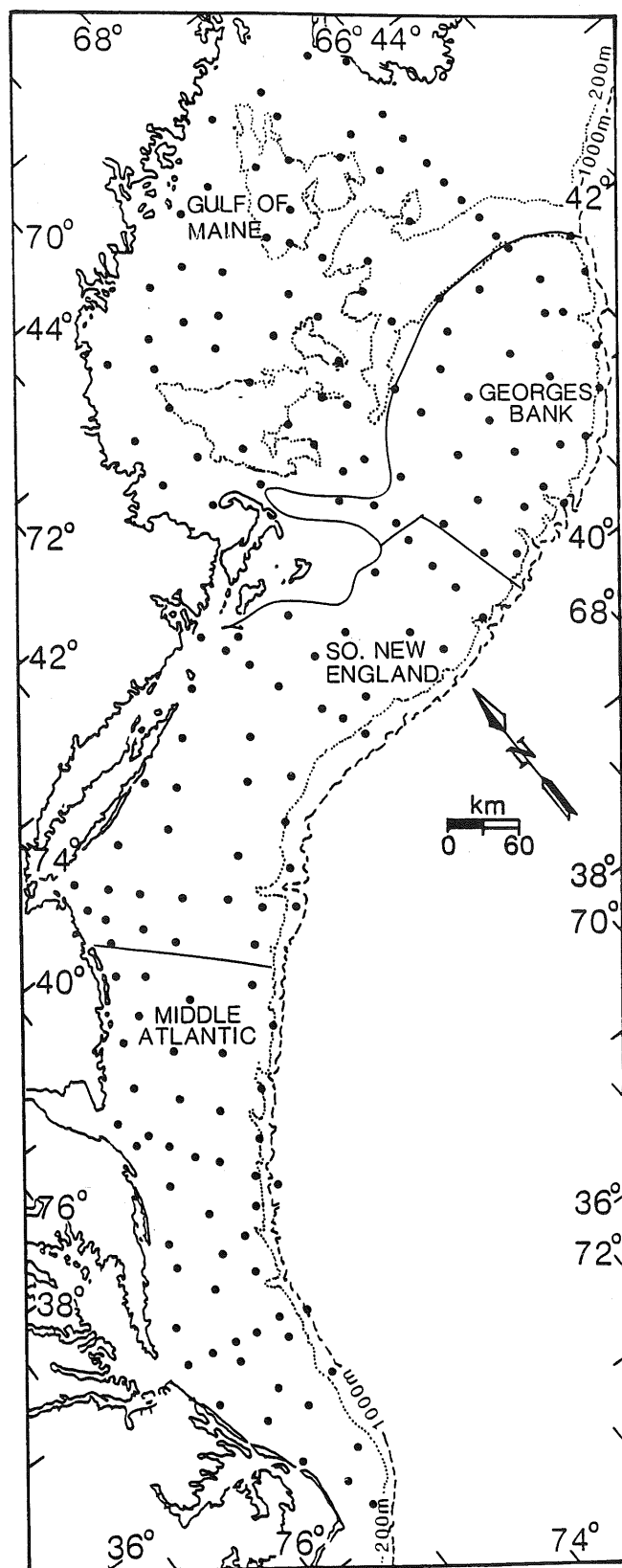


Figure 1. Standard station plan and four subareas for MARMAP, NEFC ichthyoplankton surveys.

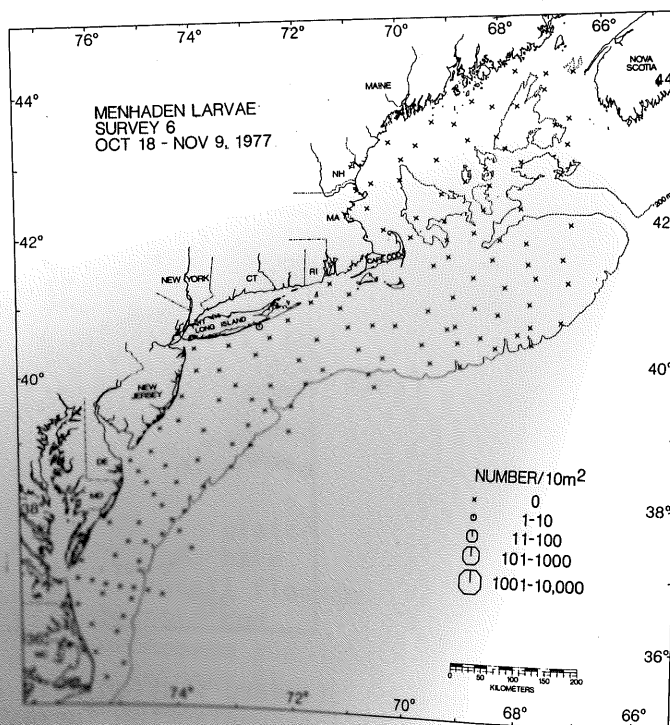
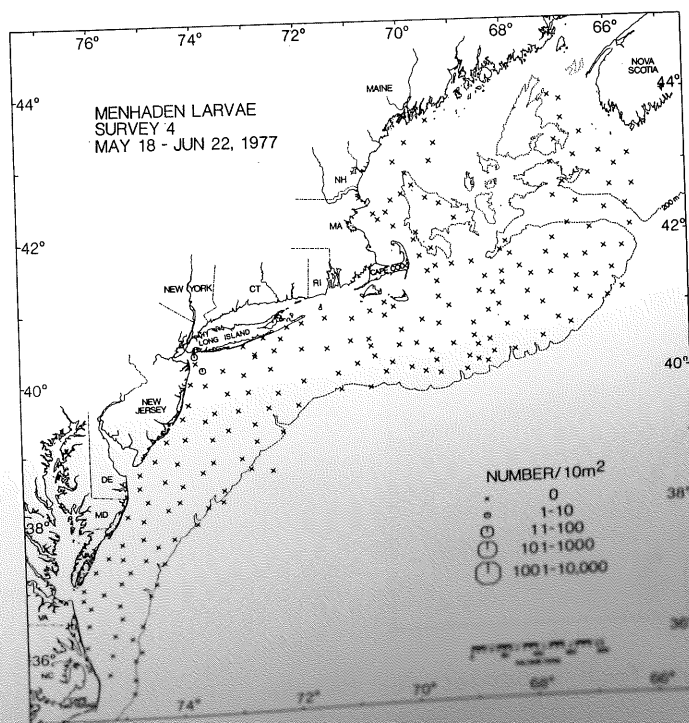
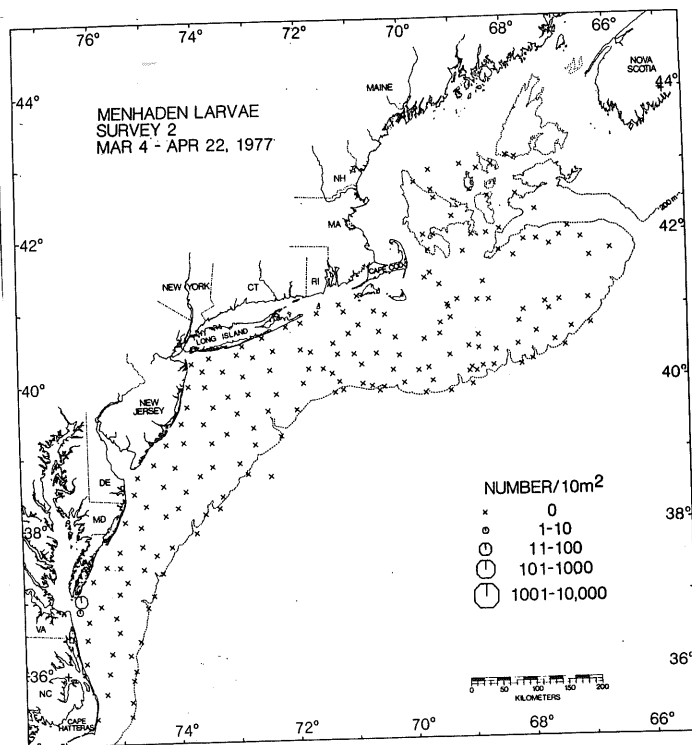
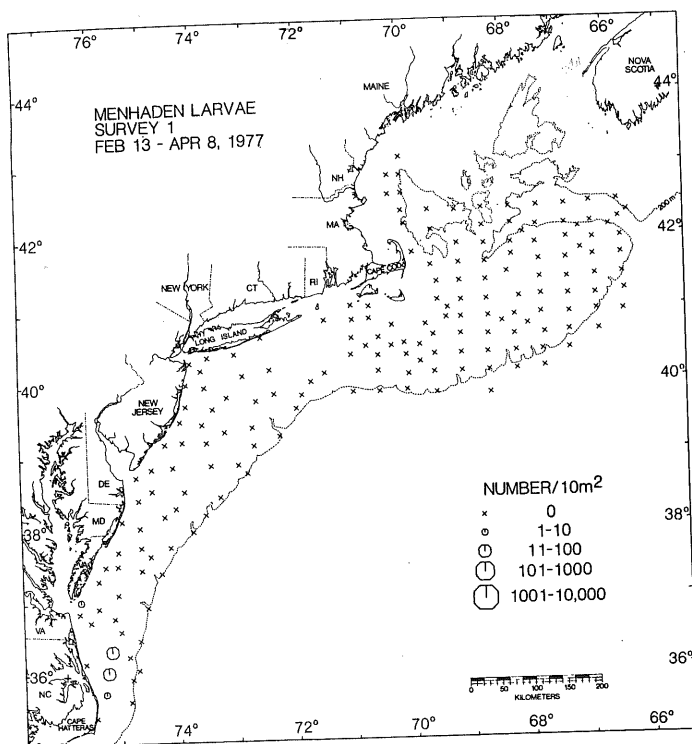


Figure 2. Distribution and abundance of menhaden, *Brevoortia tyrannus*, larvae off northeastern United States, winter 1977 through spring 1984.

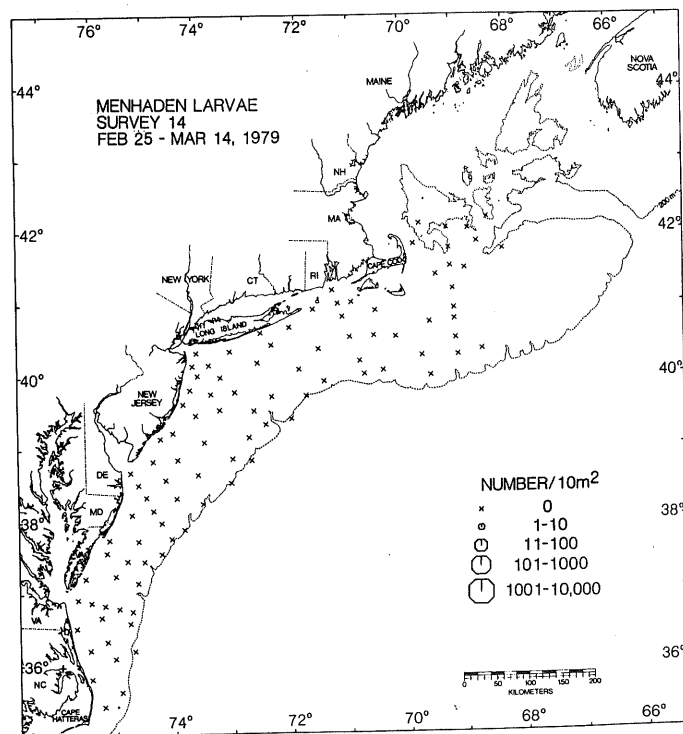
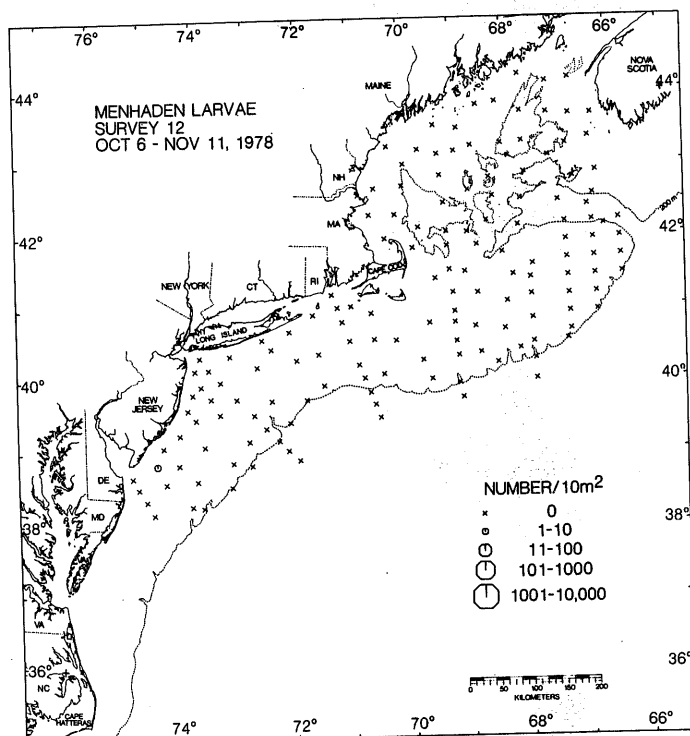
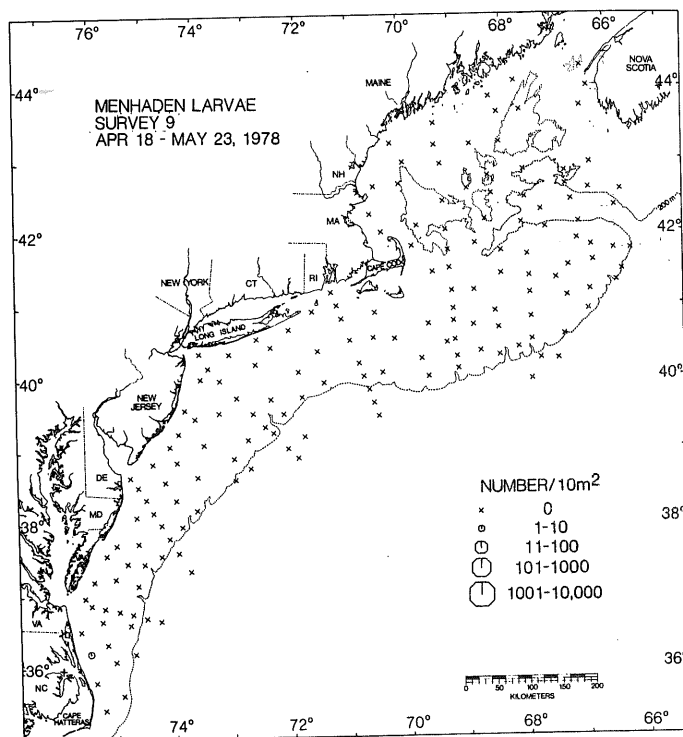
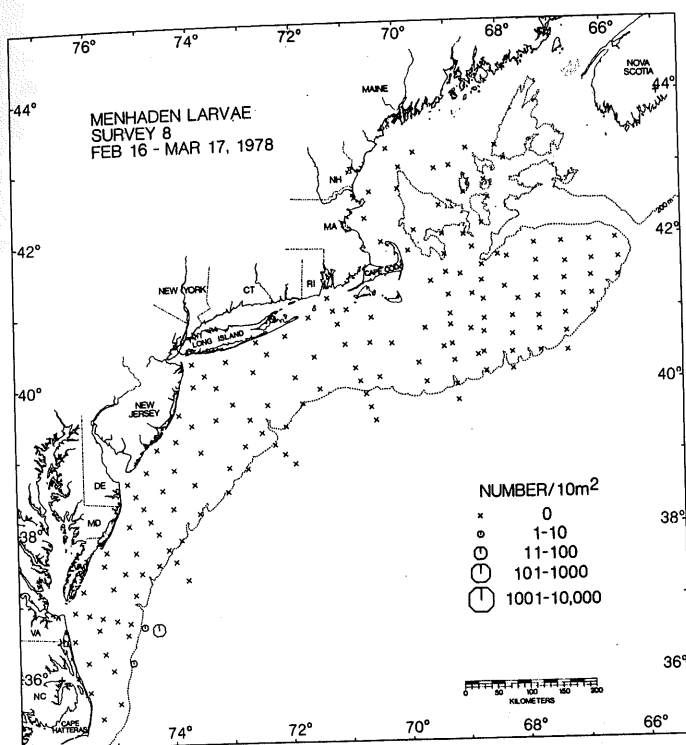


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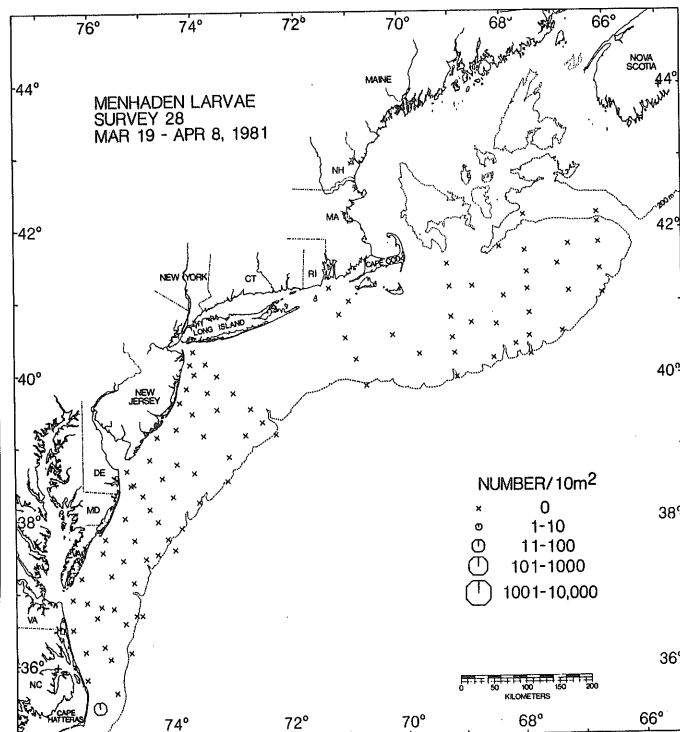
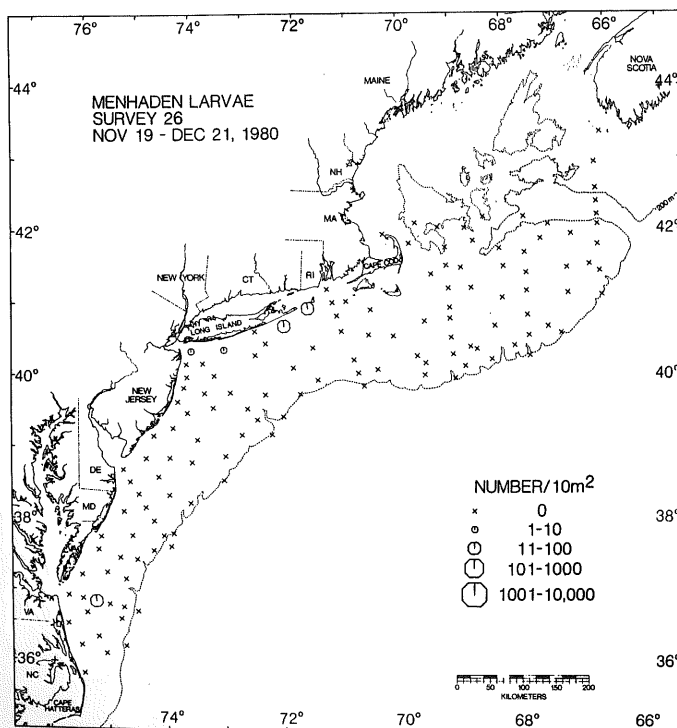
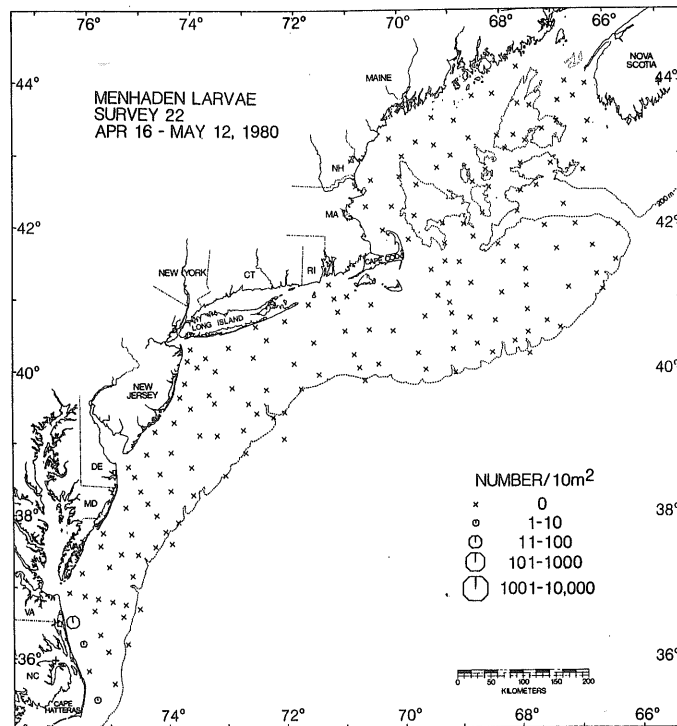
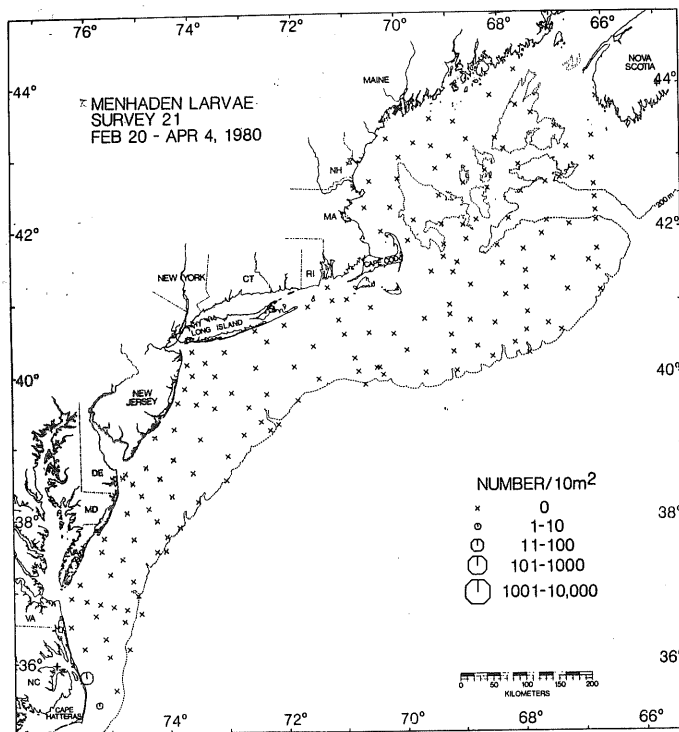


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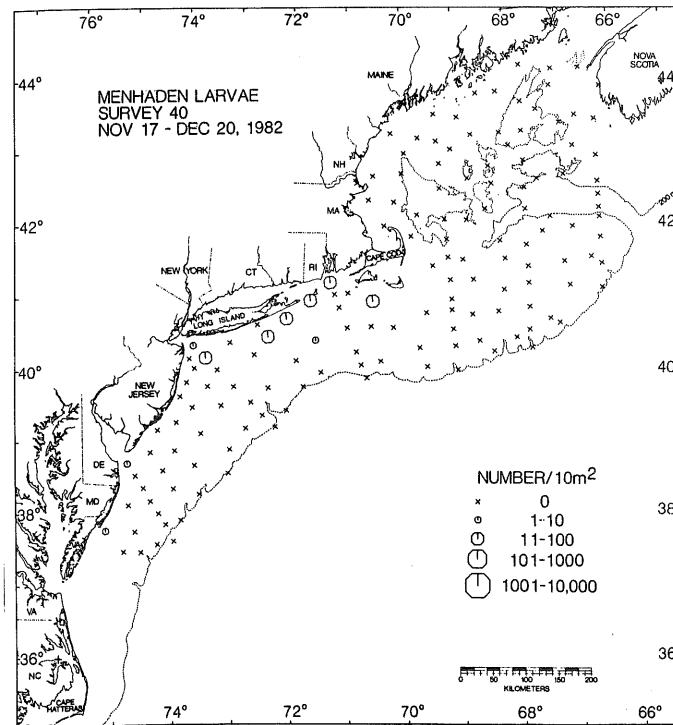
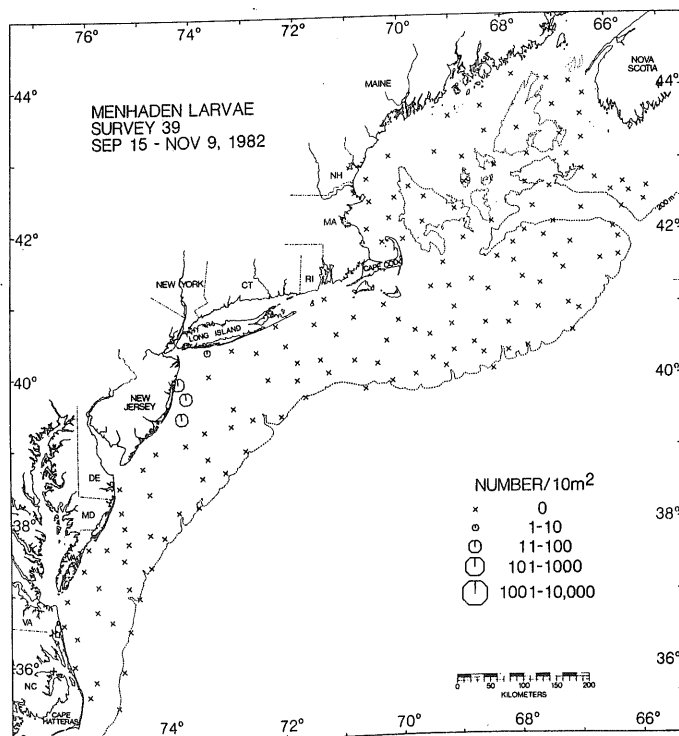
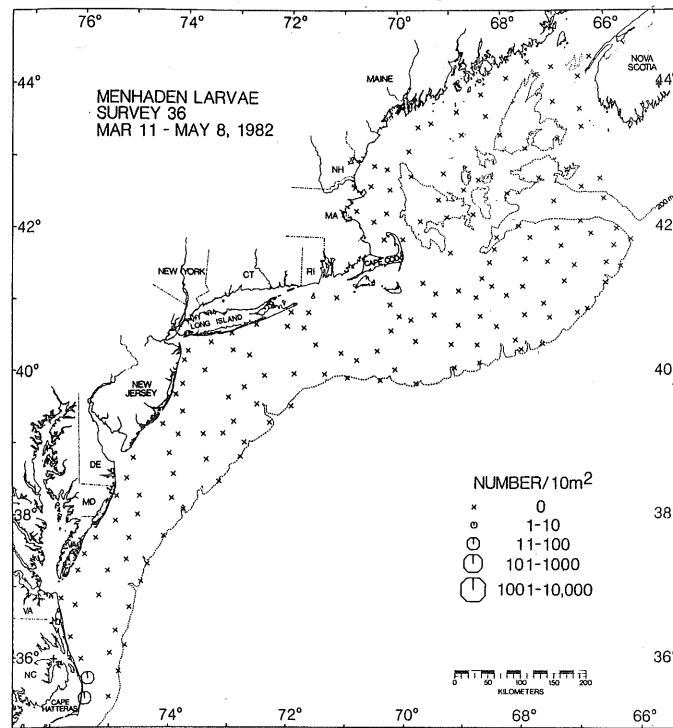
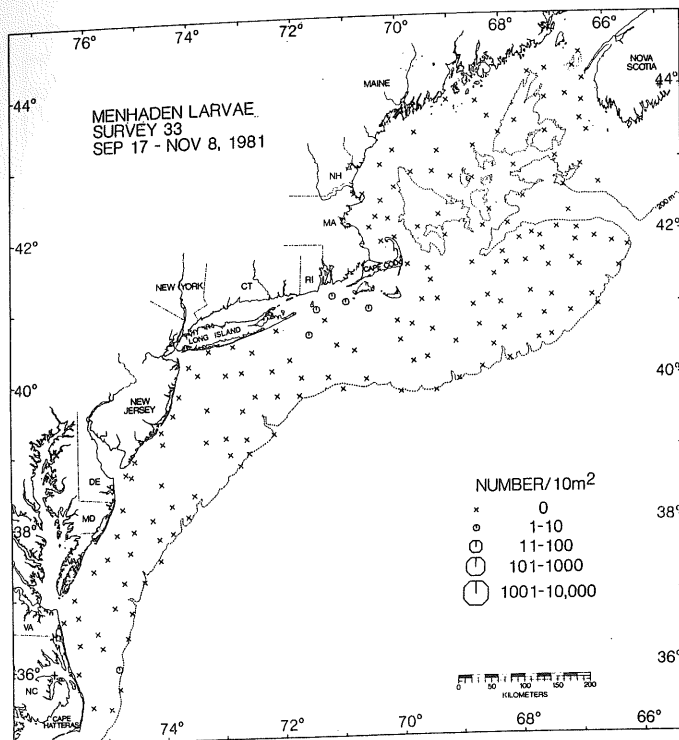


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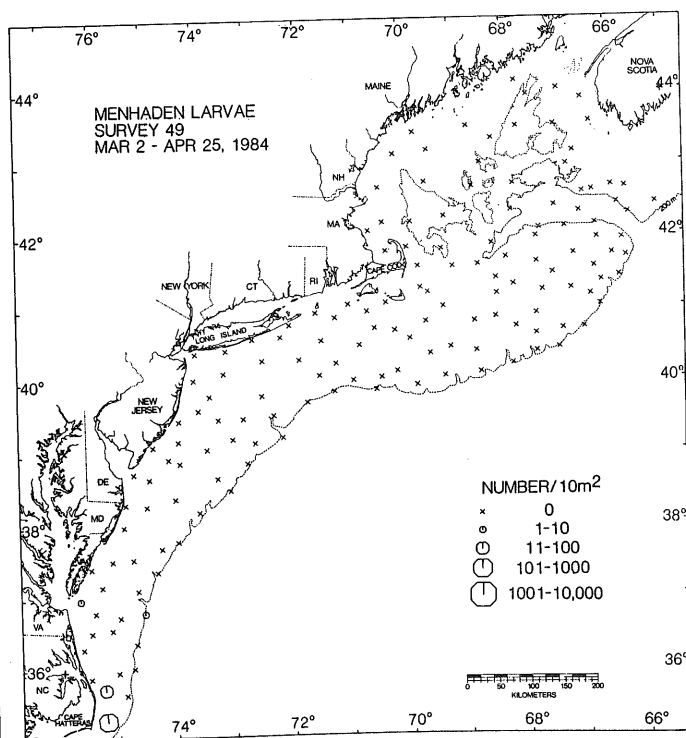
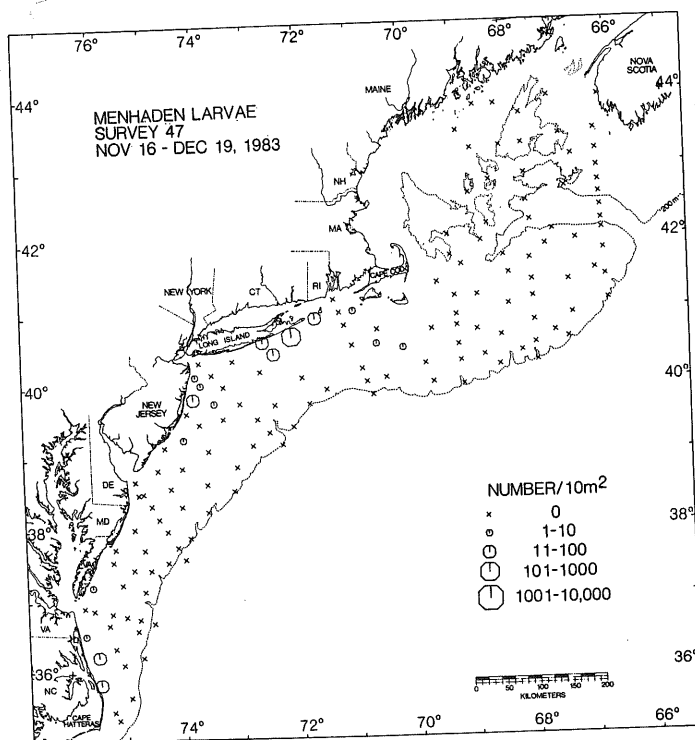
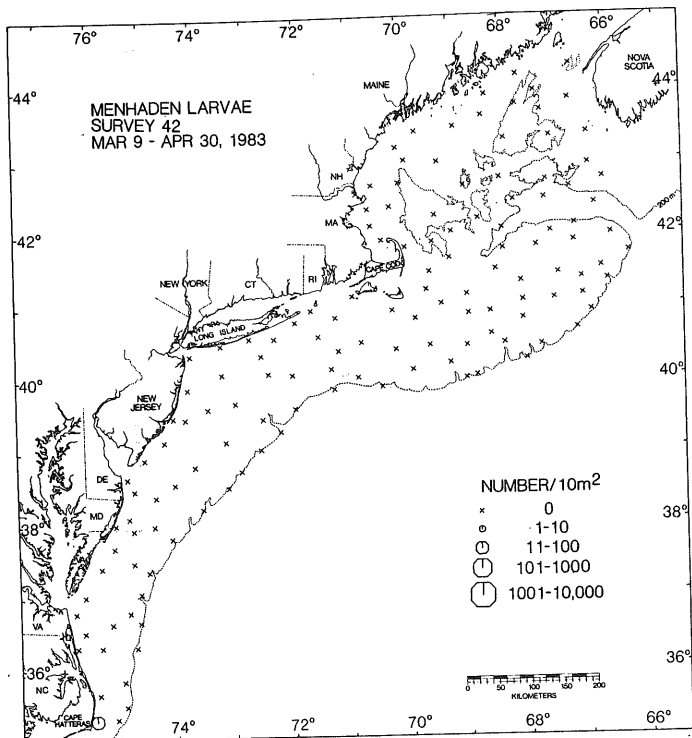
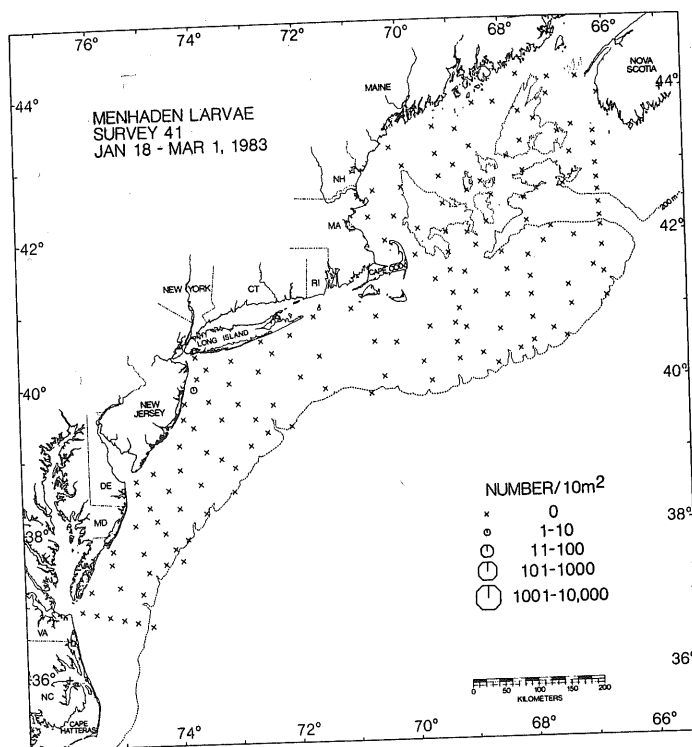


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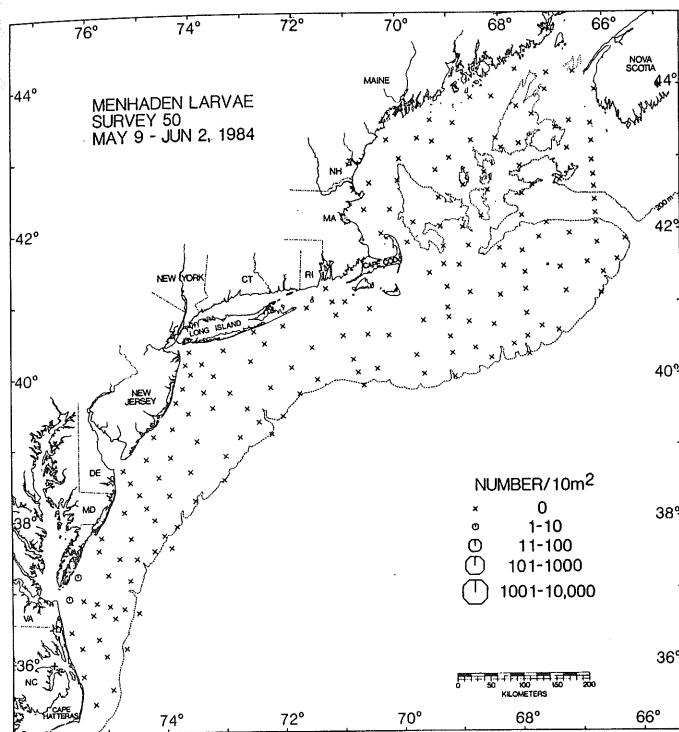


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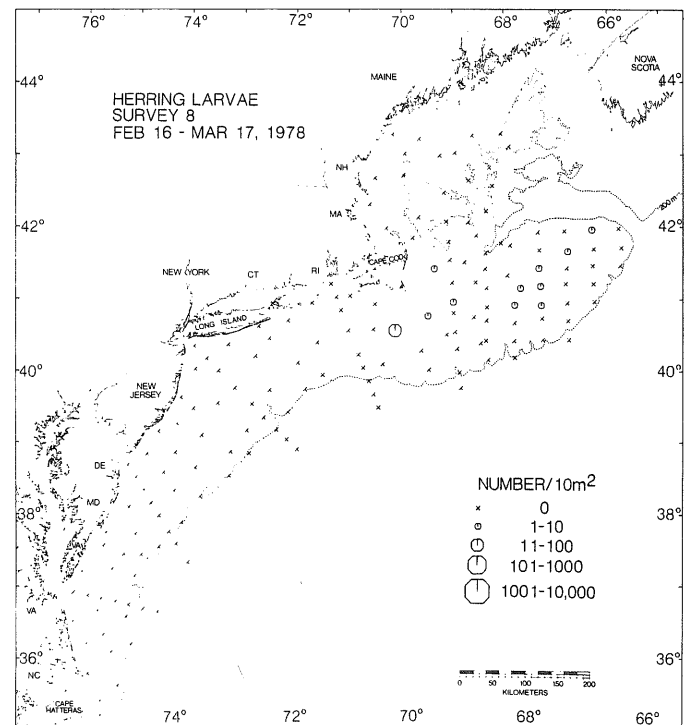
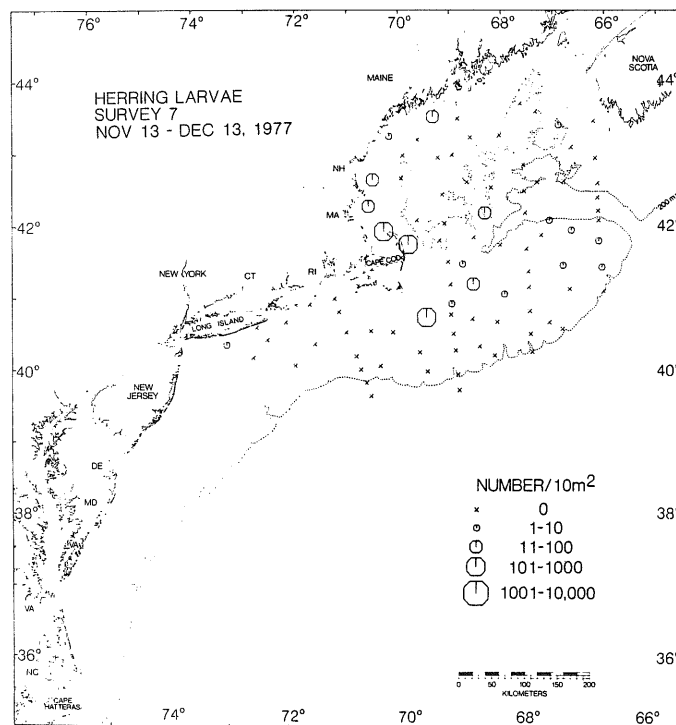
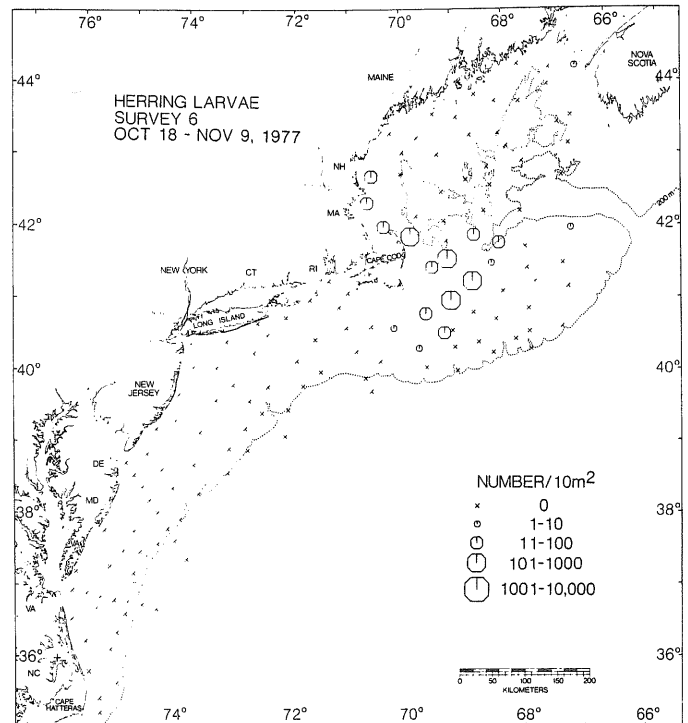
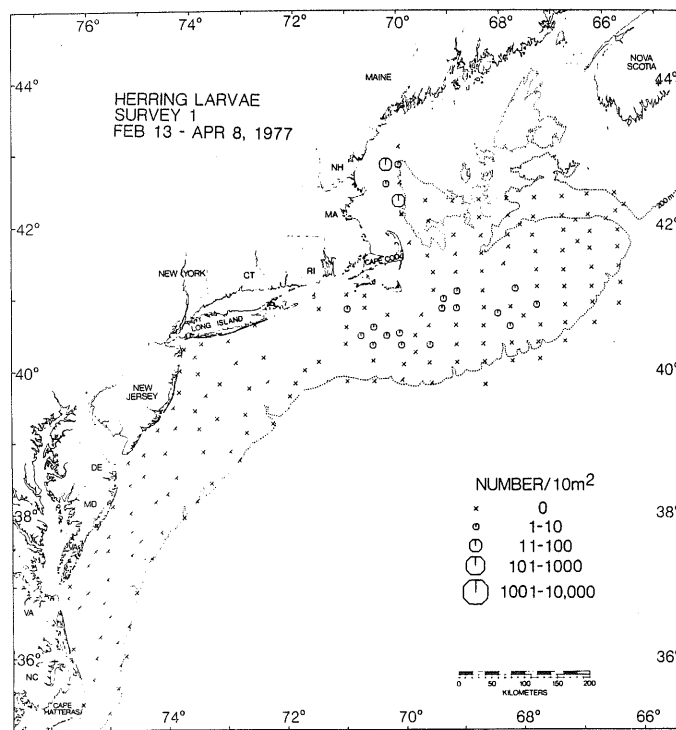


Figure 3. Distribution and abundance of herring, *Clupea harengus*, larvae off northeastern United States, winter 1977 through spring 1984.

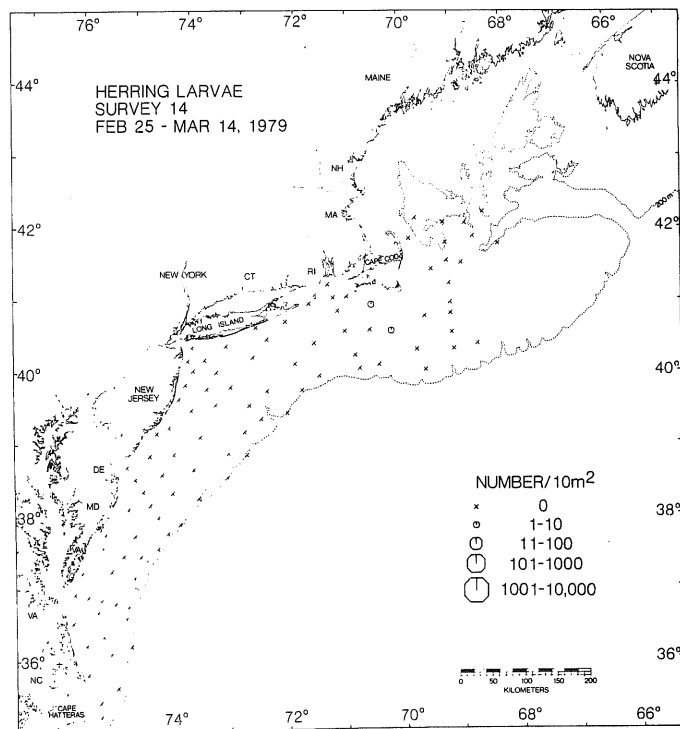
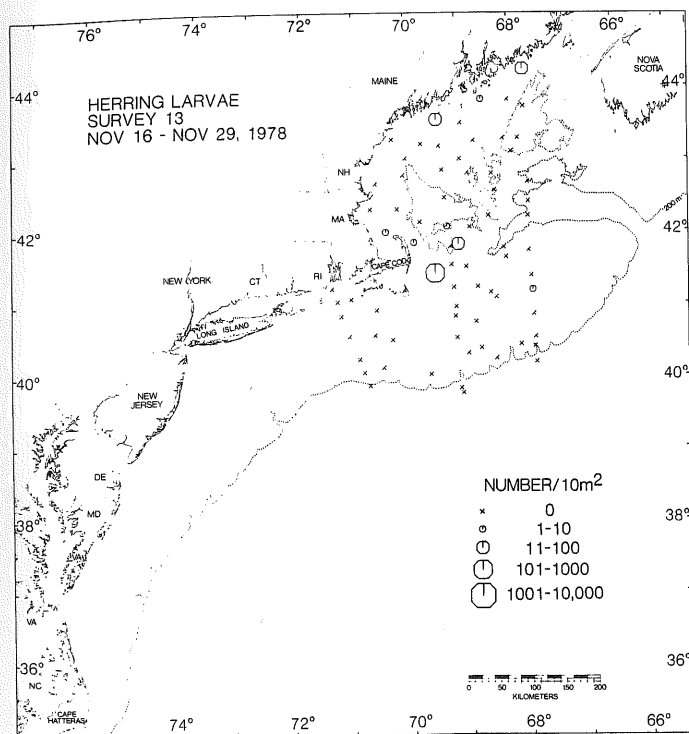
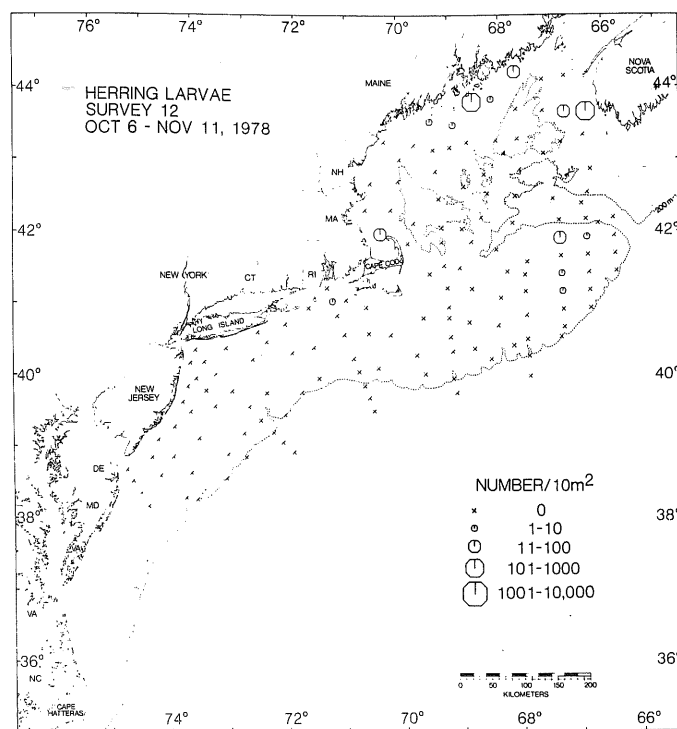
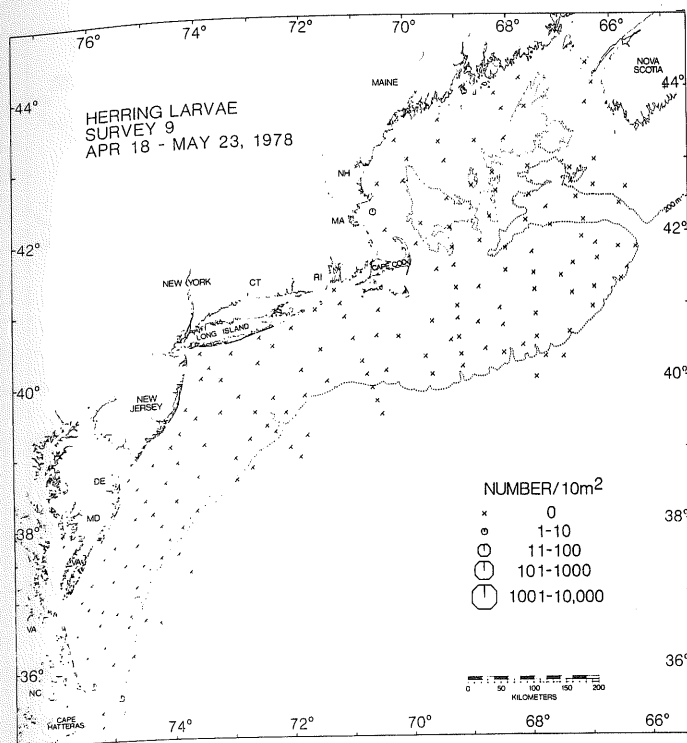


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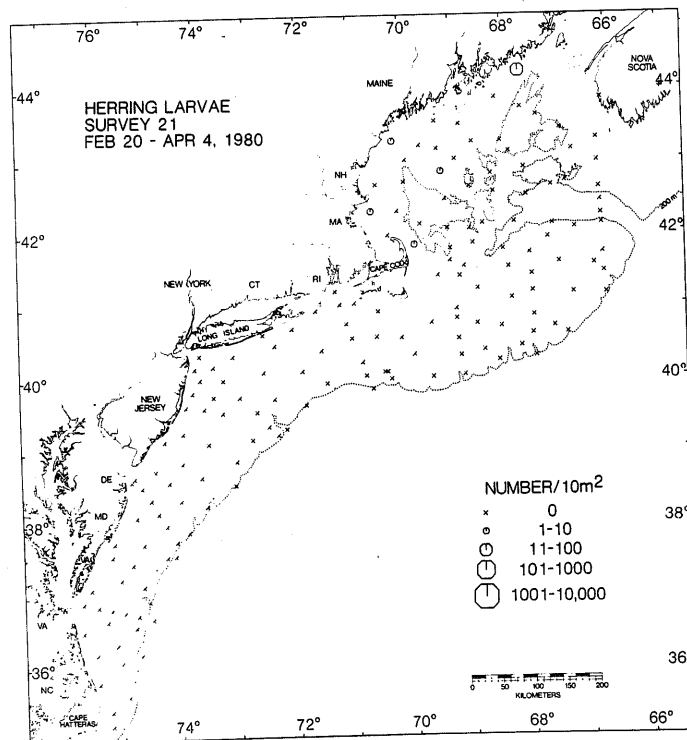
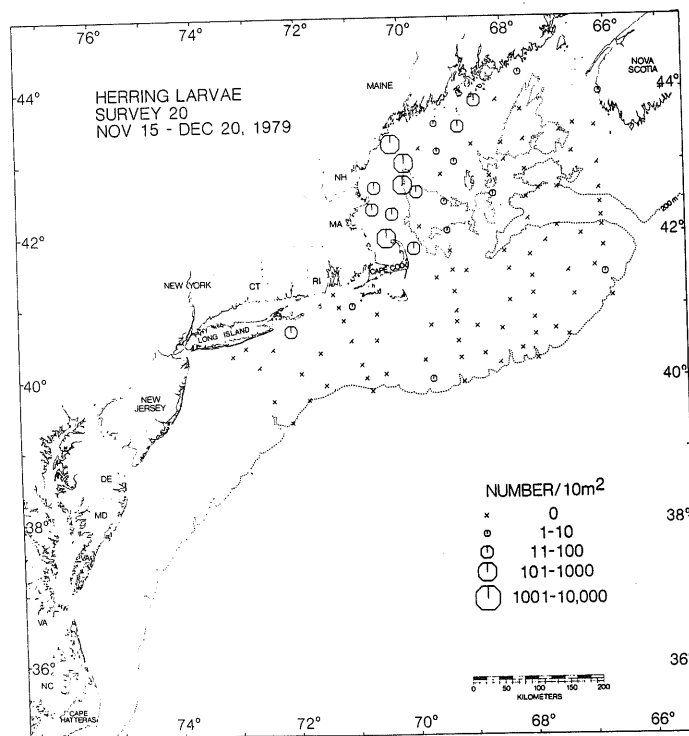
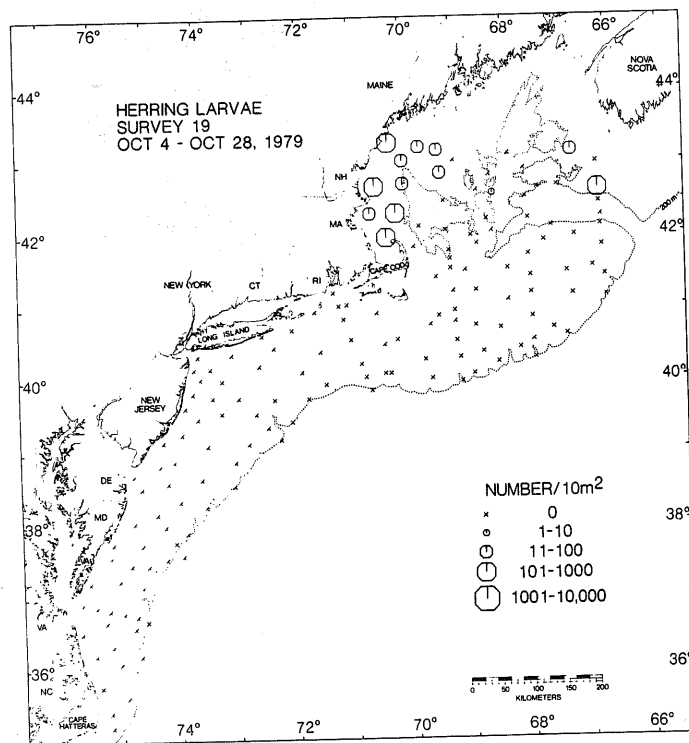
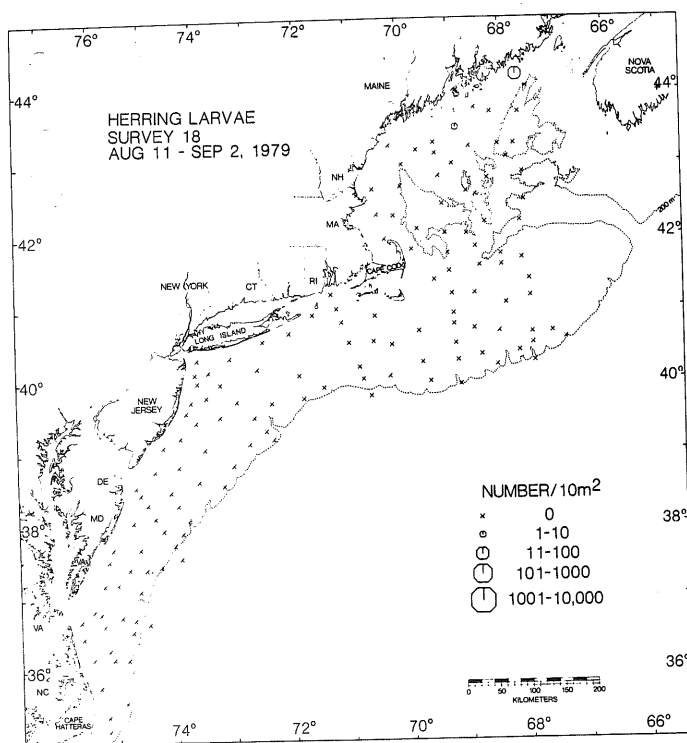


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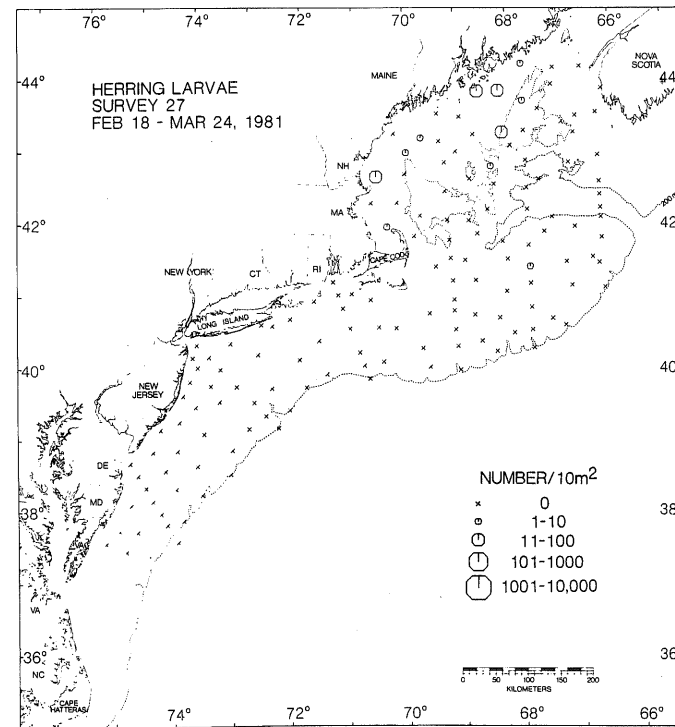
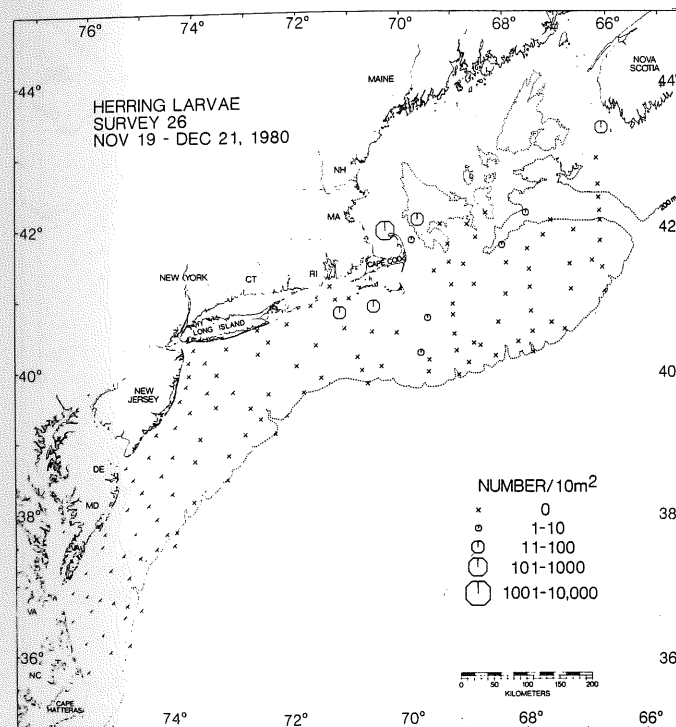
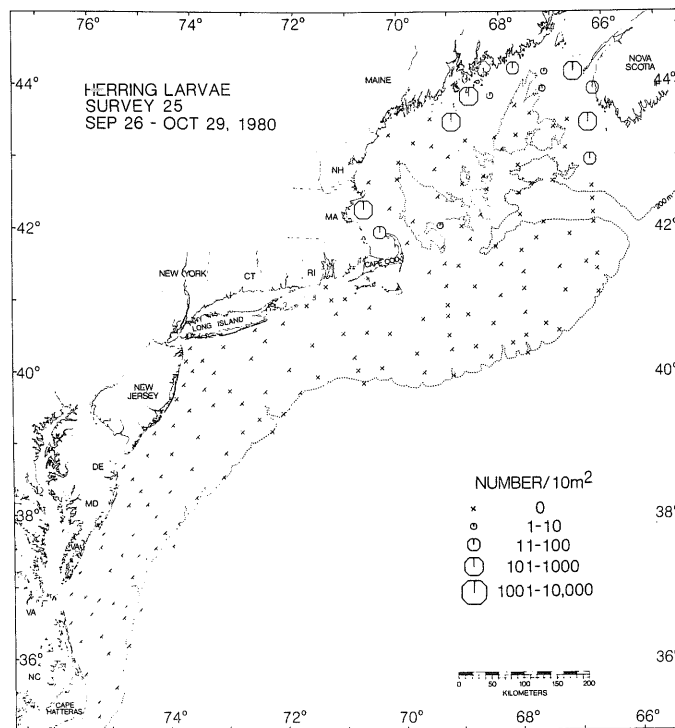
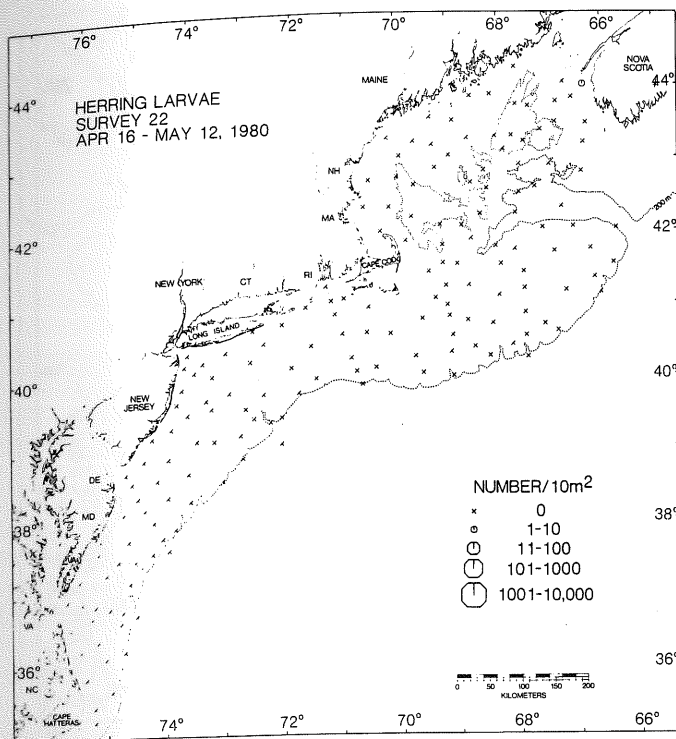


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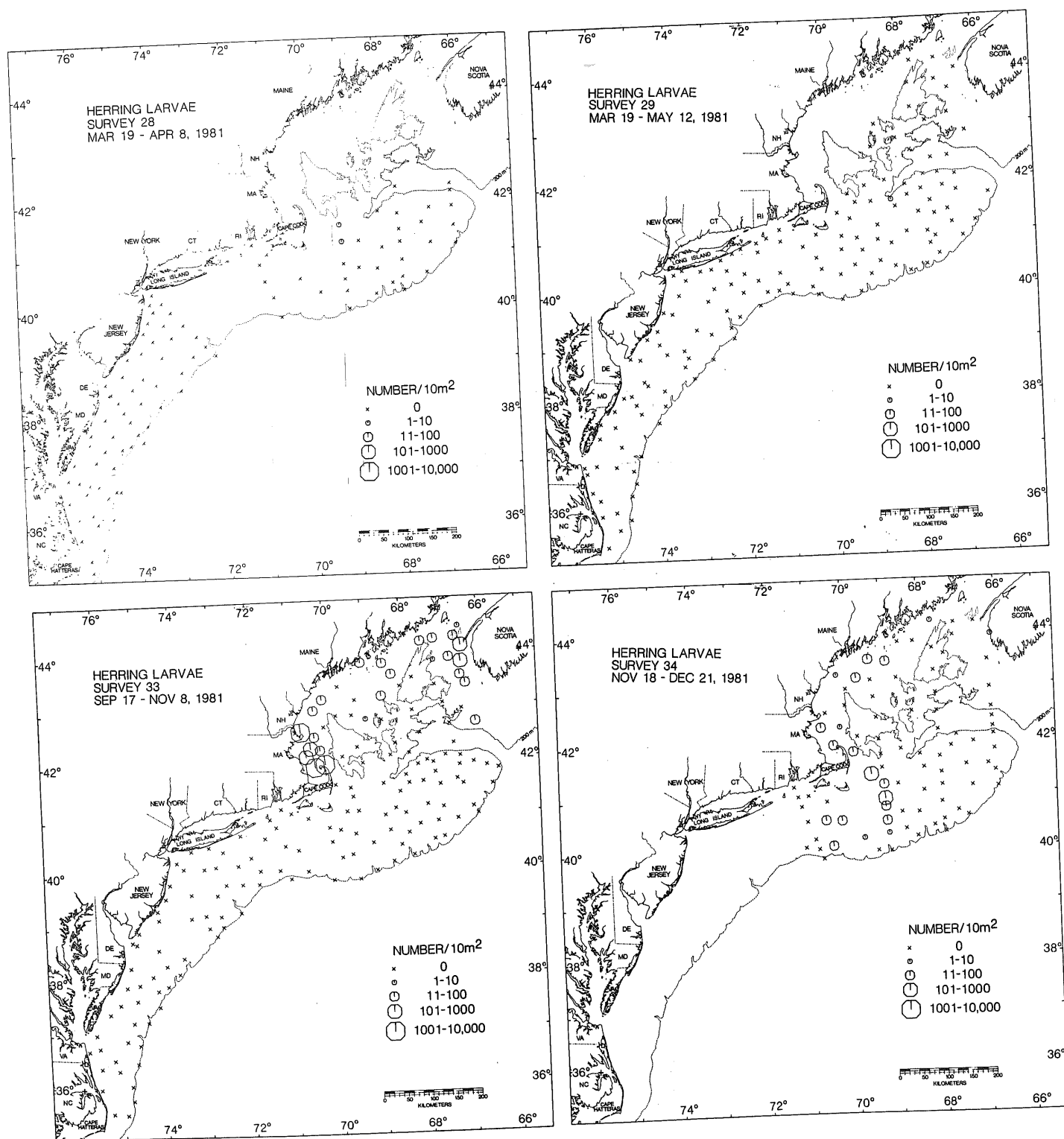


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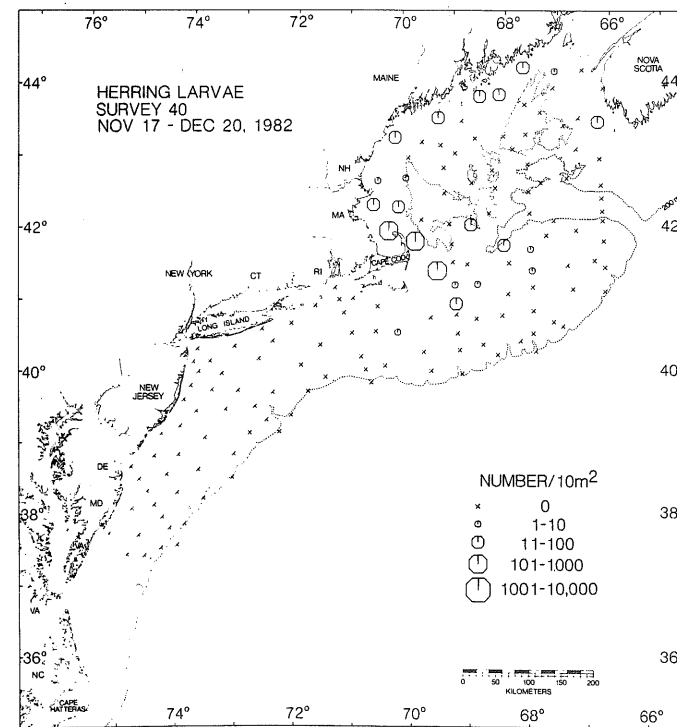
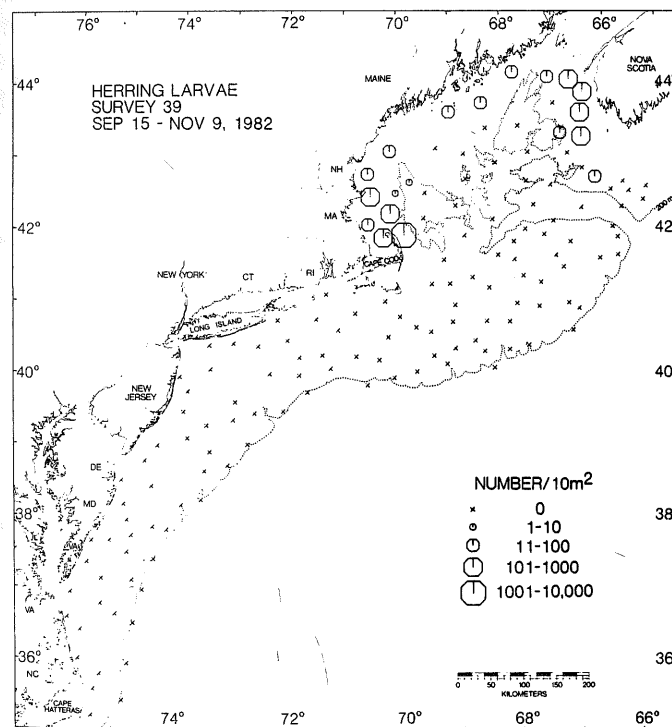
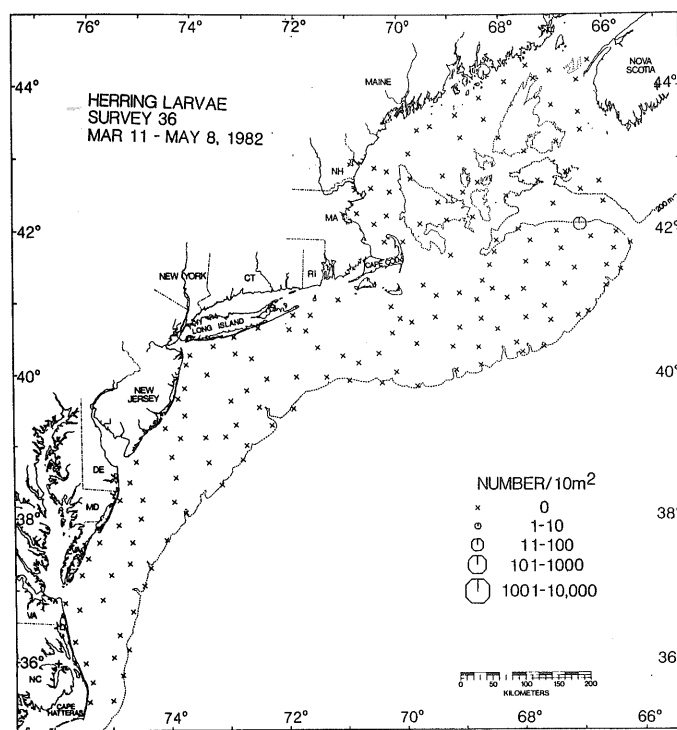
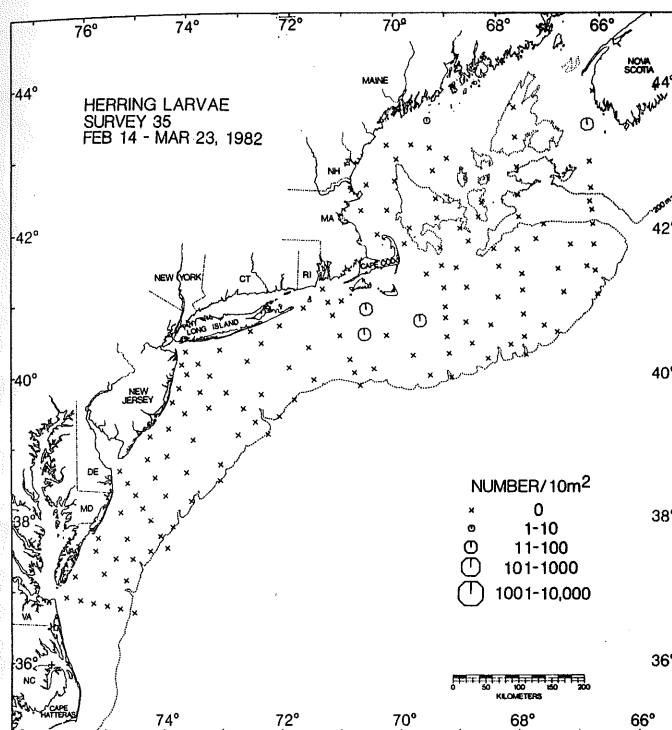


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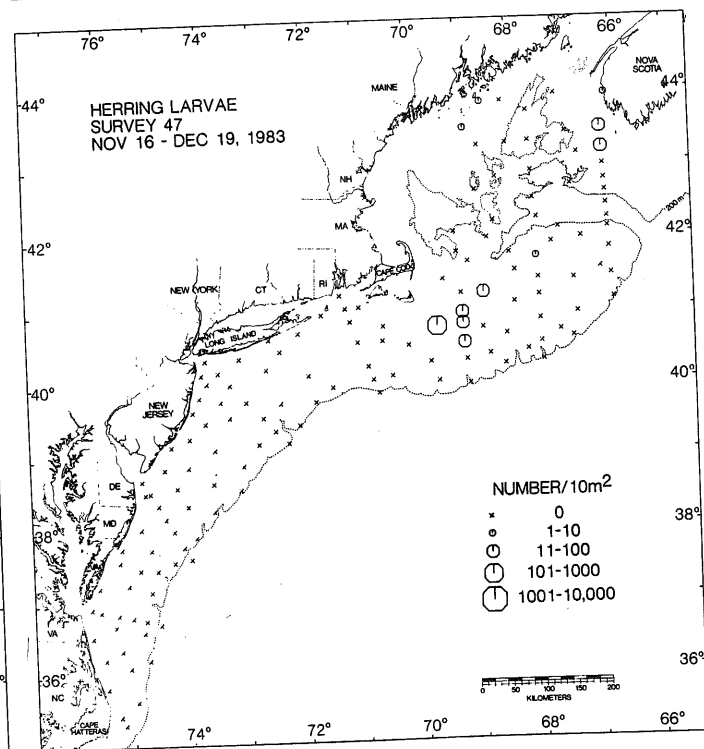
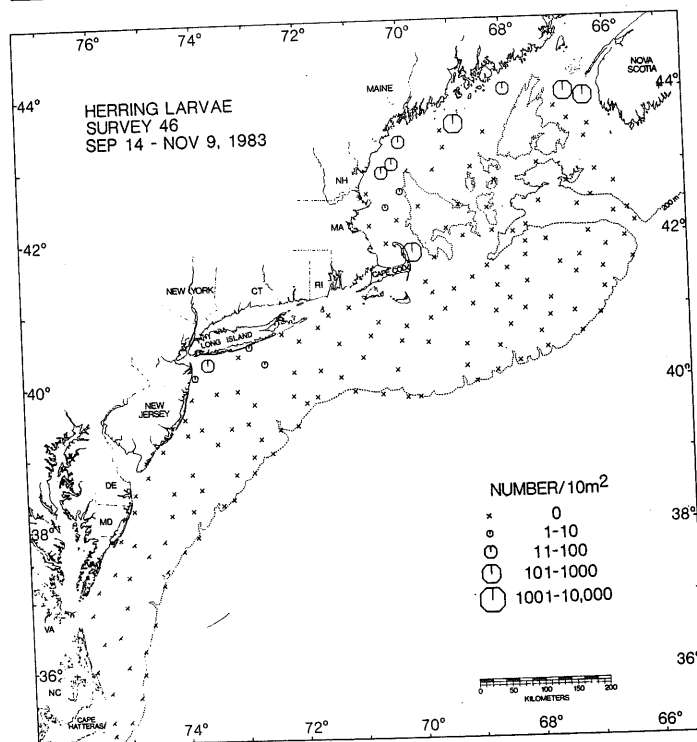
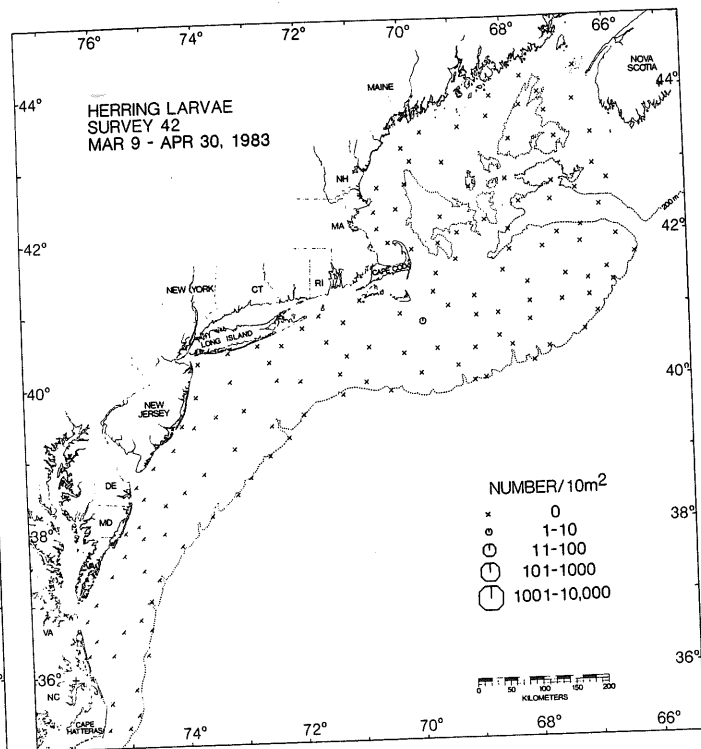
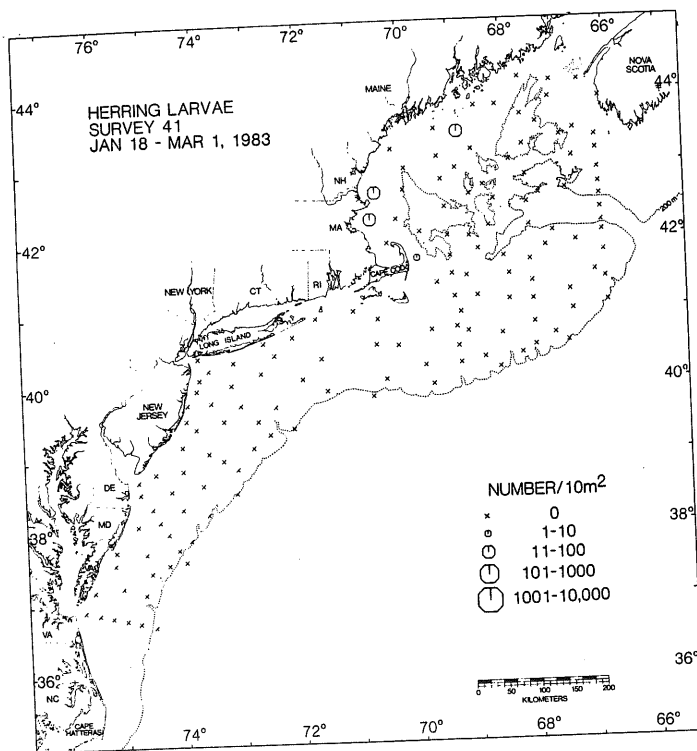


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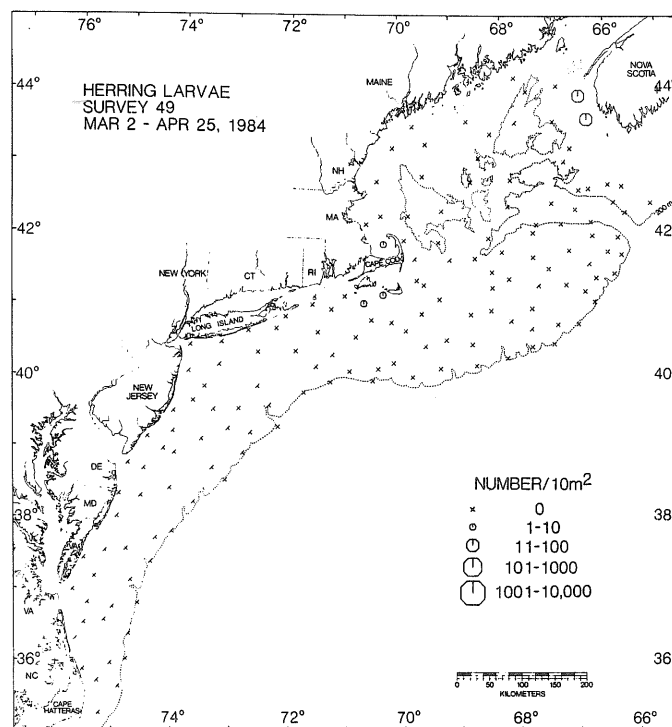
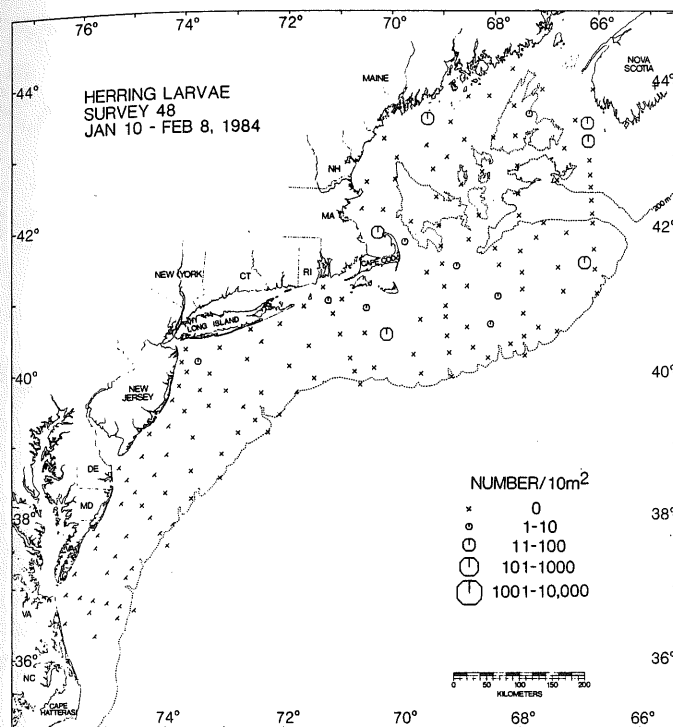


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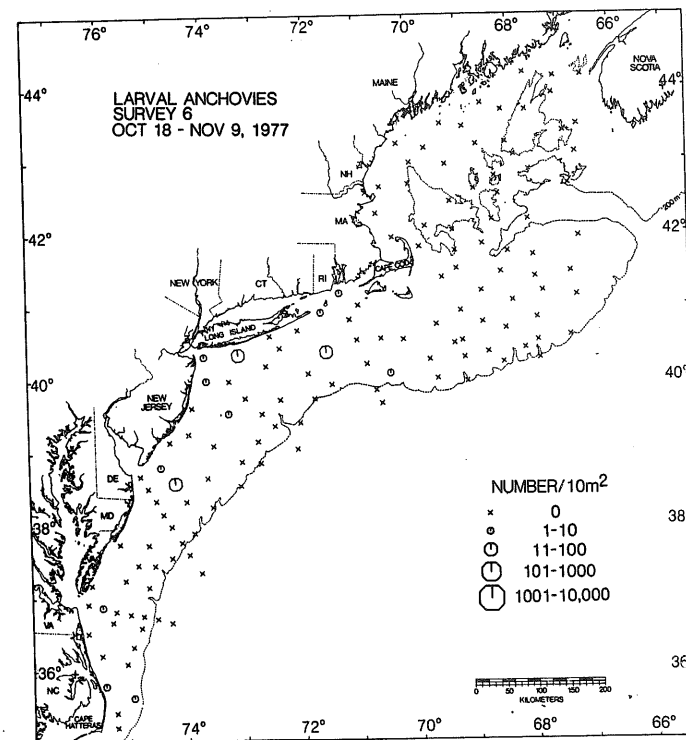
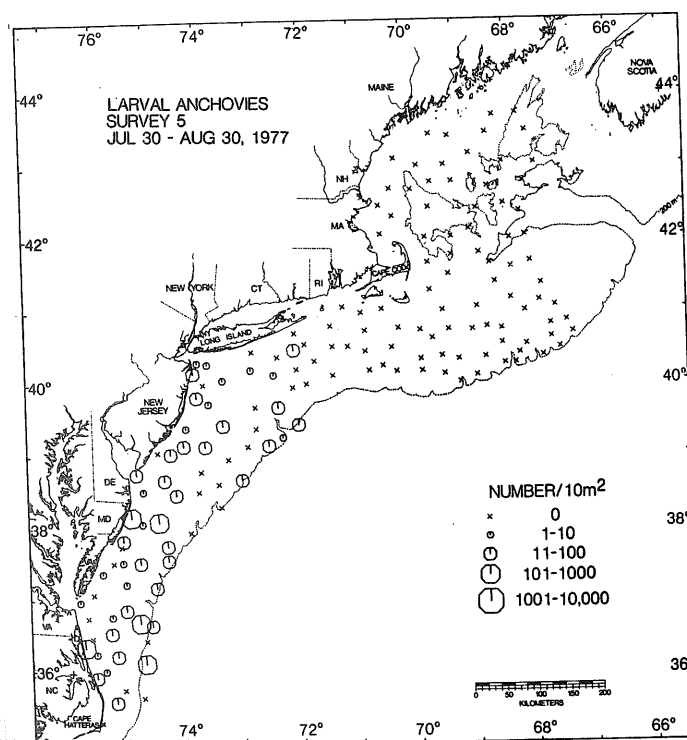
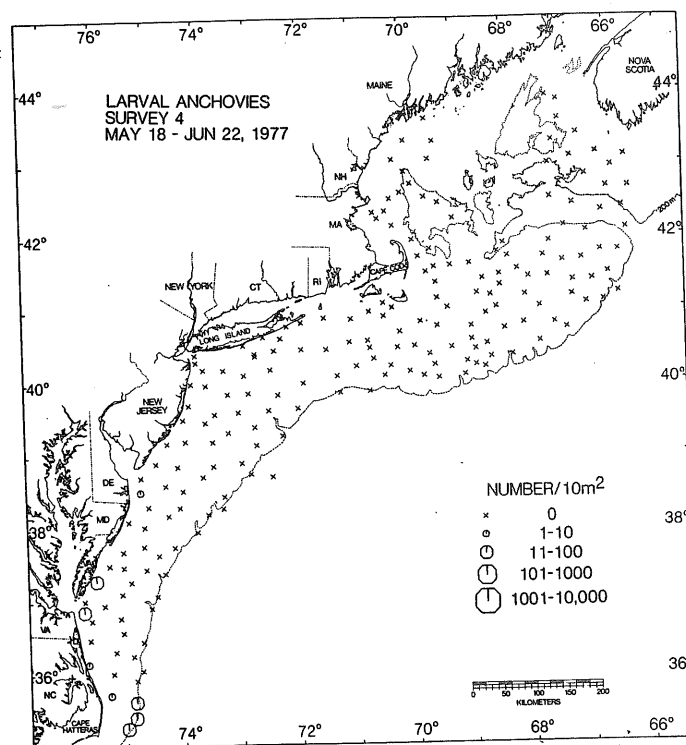
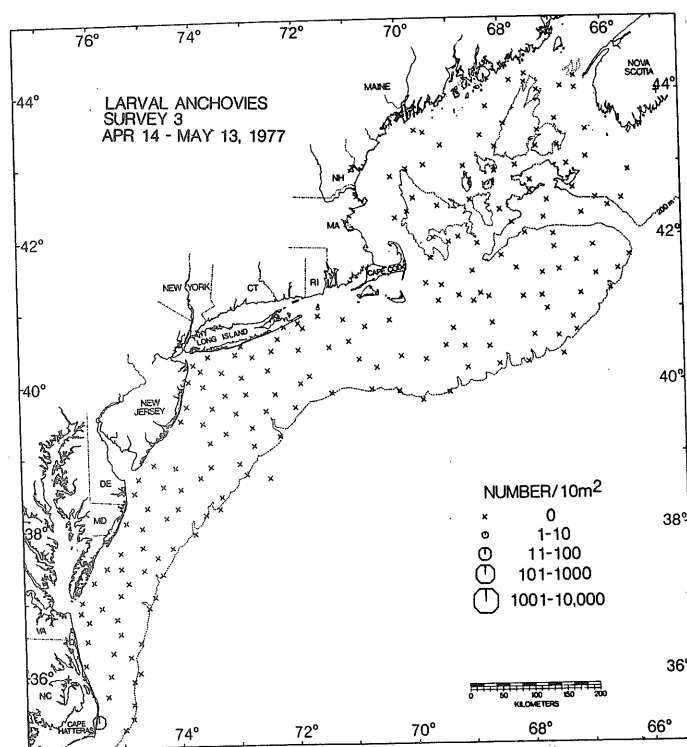


Figure 4. Distribution and abundance of larval anchovies, *Engraulidae*, off northeastern United States, winter 1977 through spring 1984.

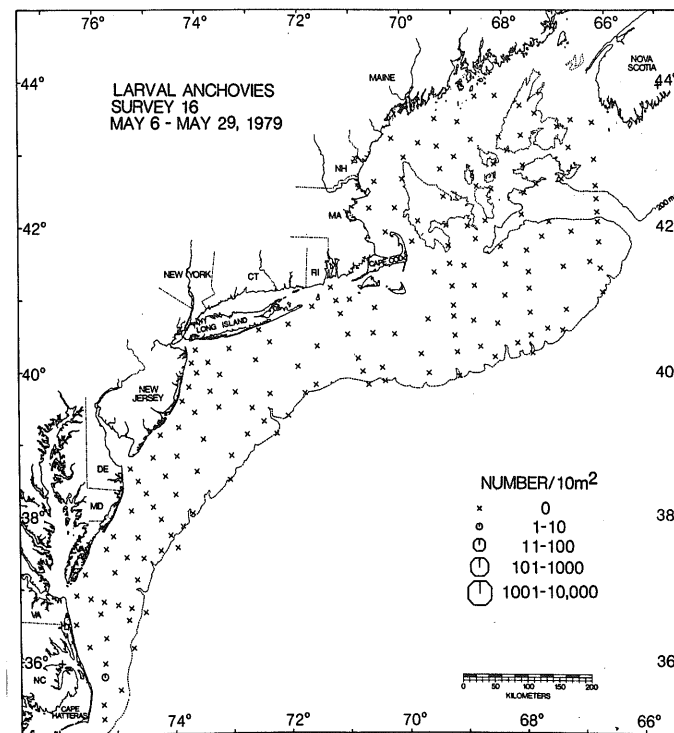
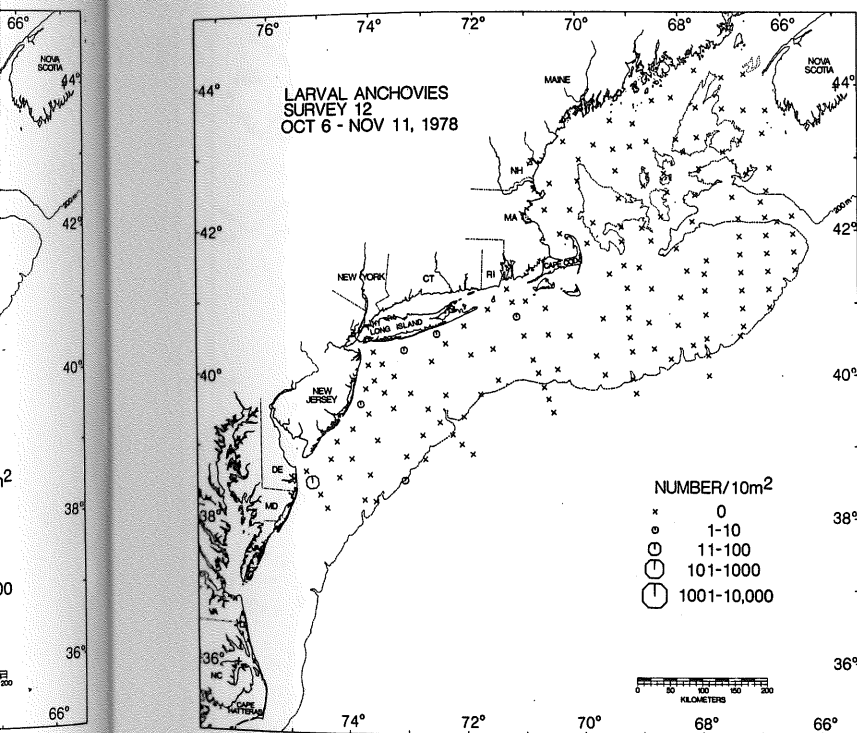
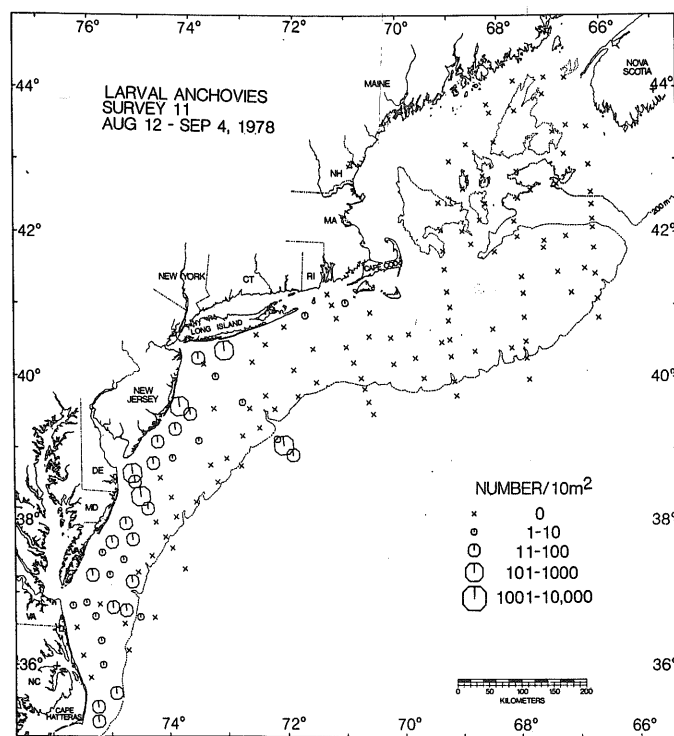
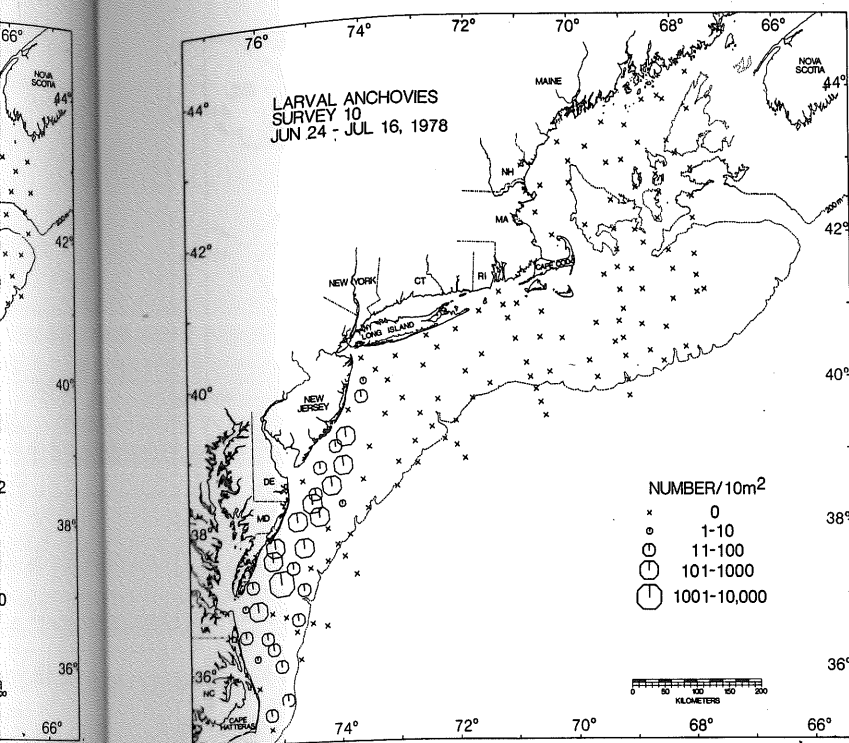


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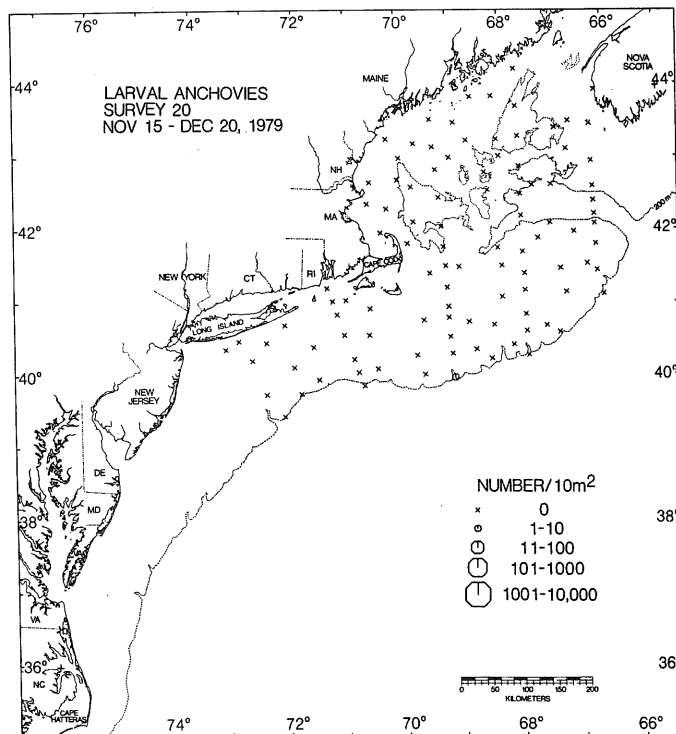
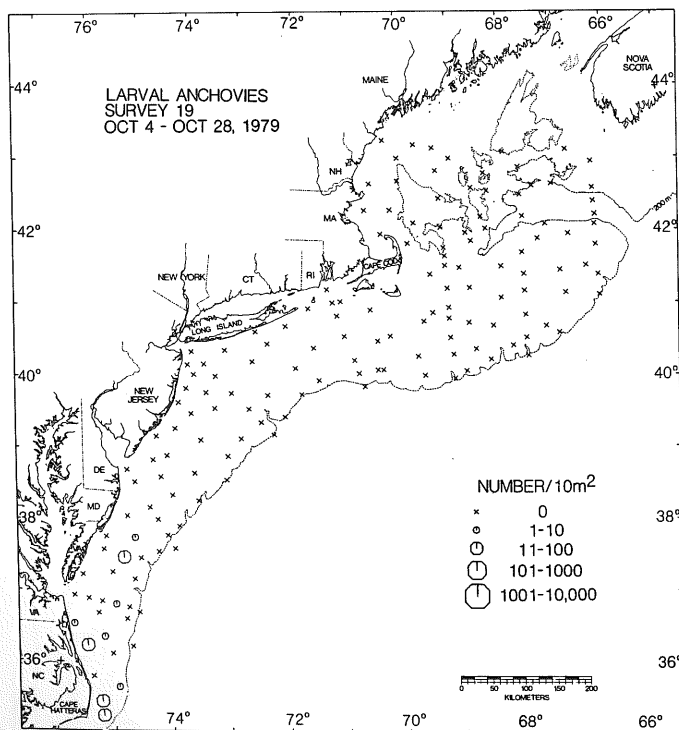
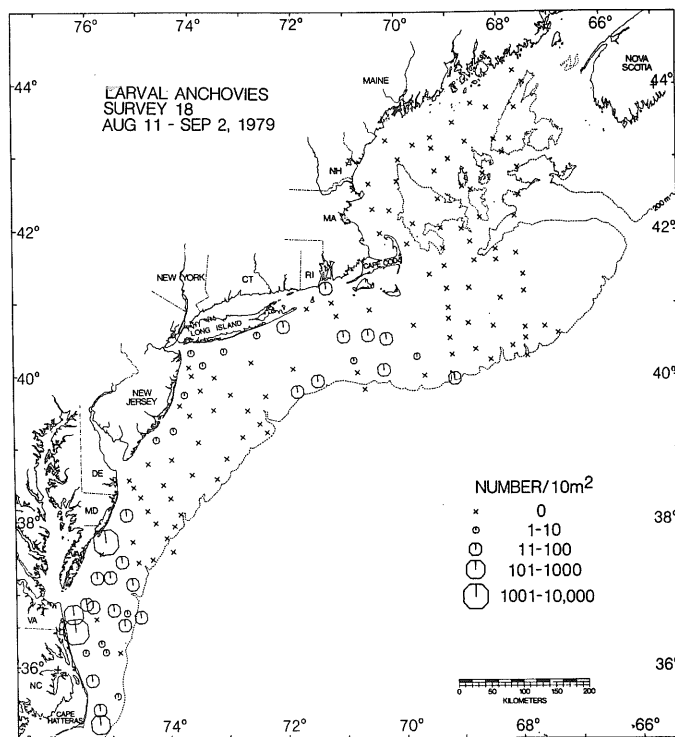
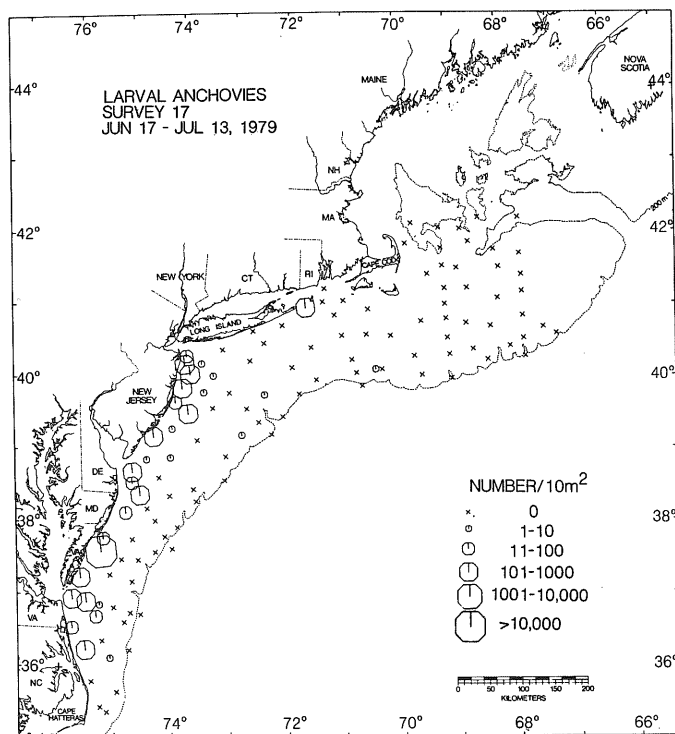


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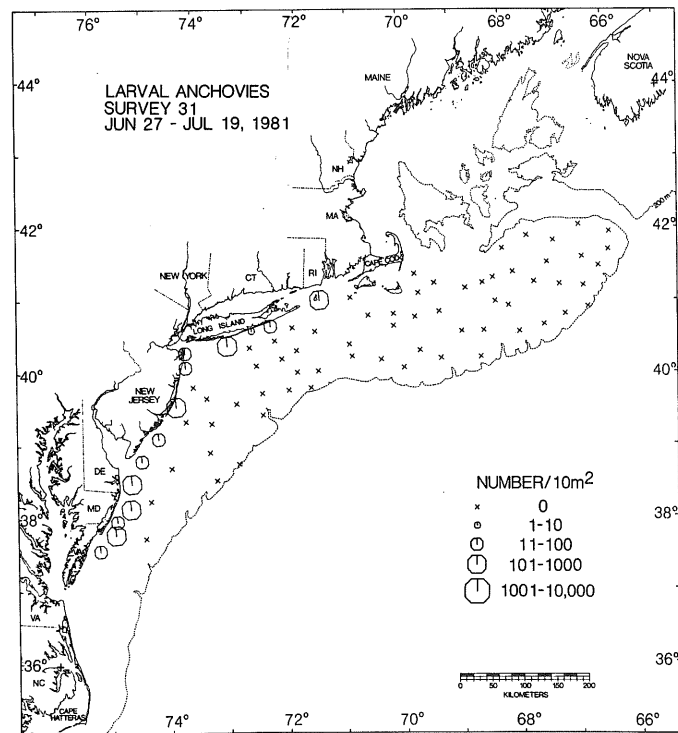
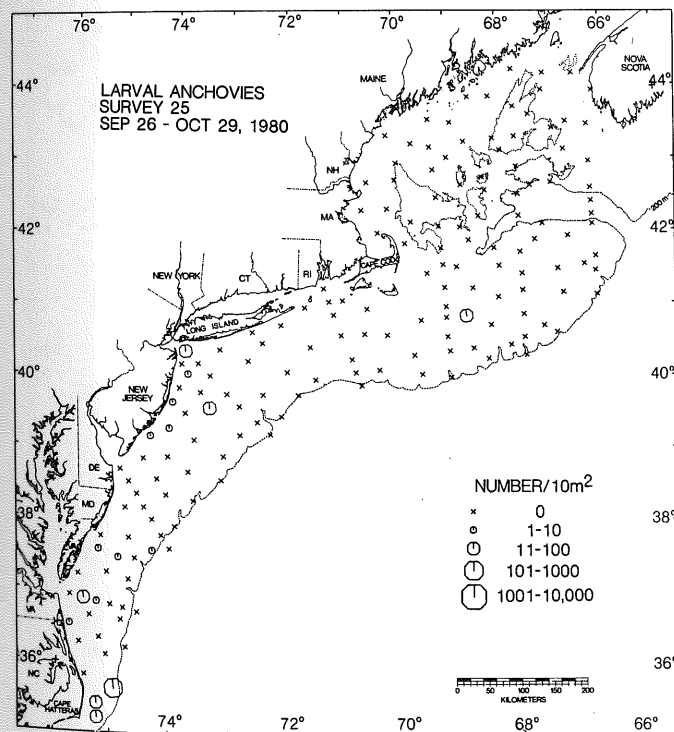
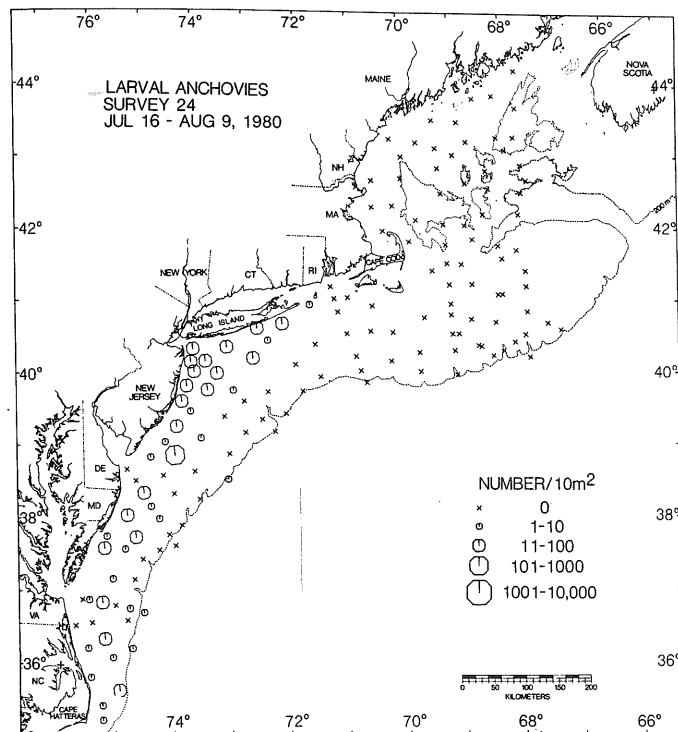
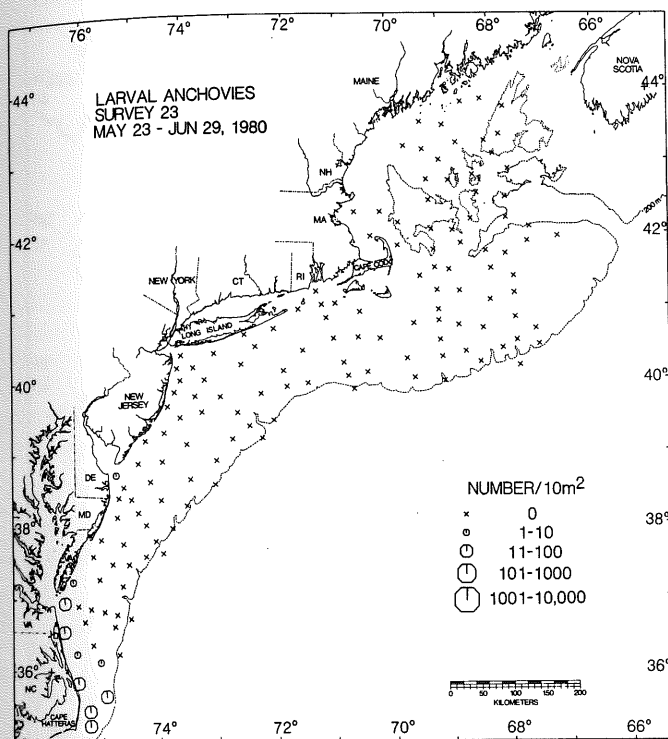


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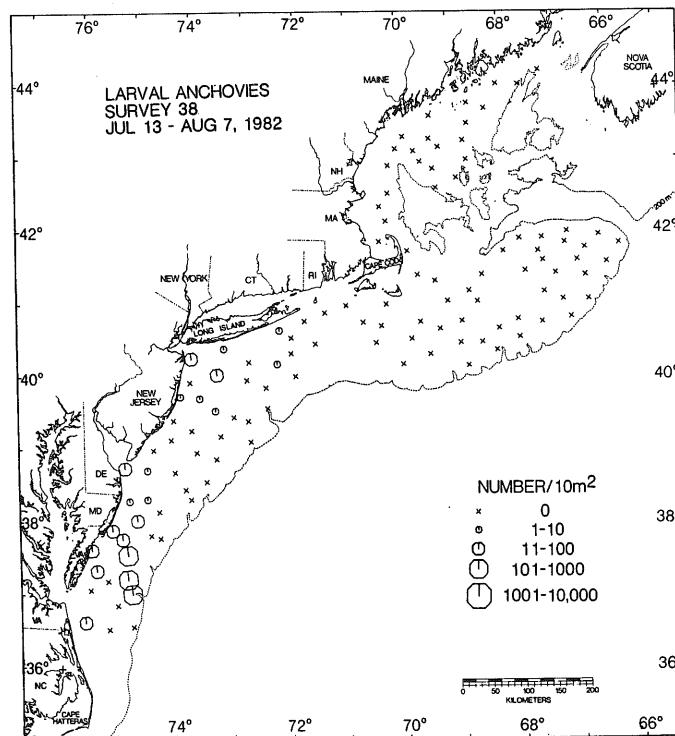
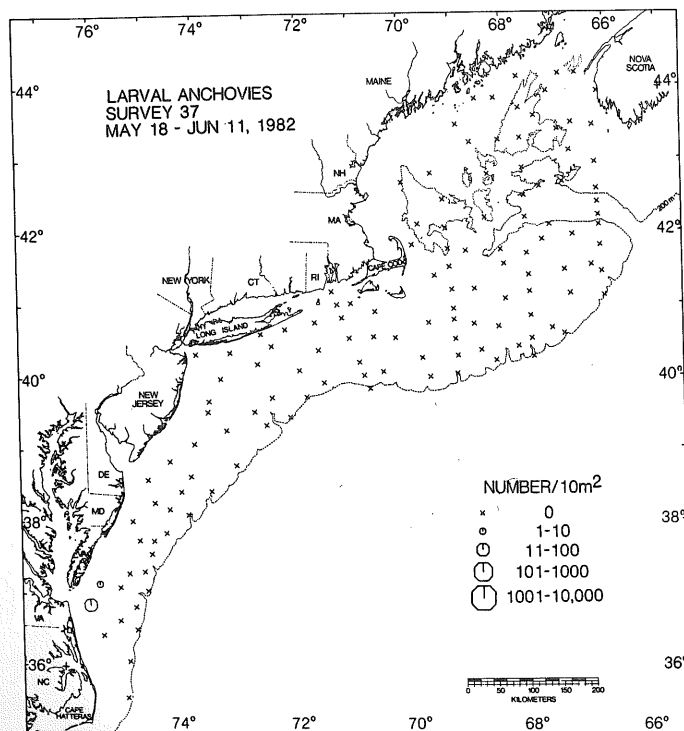
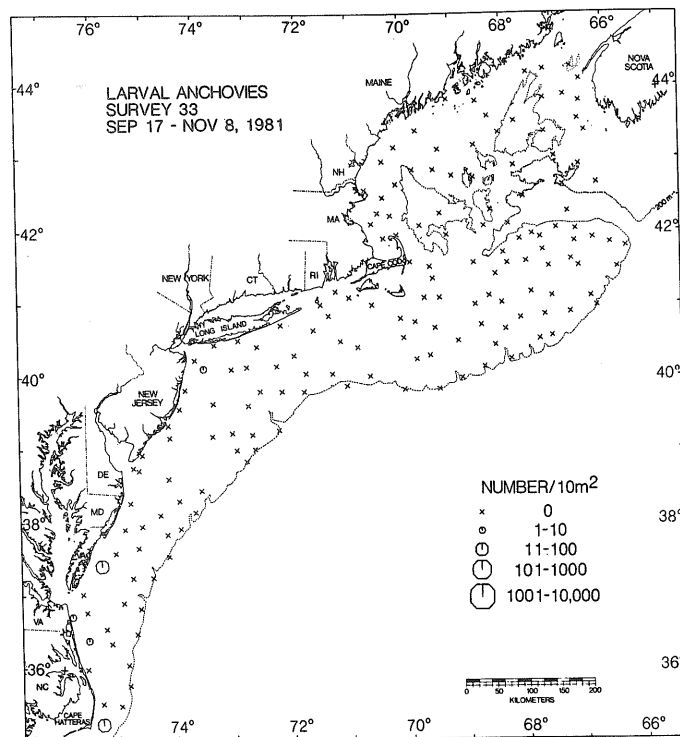
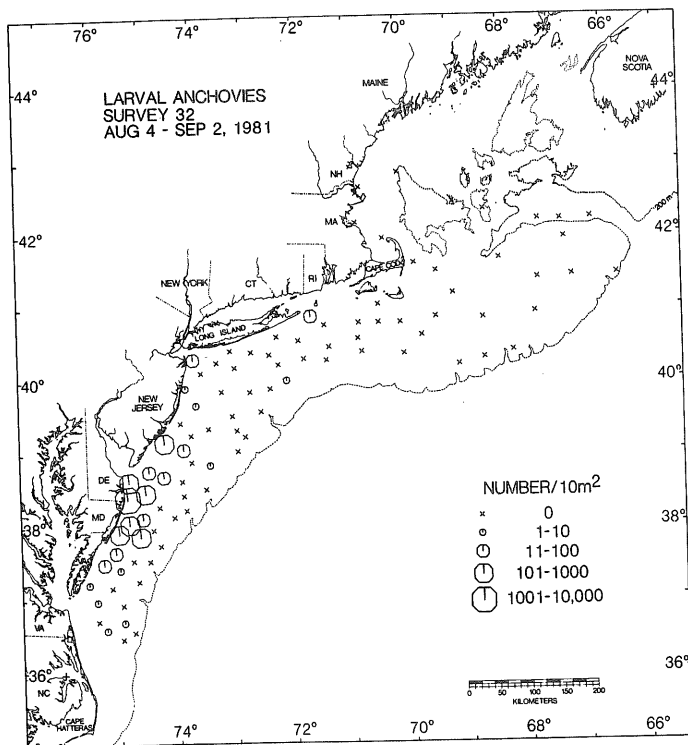


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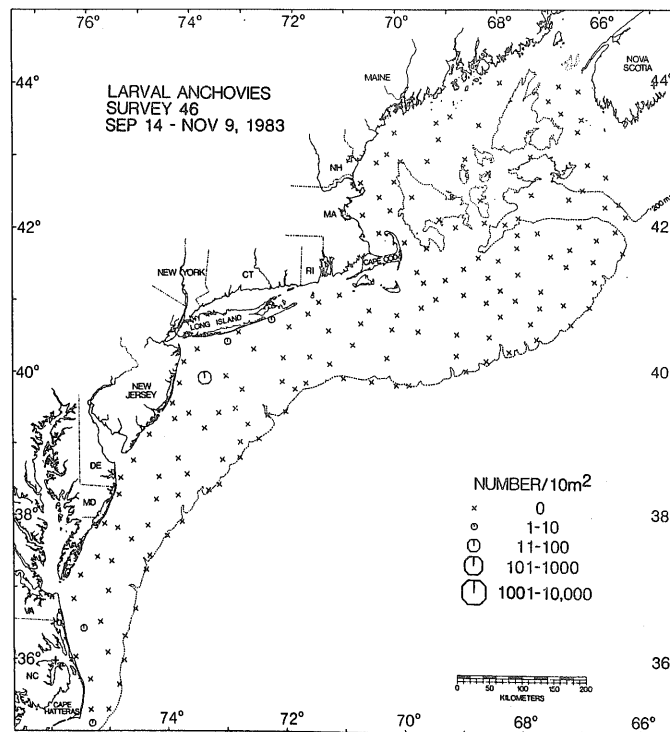
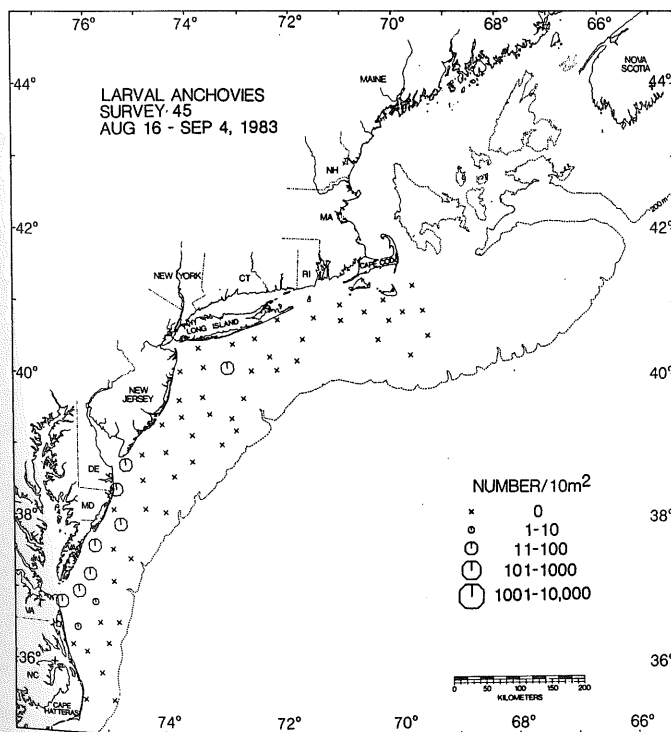
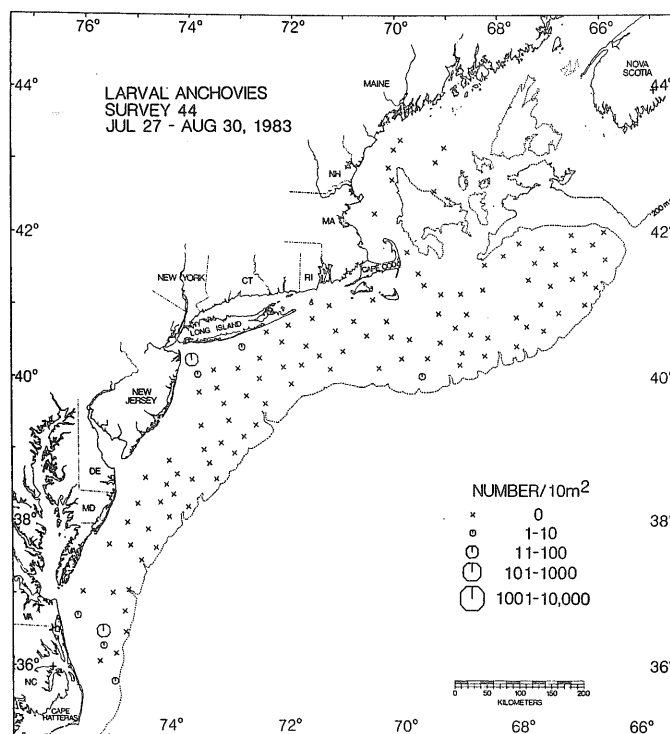
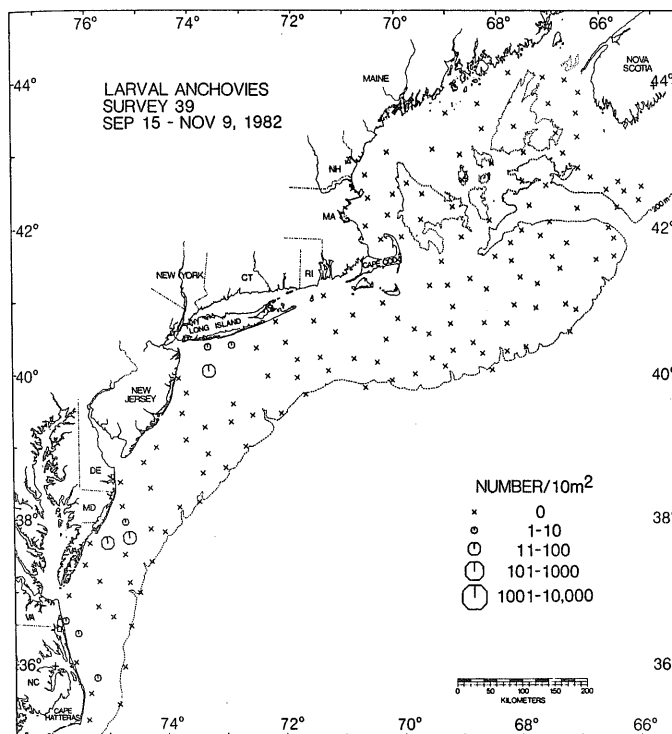


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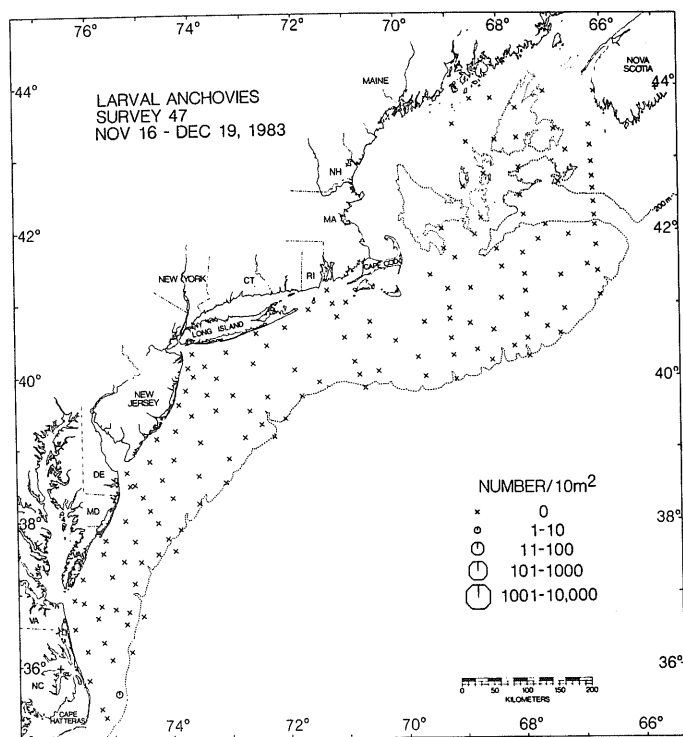


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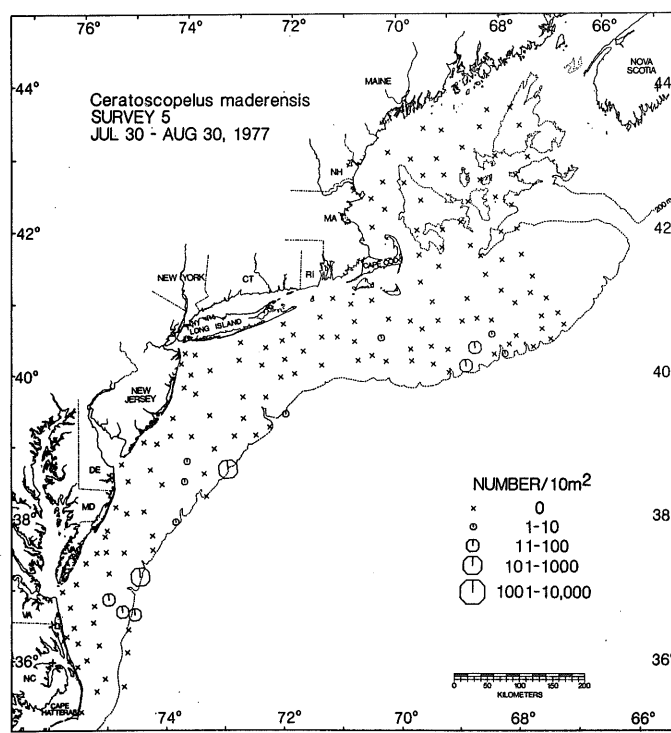
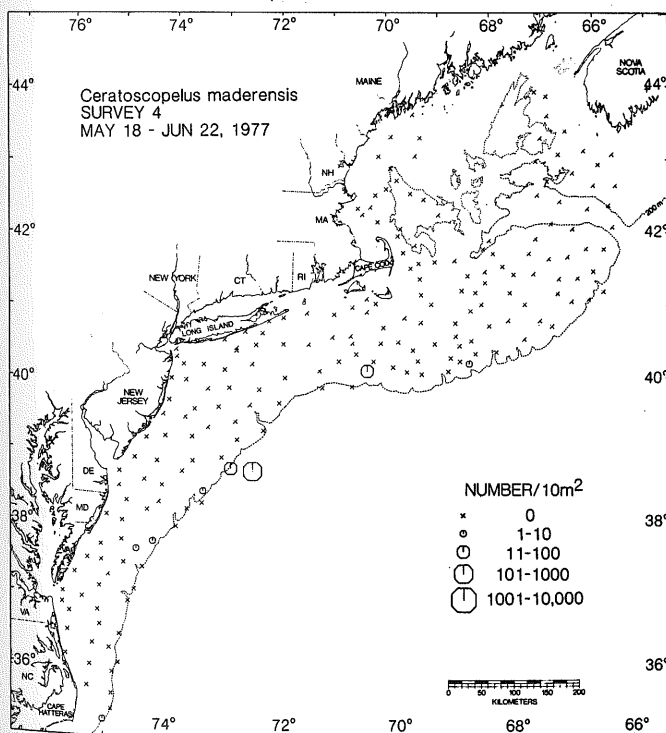
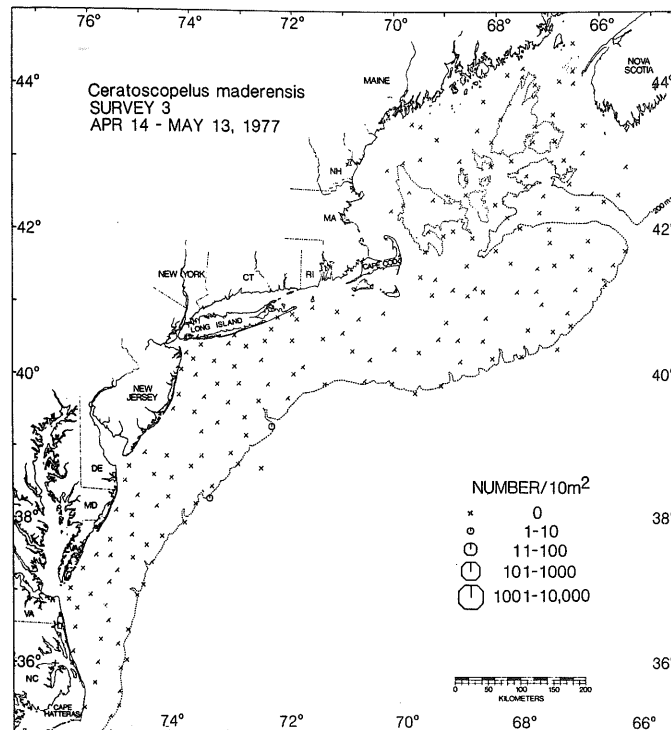
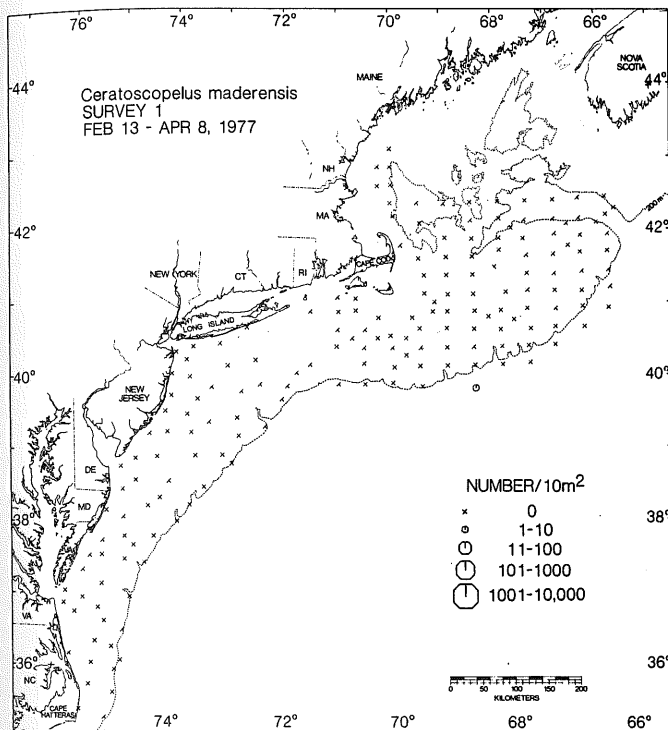


Figure 5. Distribution and abundance of *Ceratoscopelus maderensis* off northeastern United States, winter 1977 through spring 1984.

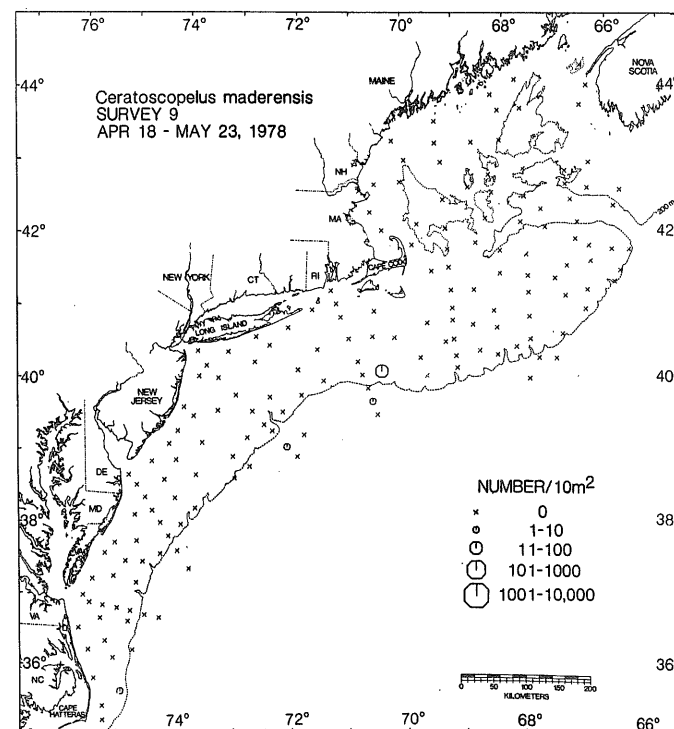
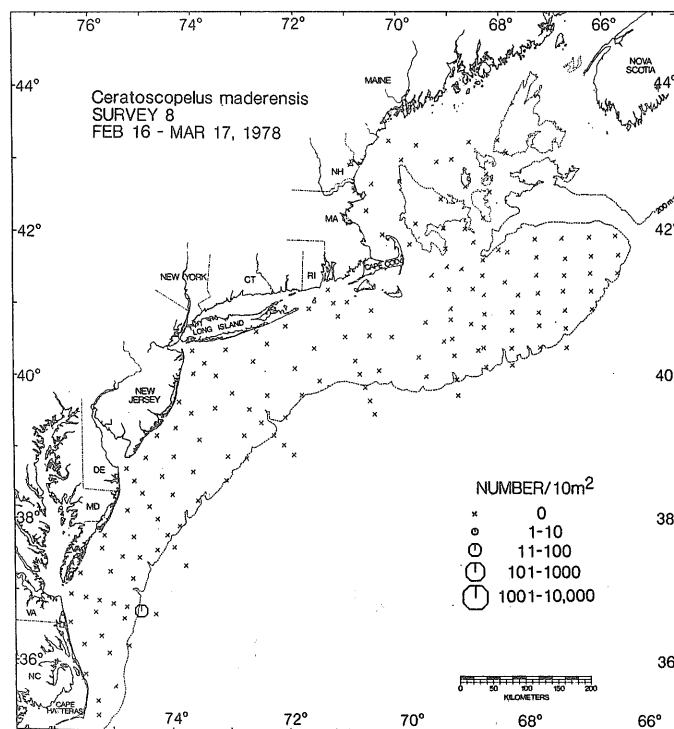
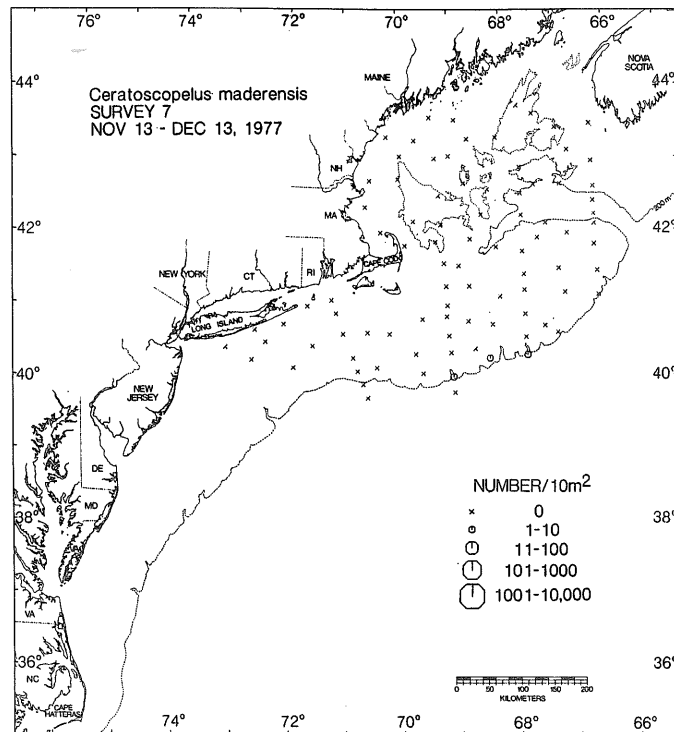
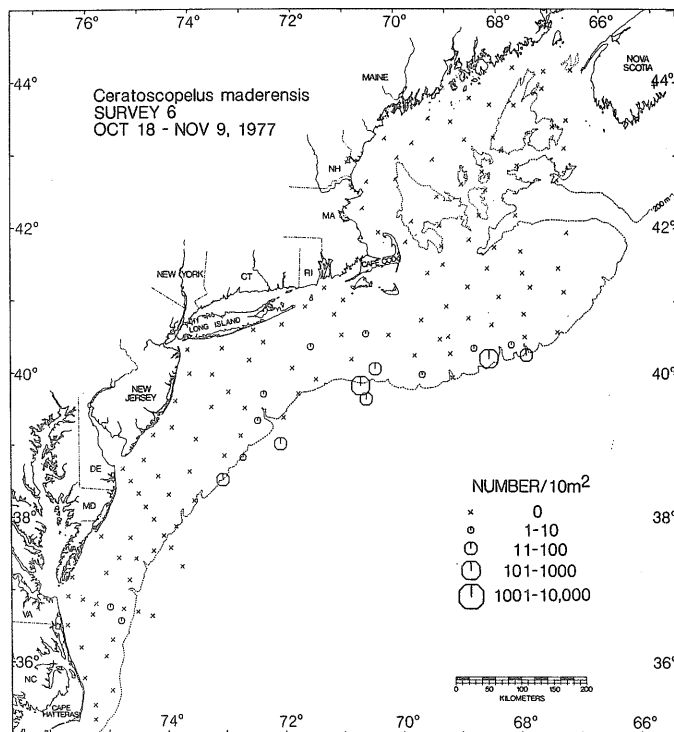


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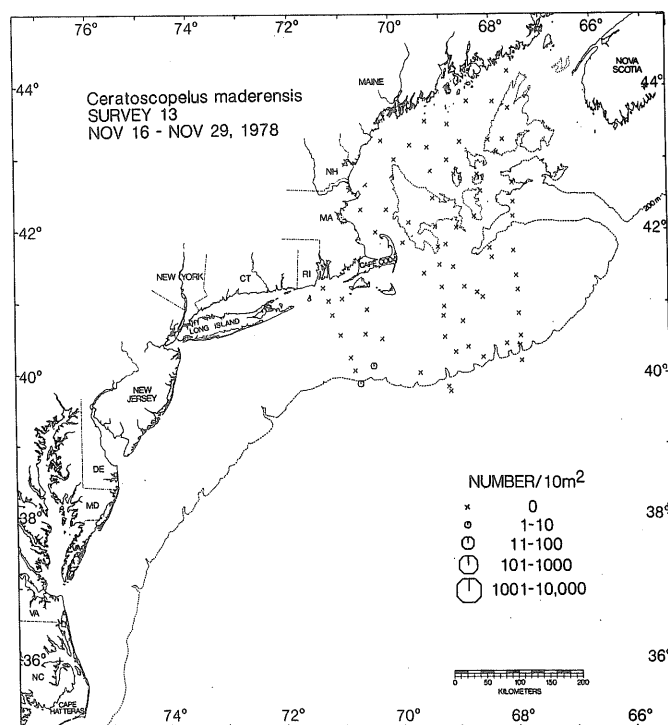
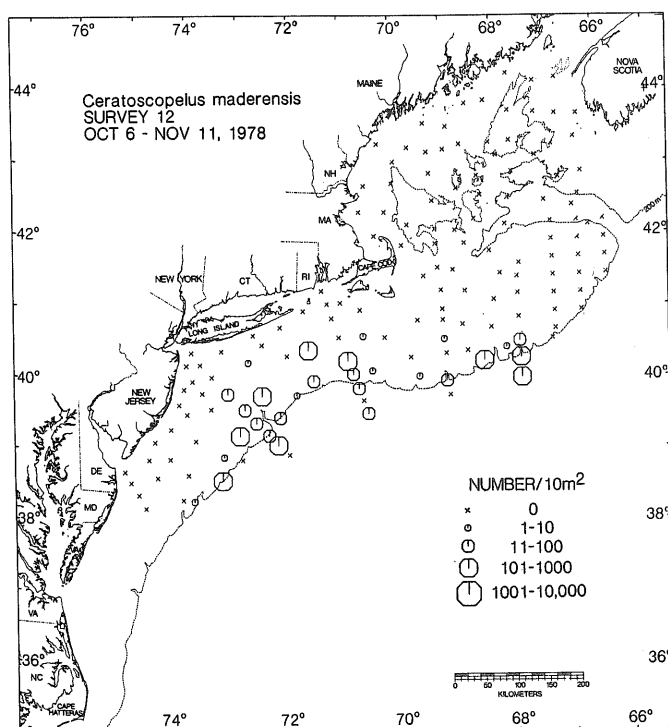
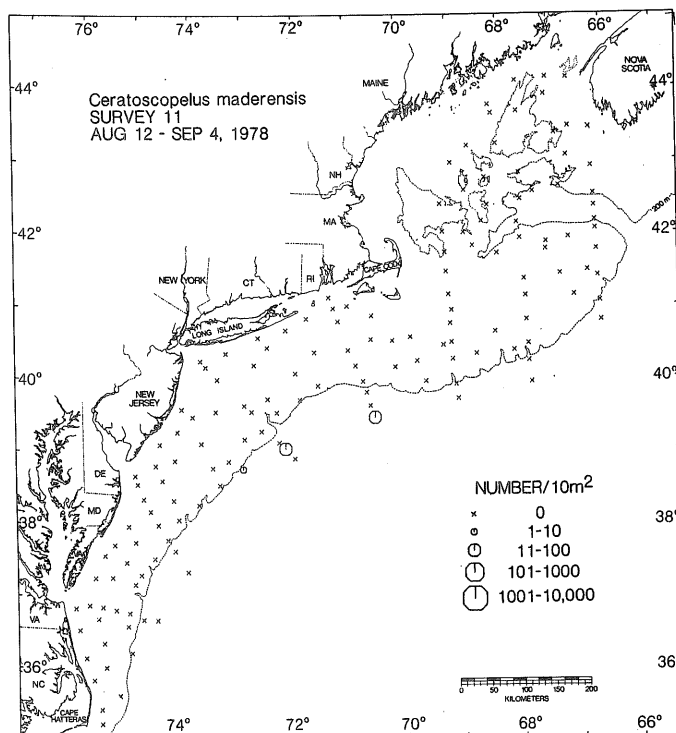
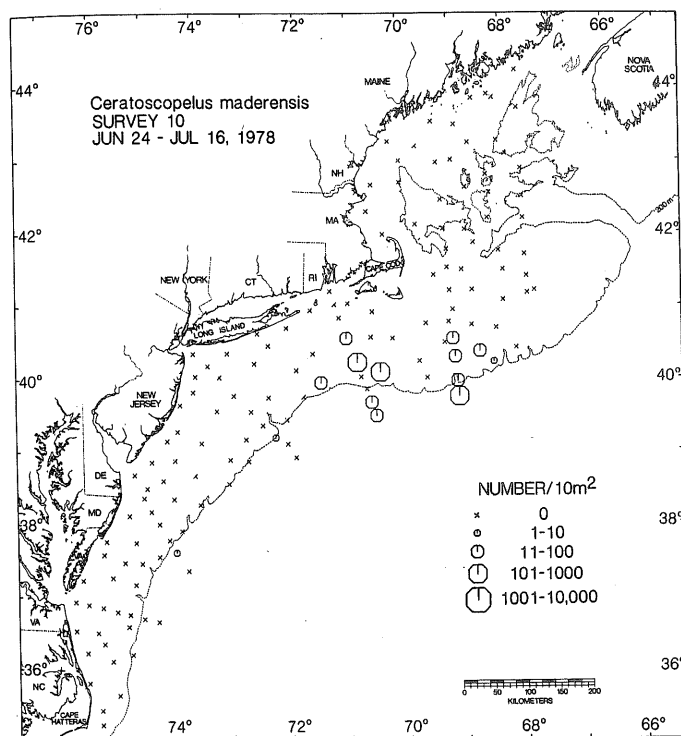


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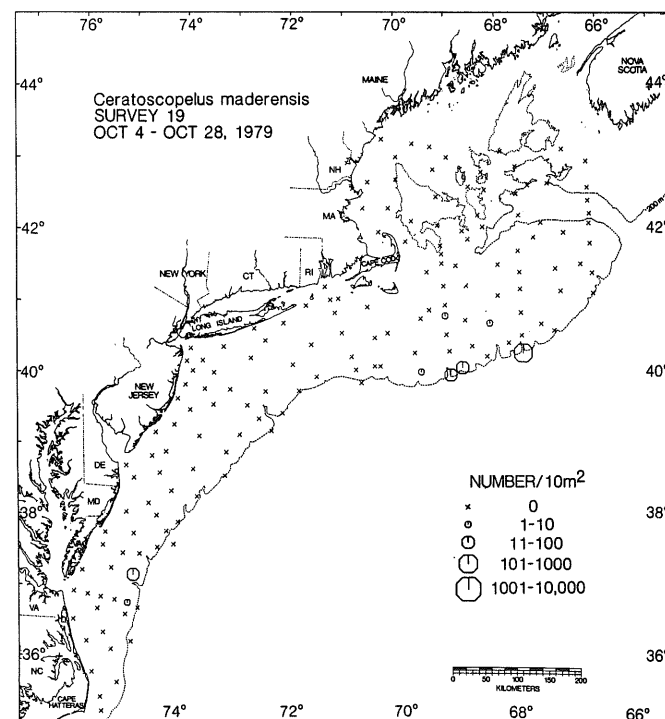
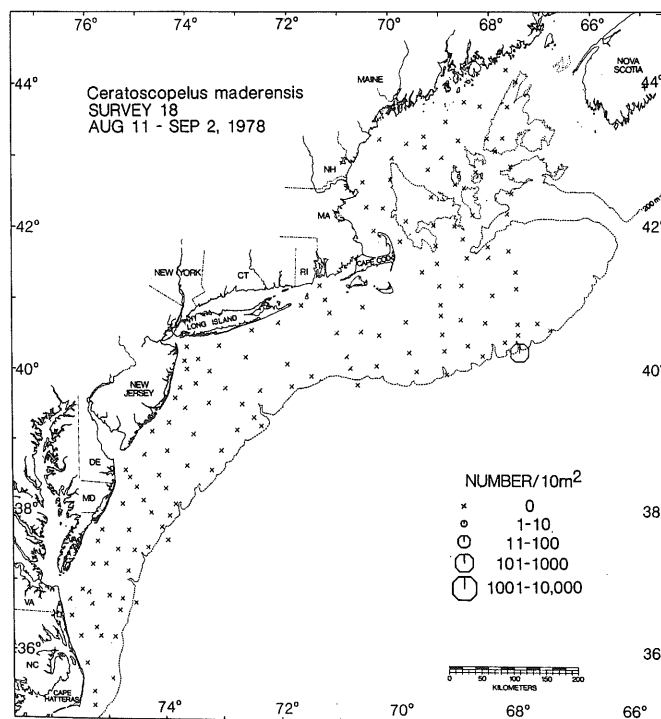
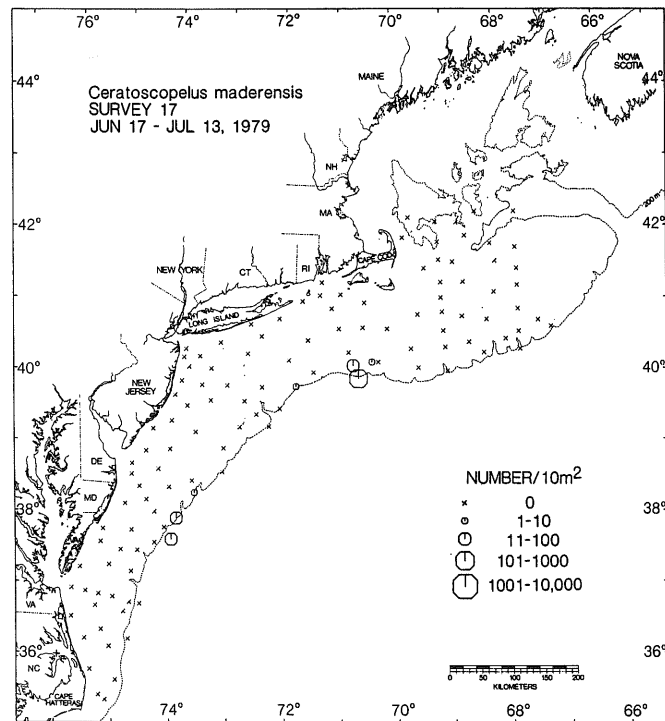
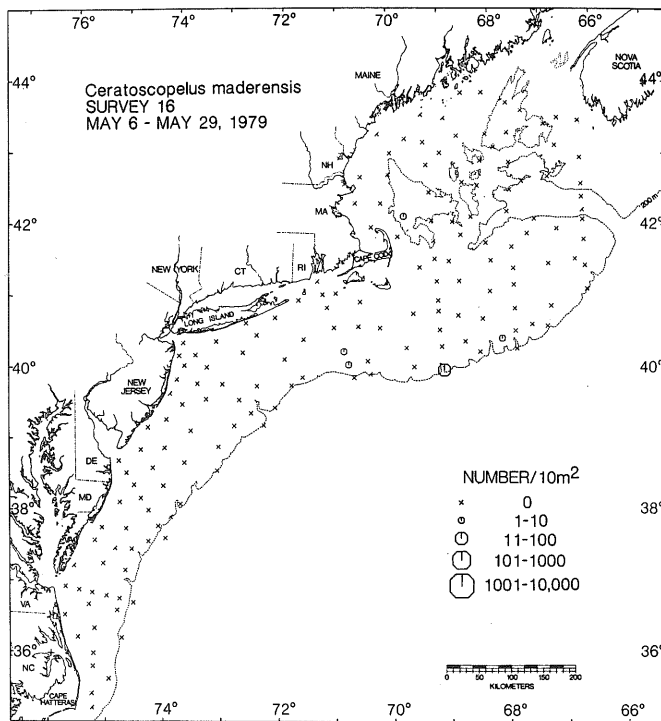


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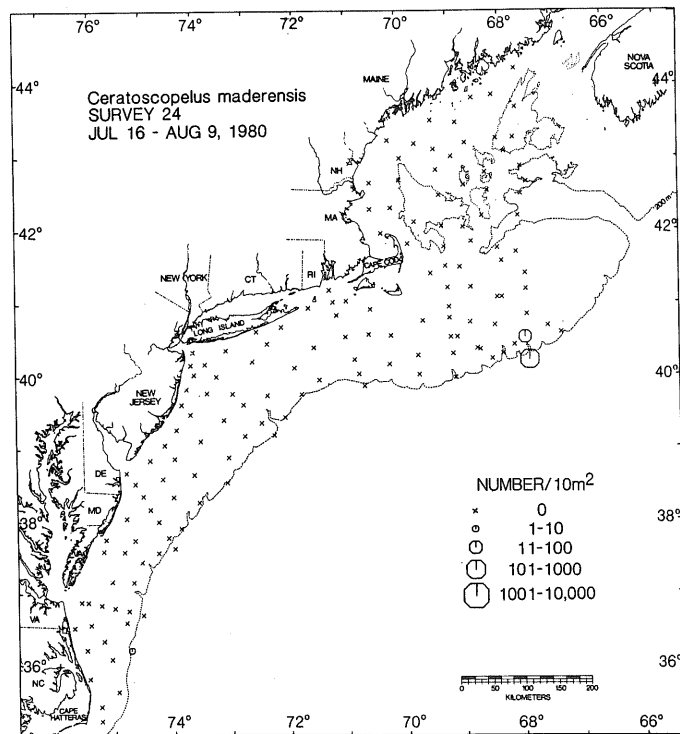
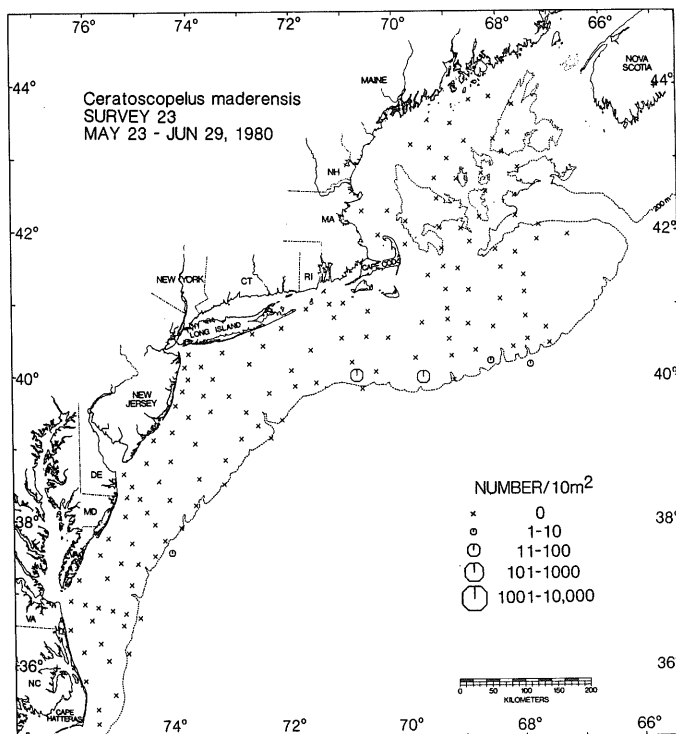
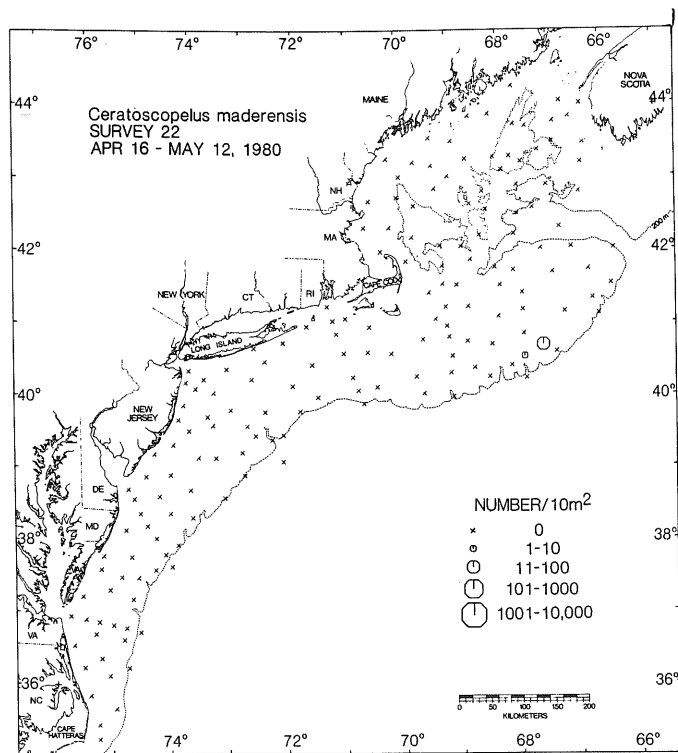
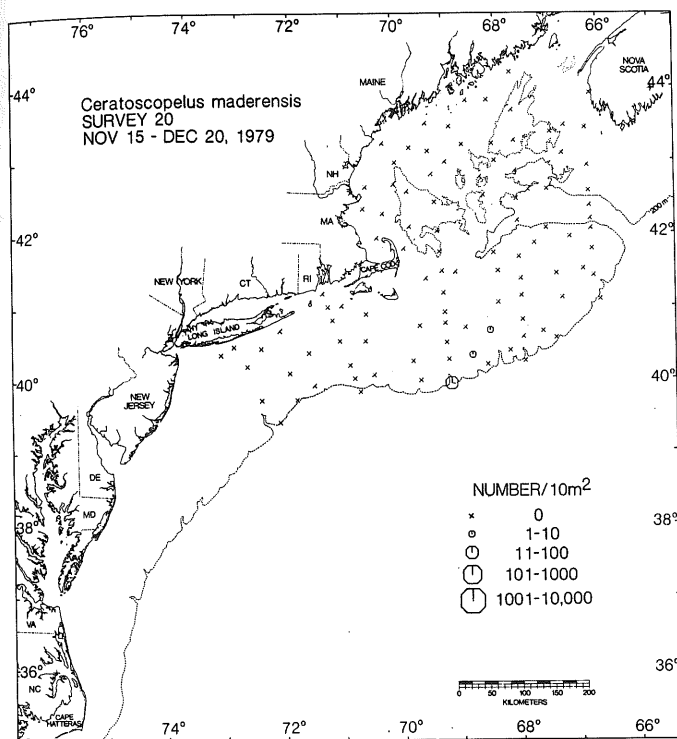


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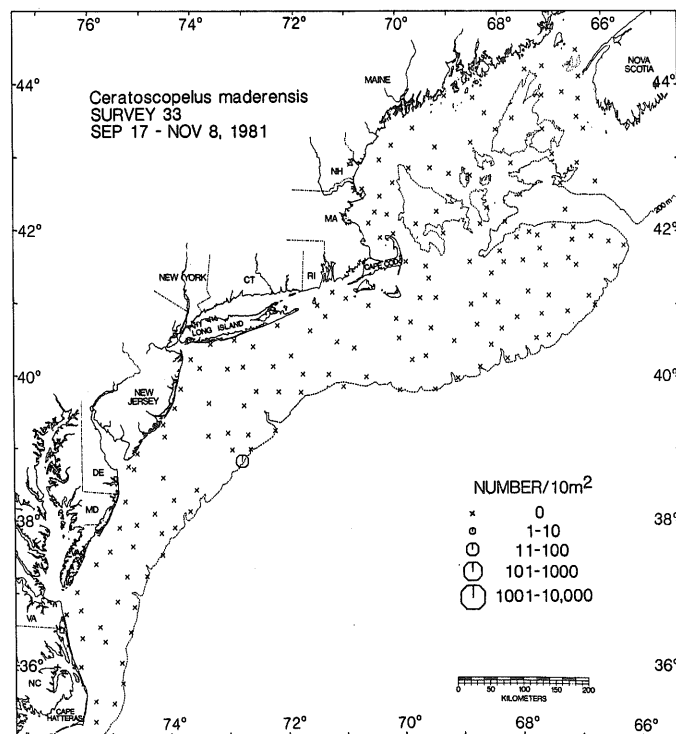
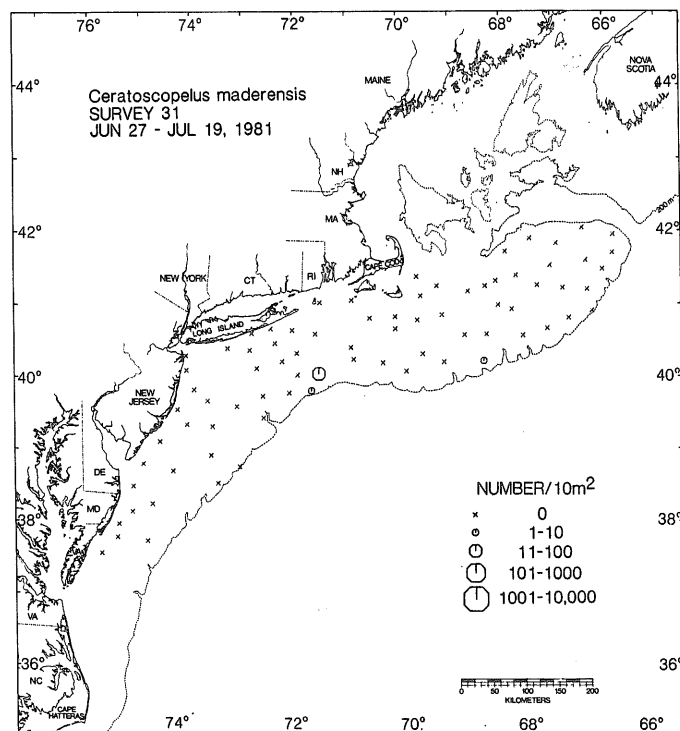
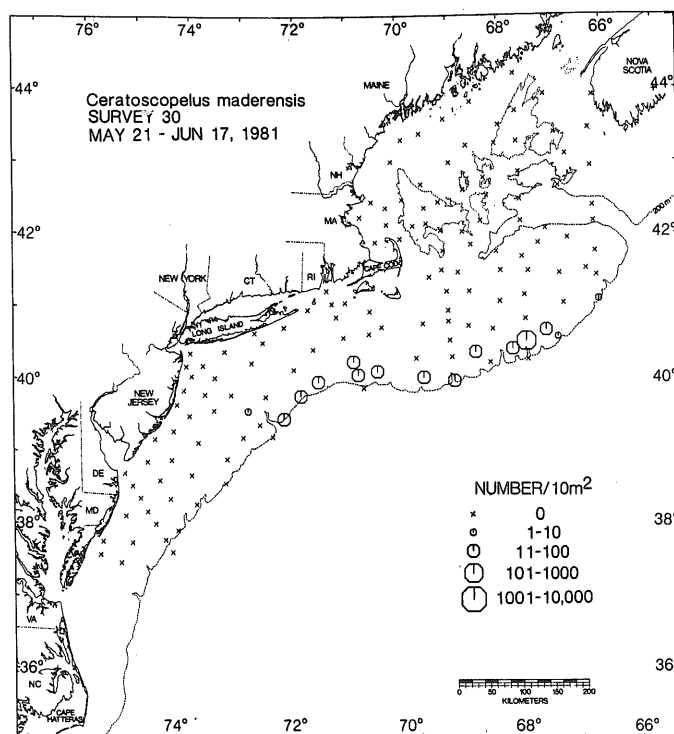
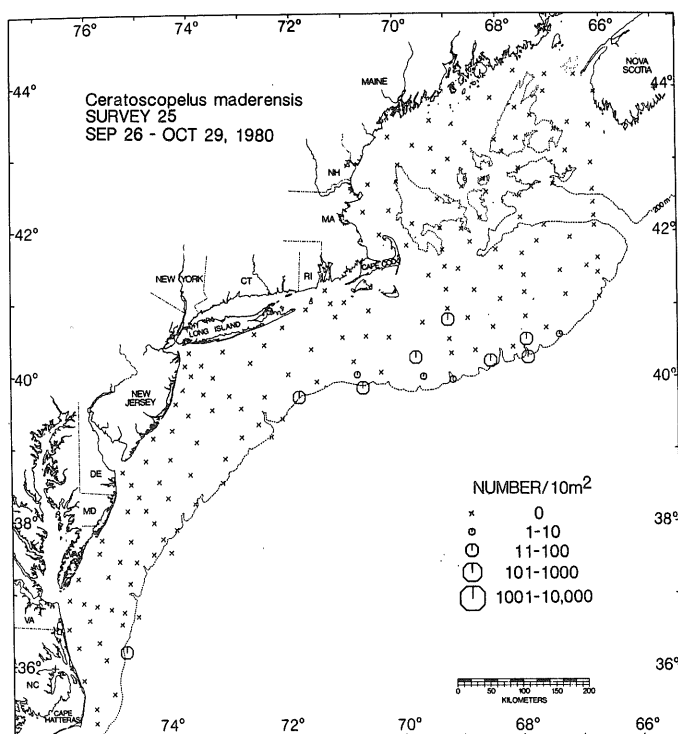


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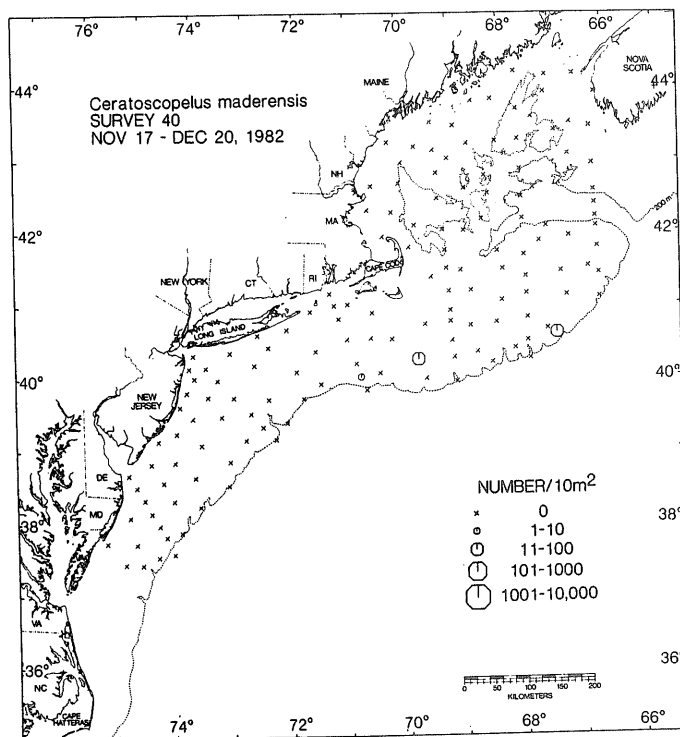
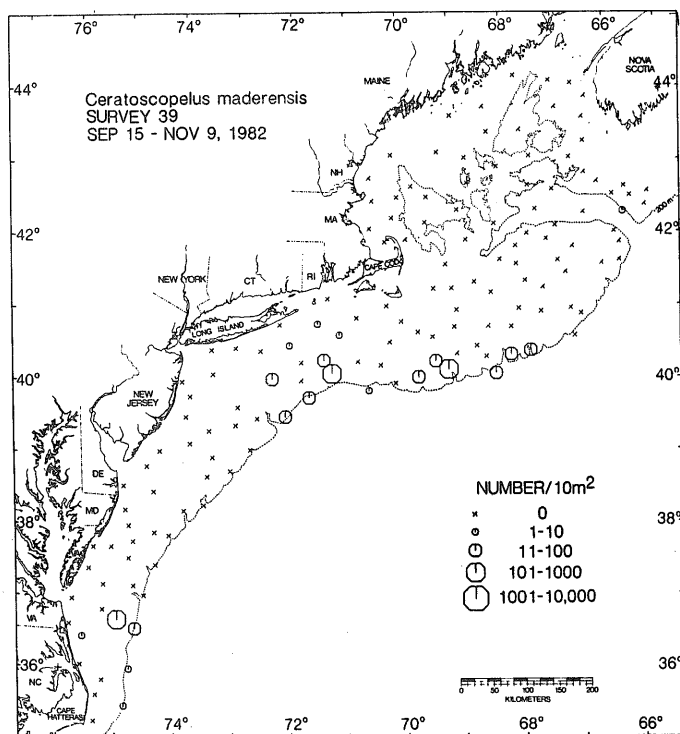
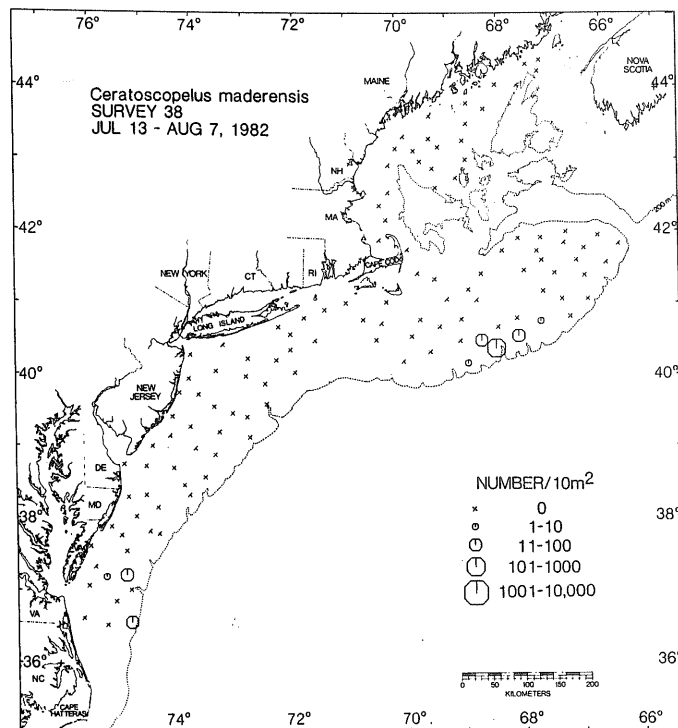
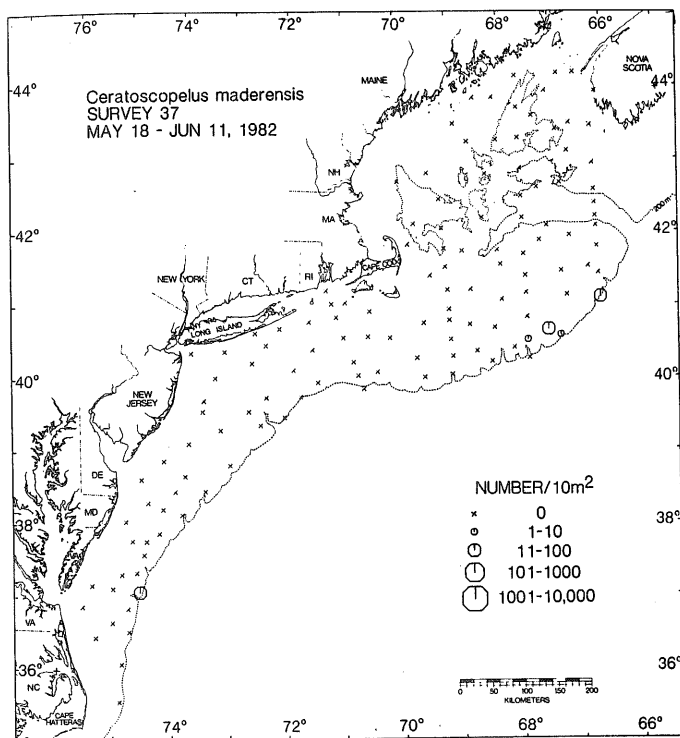


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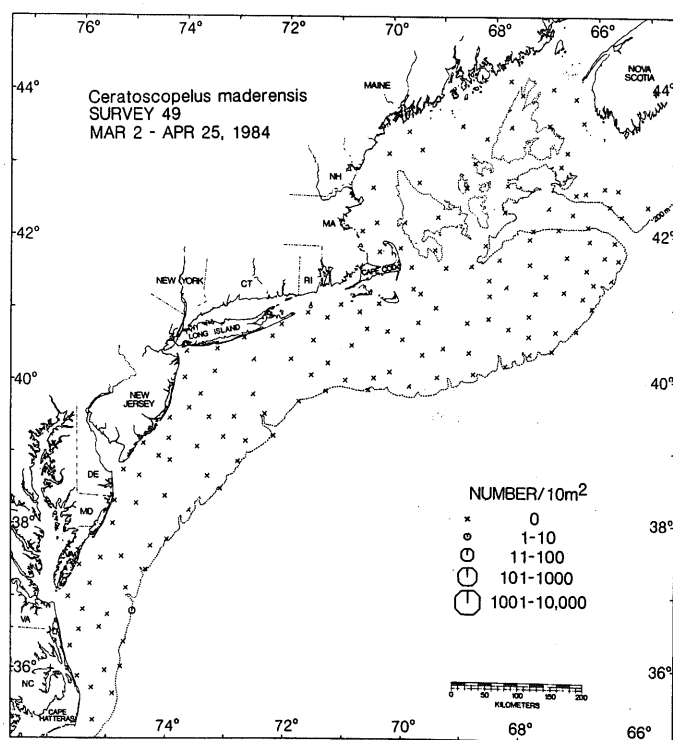
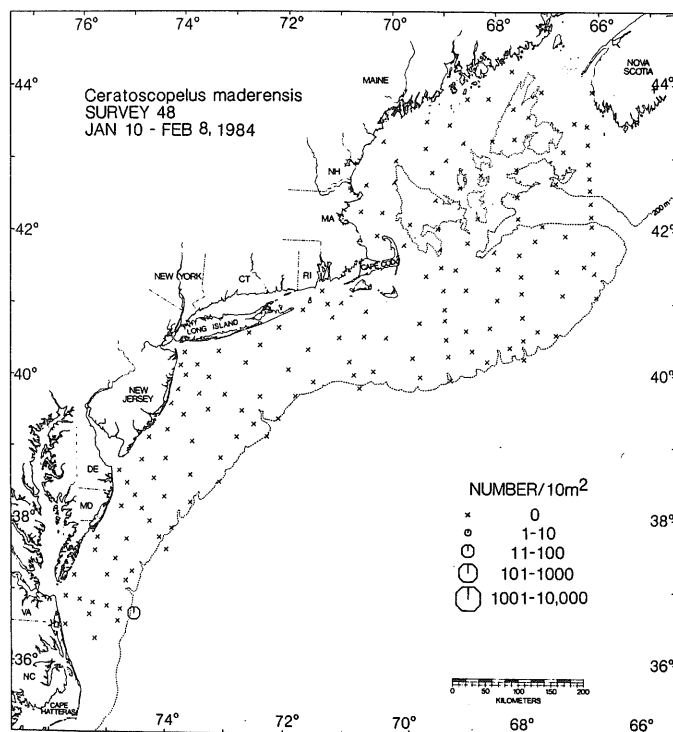
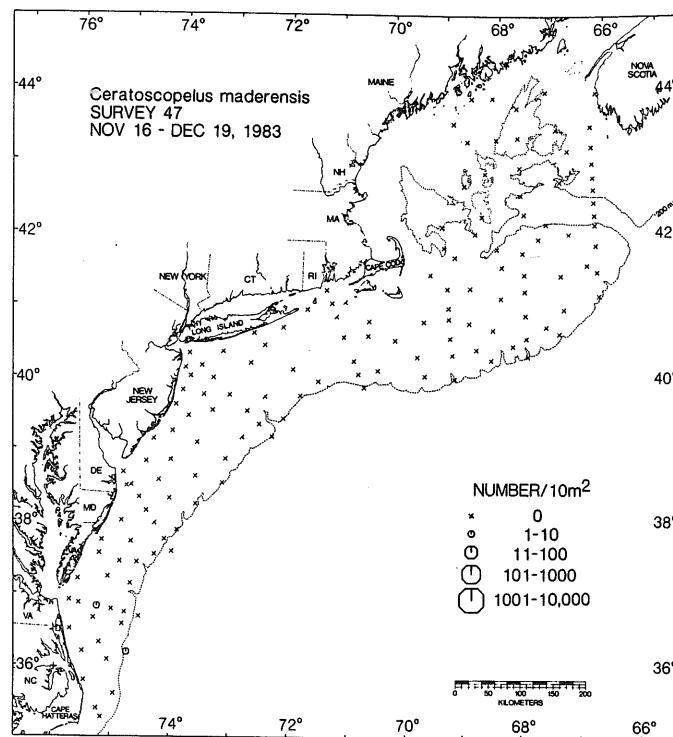
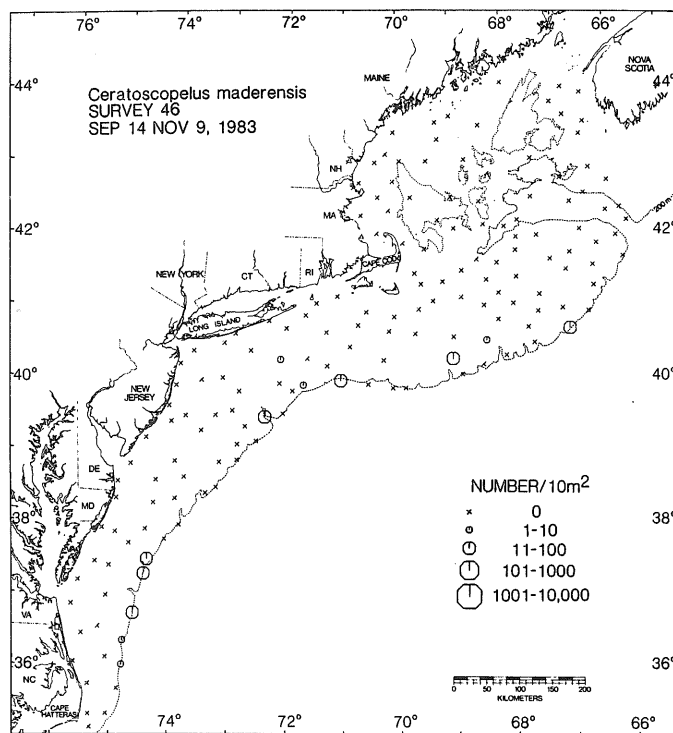


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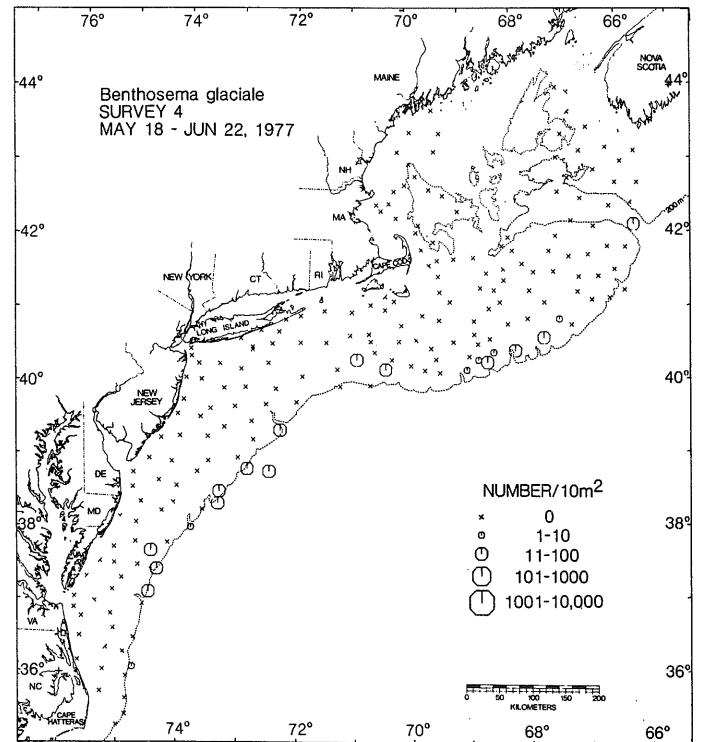
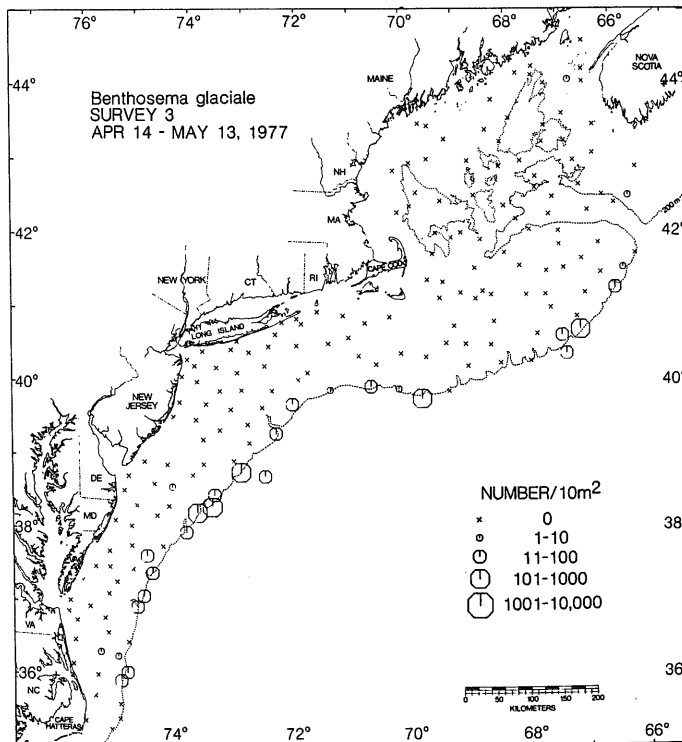
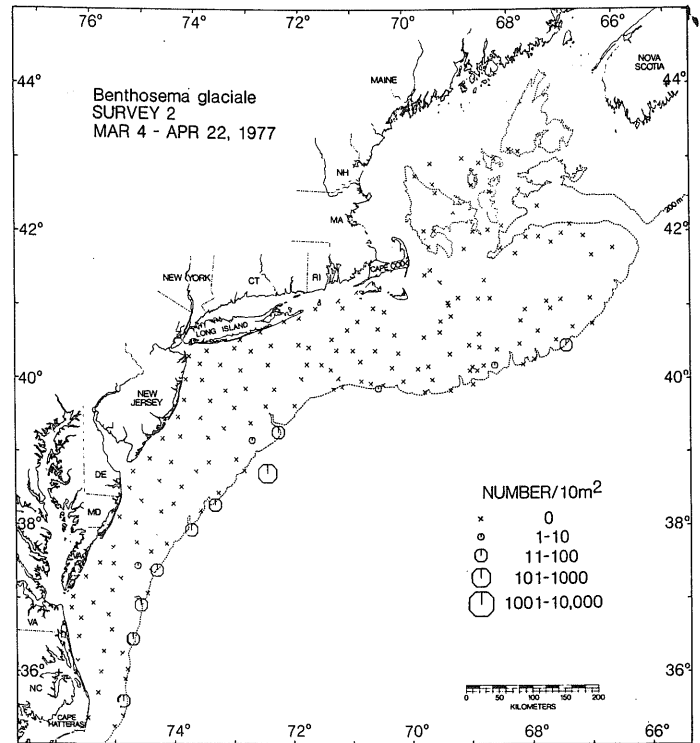
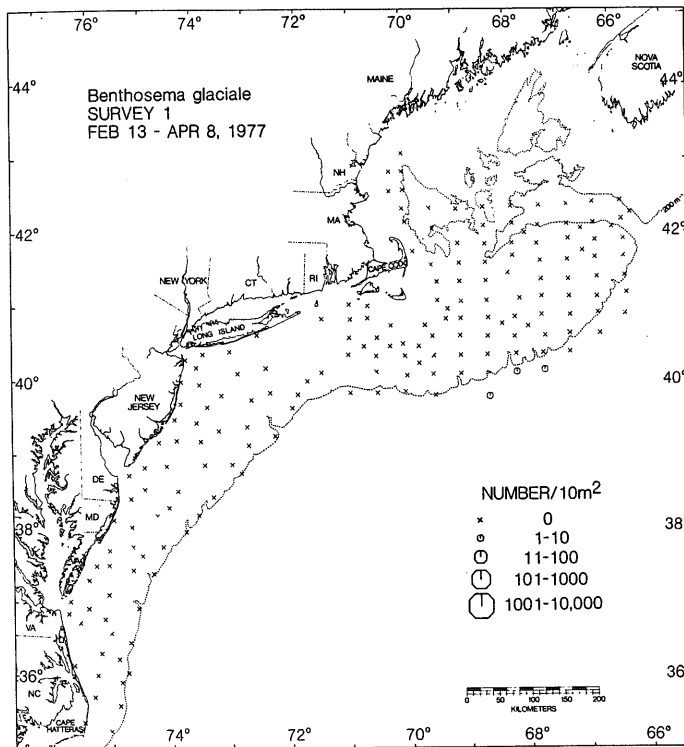


Figure 6. Distribution and abundance of Benthosema glaciale off northeastern United States, winter 1977 through spring 1984.

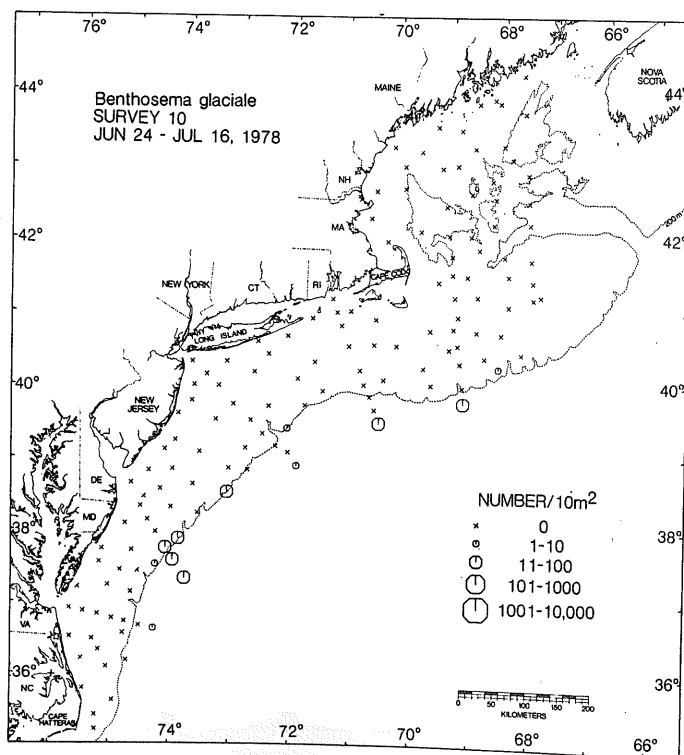
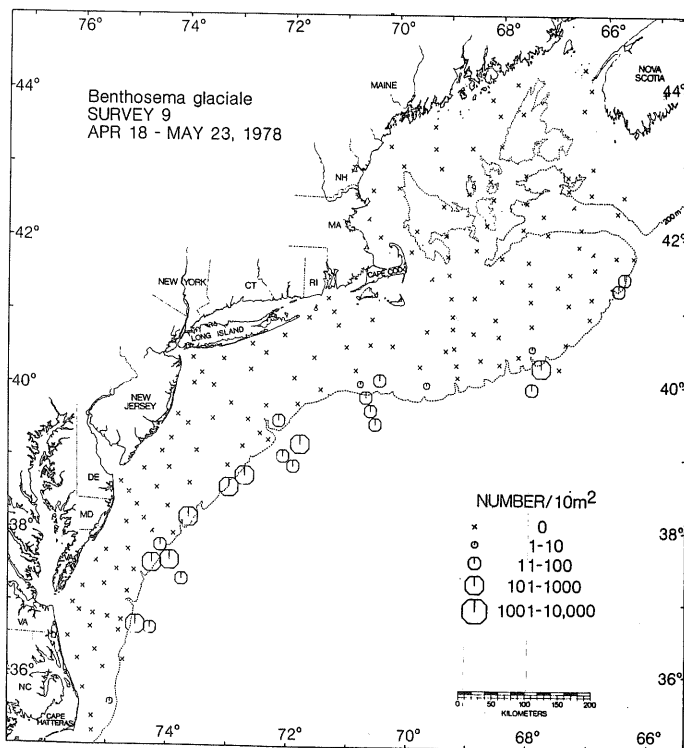
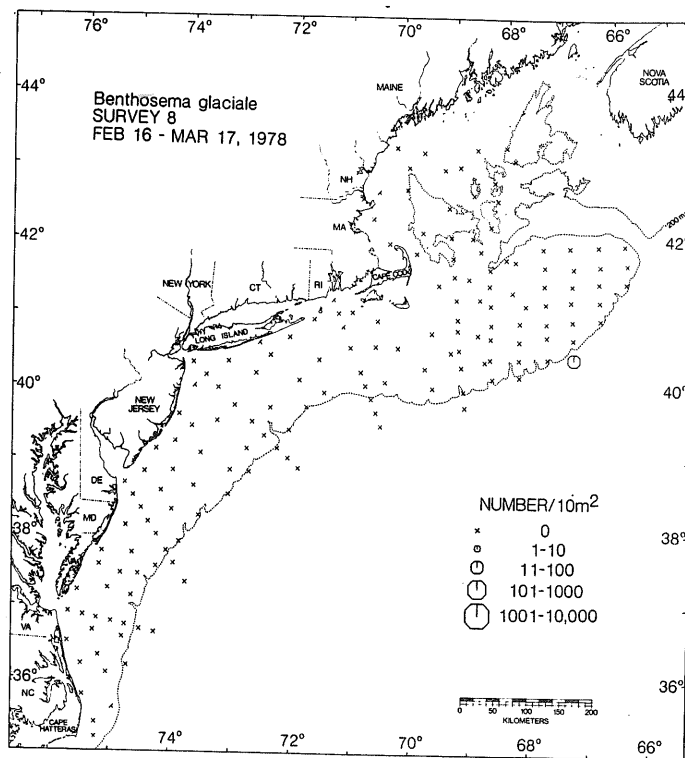
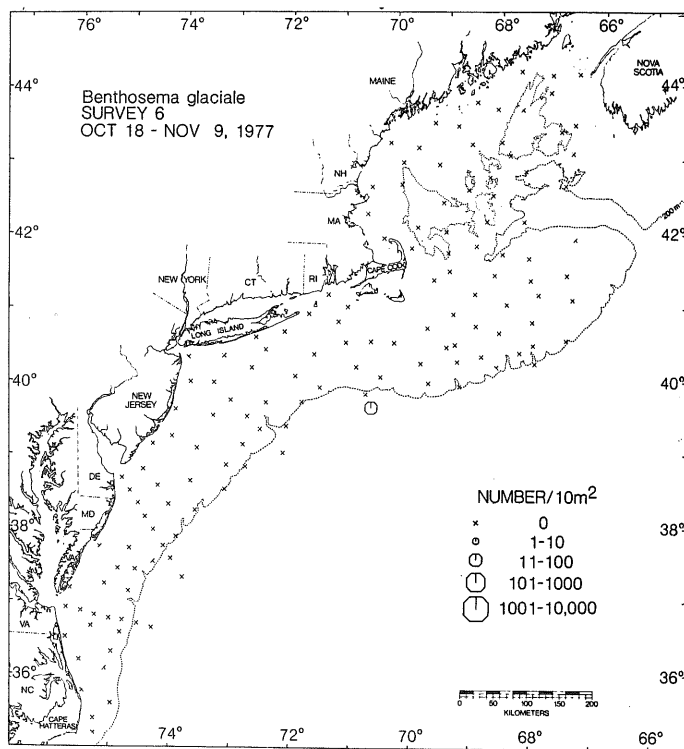


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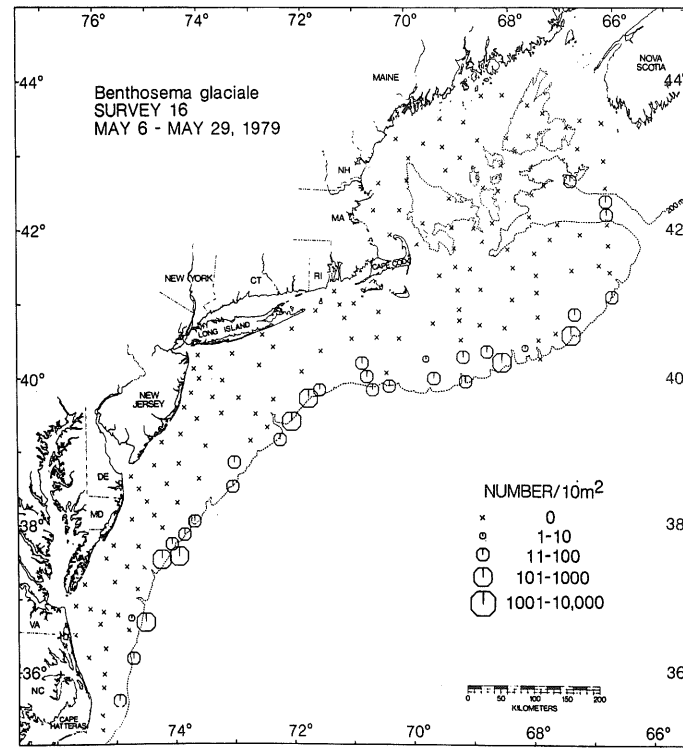
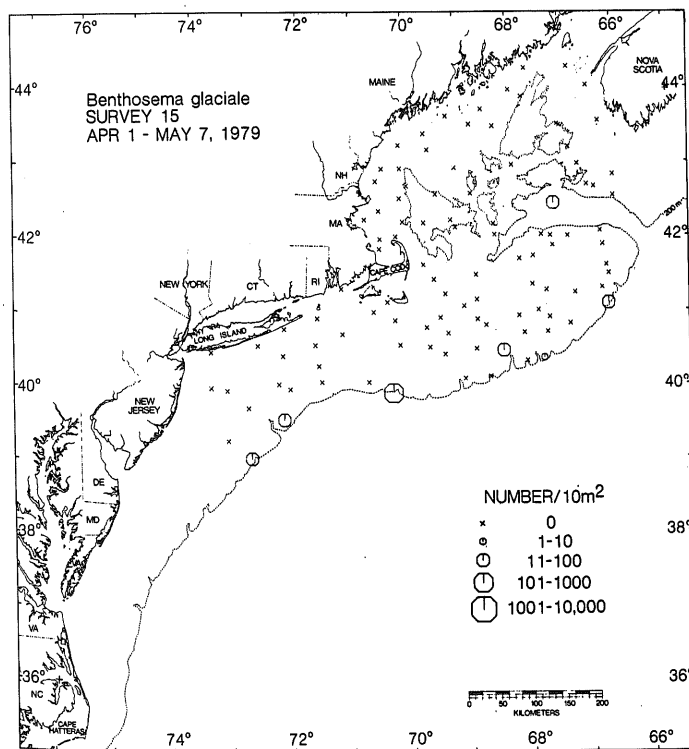
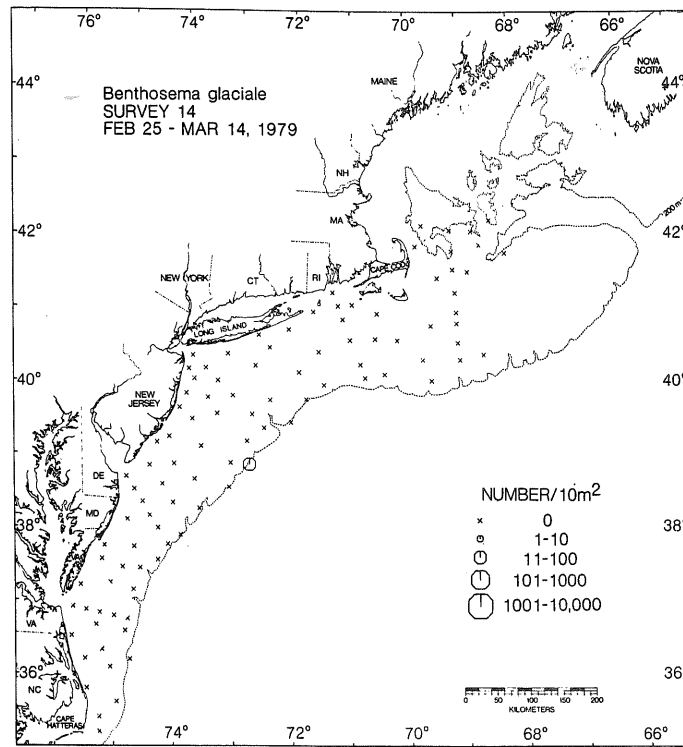
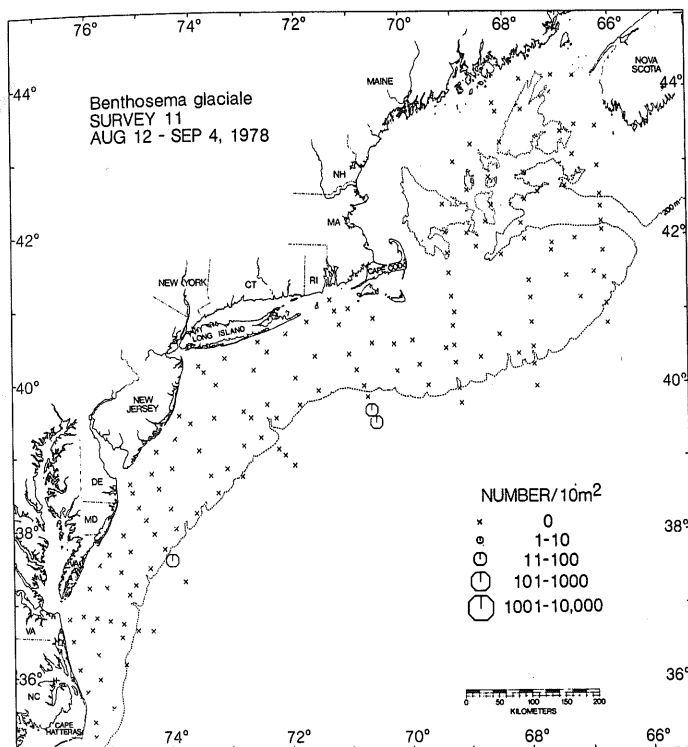


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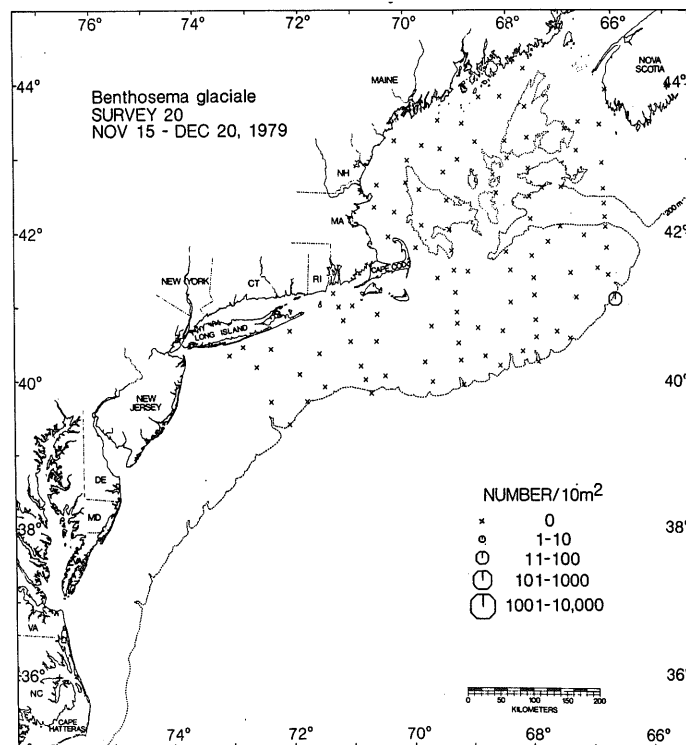
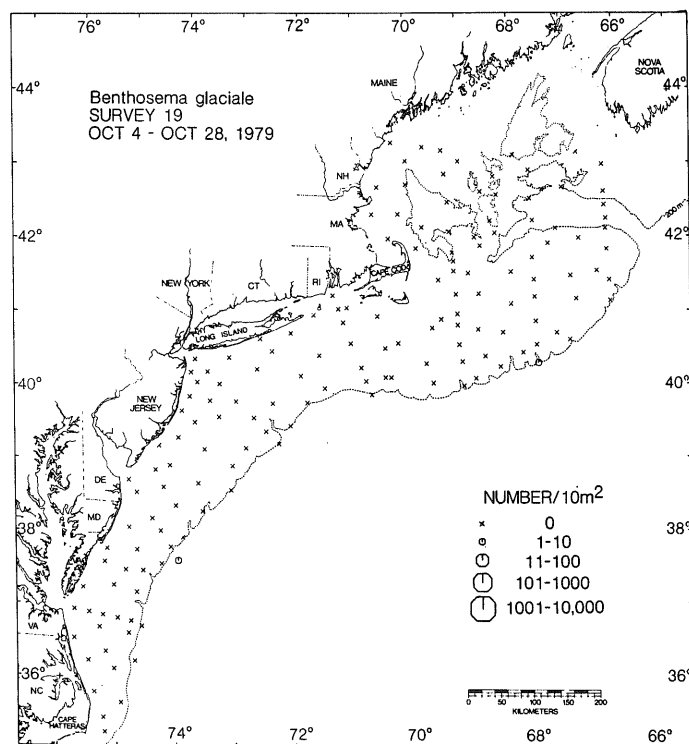
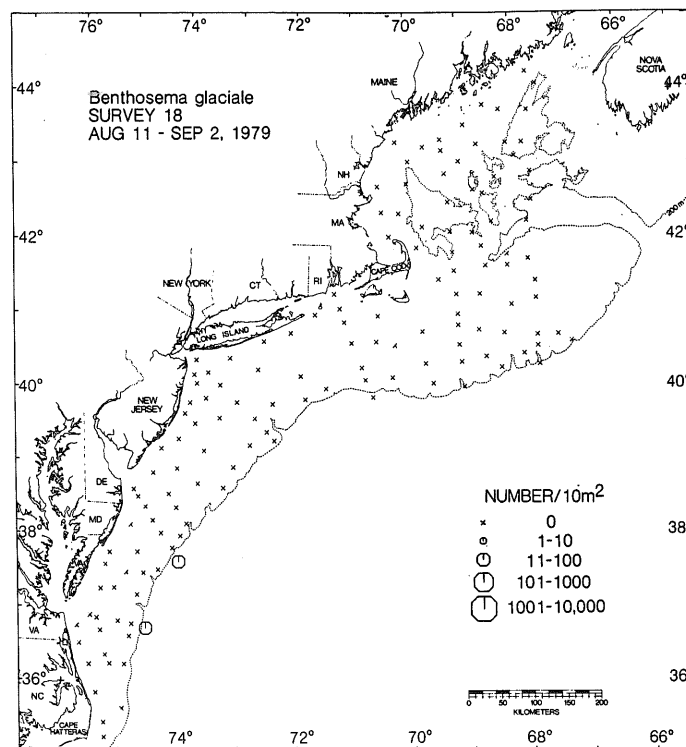
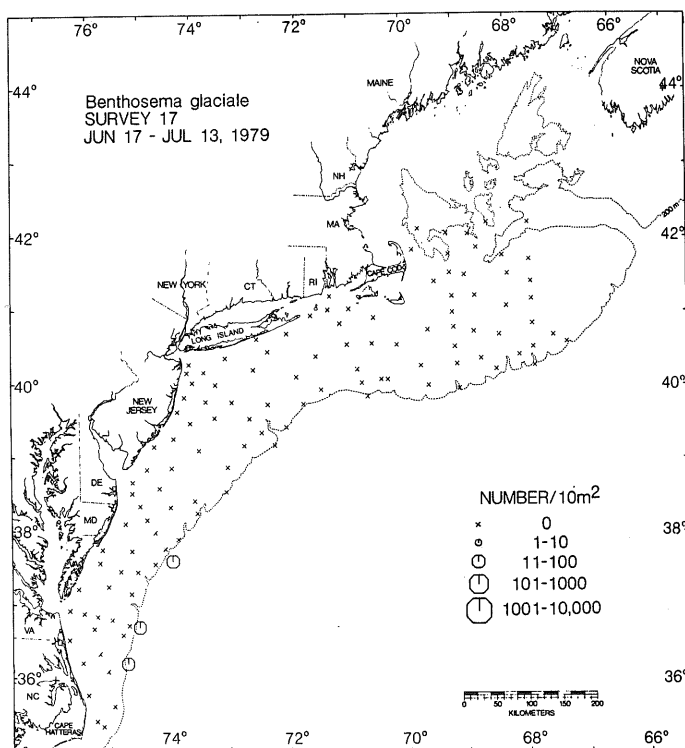


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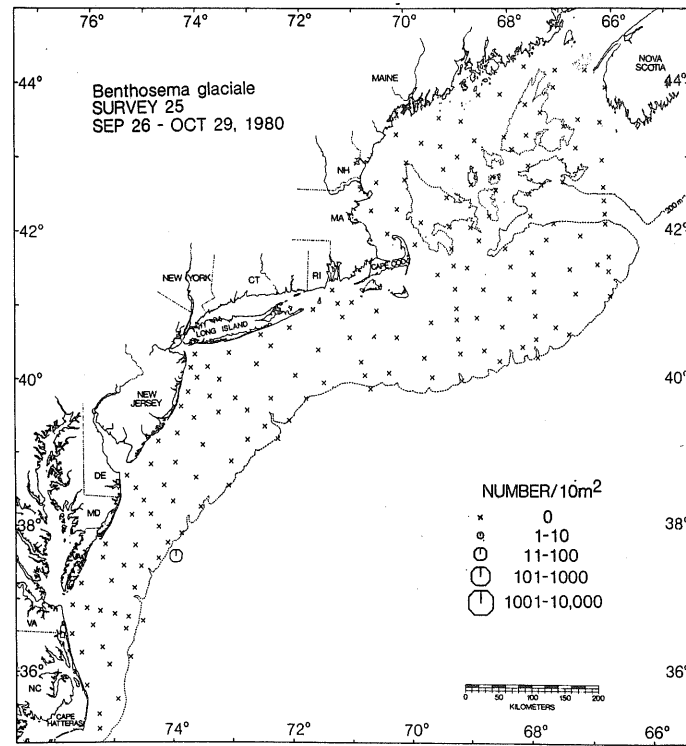
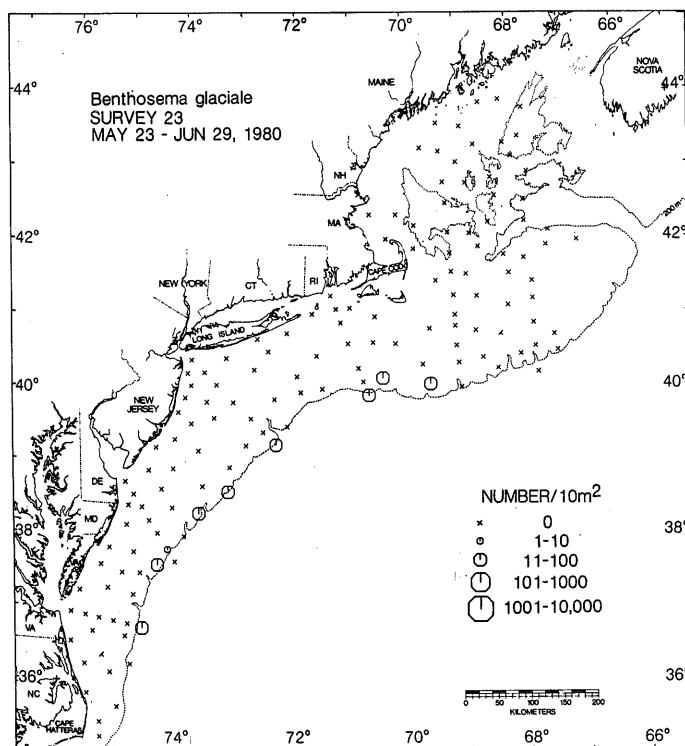
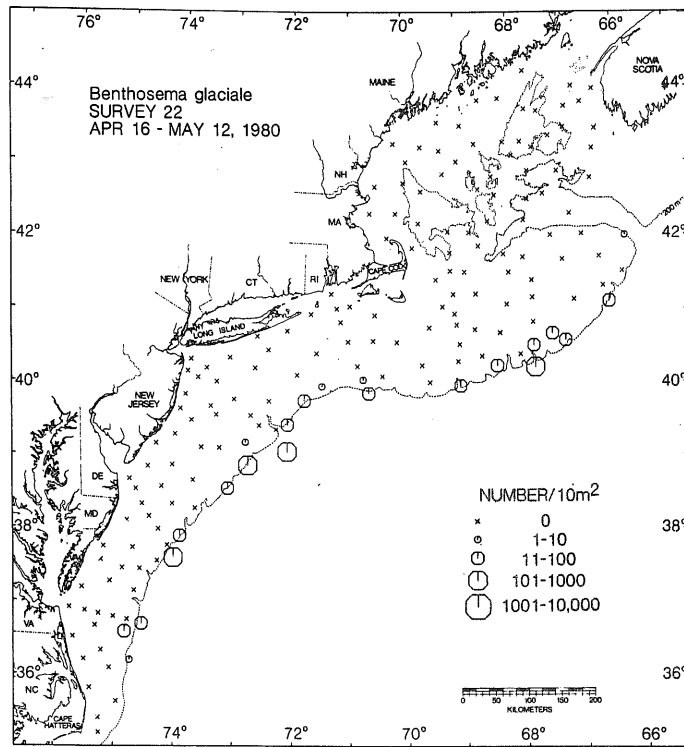
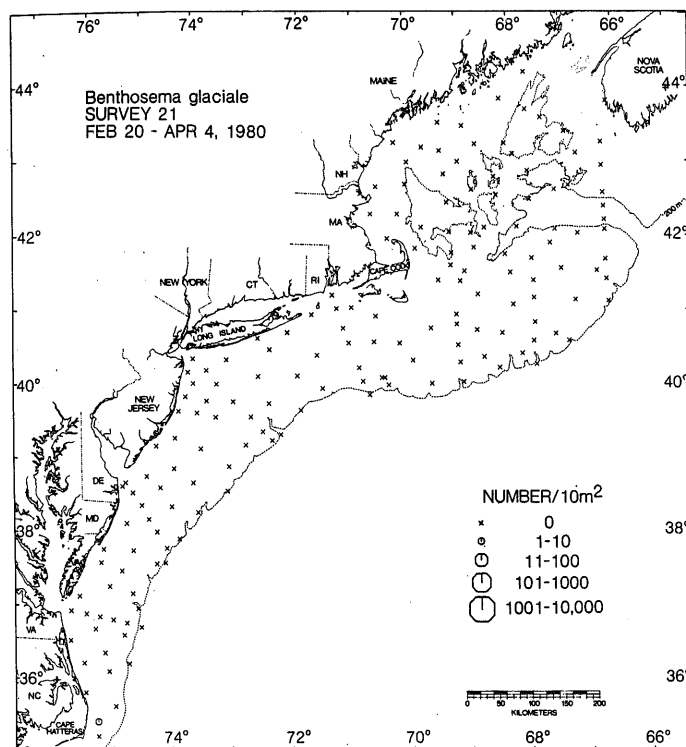


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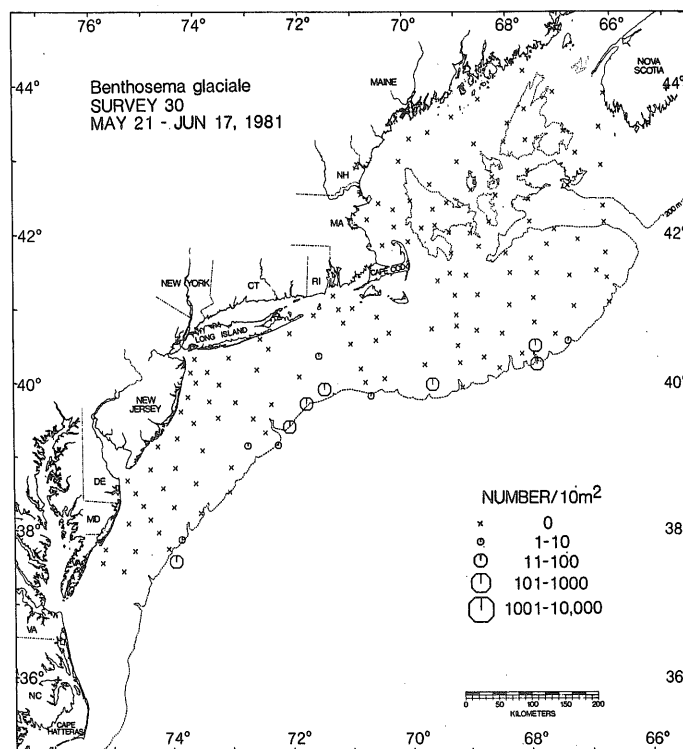
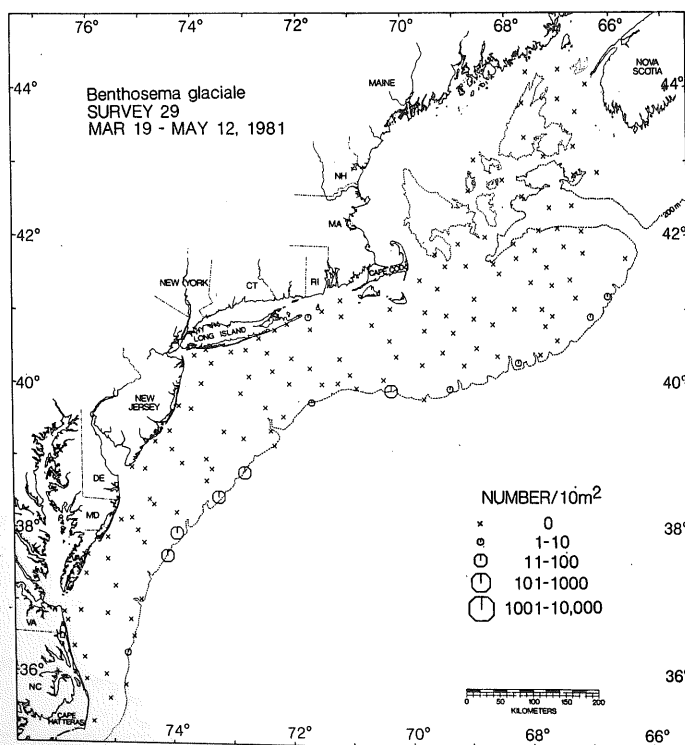
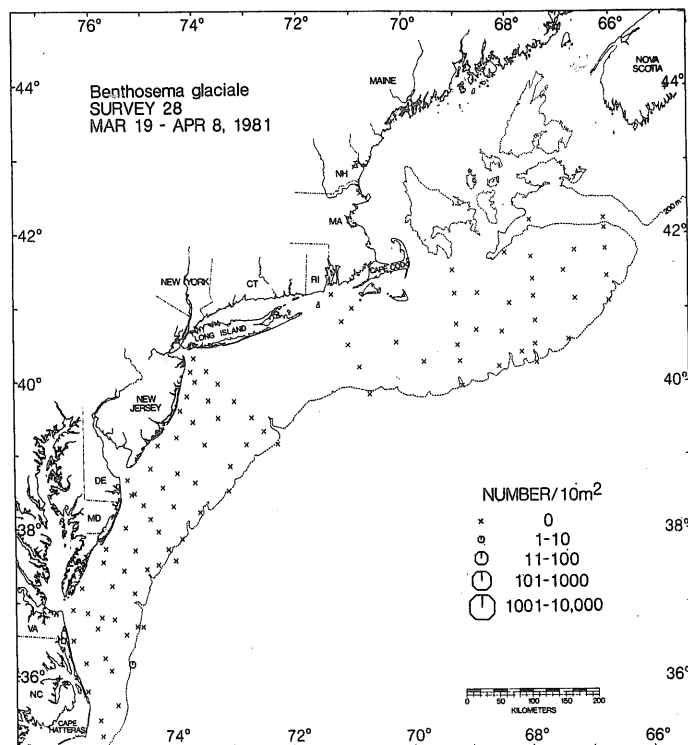
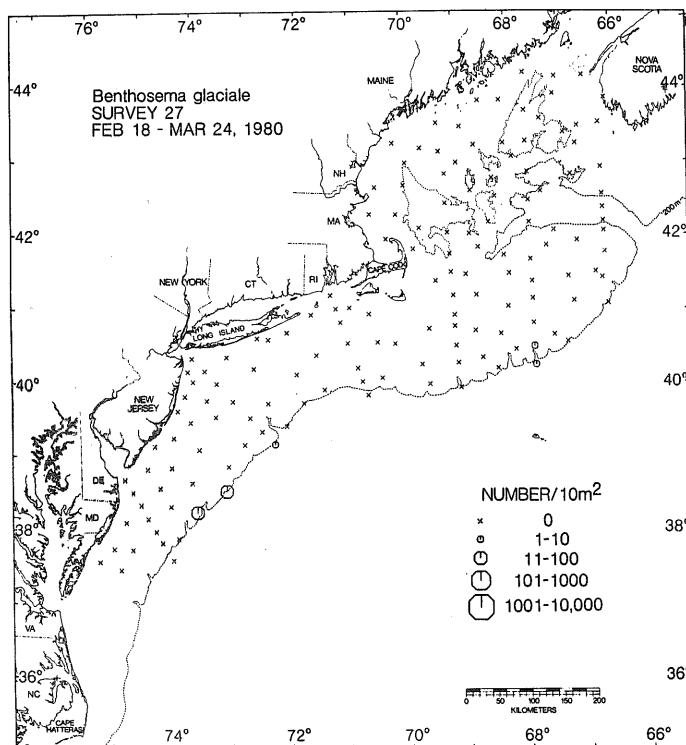


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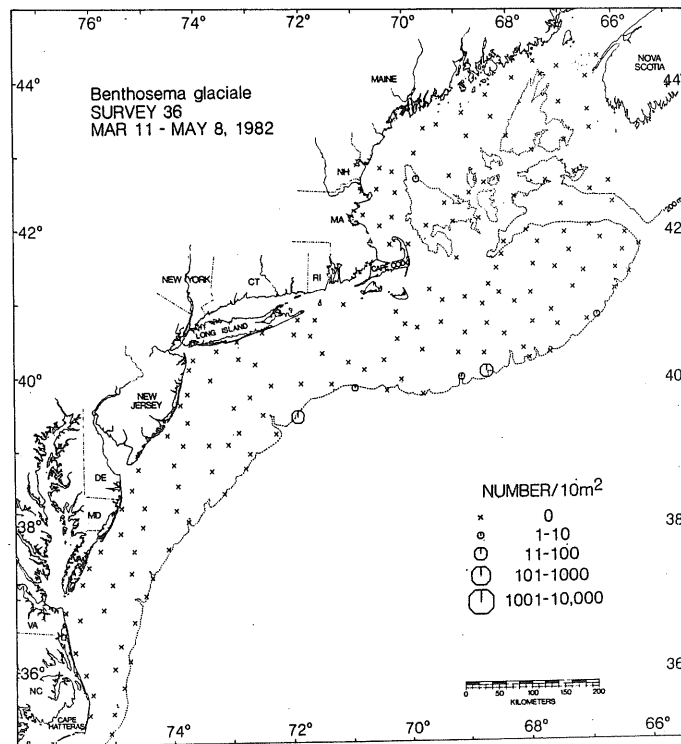
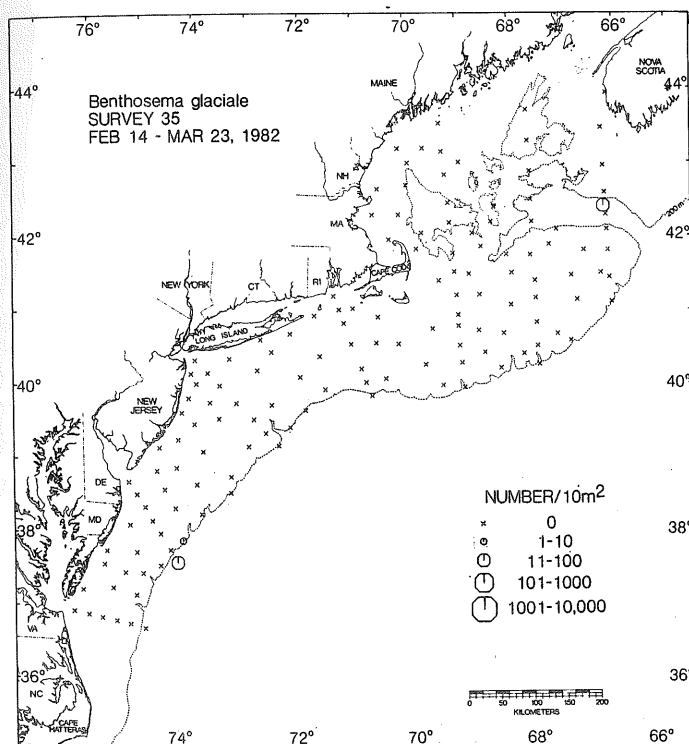
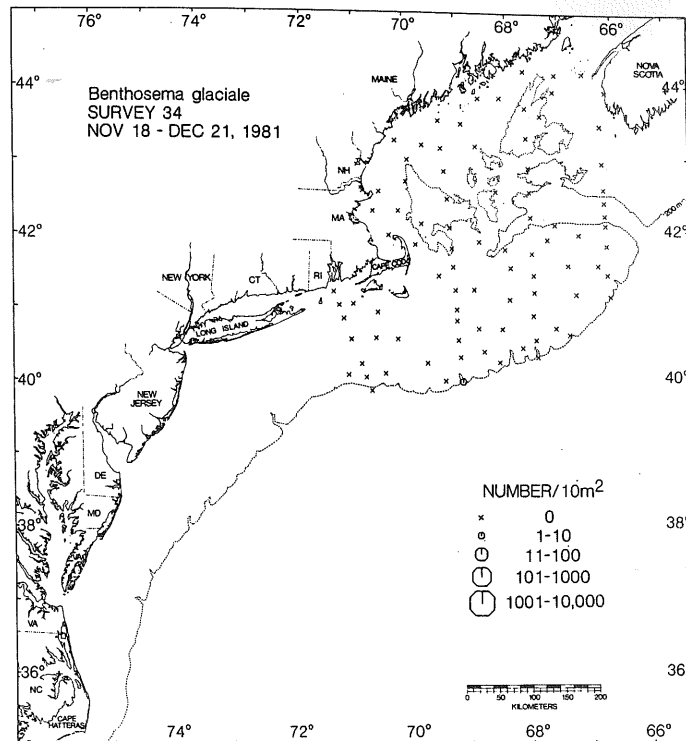
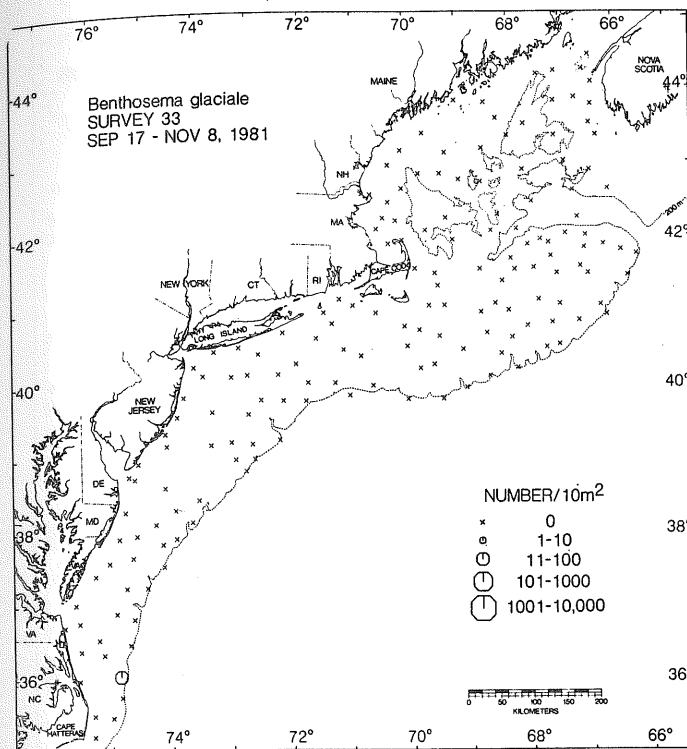


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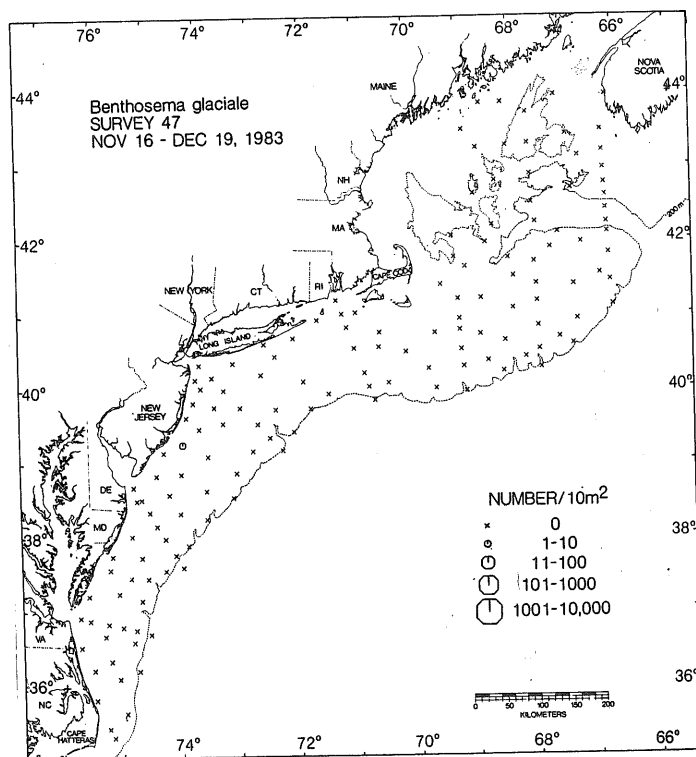
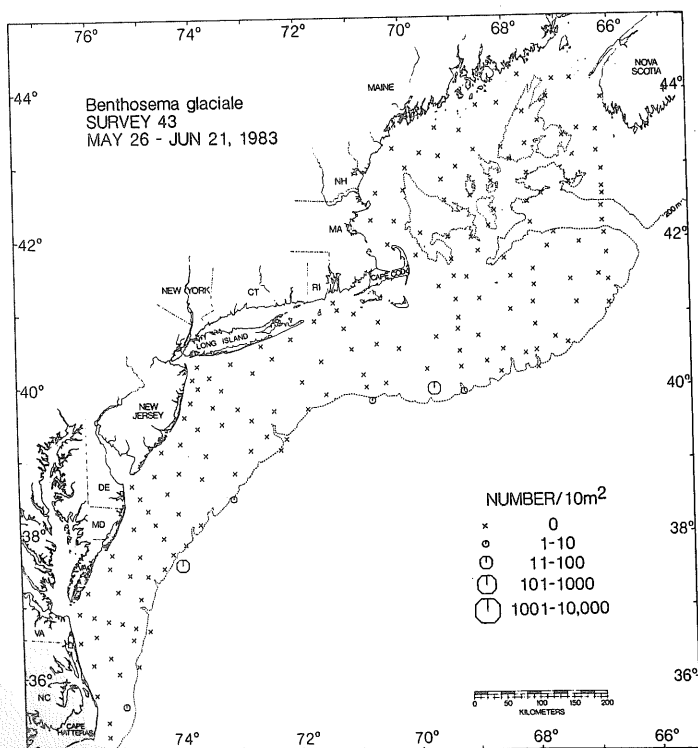
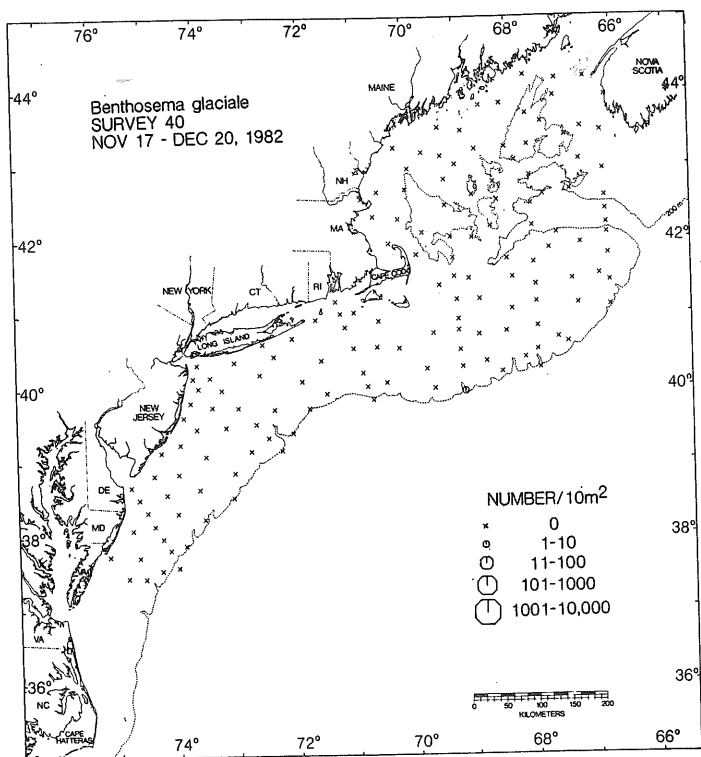
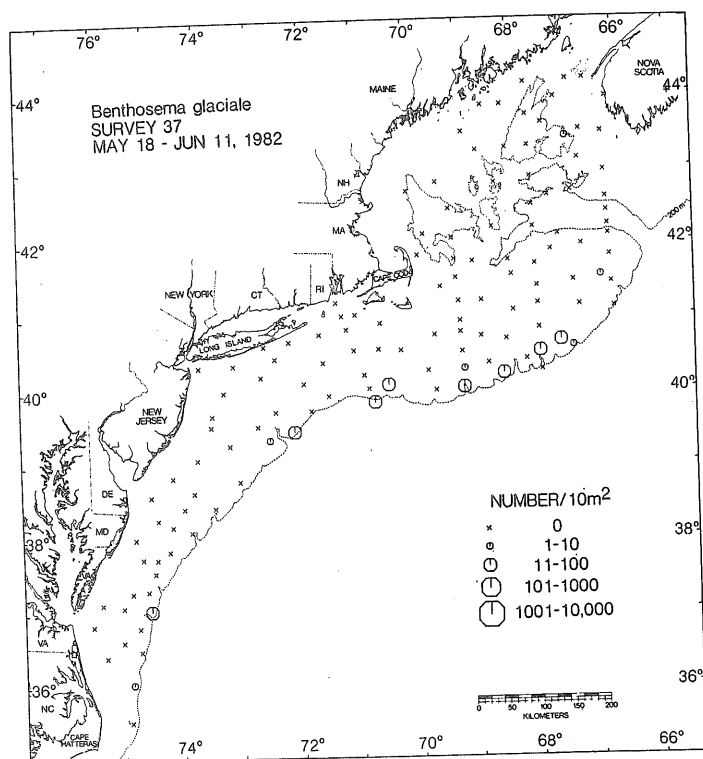


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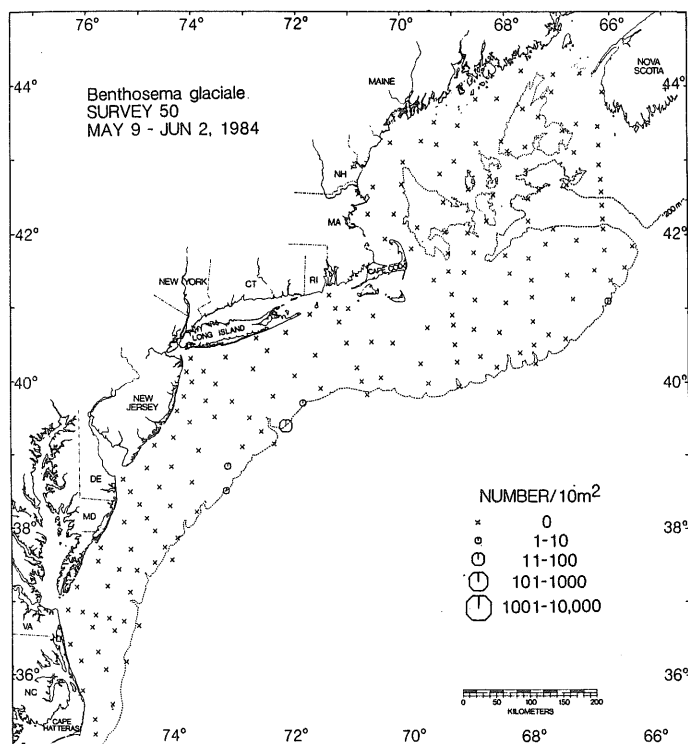


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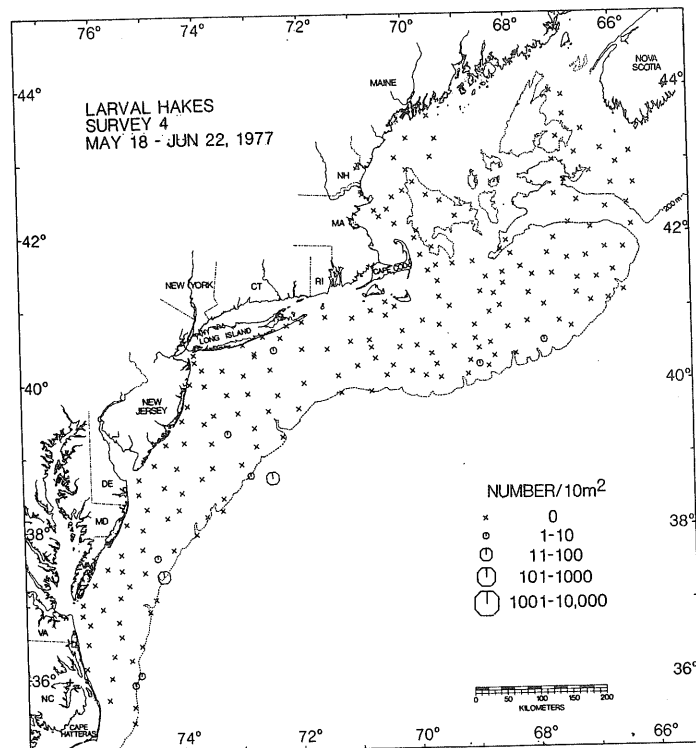
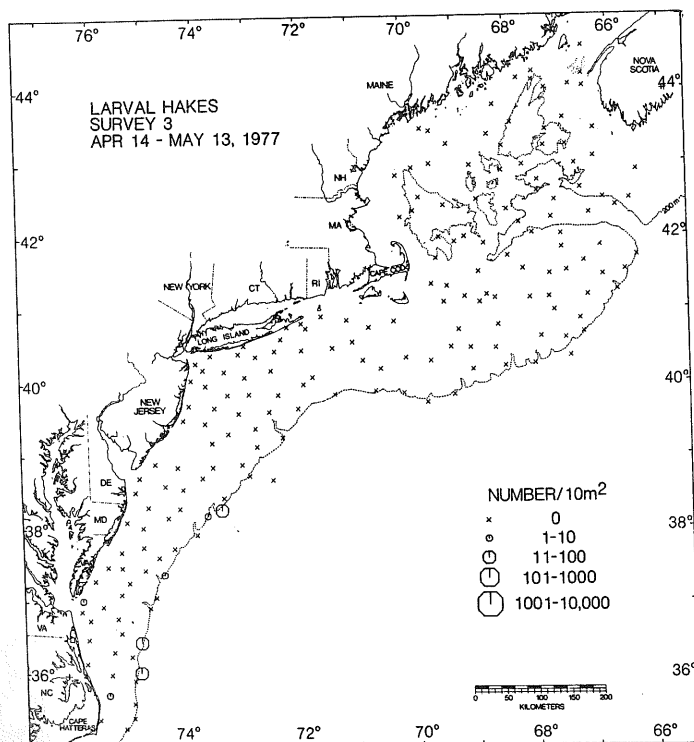
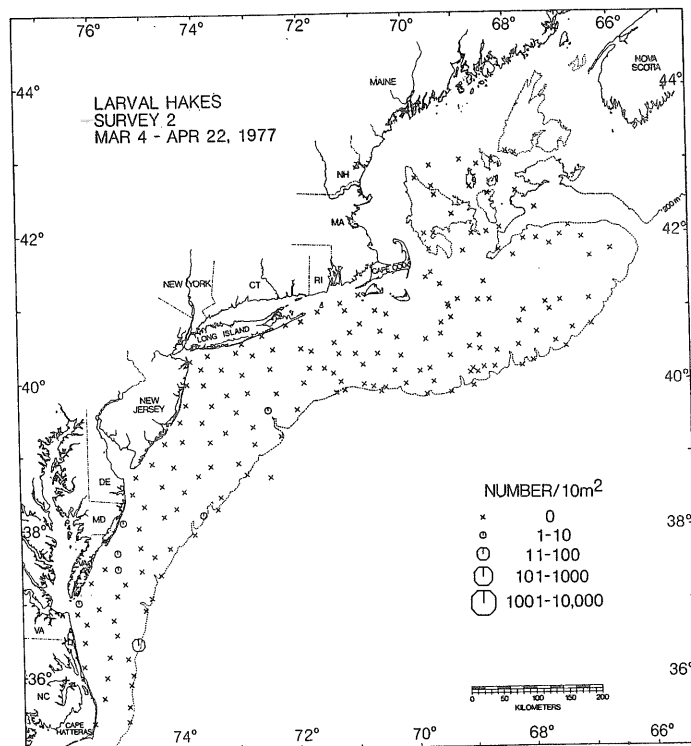
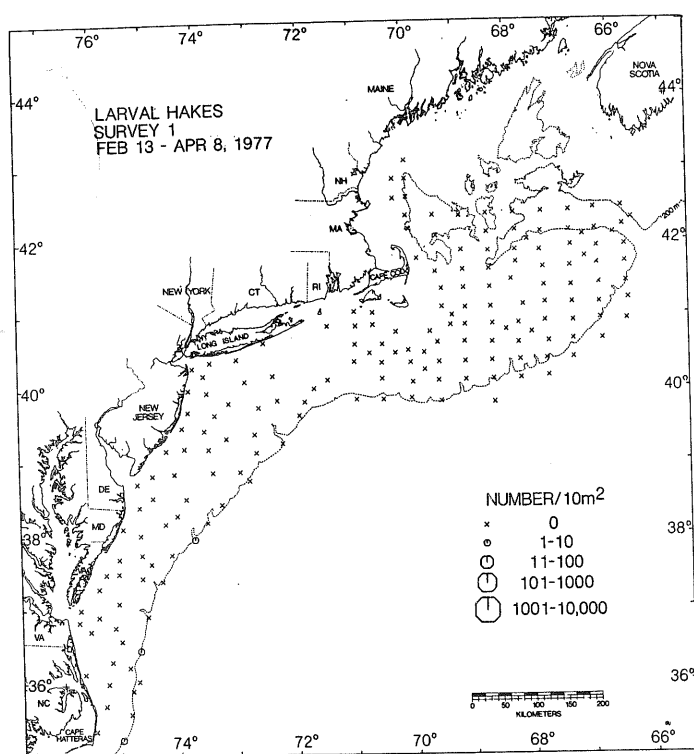


Figure 7. Distribution and abundance of larval hakes, *Urophycis* spp., off northeastern United States, winter 1977 through spring 1984.

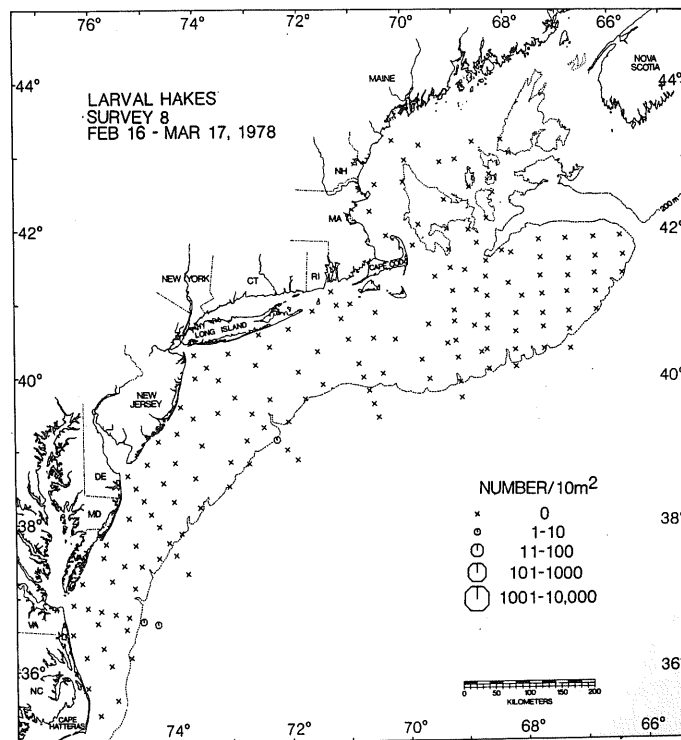
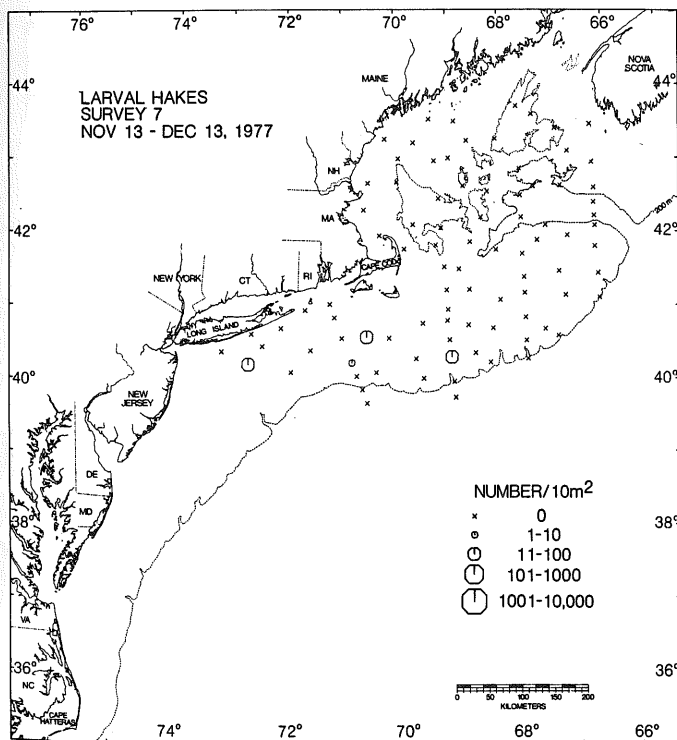
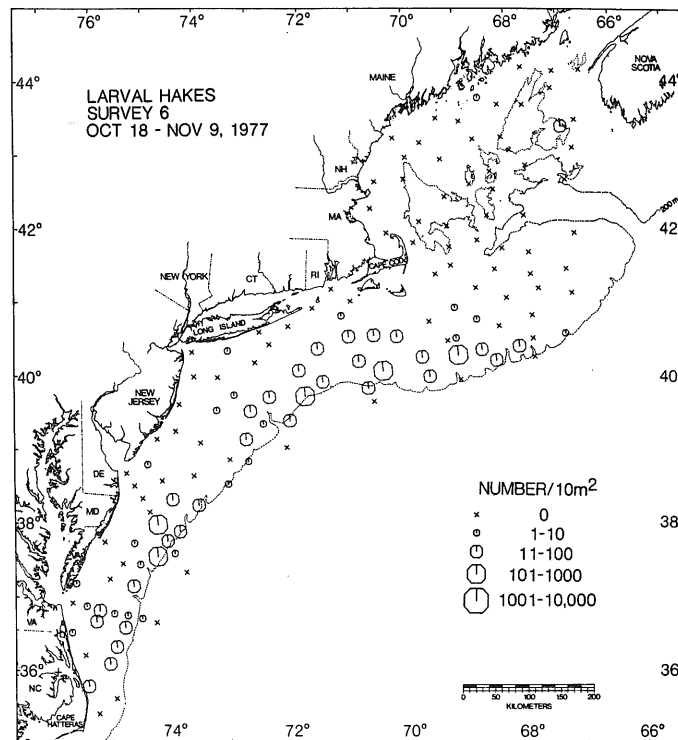
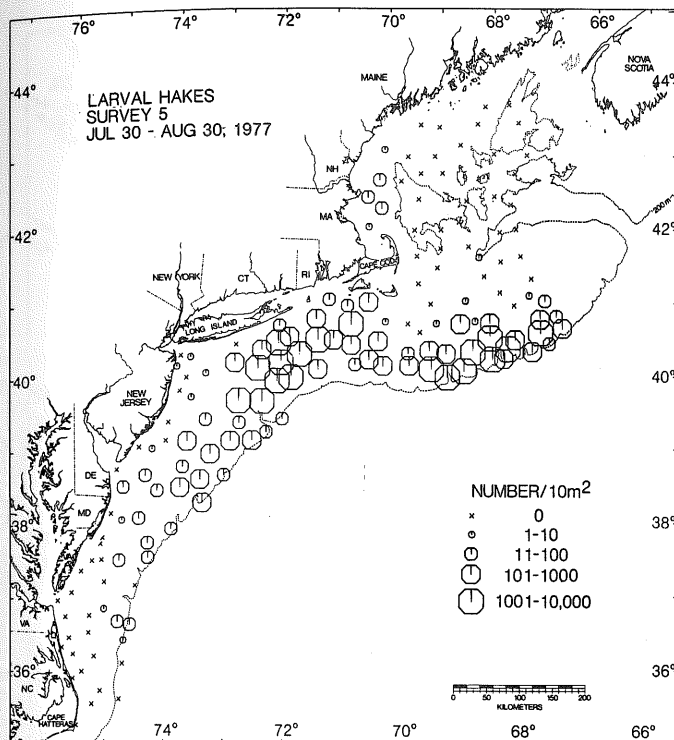


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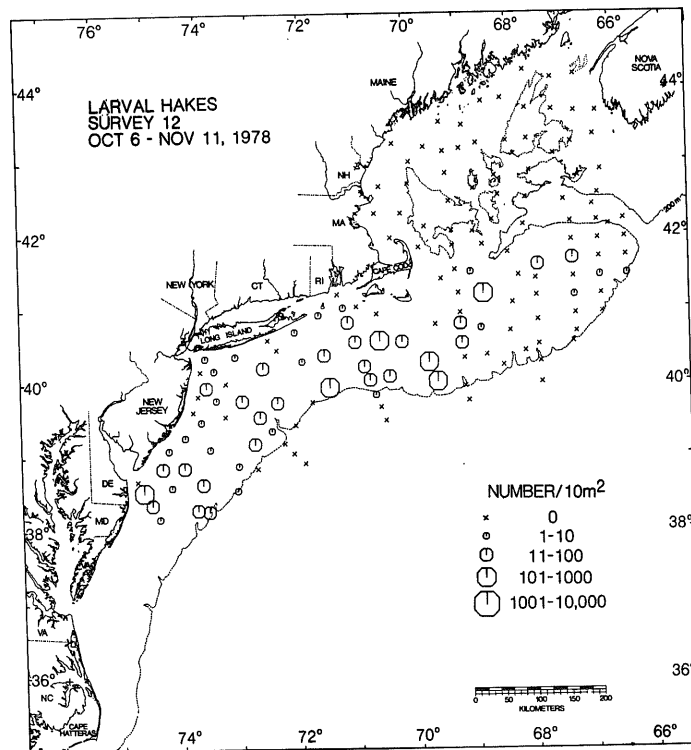
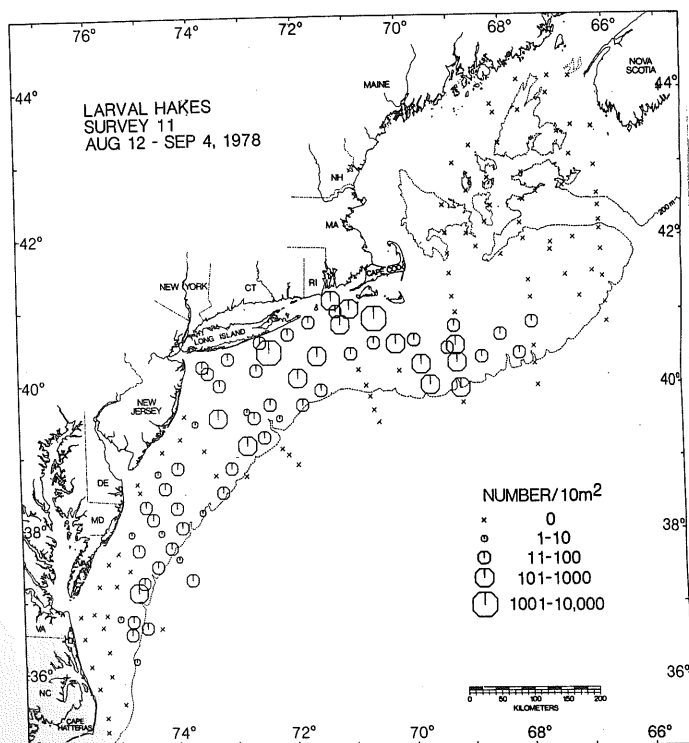
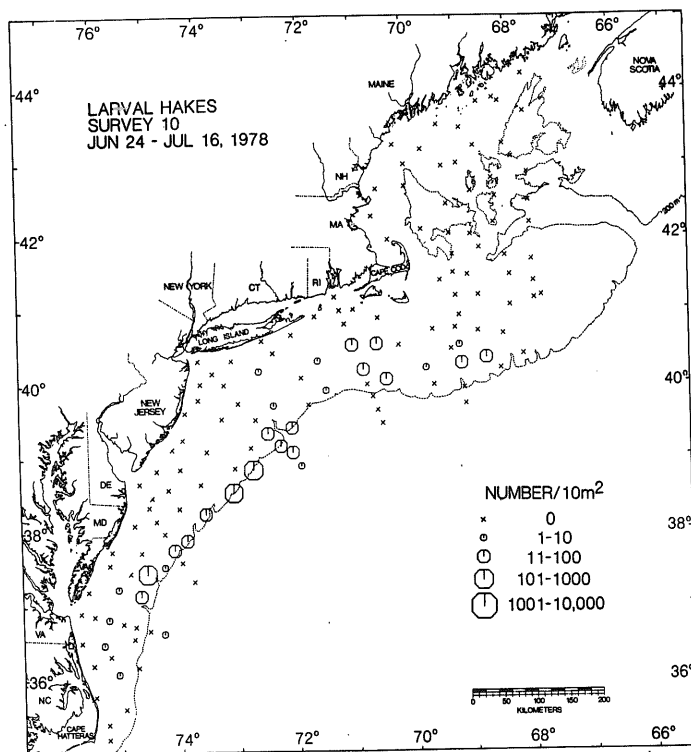
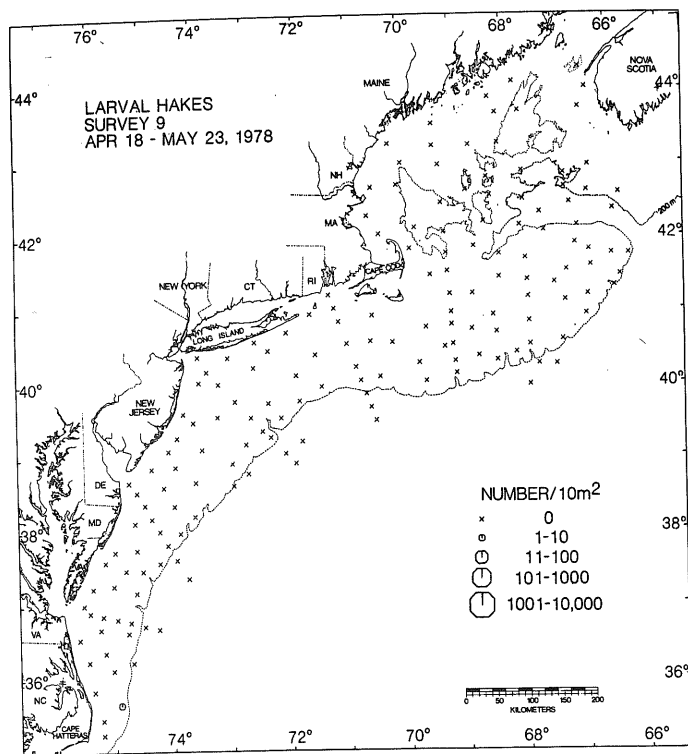


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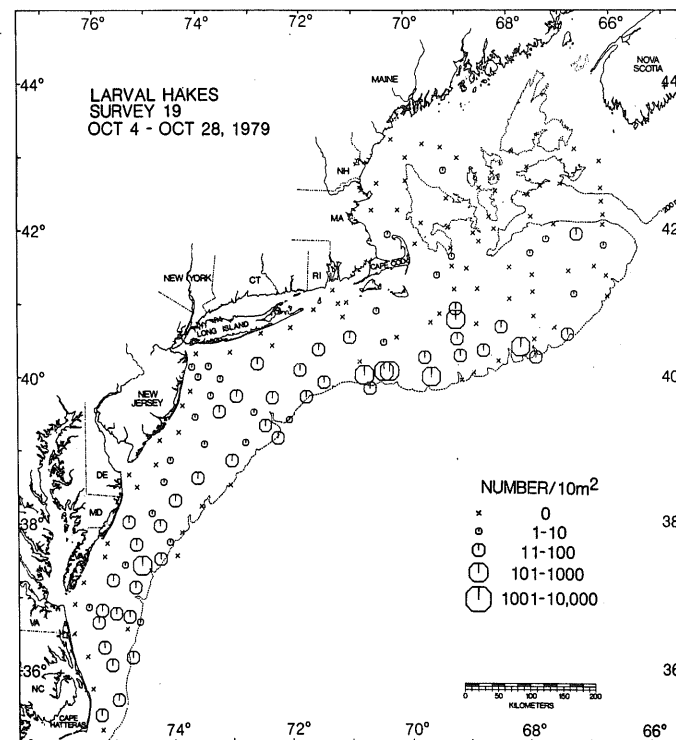
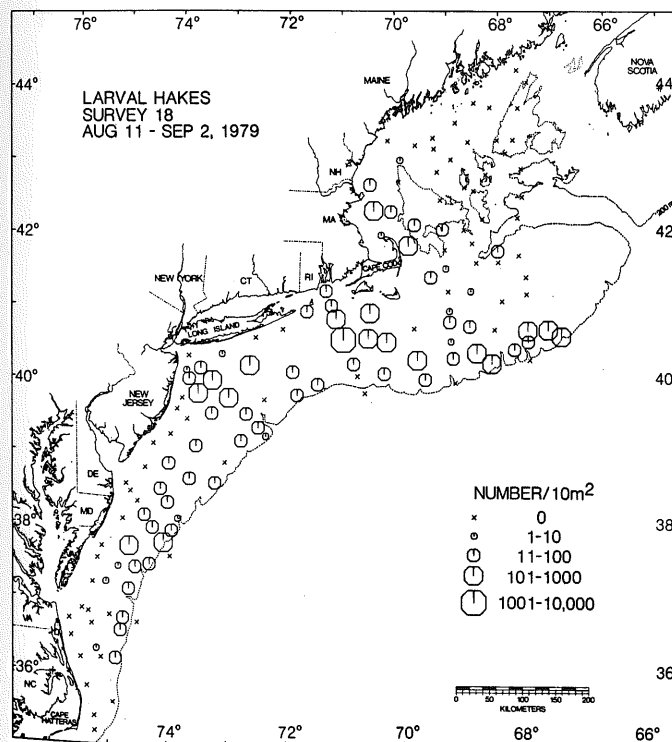
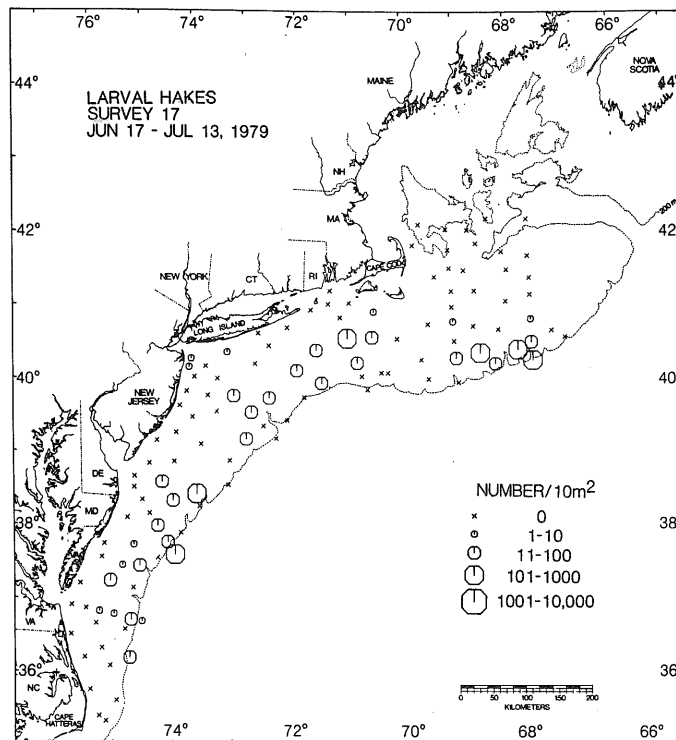
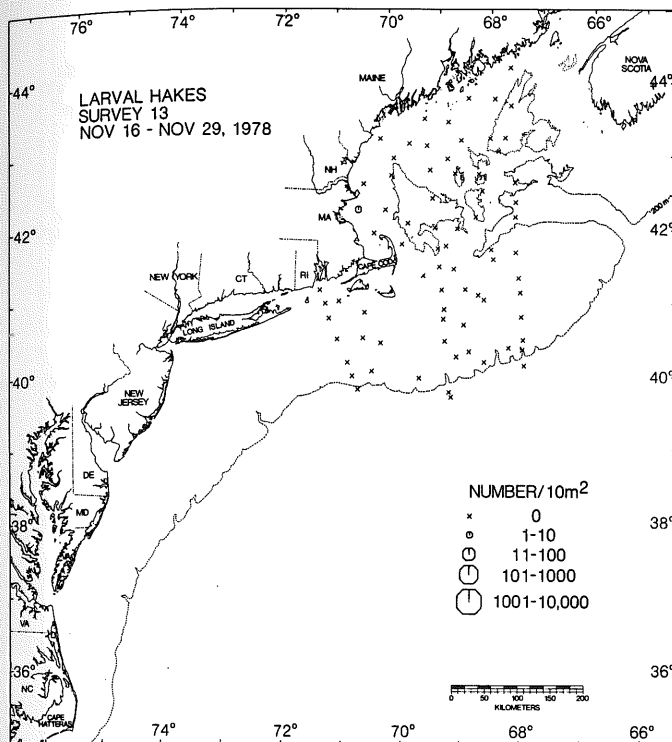


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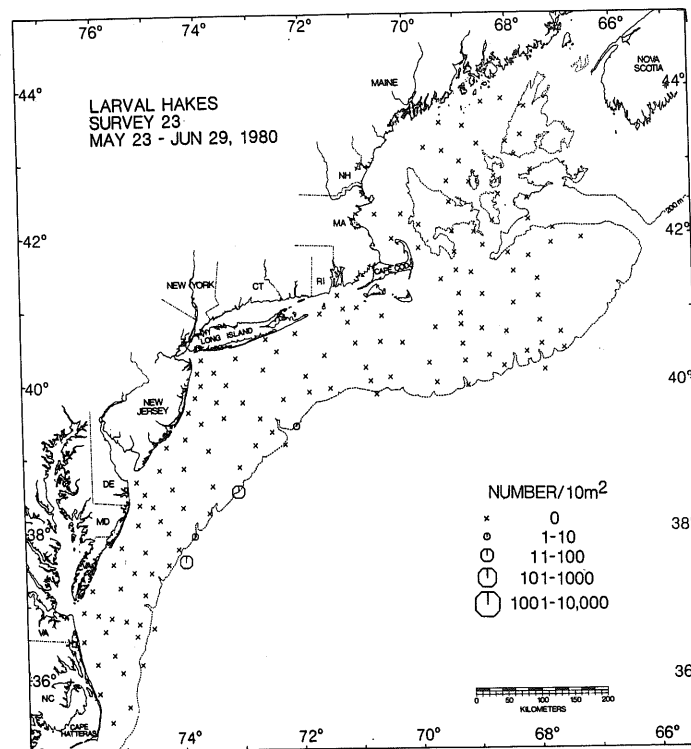
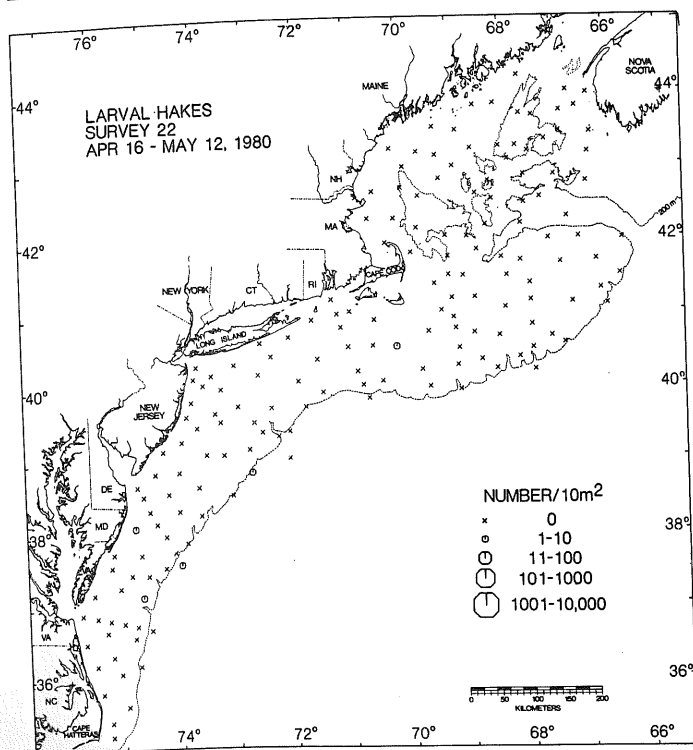
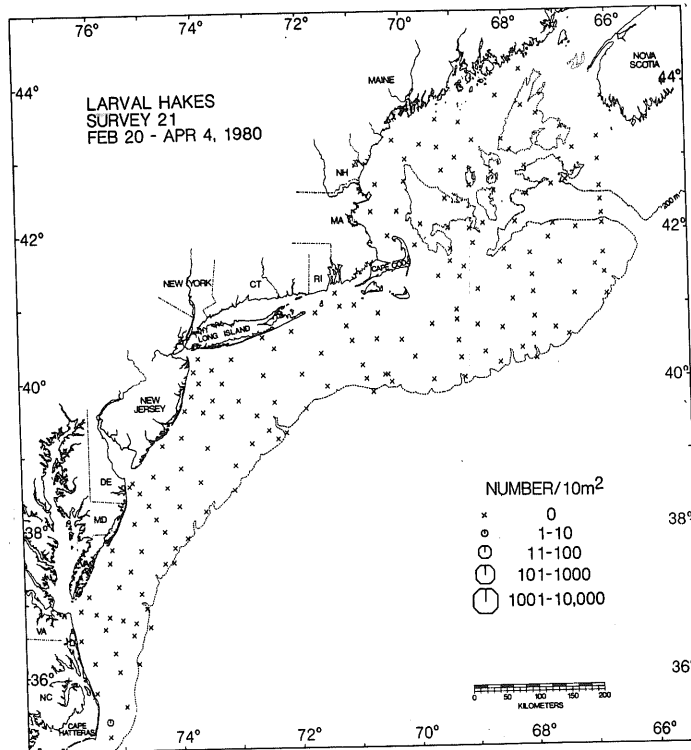
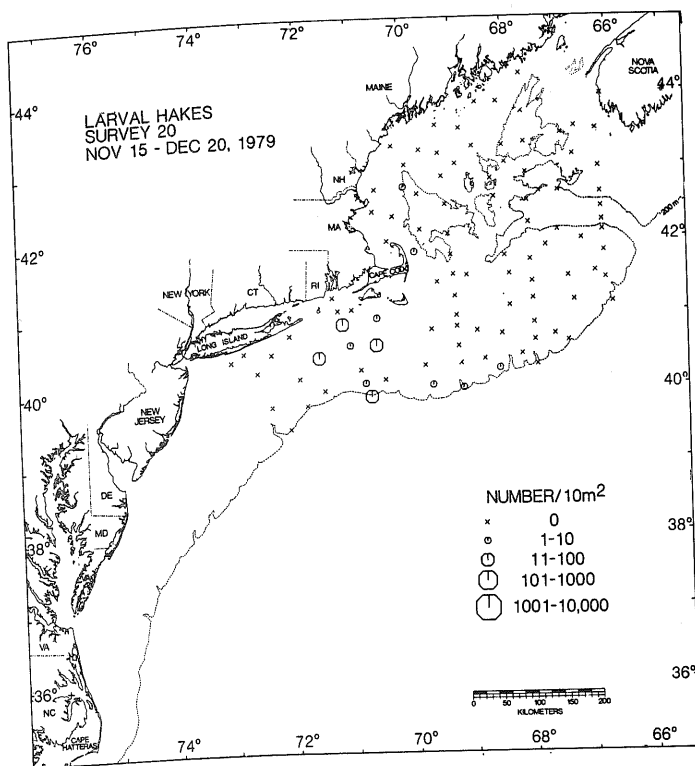


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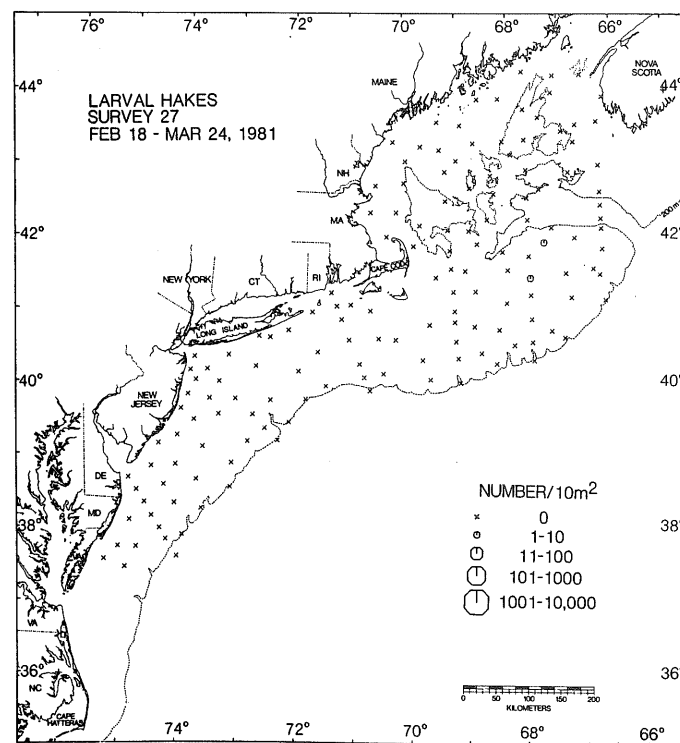
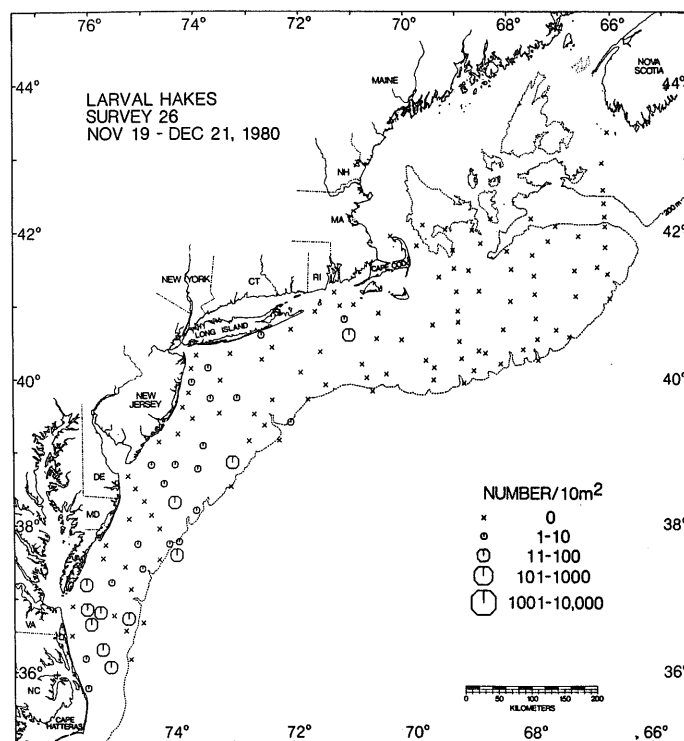
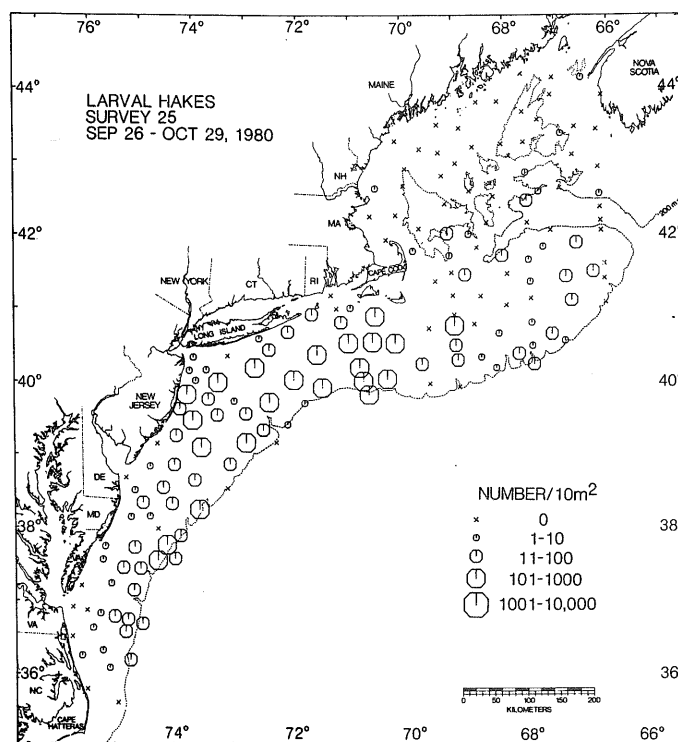
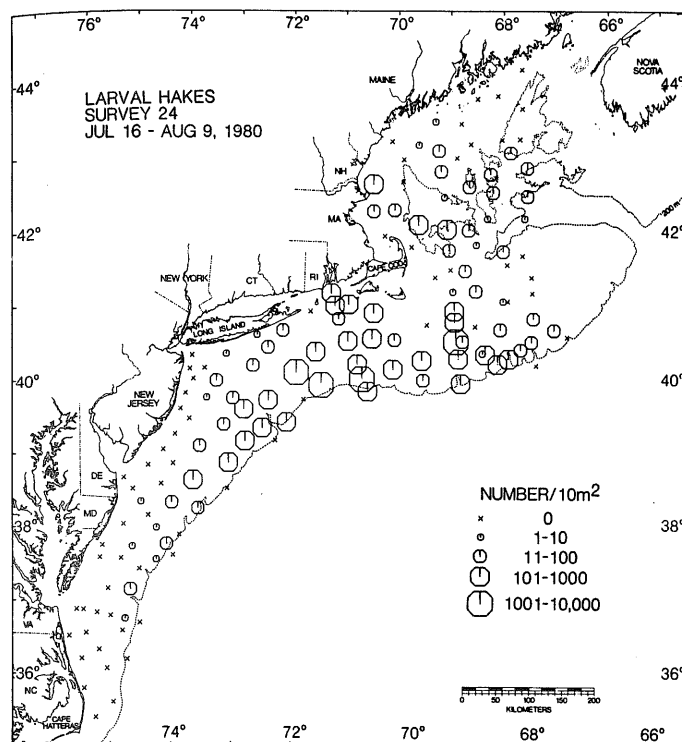


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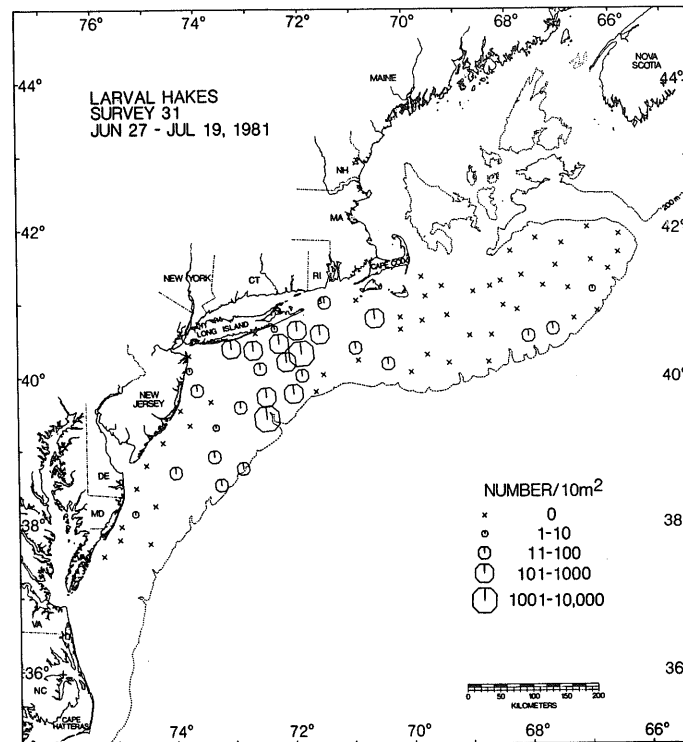
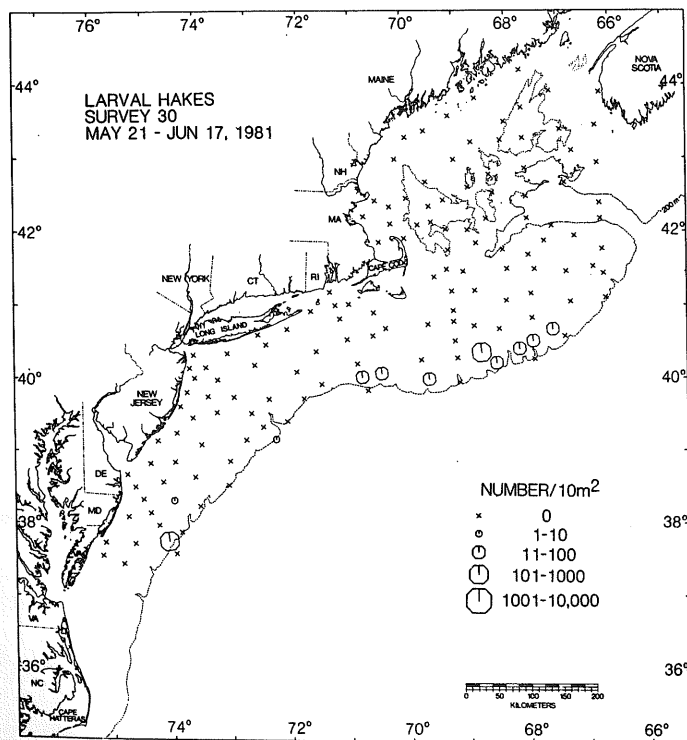
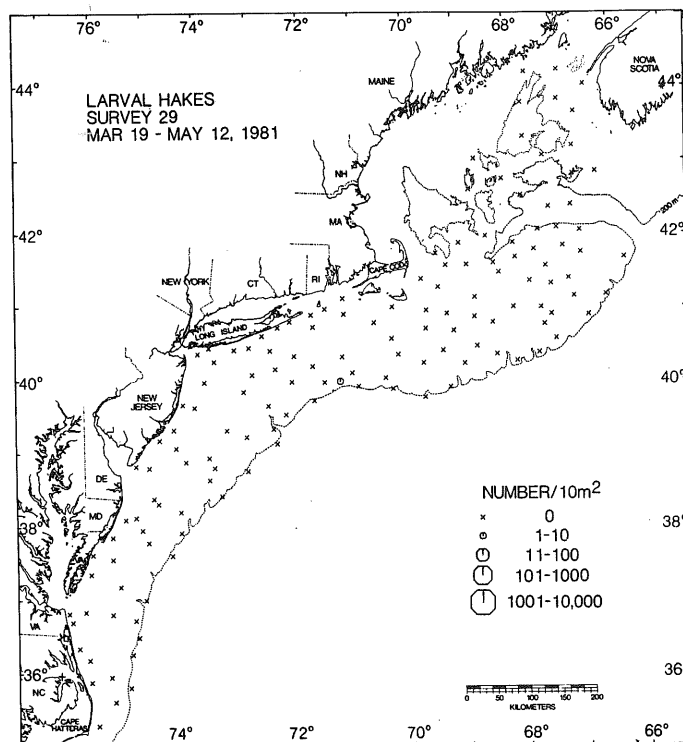
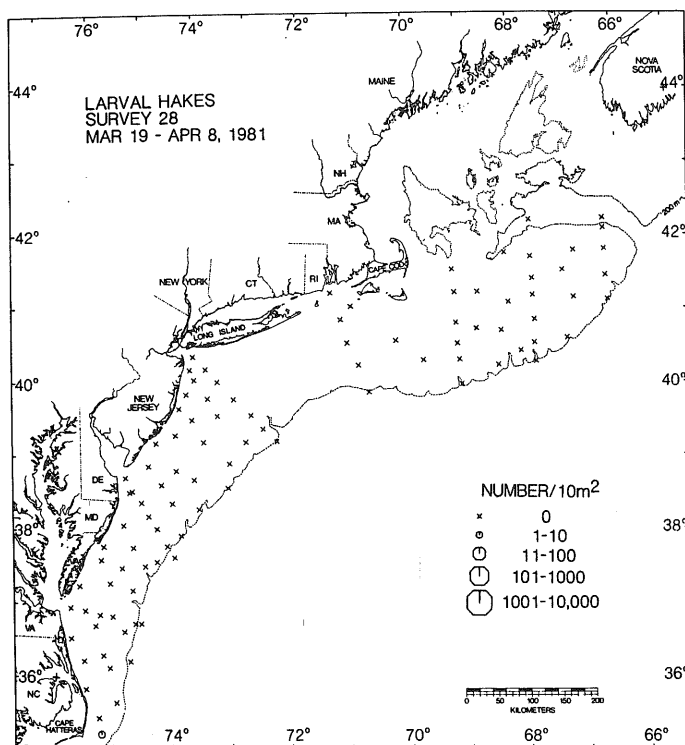


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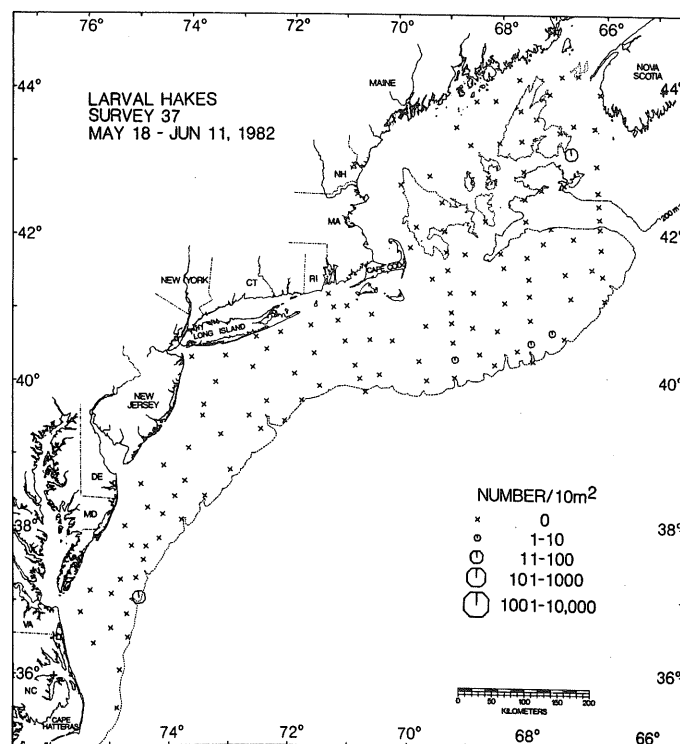
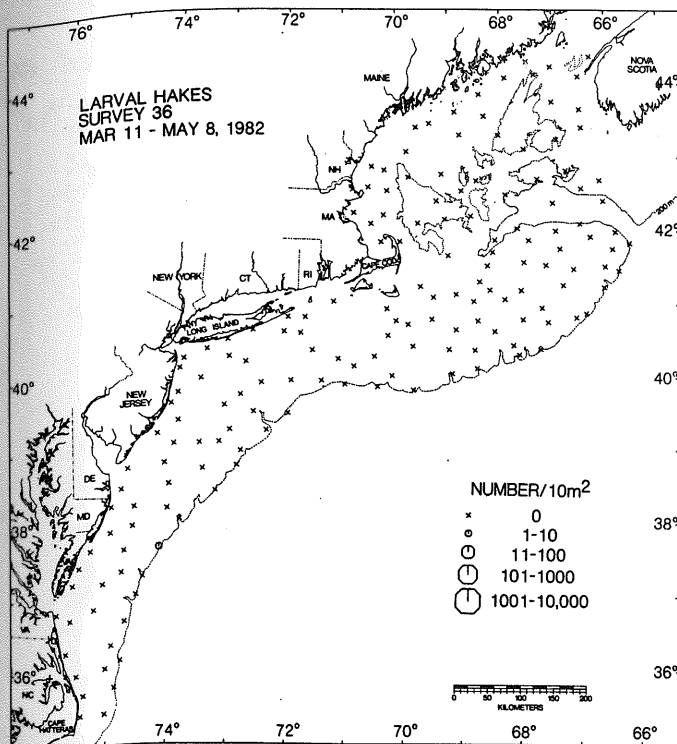
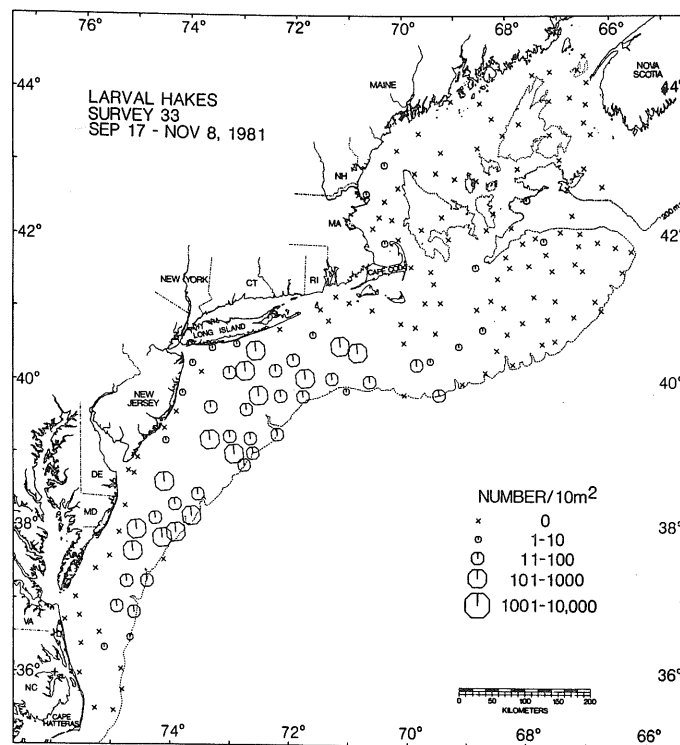
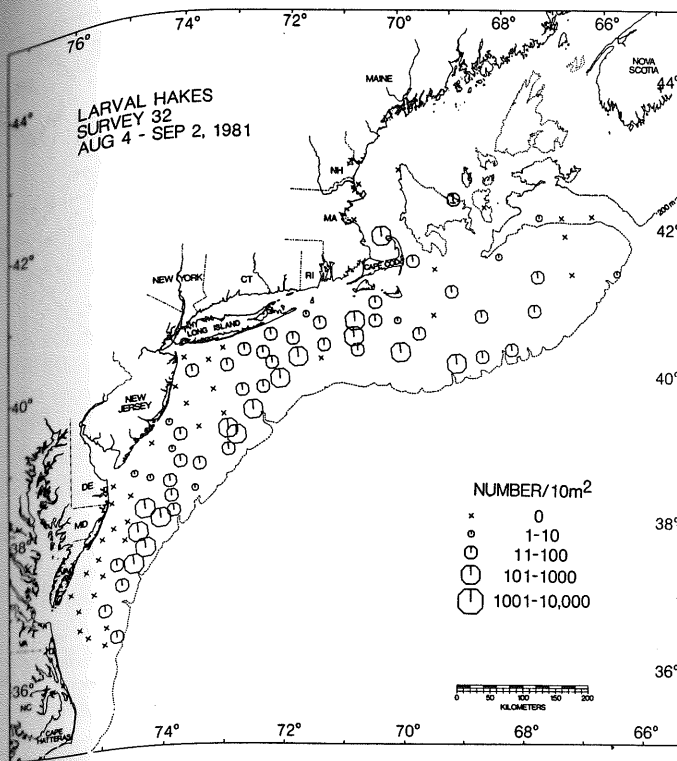


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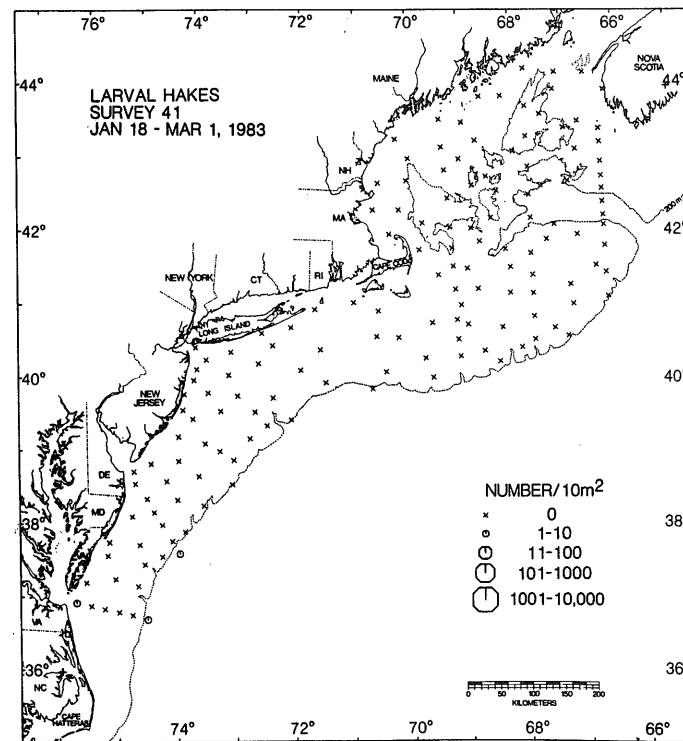
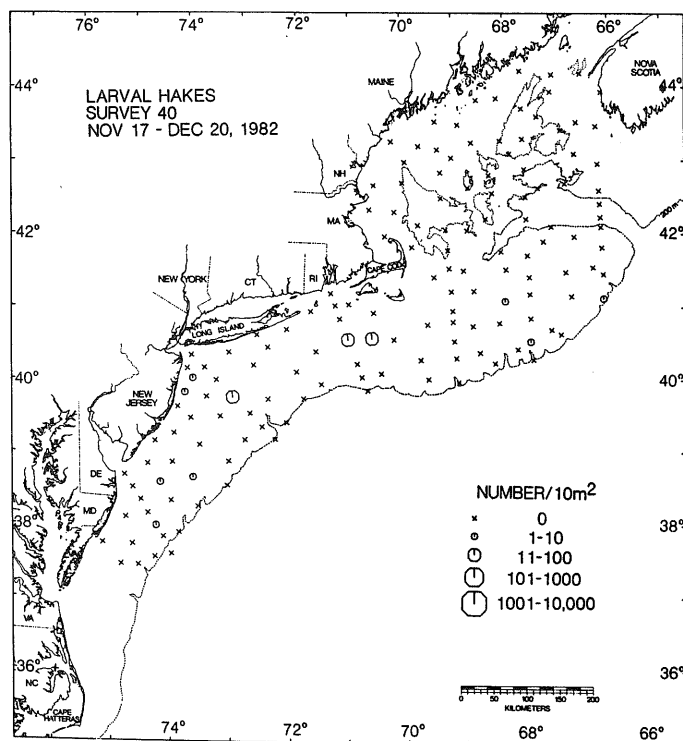
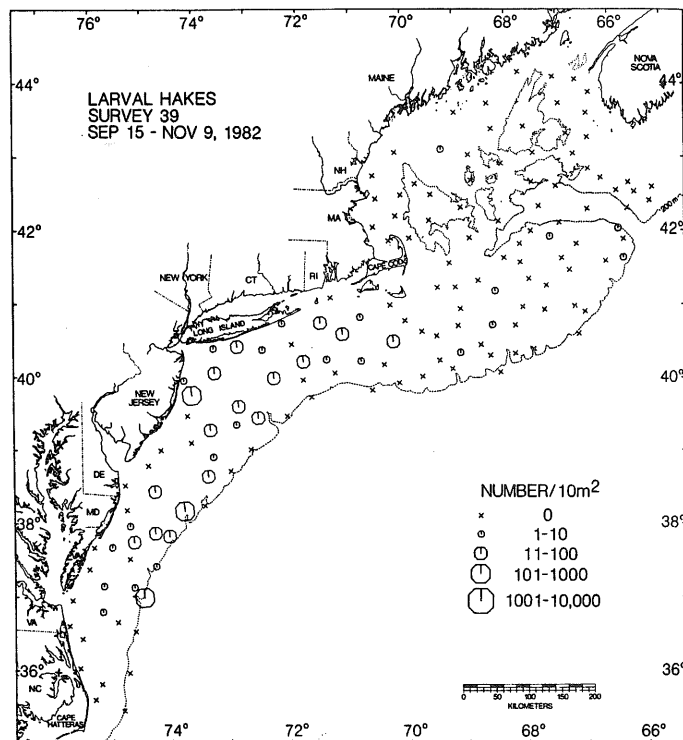
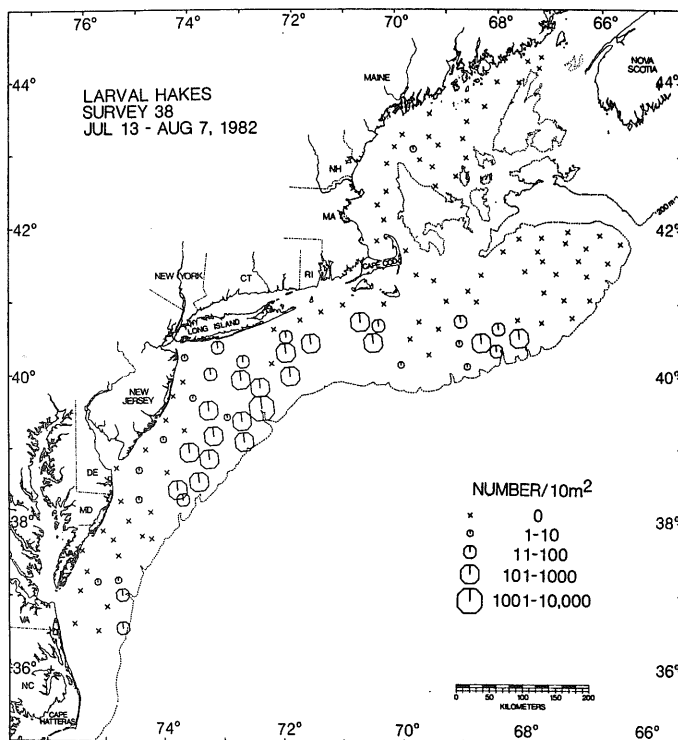


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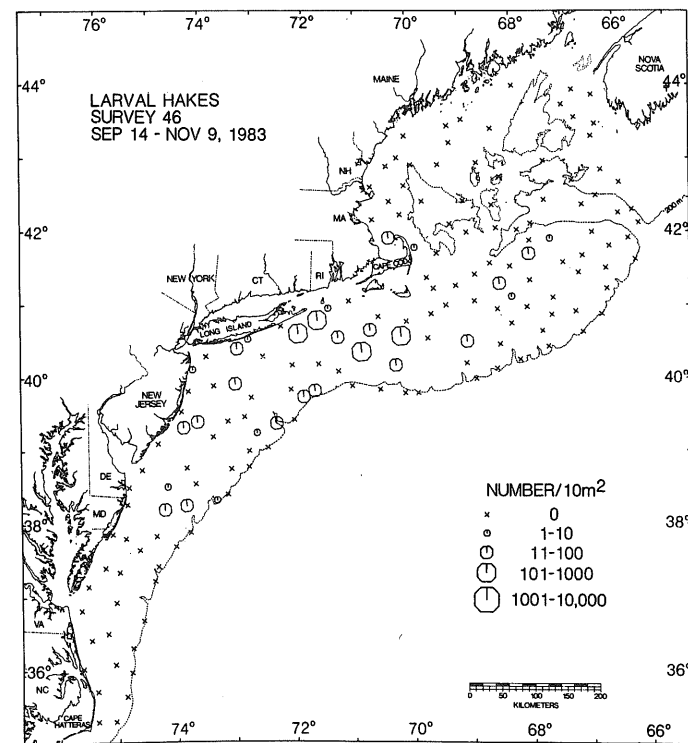
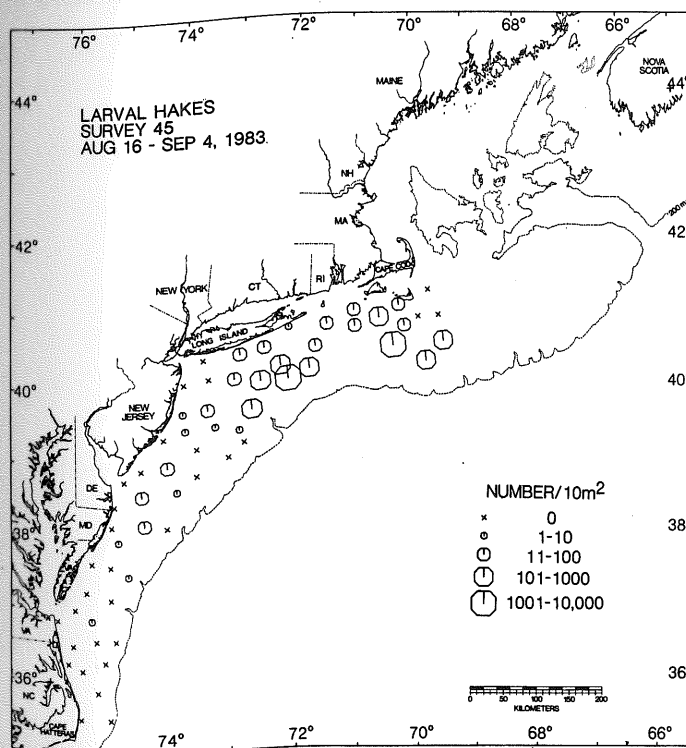
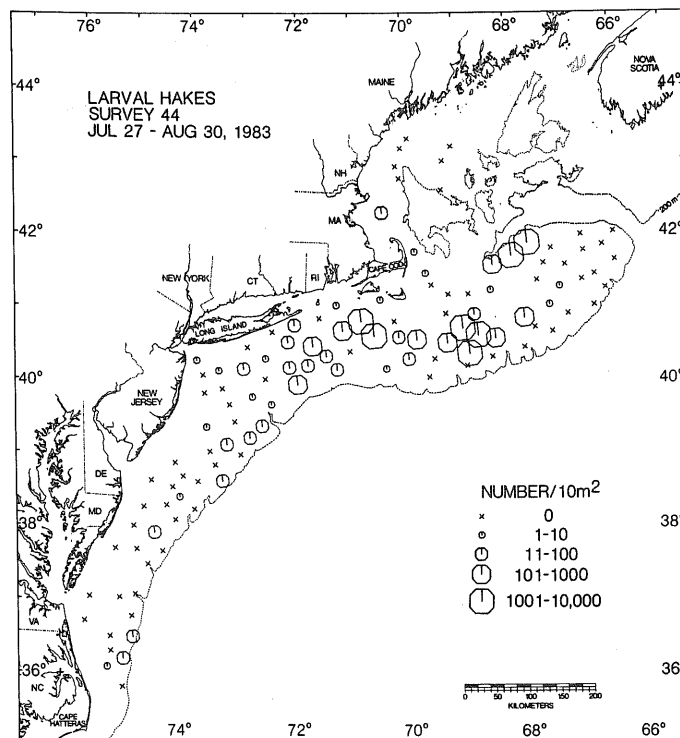
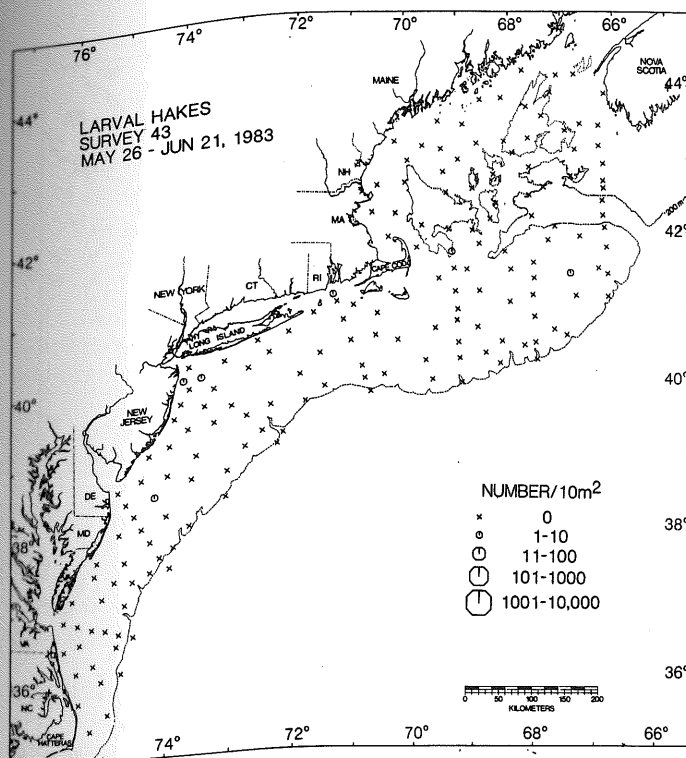


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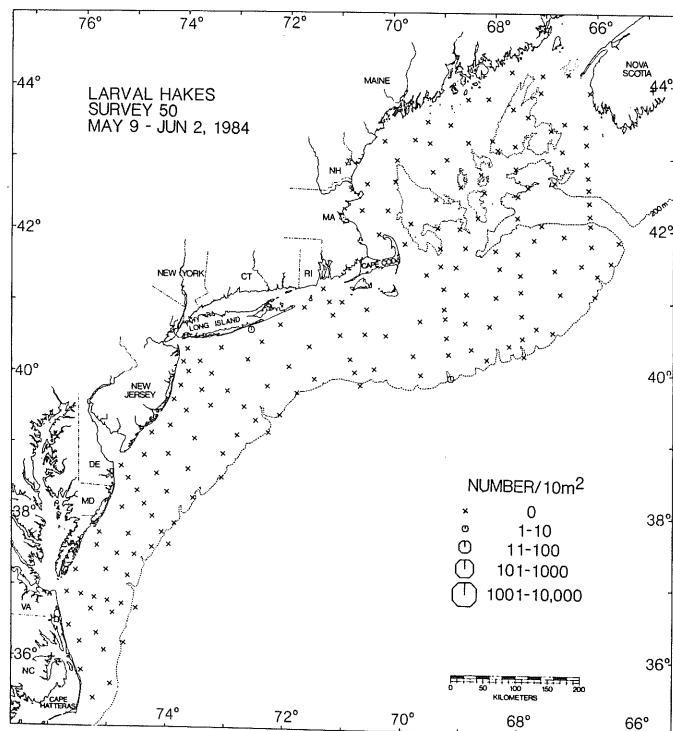
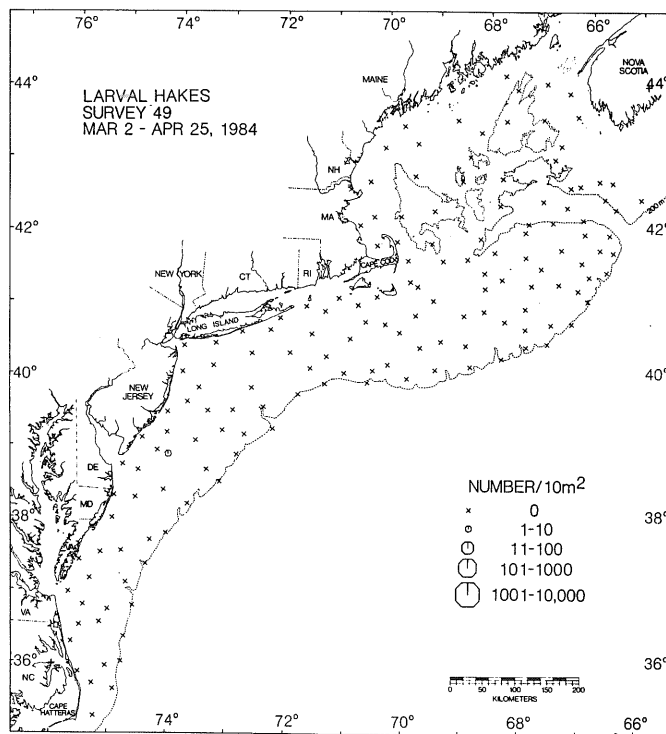
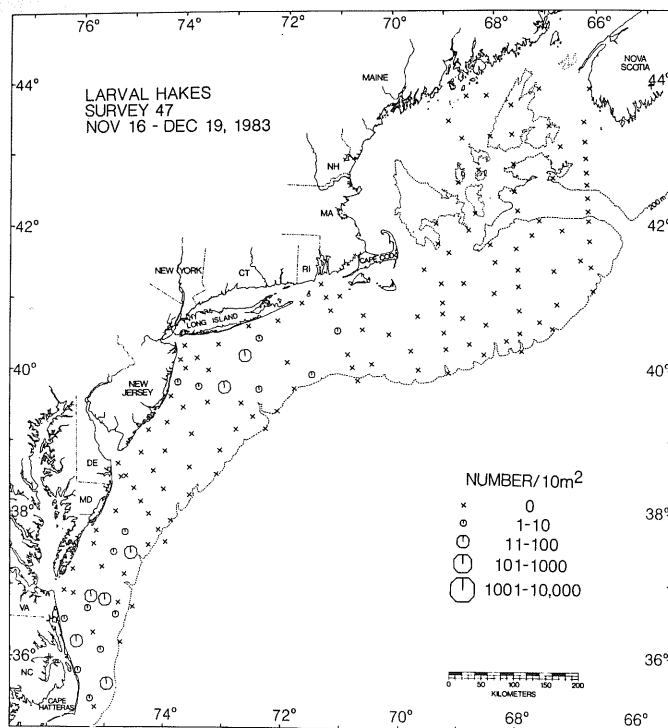


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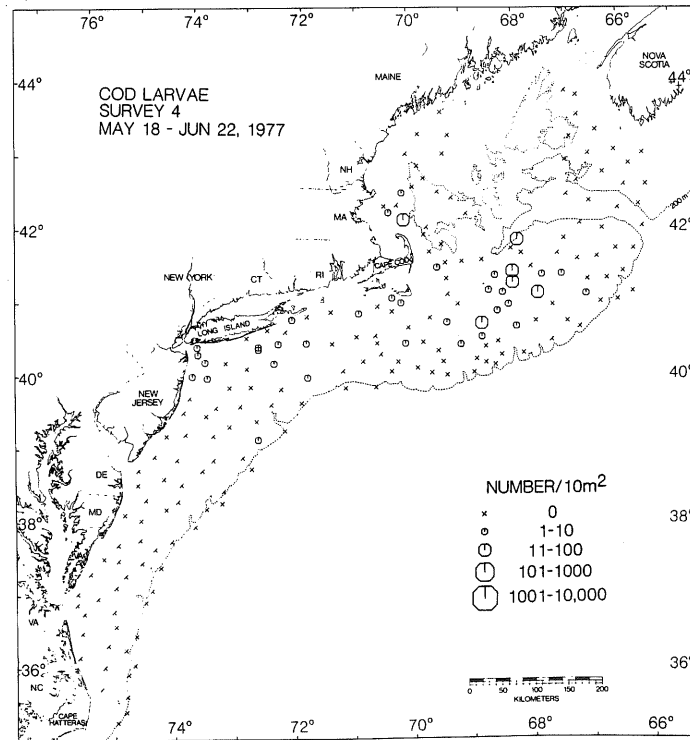
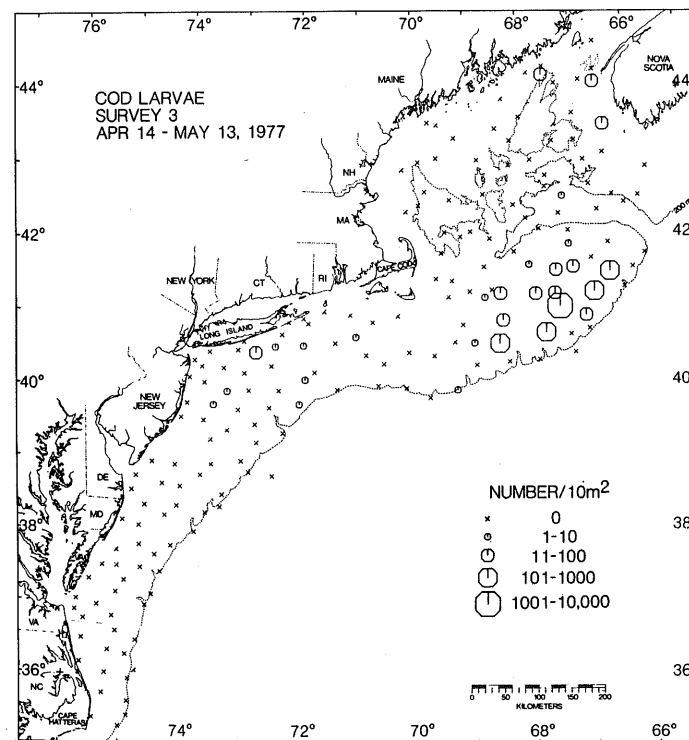
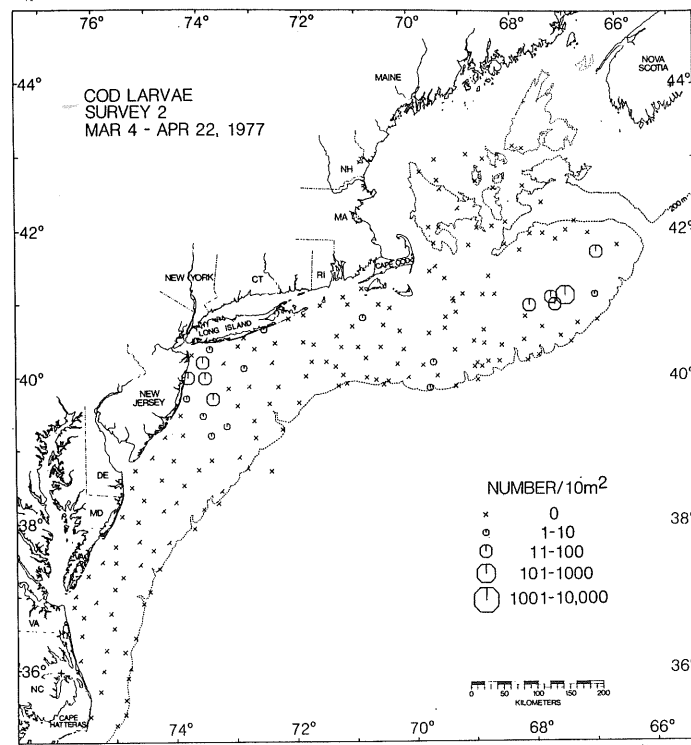
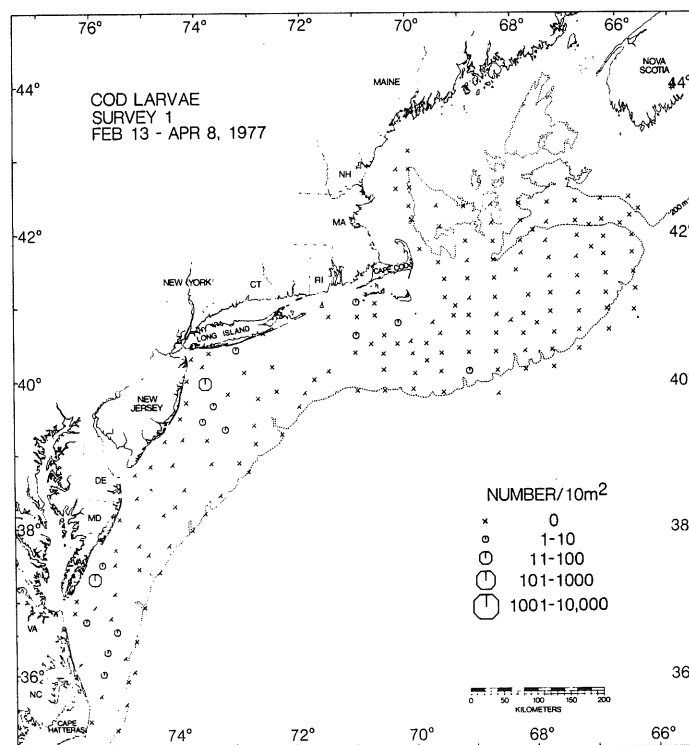


Figure 8. Distribution and abundance of cod, *Gadus morhua*, larvae off northeastern United States, winter 1977 through spring 1984.

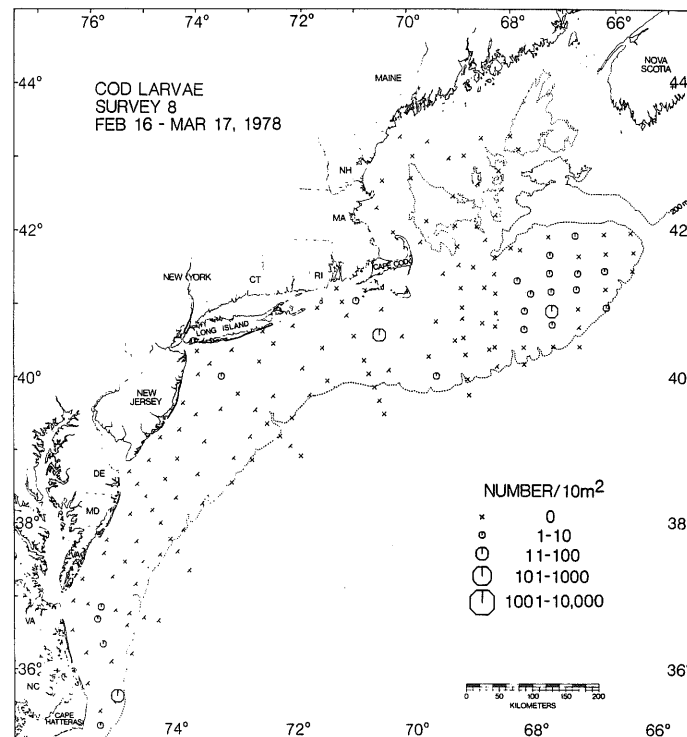
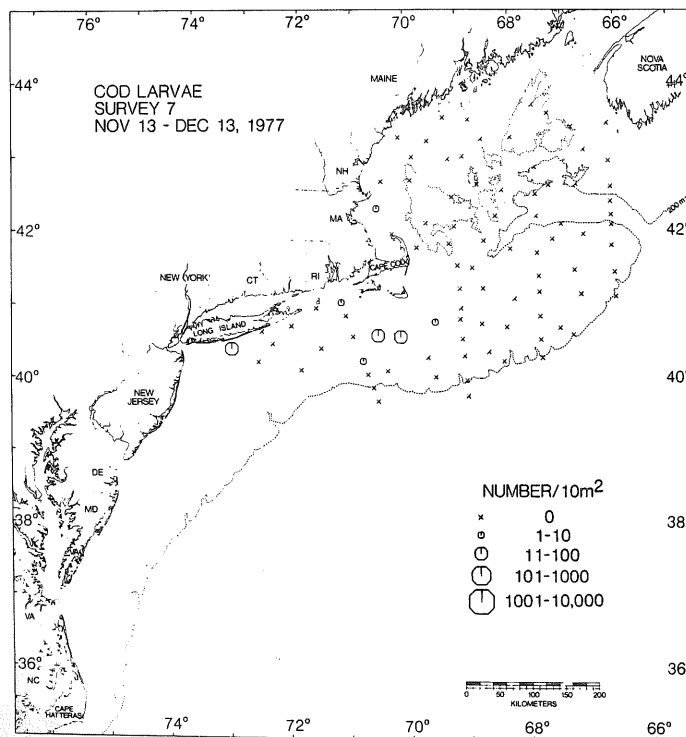
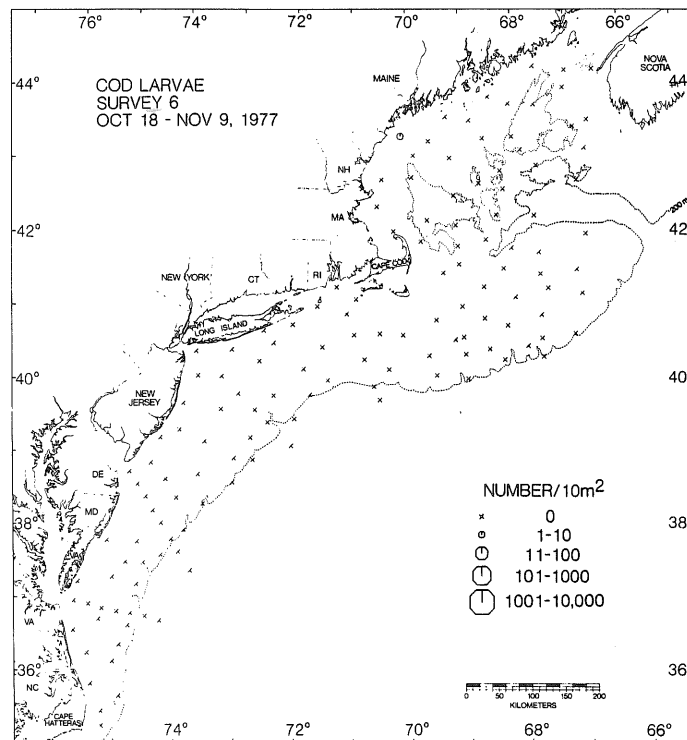
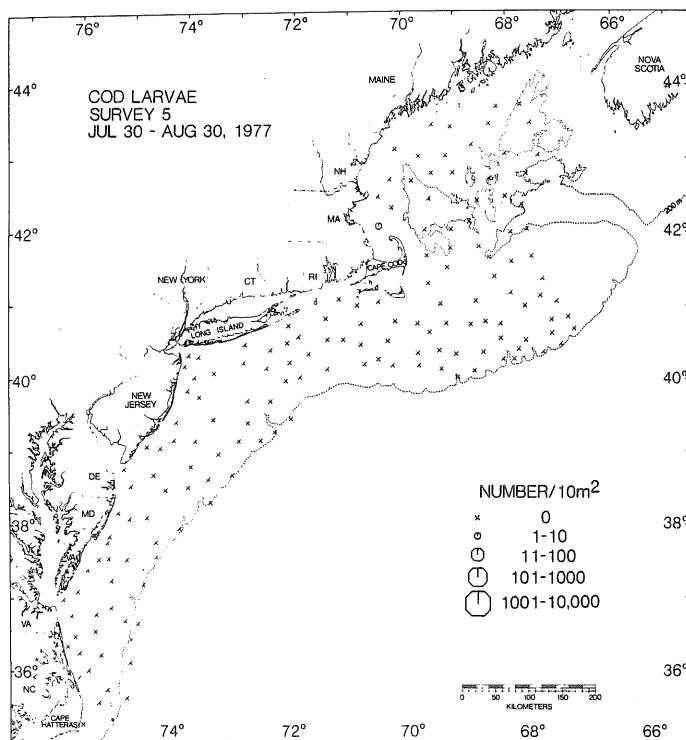


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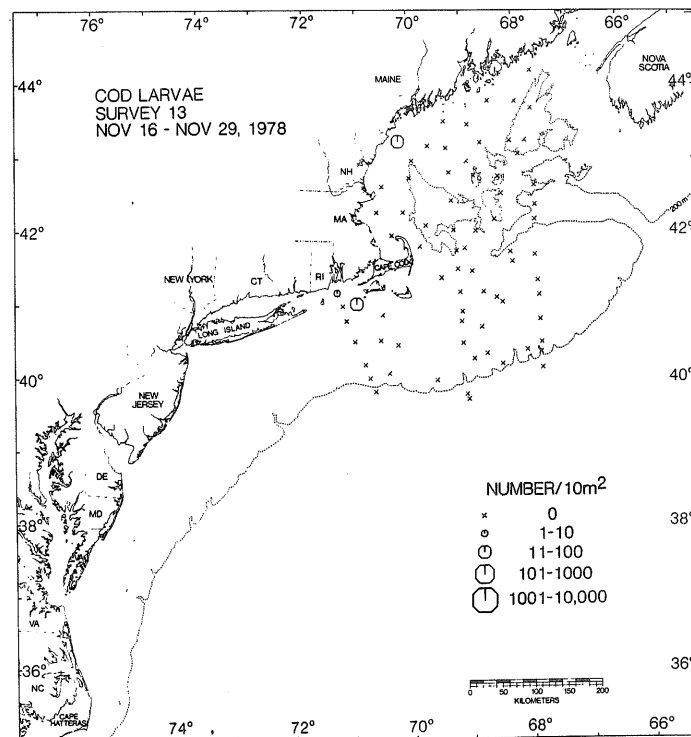
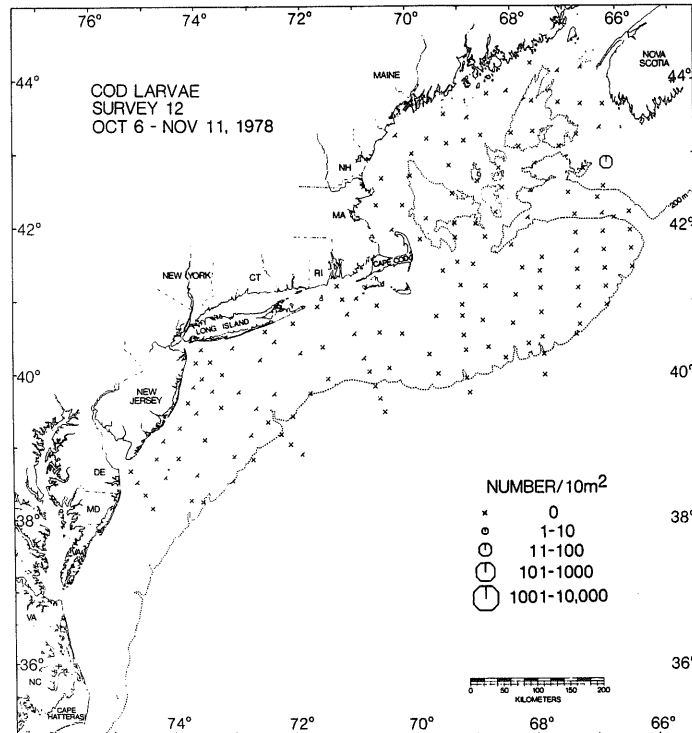
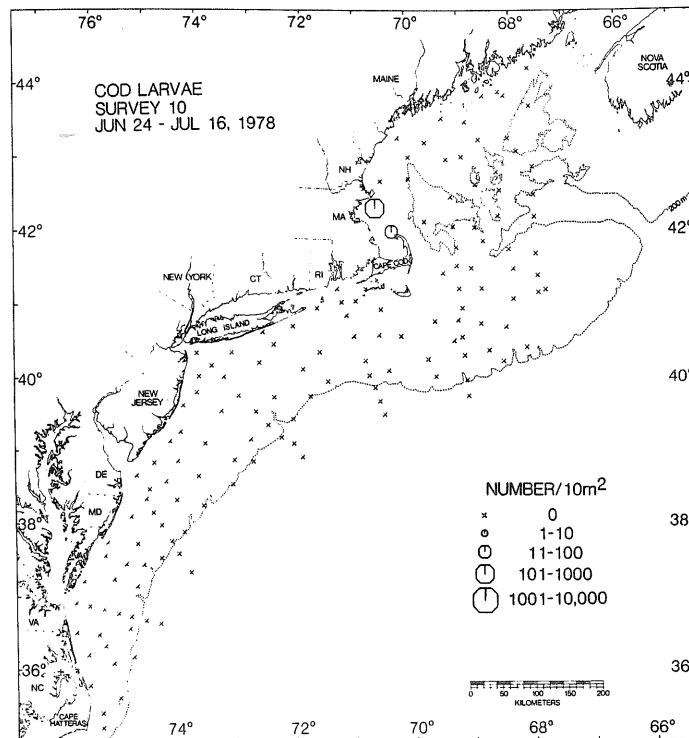
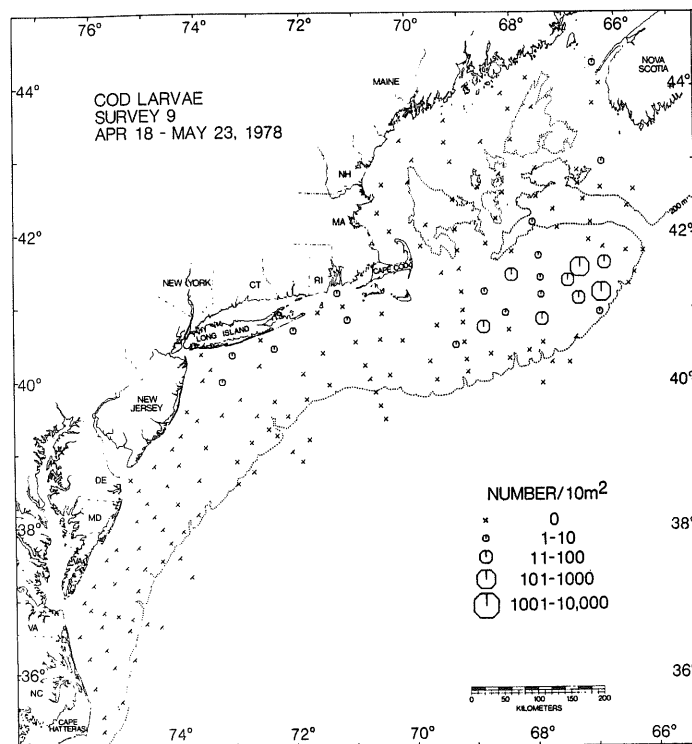


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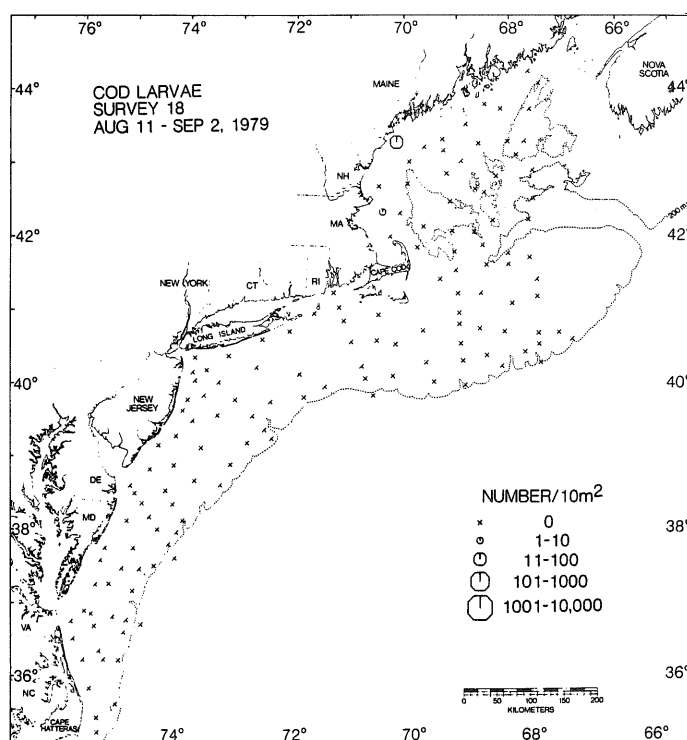
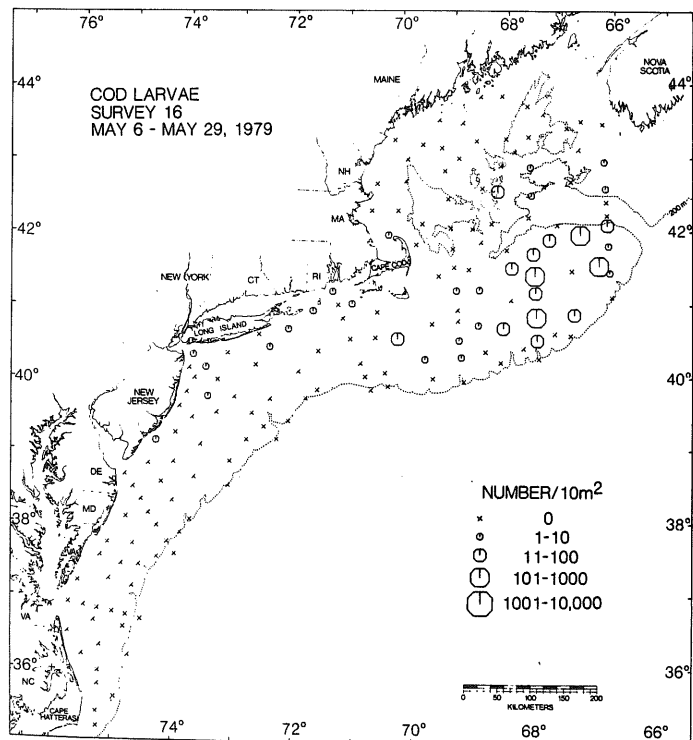
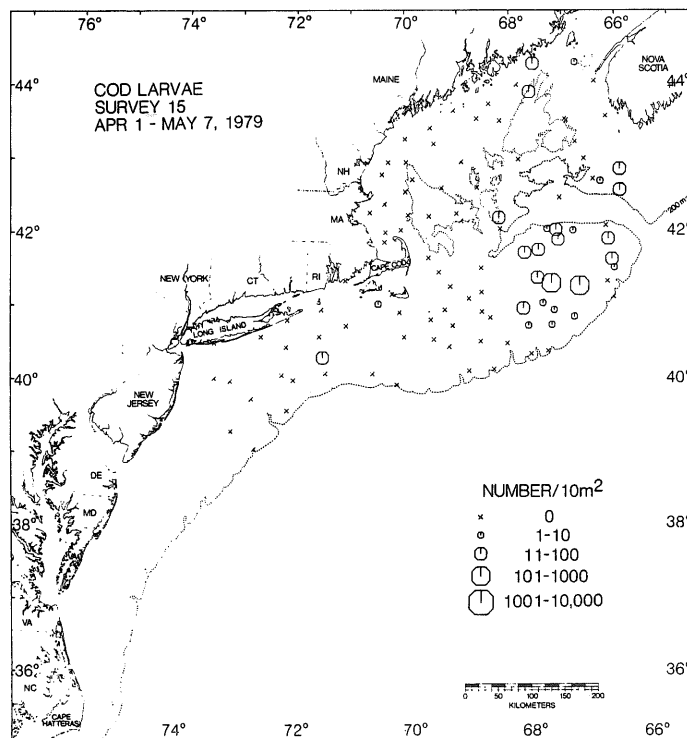
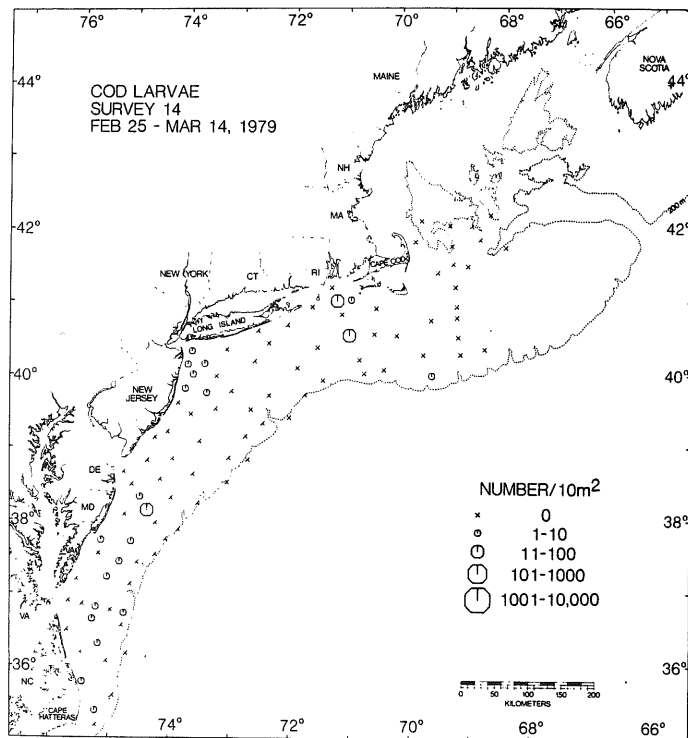


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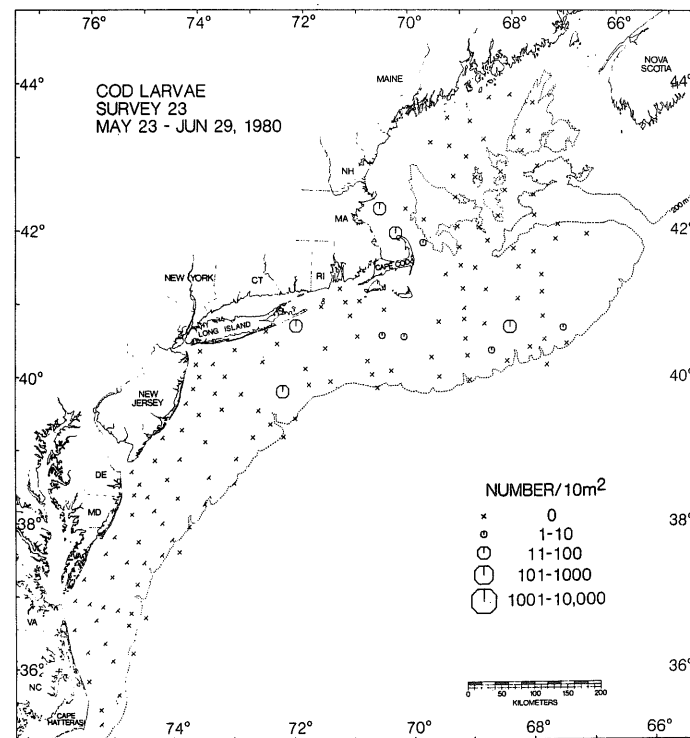
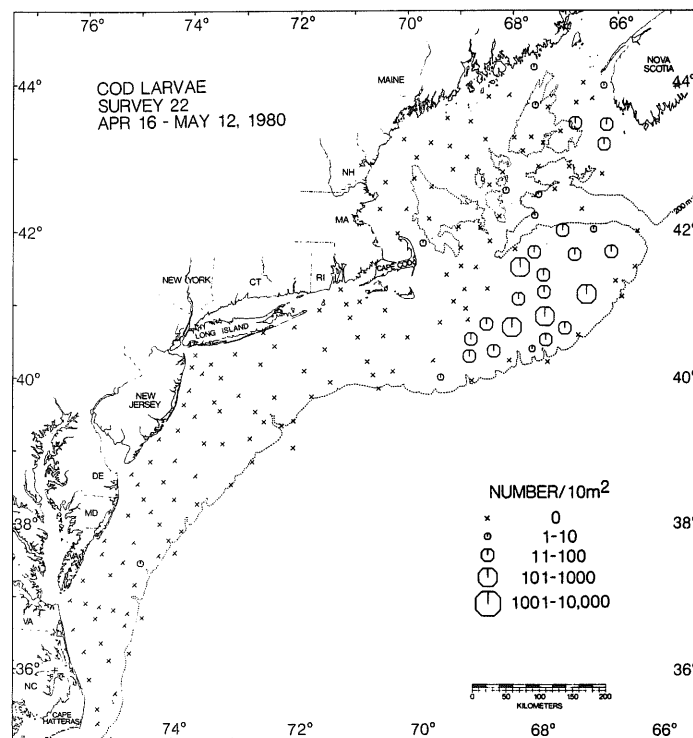
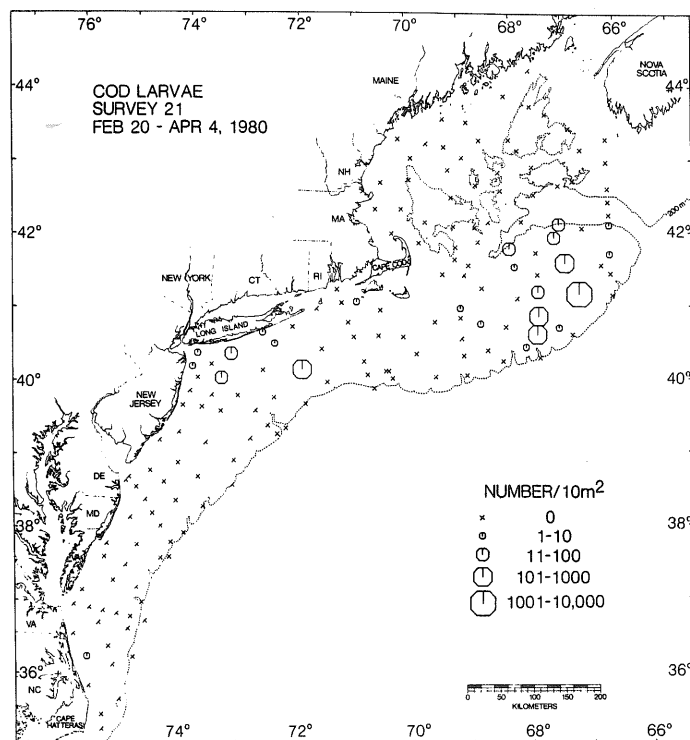
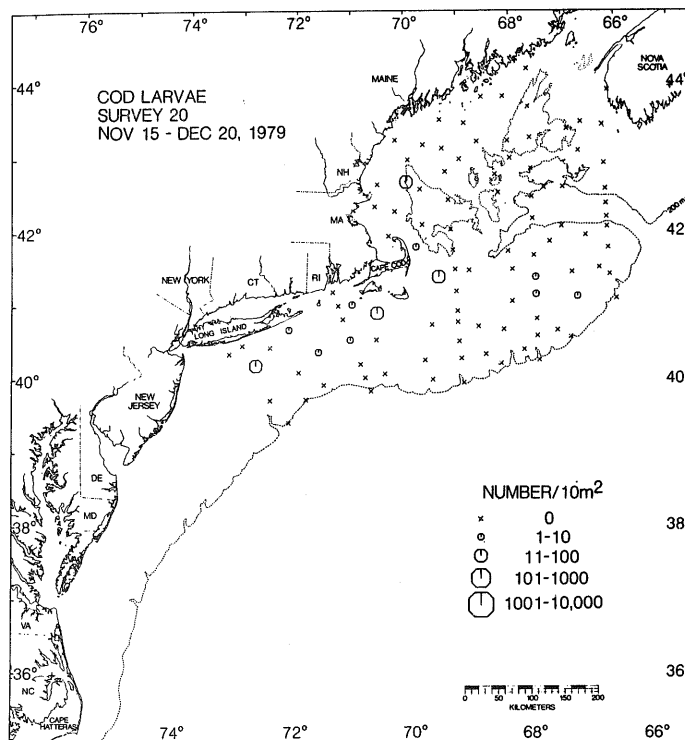


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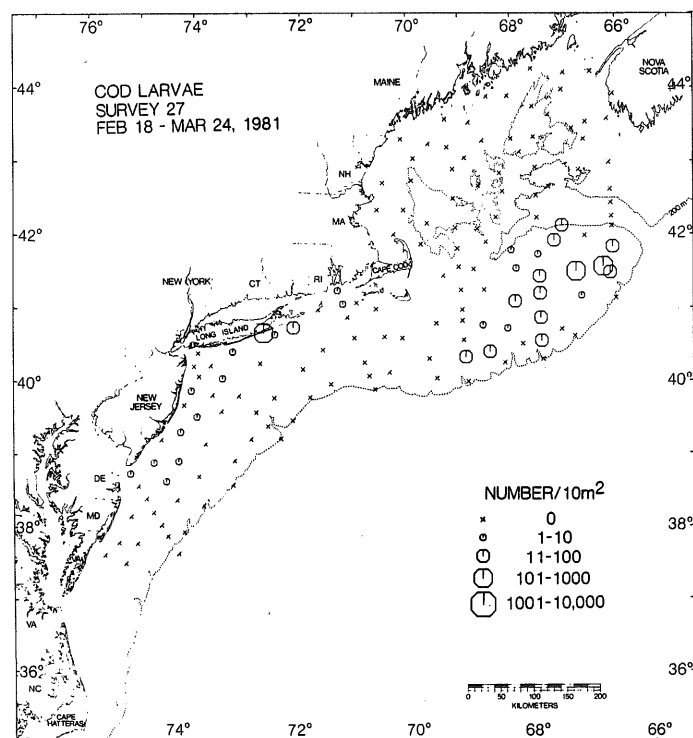
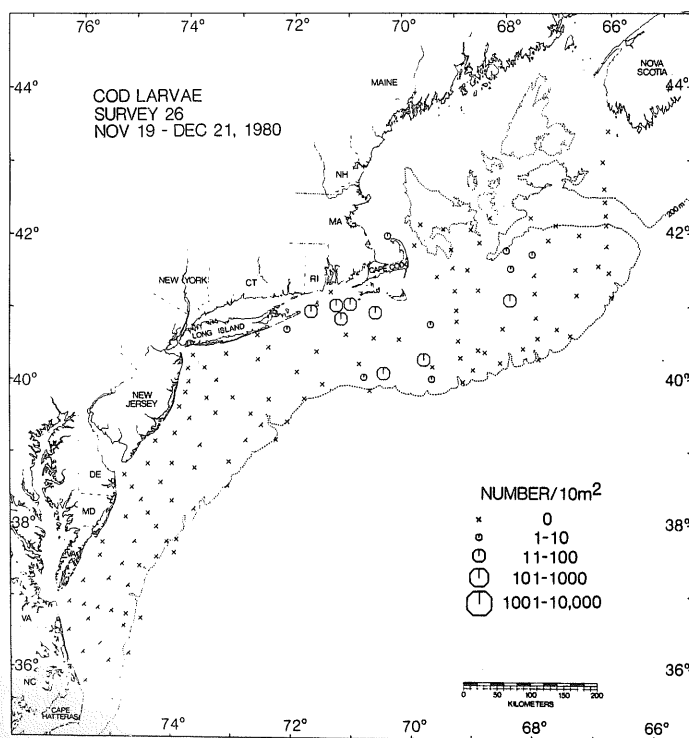
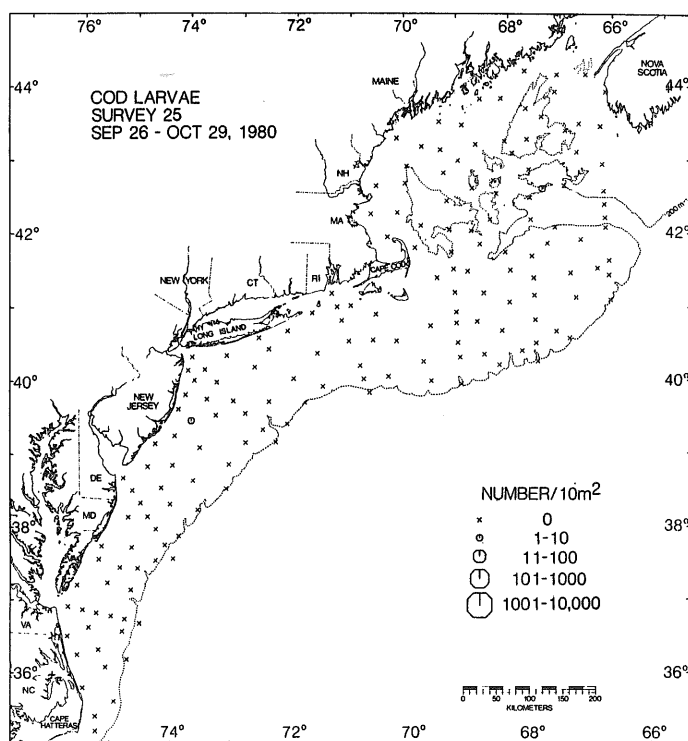
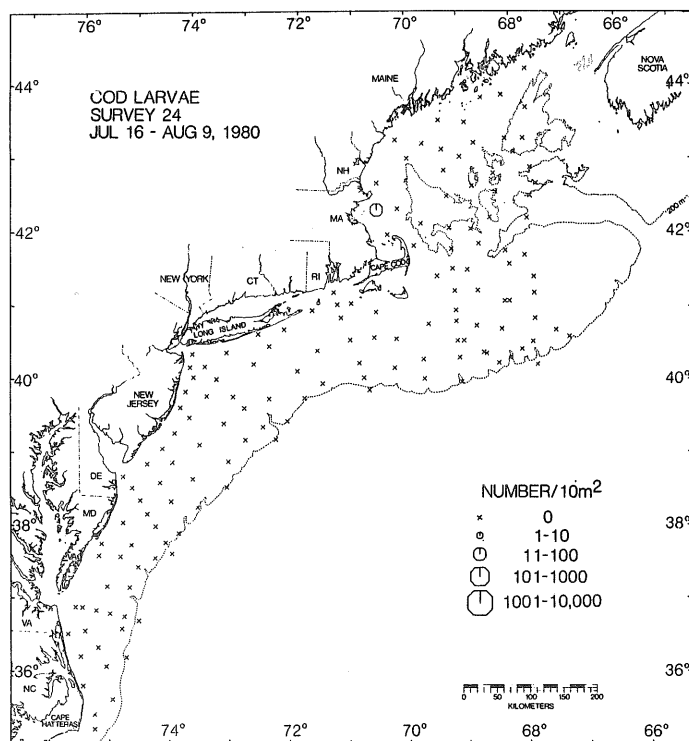


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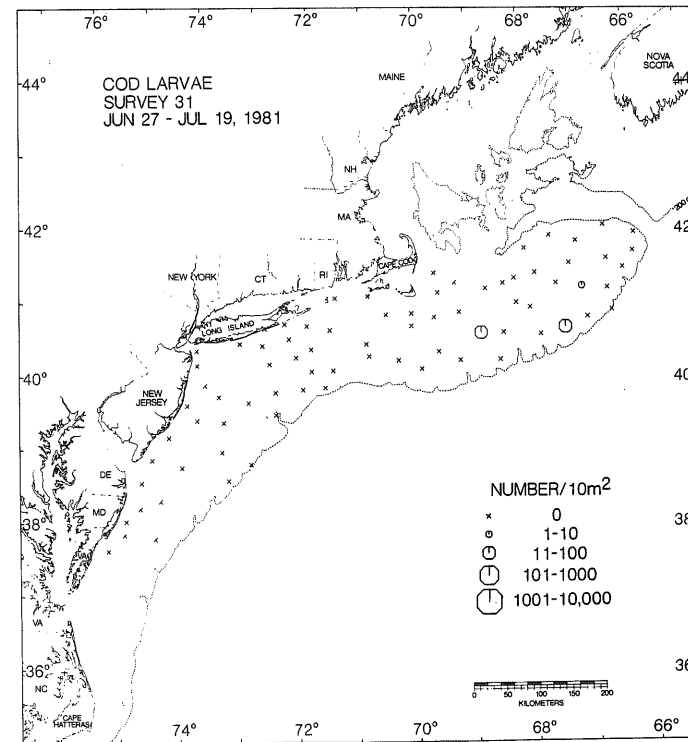
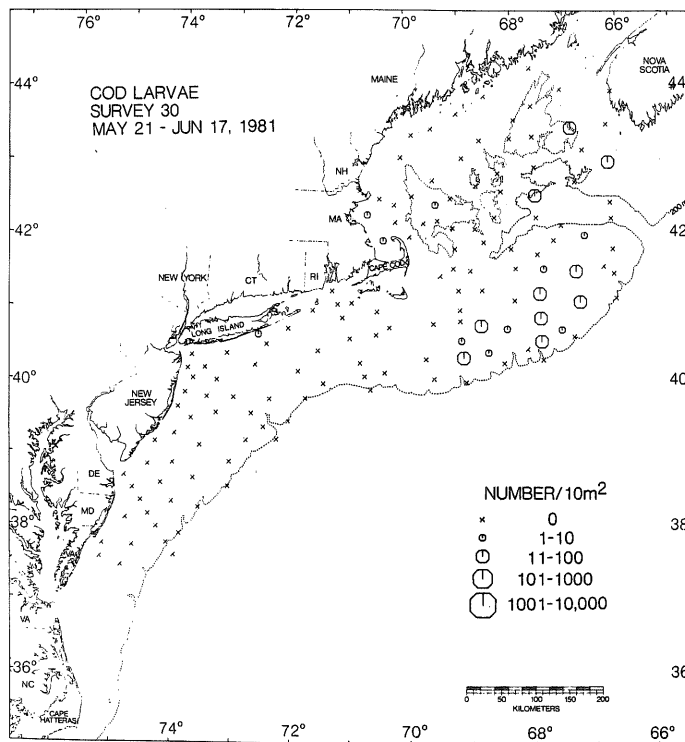
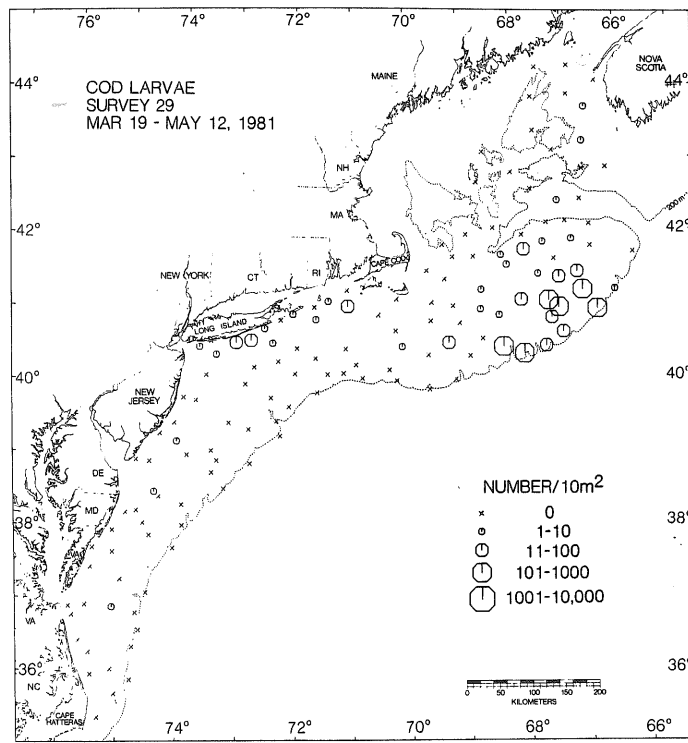
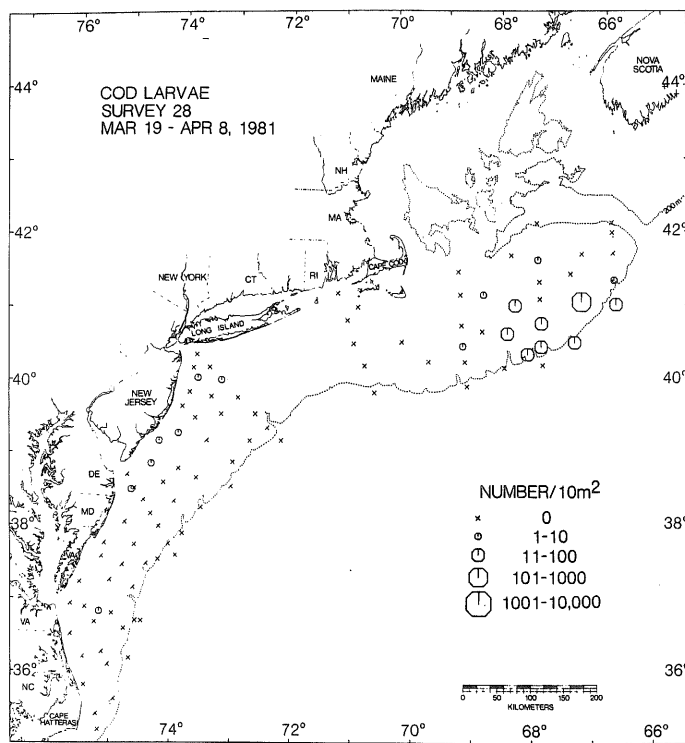


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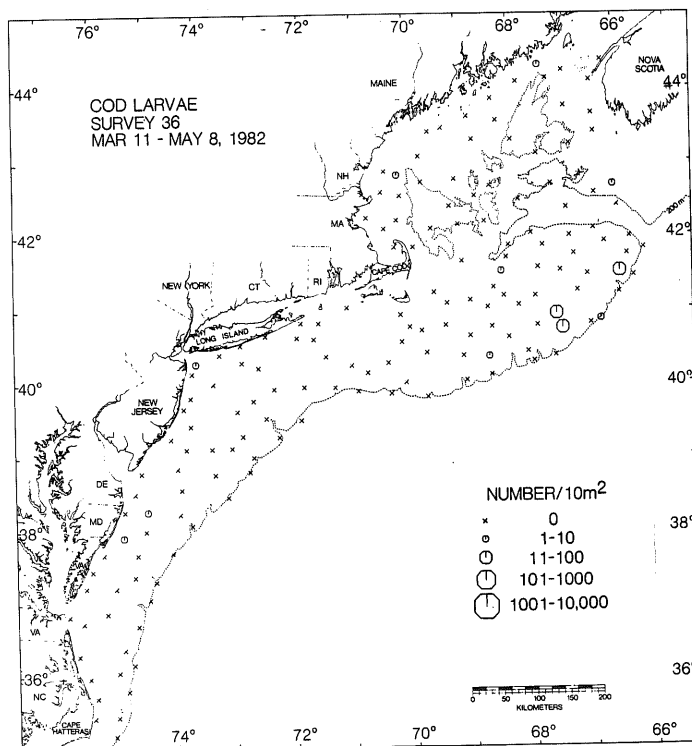
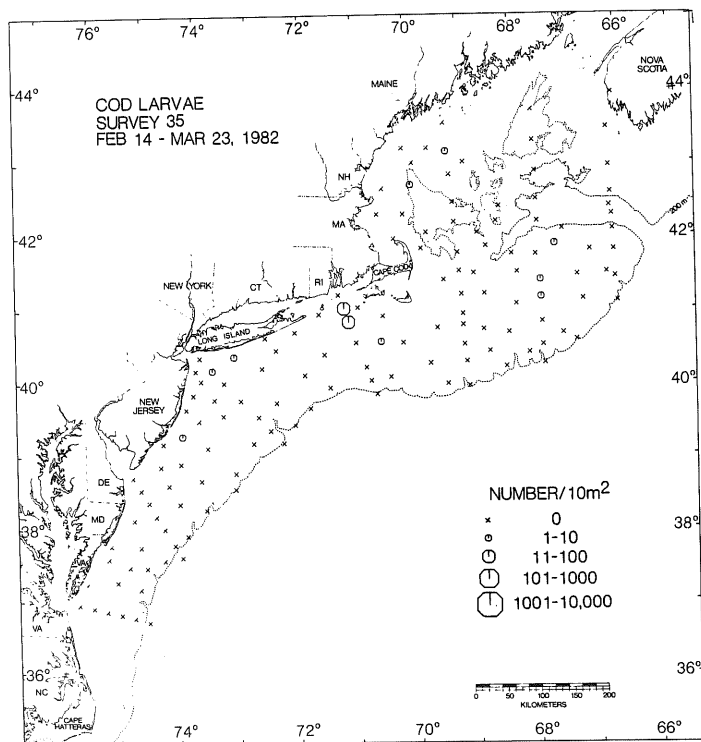
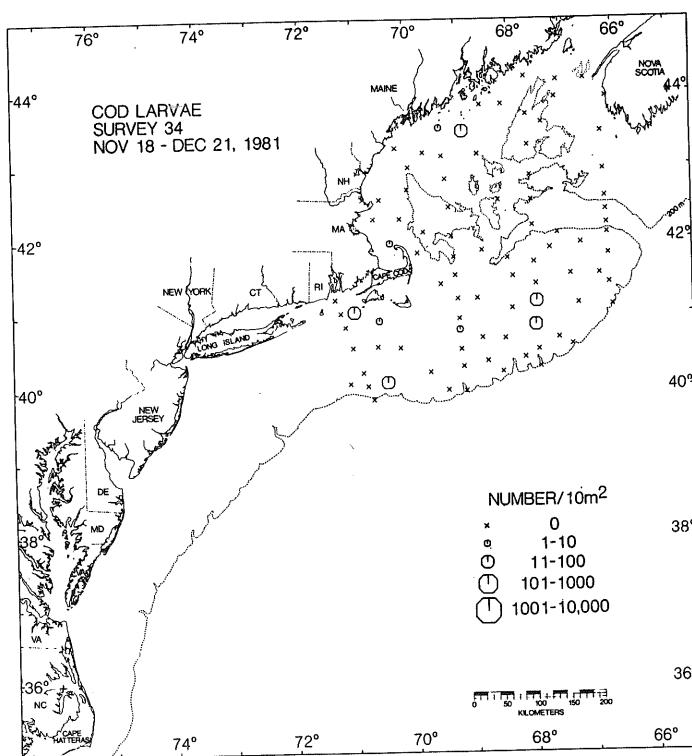
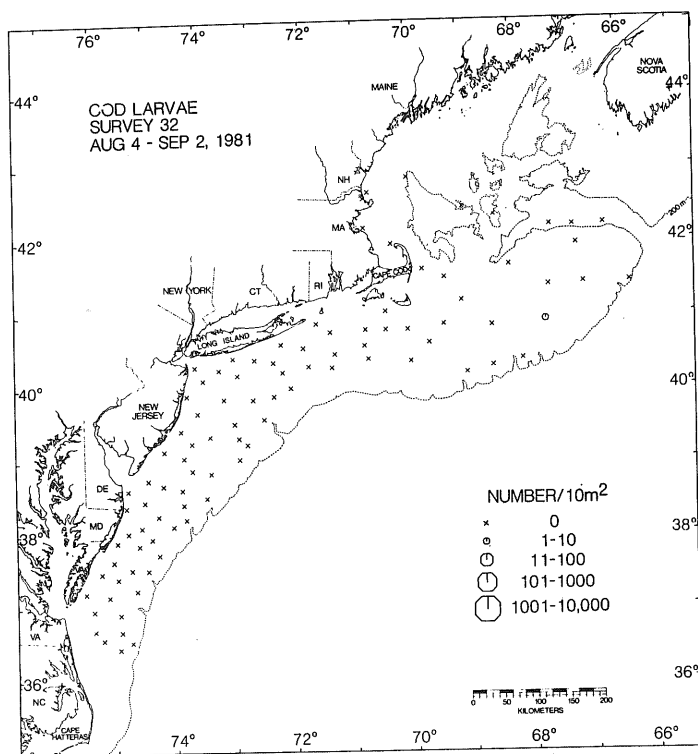


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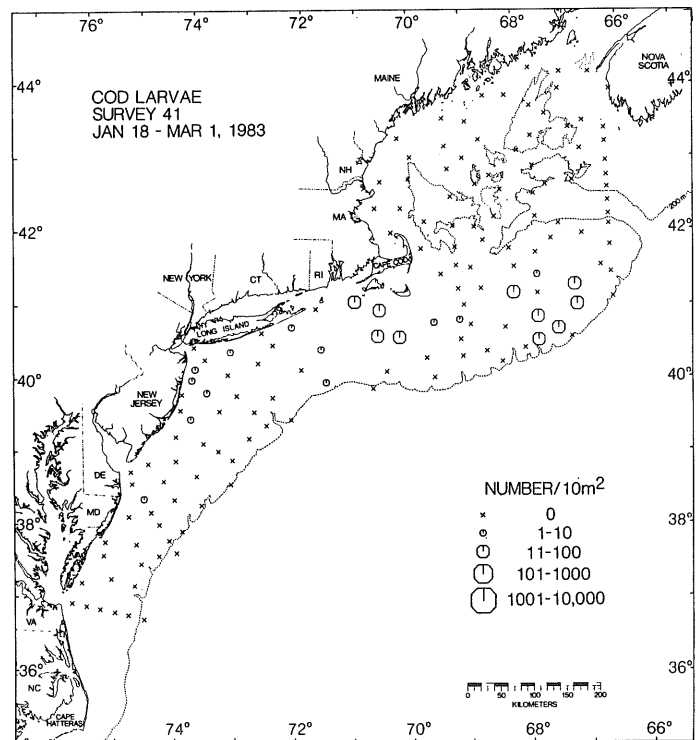
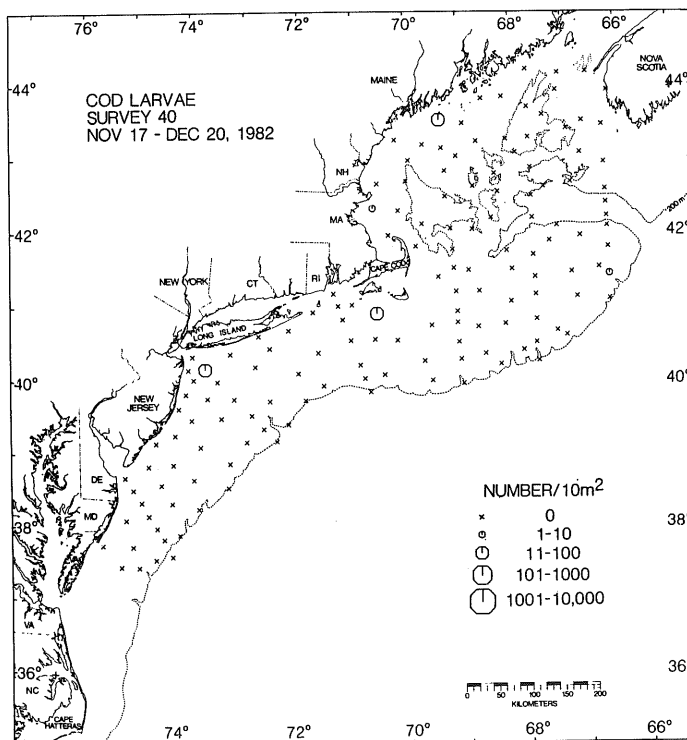
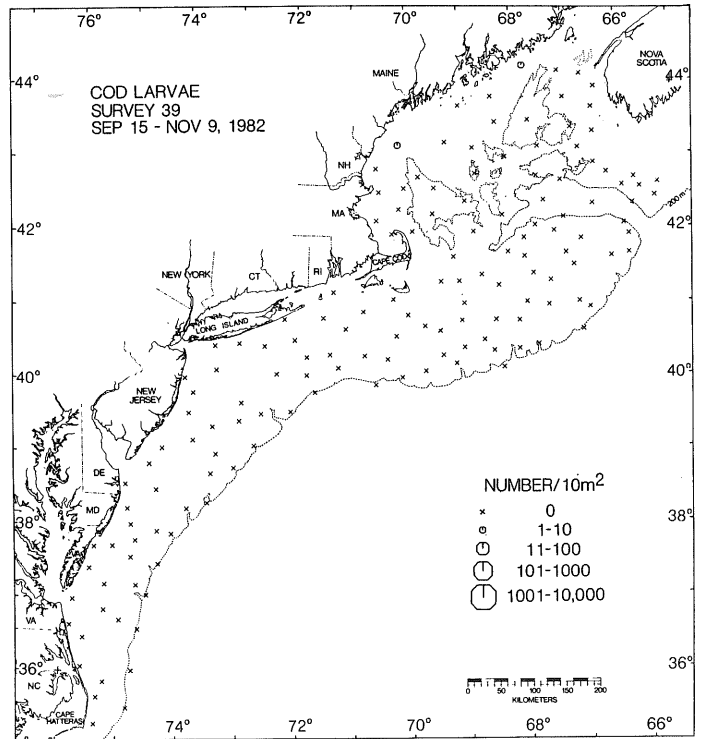
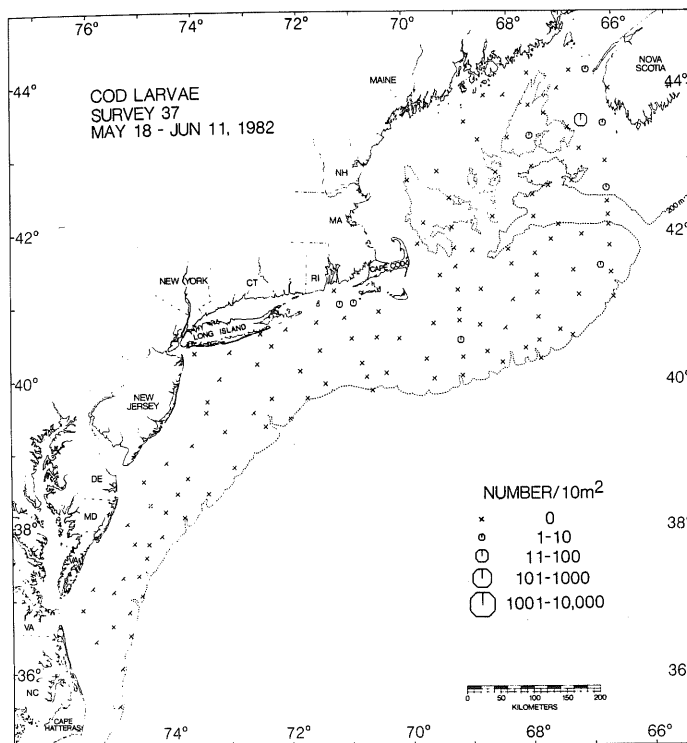


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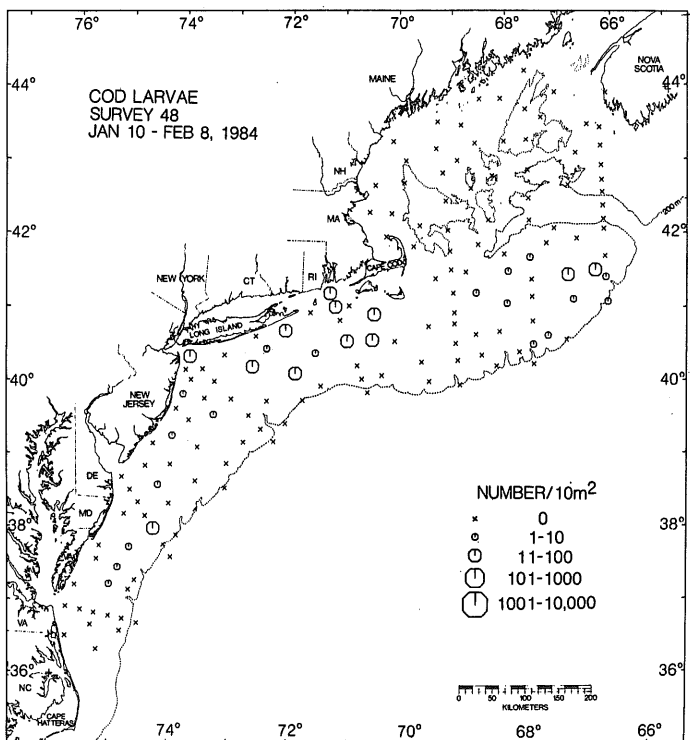
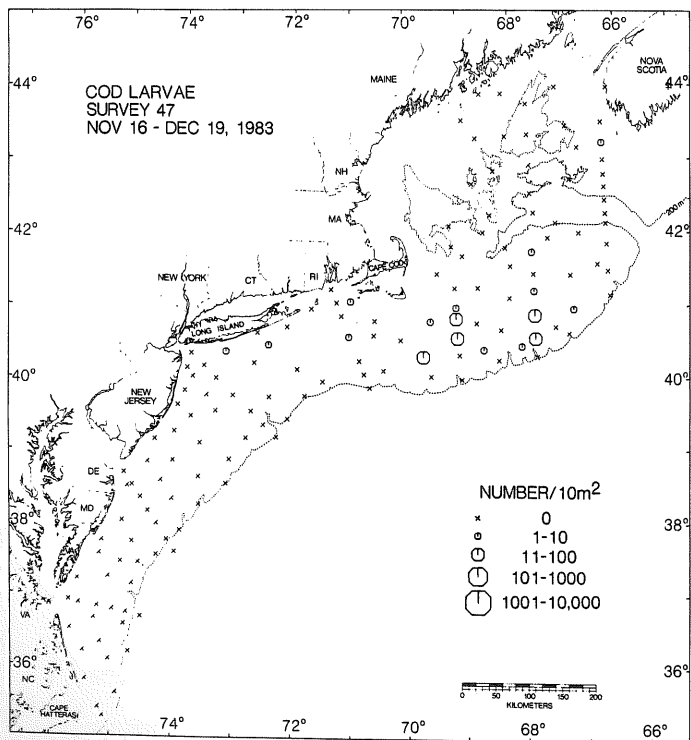
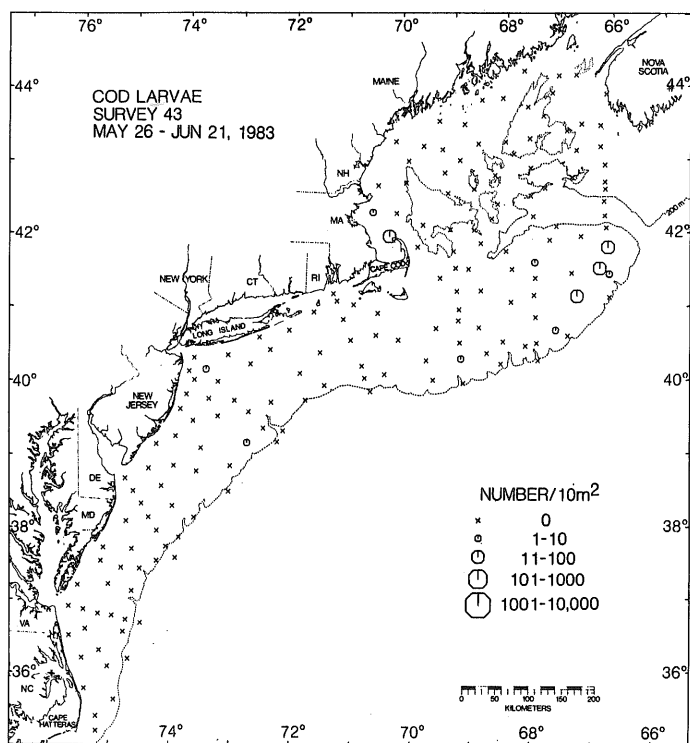
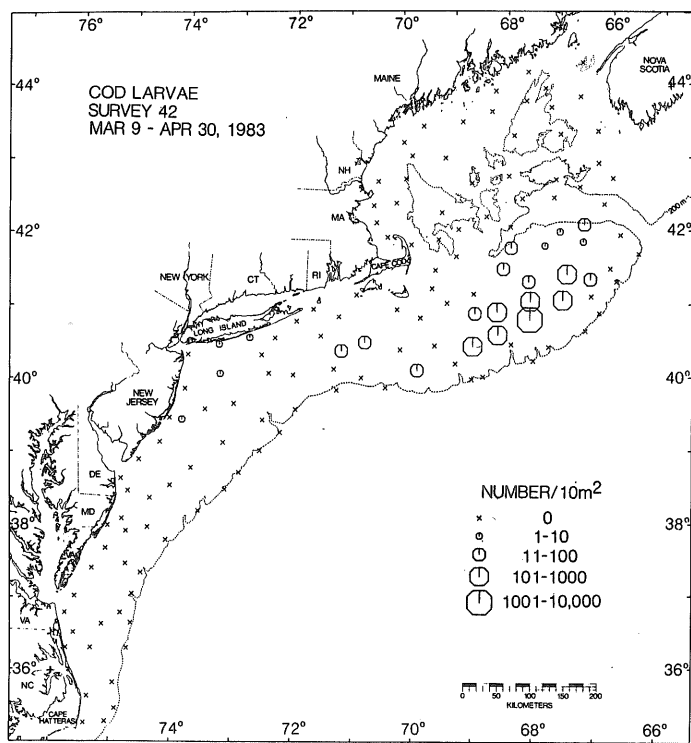


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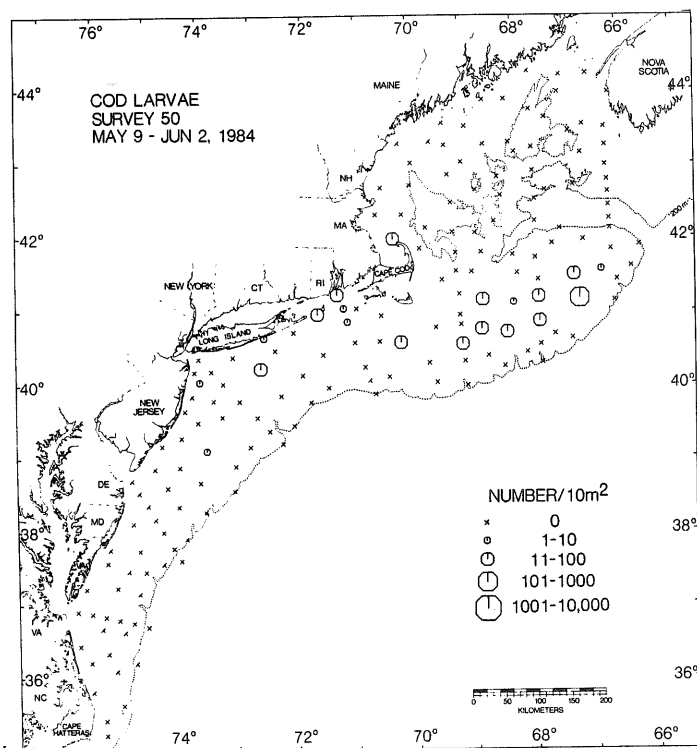
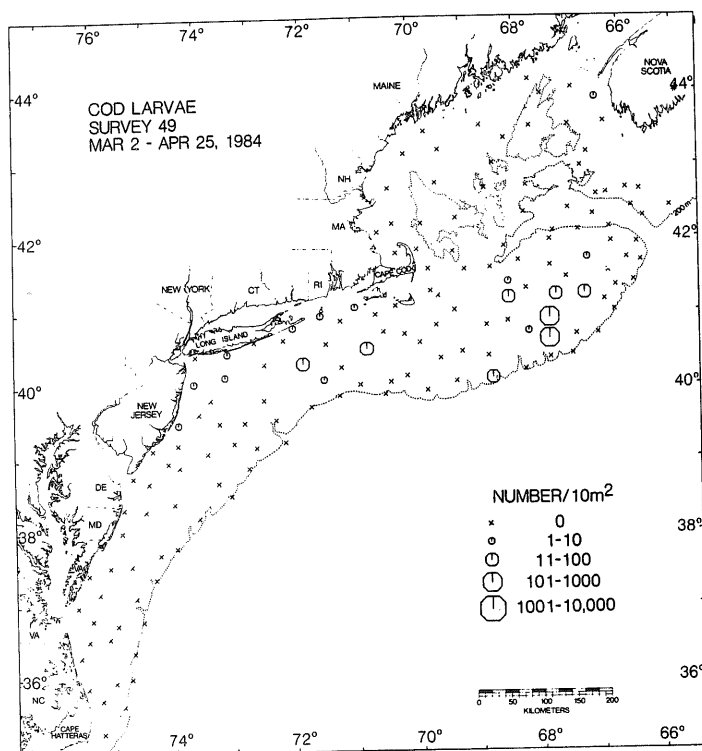


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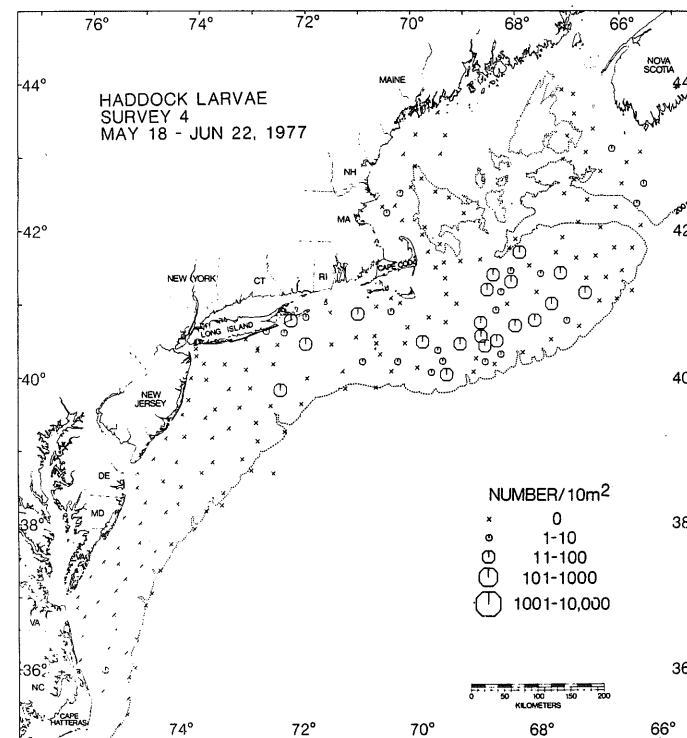
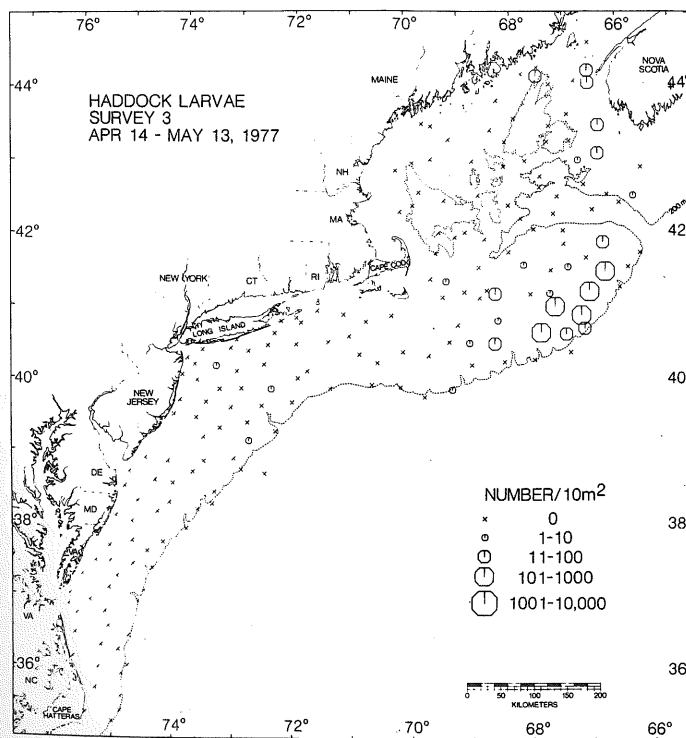
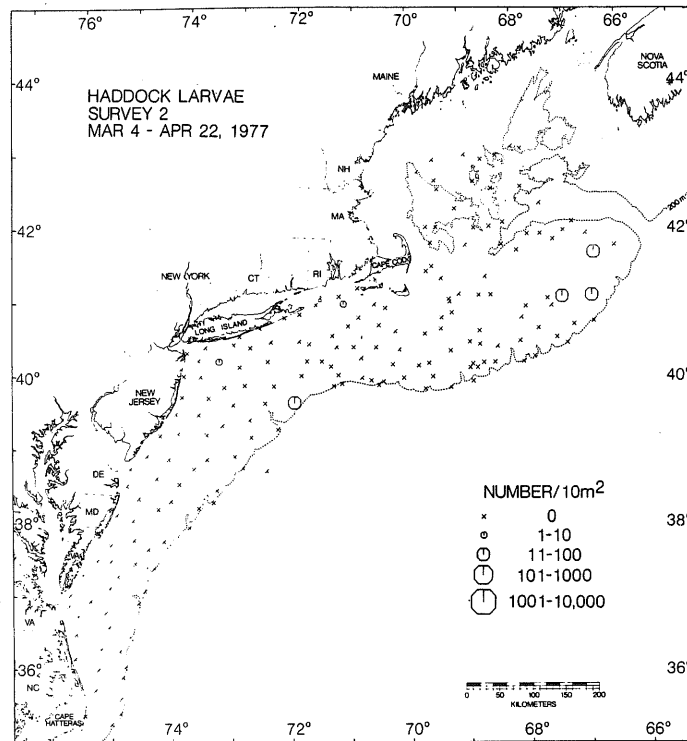
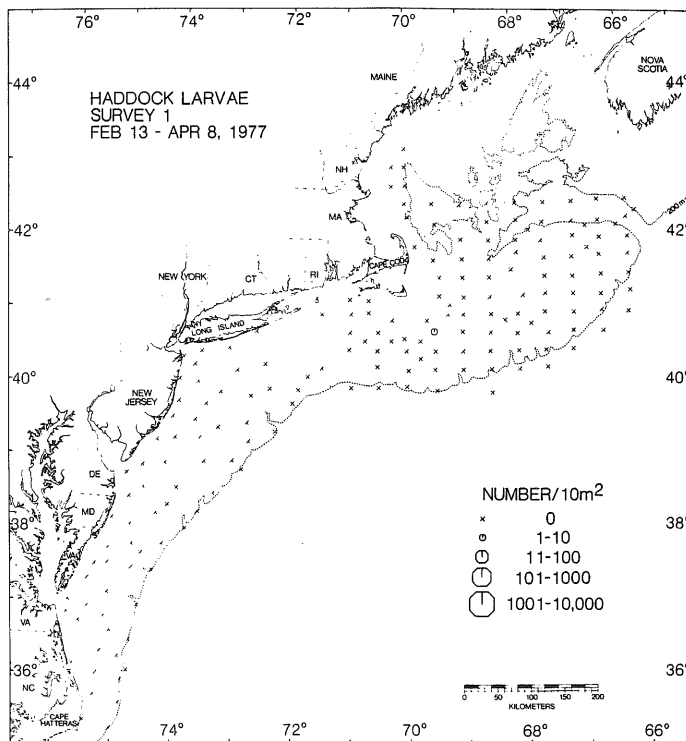


Figure 9. Distribution and abundance of haddock, Melanogrammus aeglefinus, larvae off northeastern United States, winter 1977 through spring 1984.

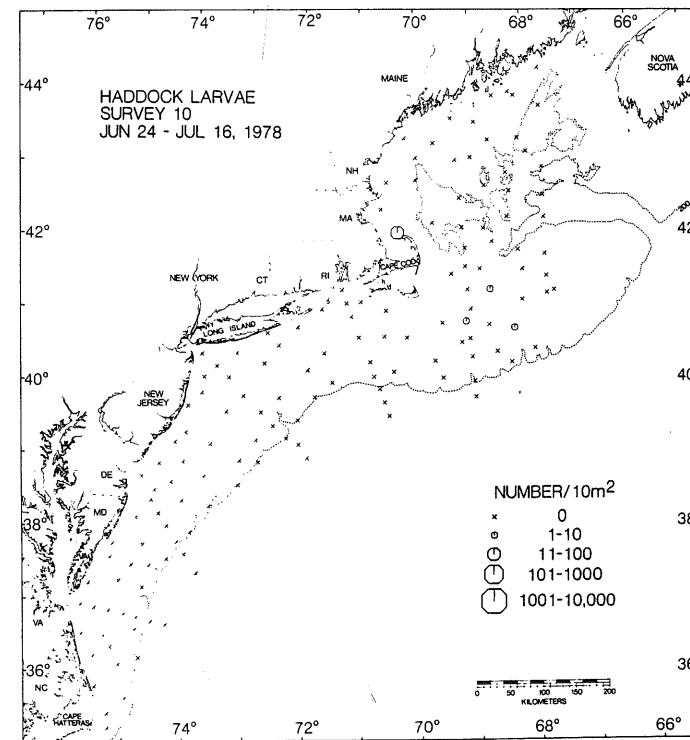
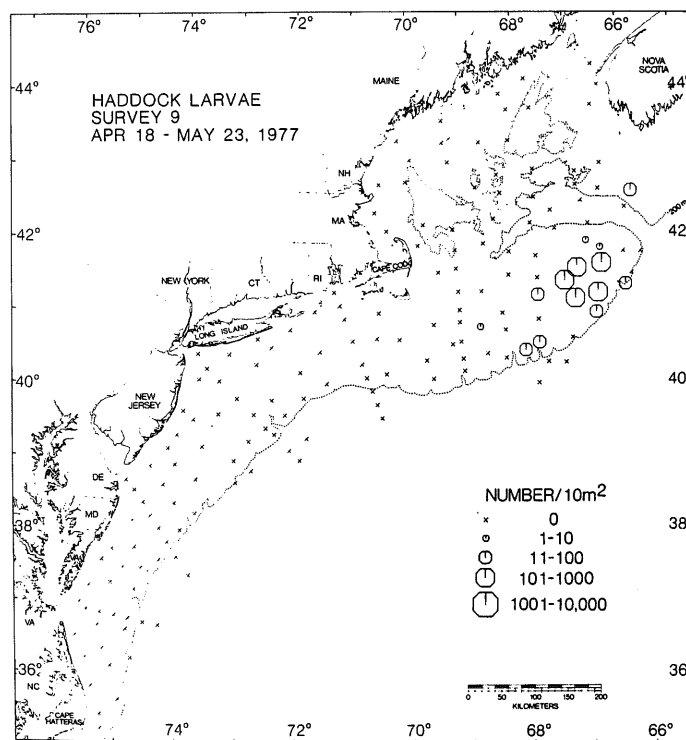
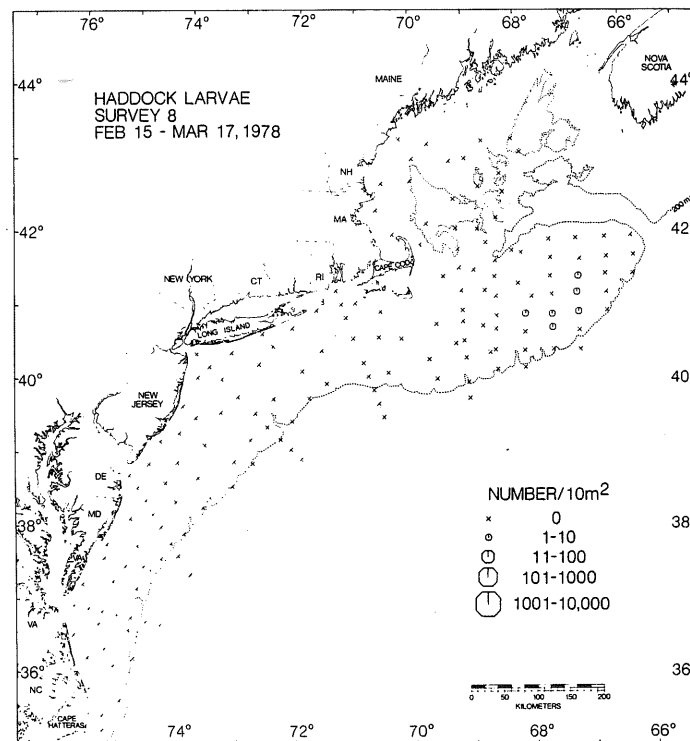
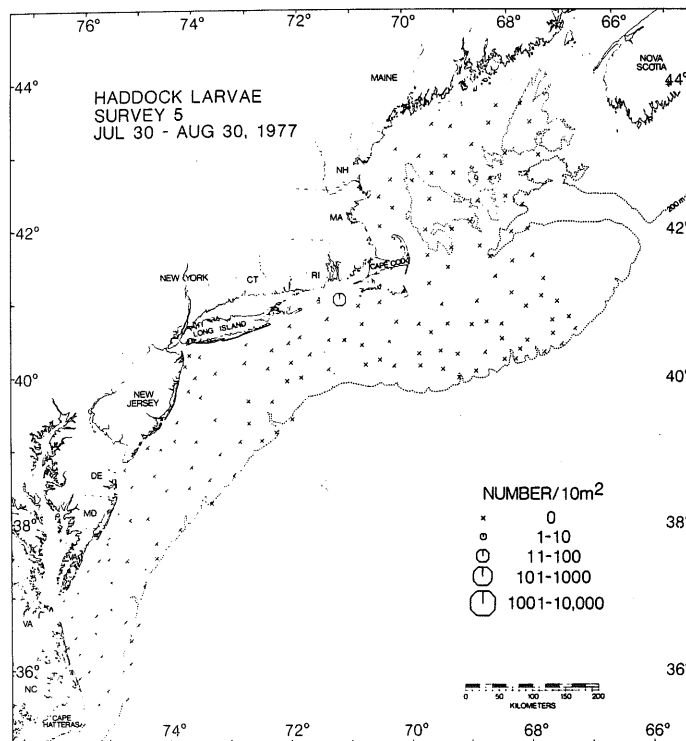


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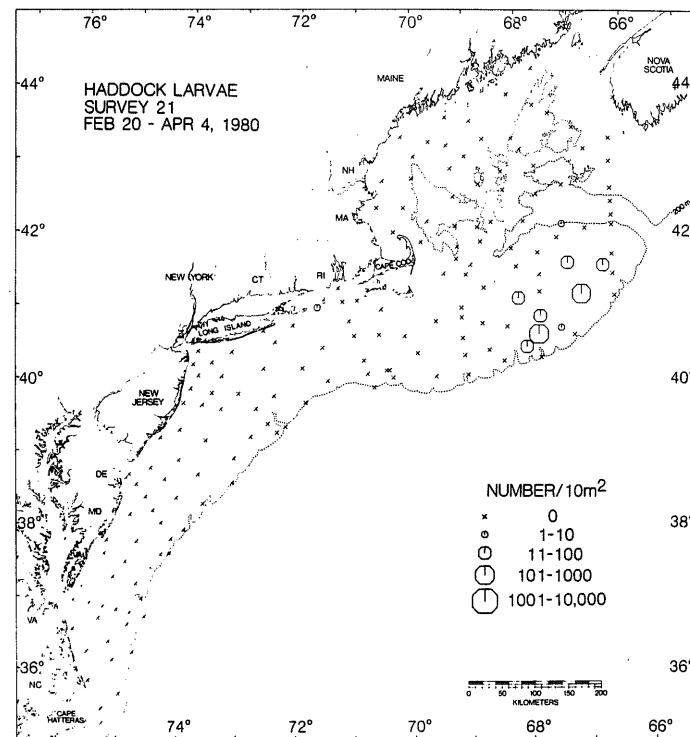
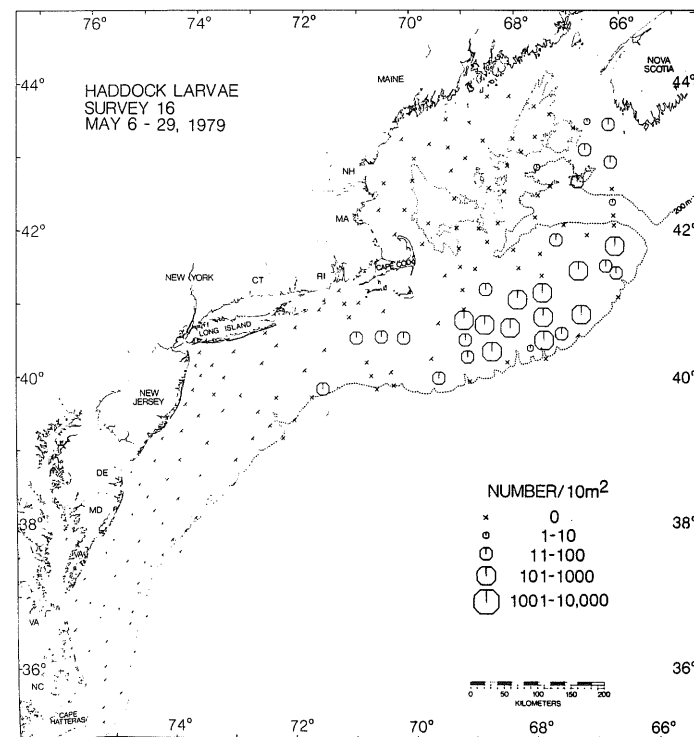
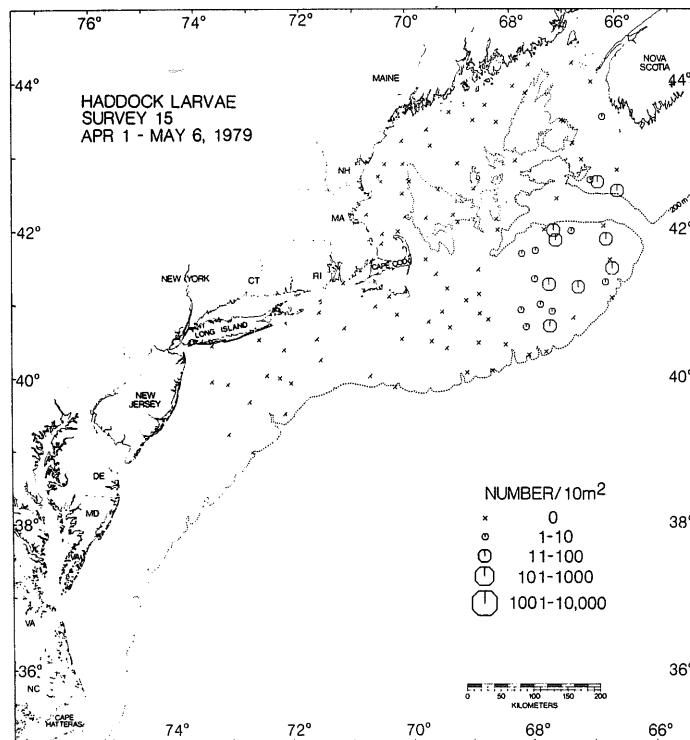
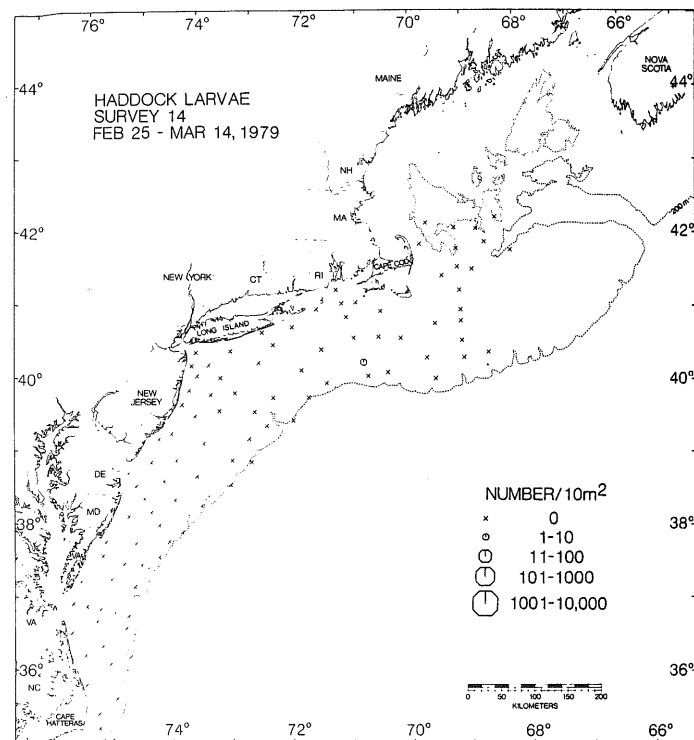


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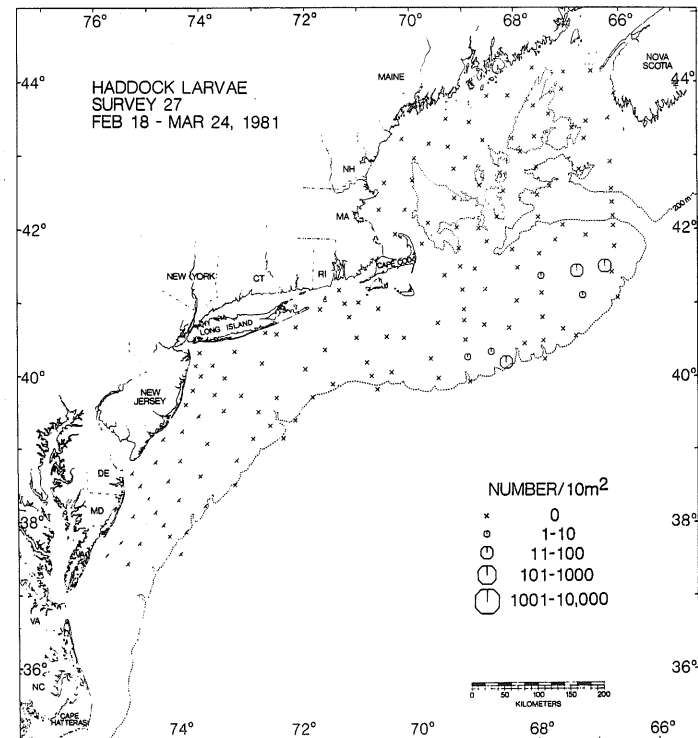
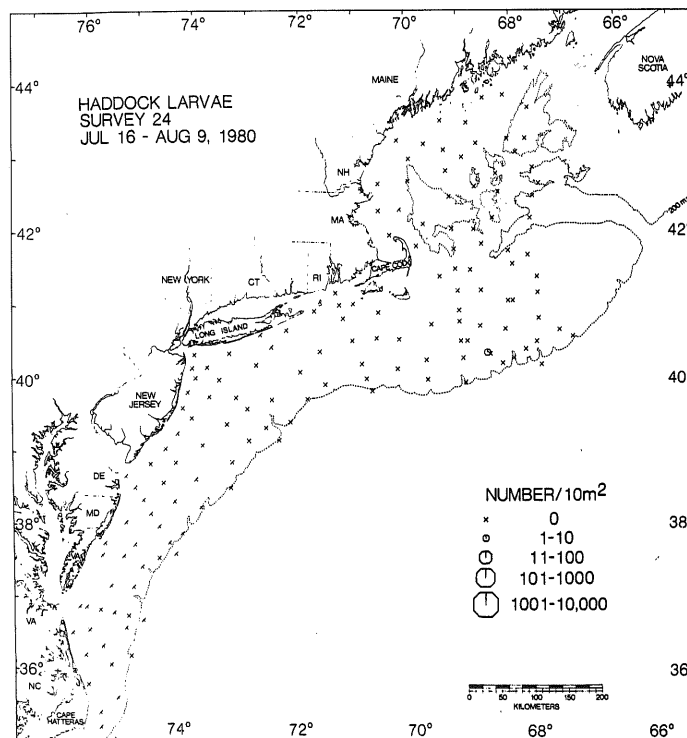
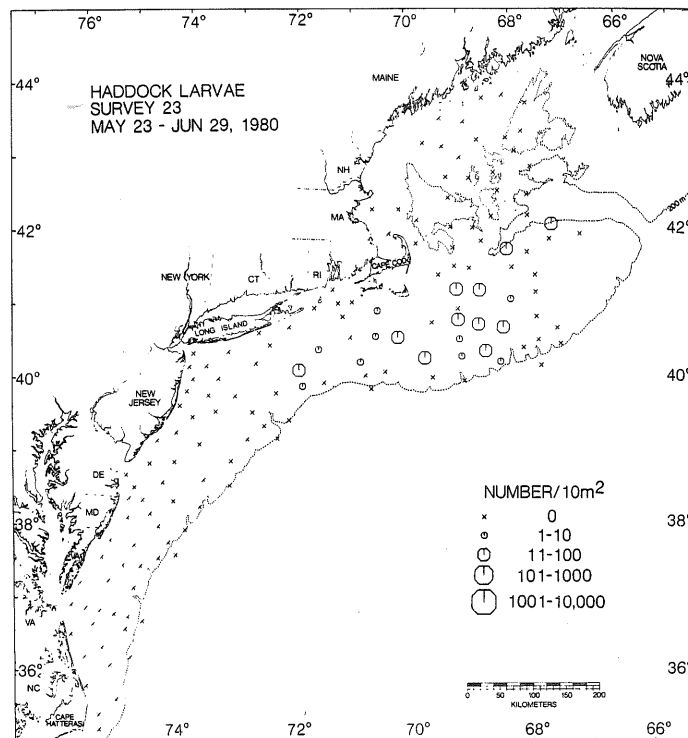
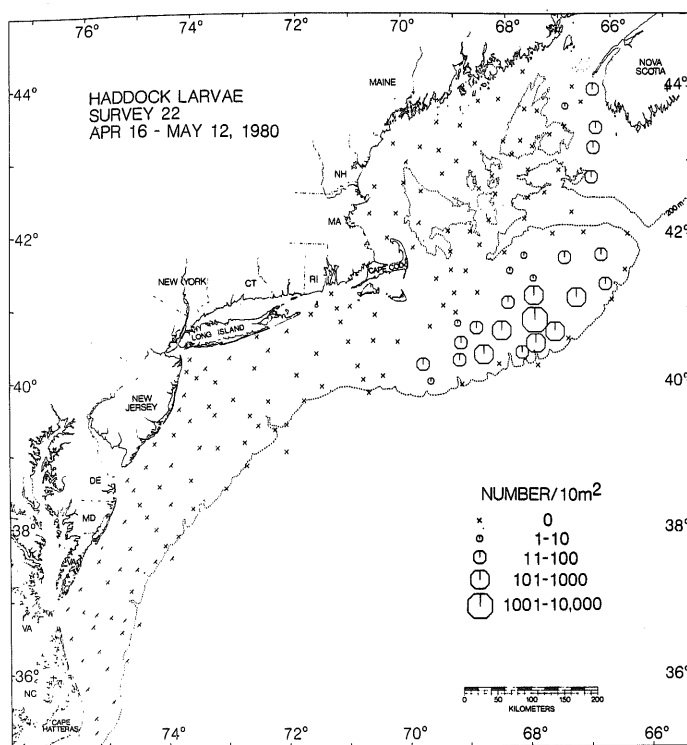


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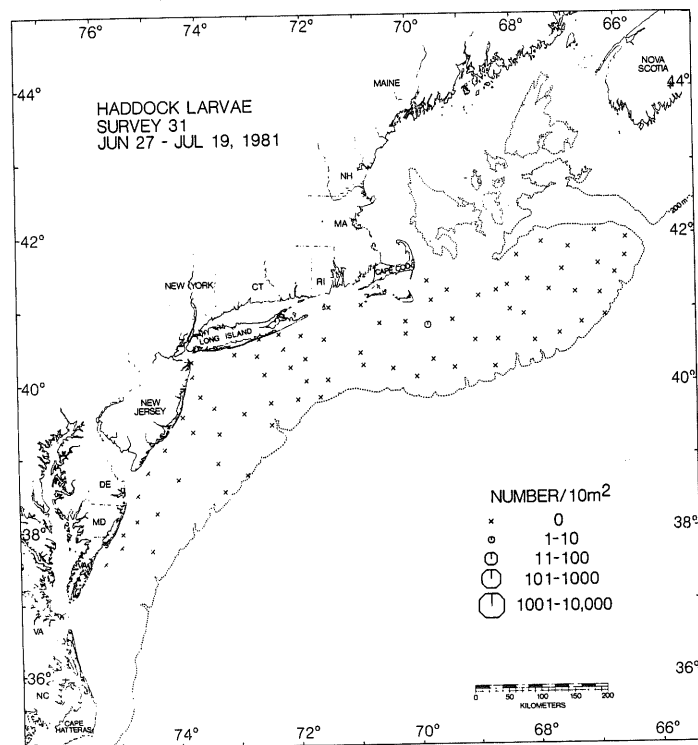
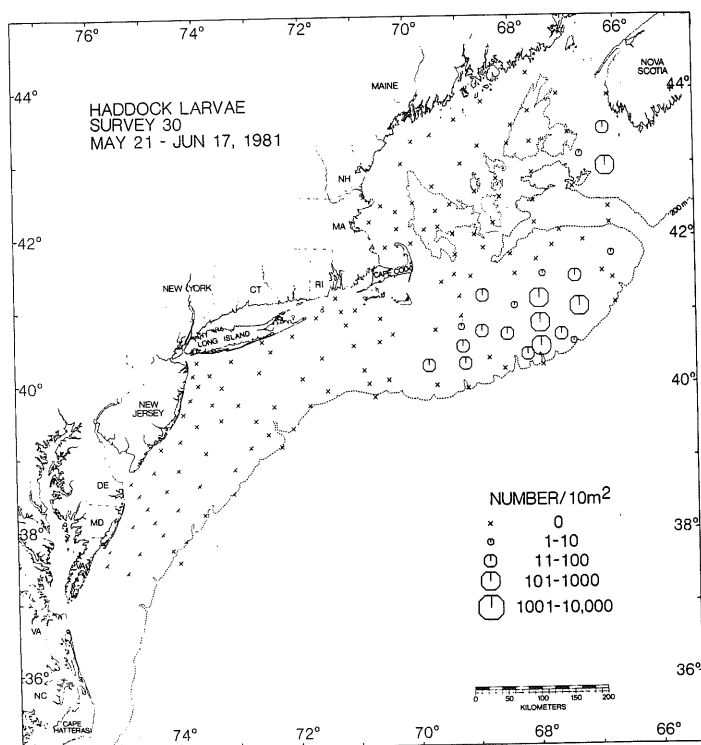
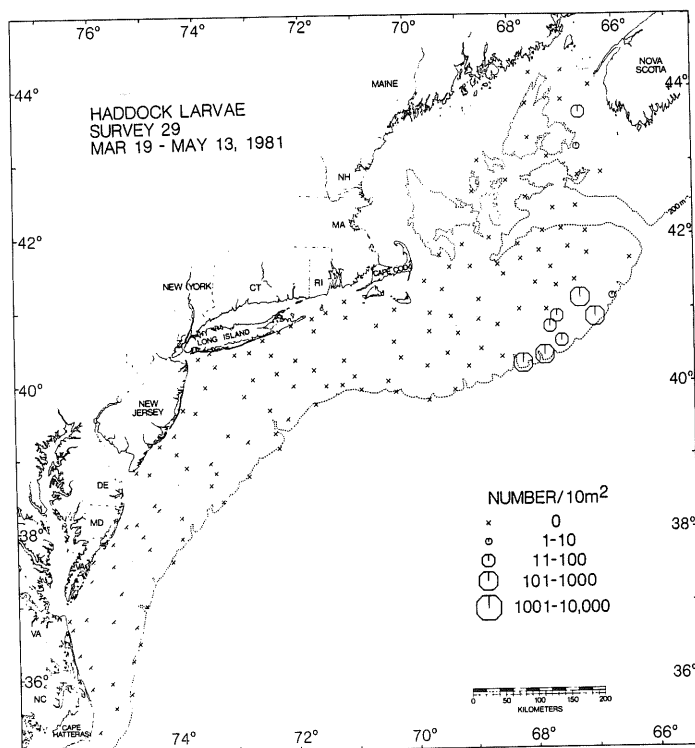
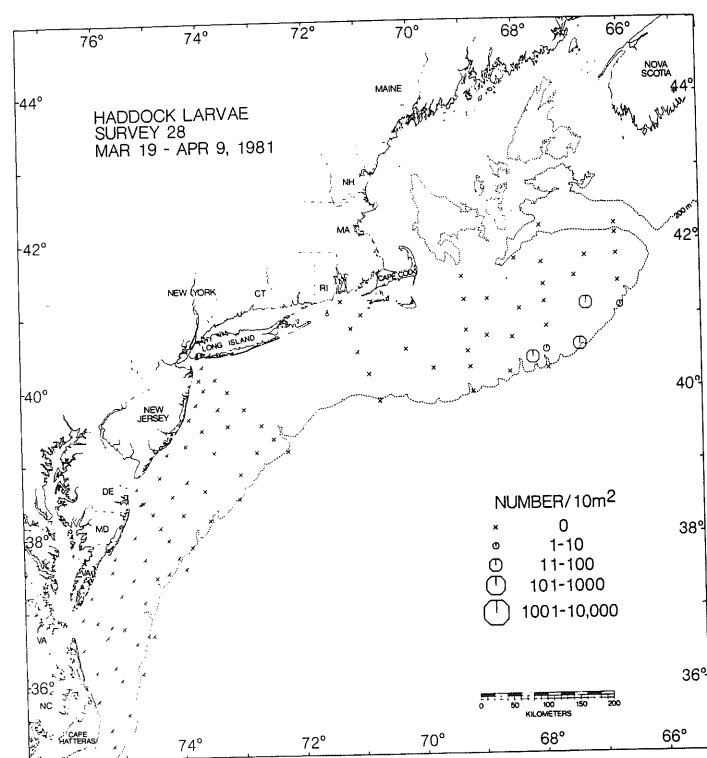


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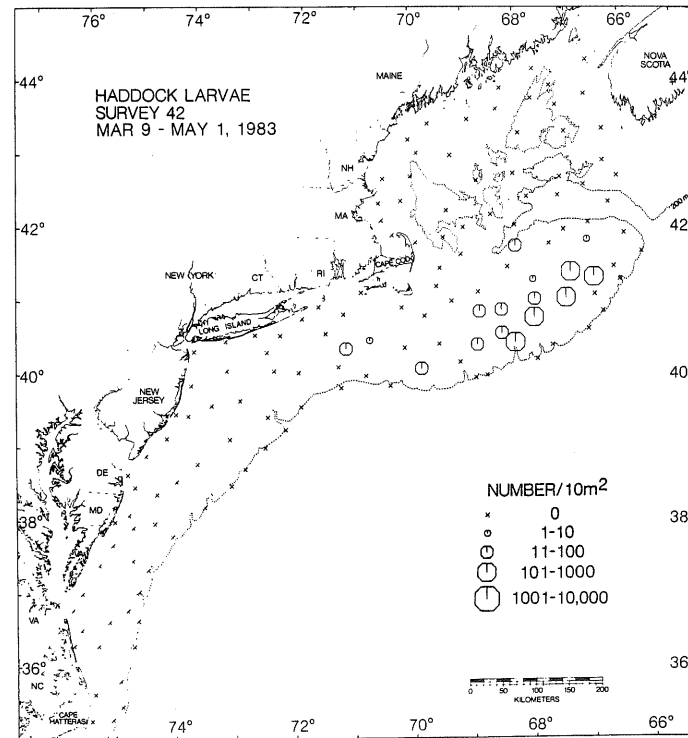
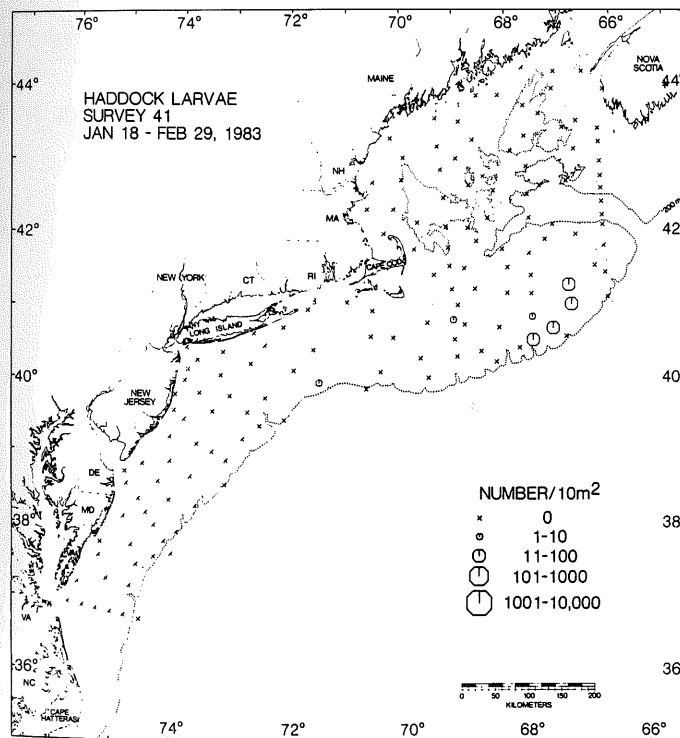
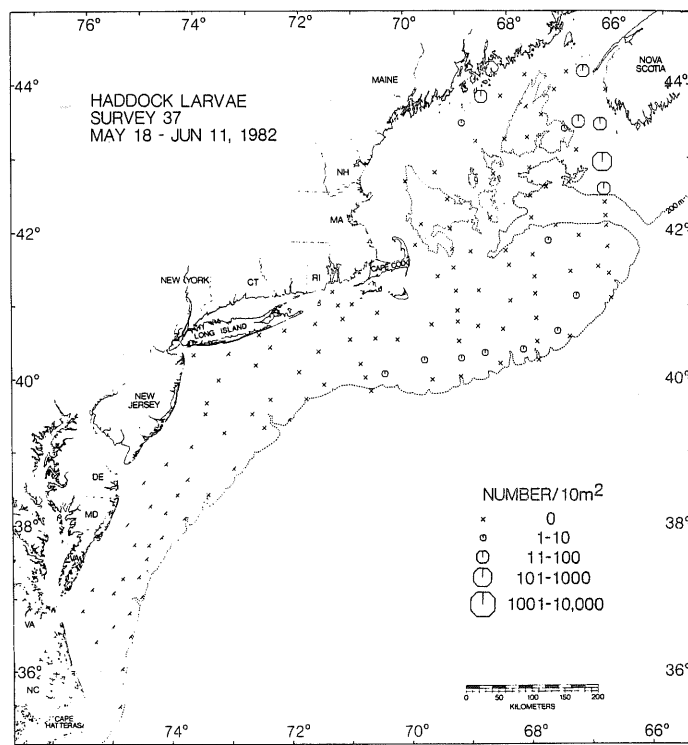
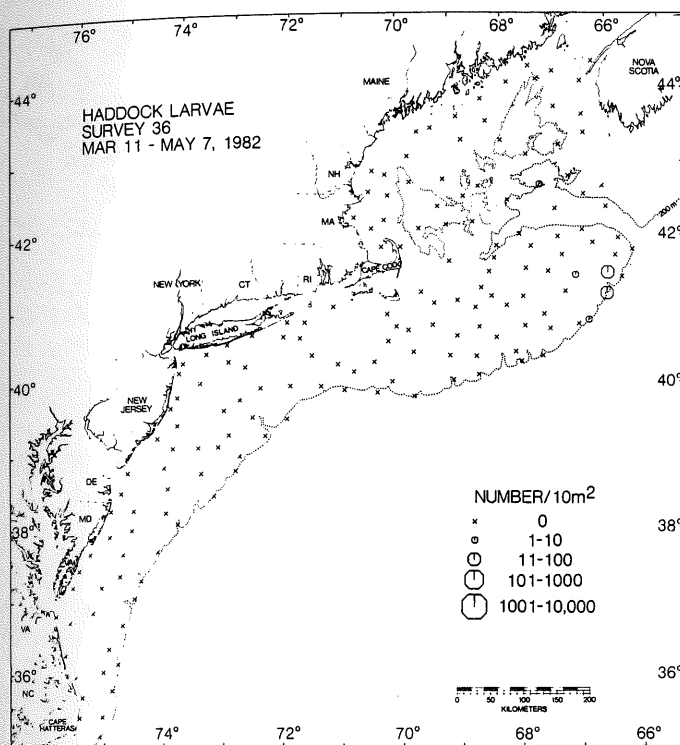


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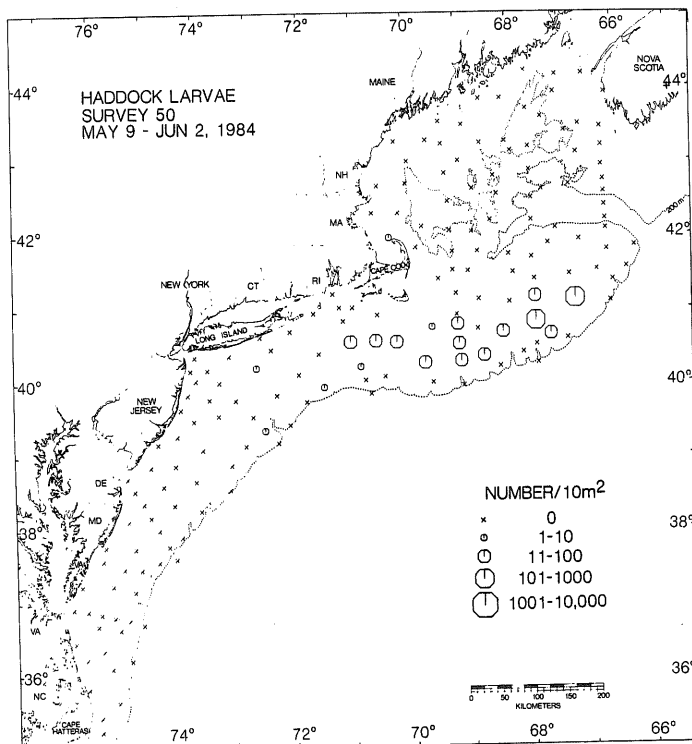
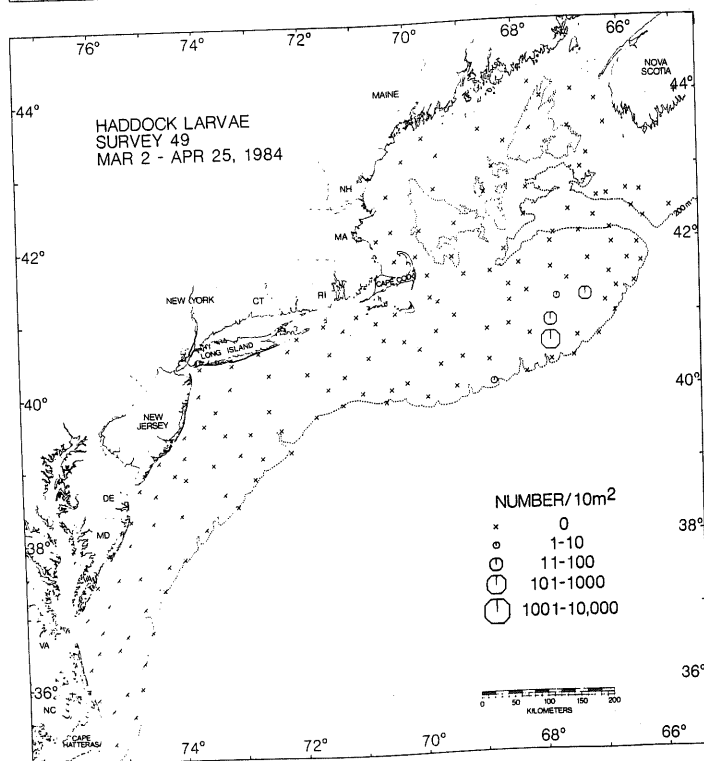
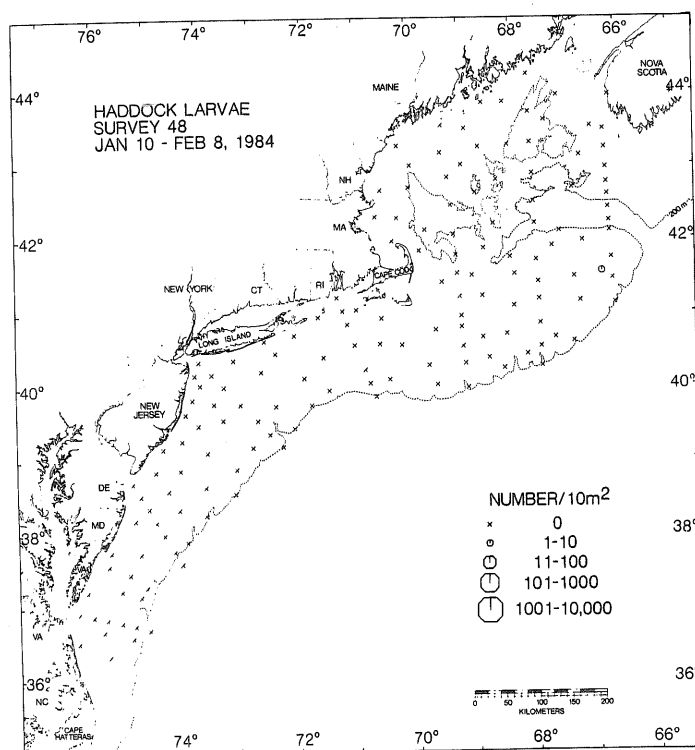
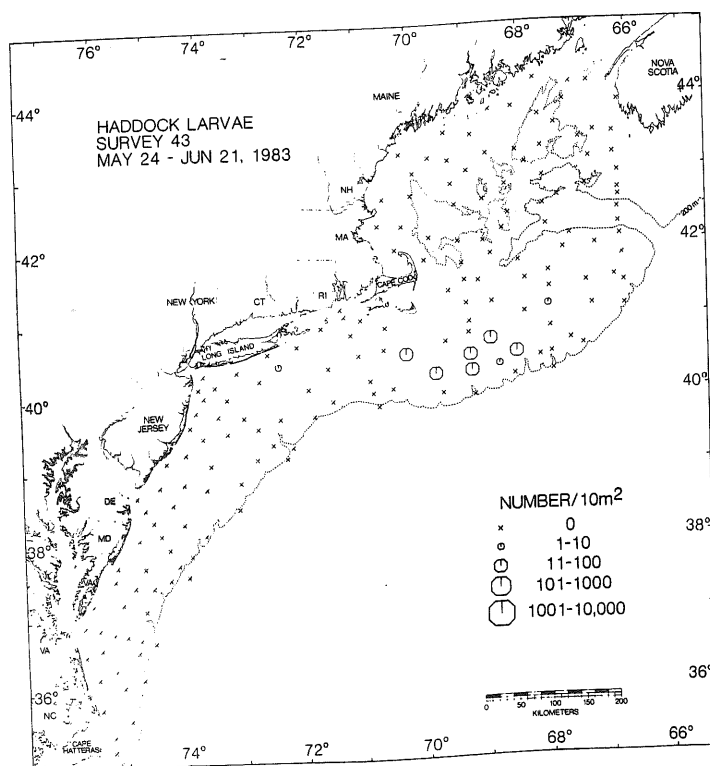


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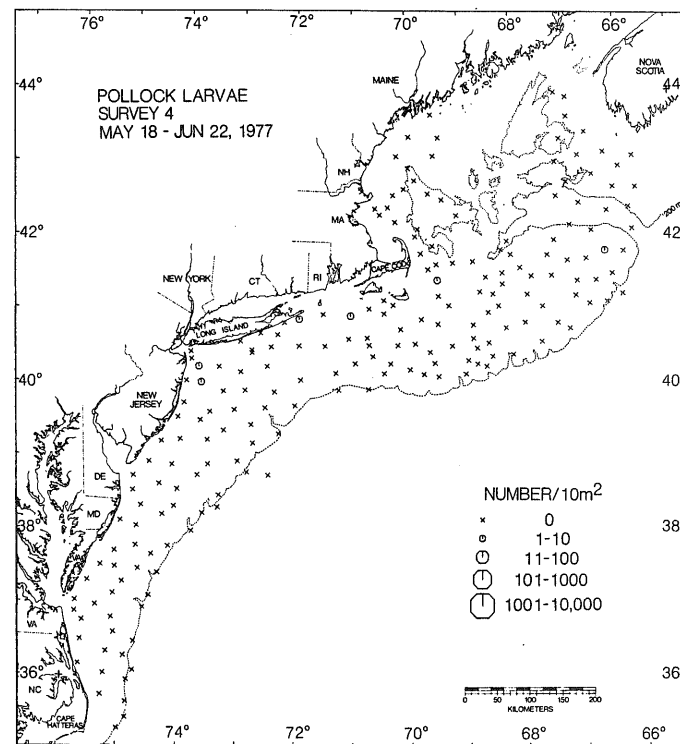
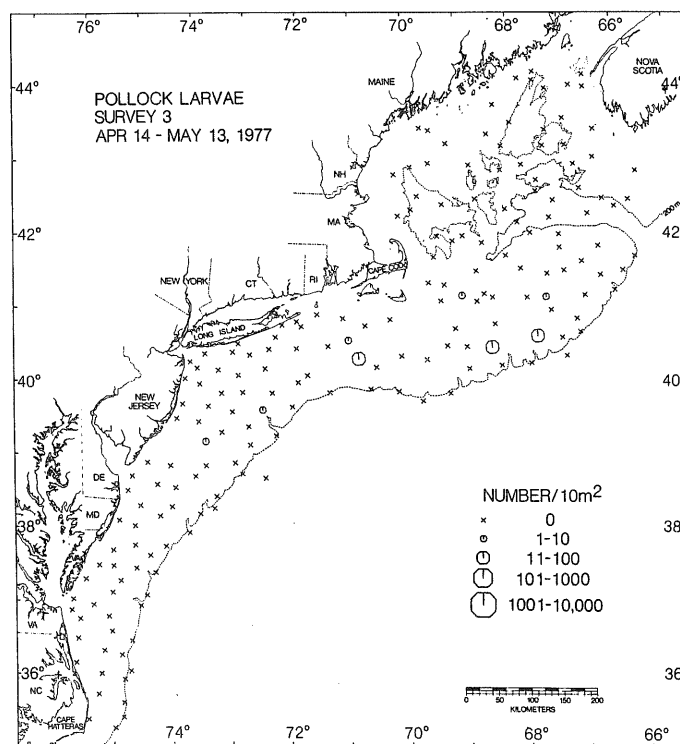
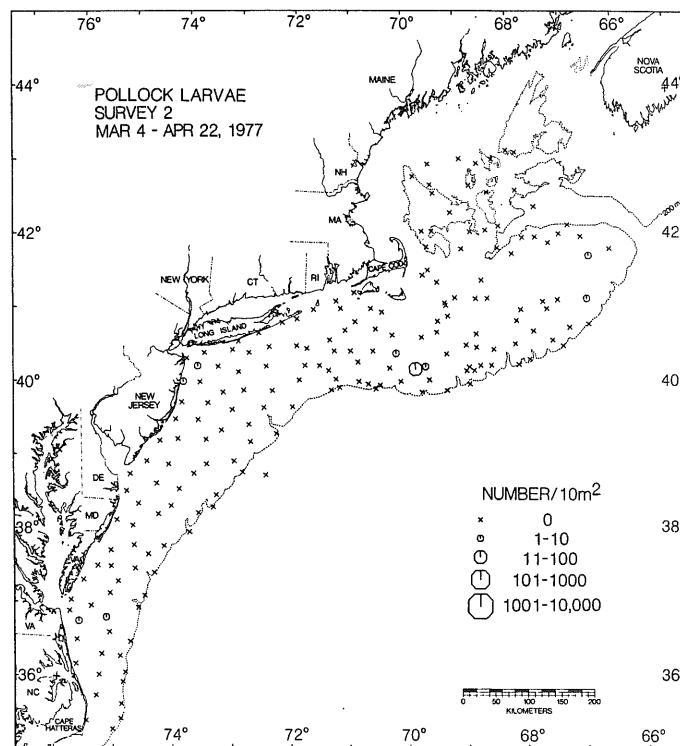
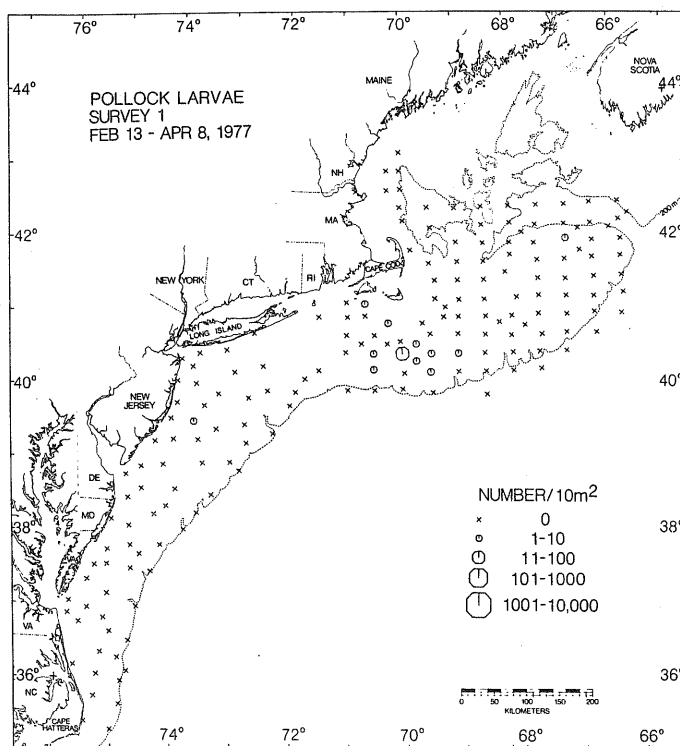


Figure 10. Distribution and abundance of pollock, *Pollachius virens*, larvae off northeastern United States, winter 1977 through spring 1984.

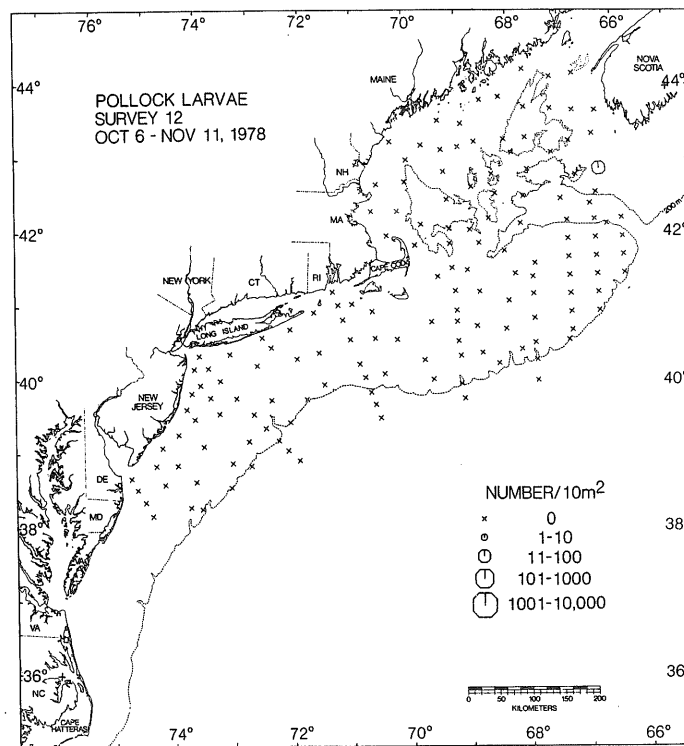
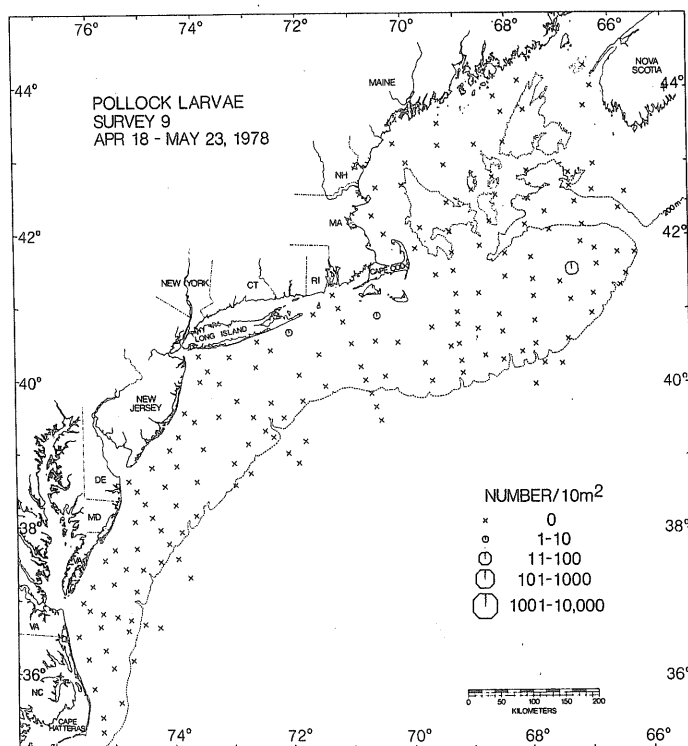
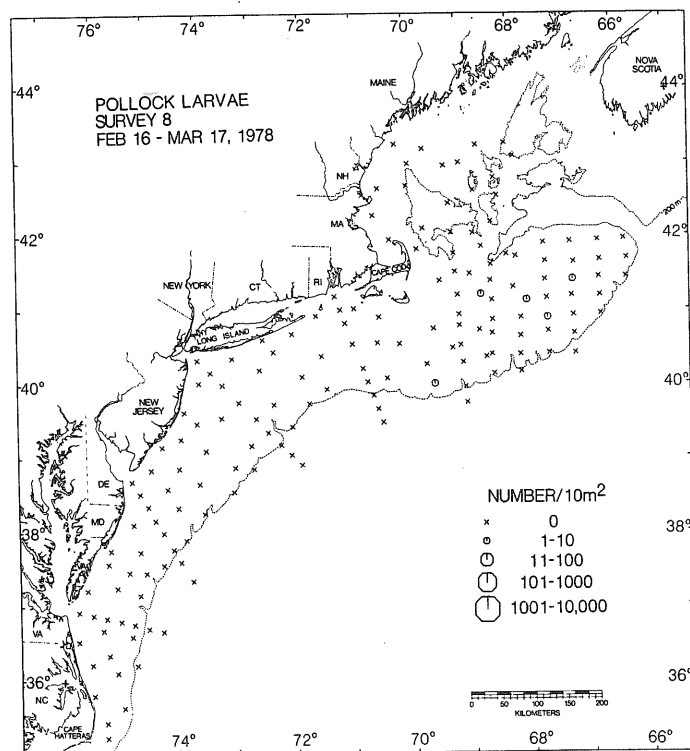
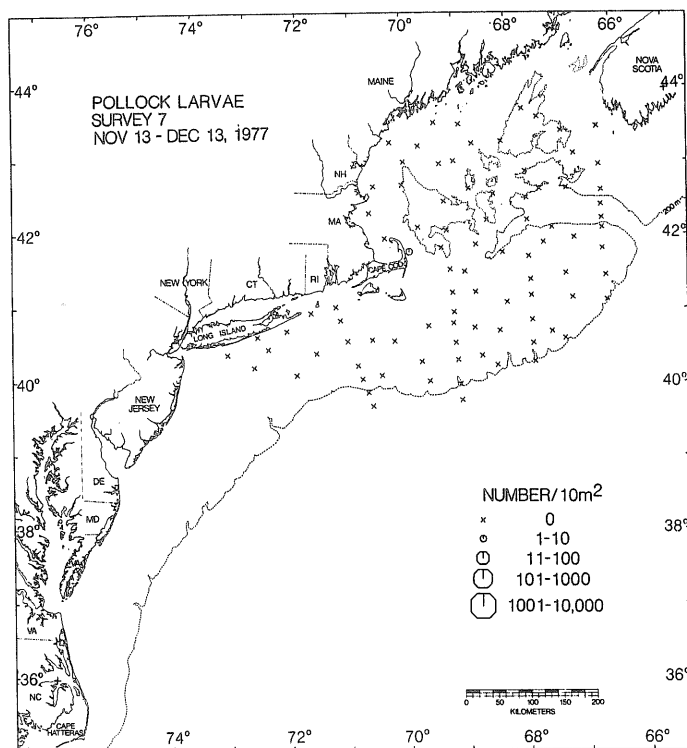


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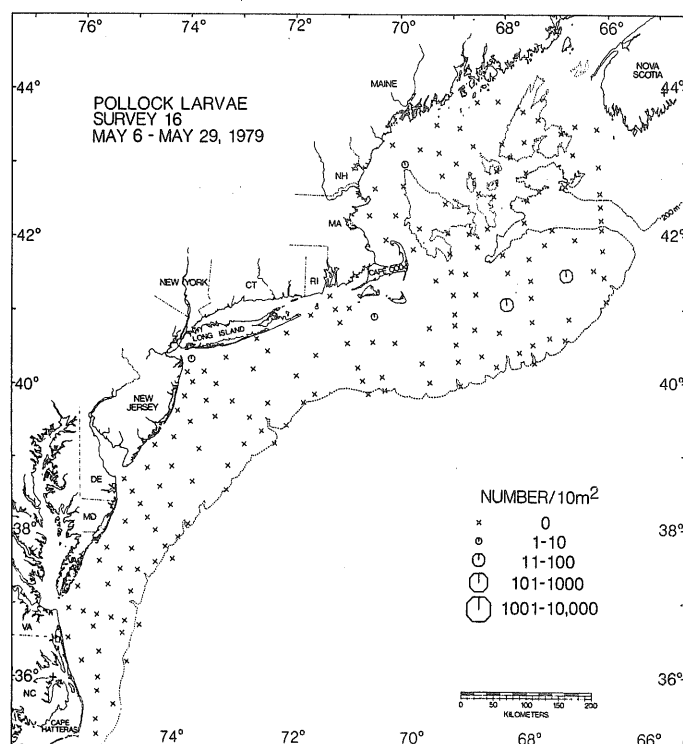
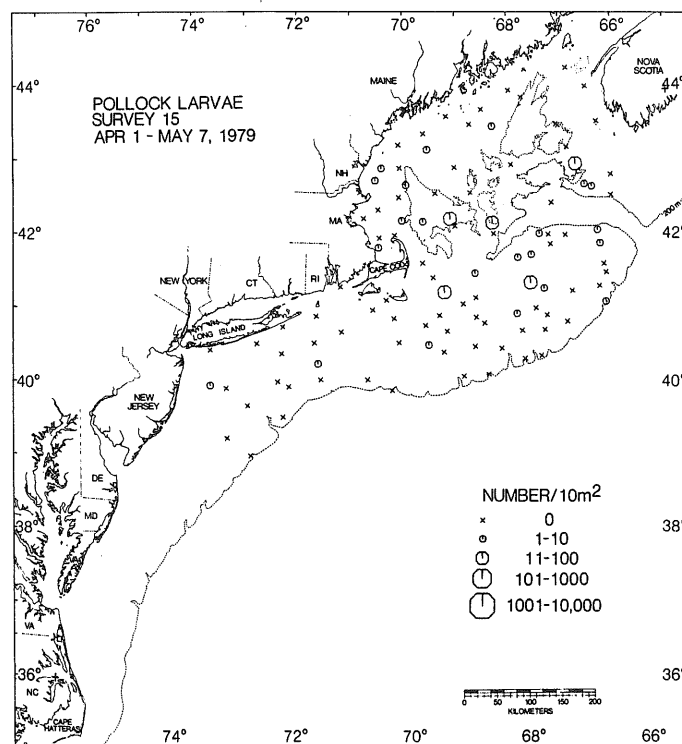
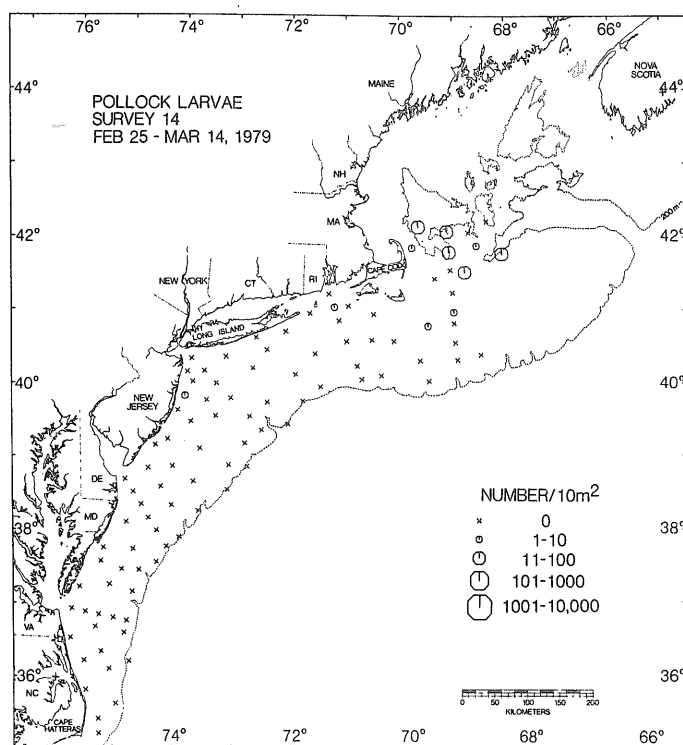
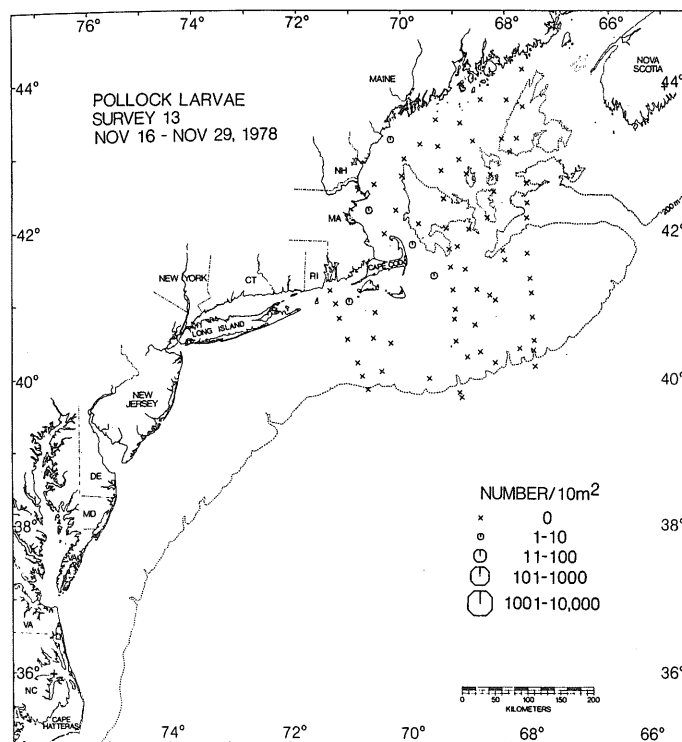


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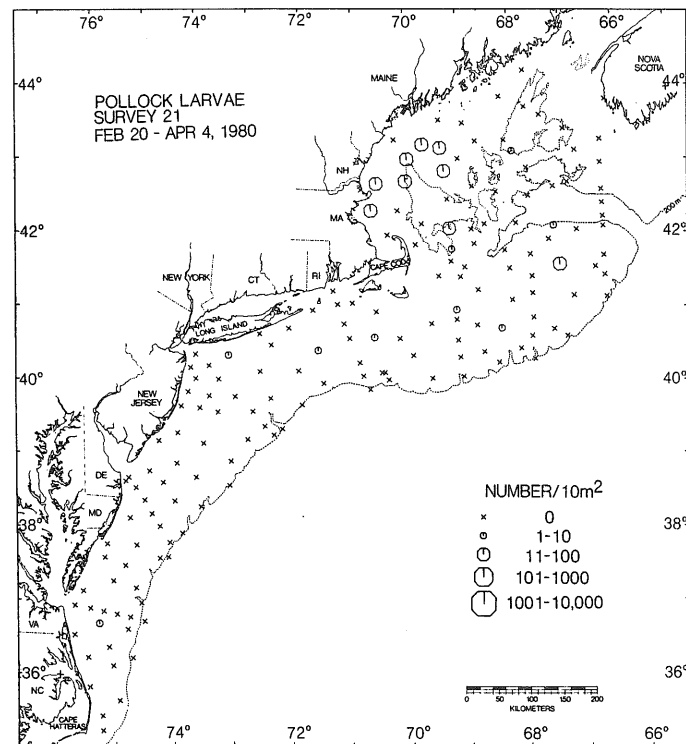
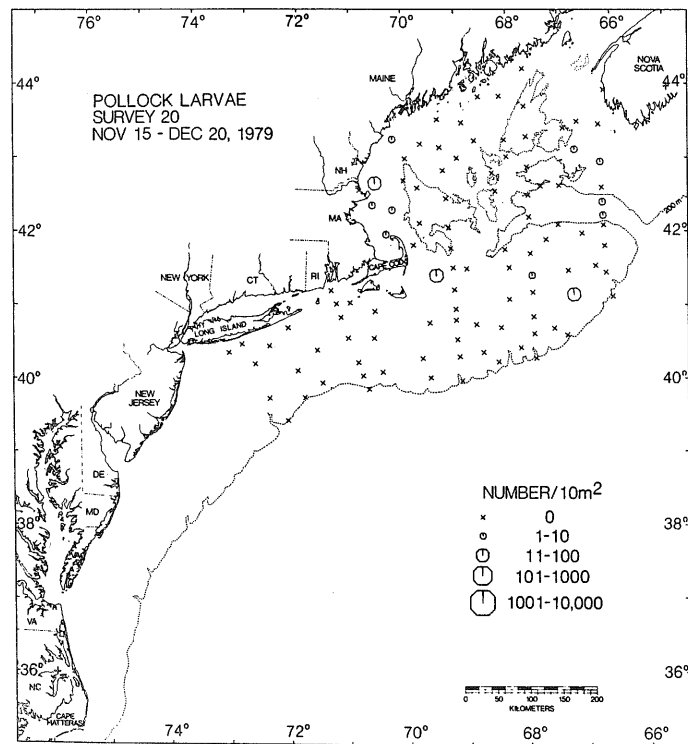
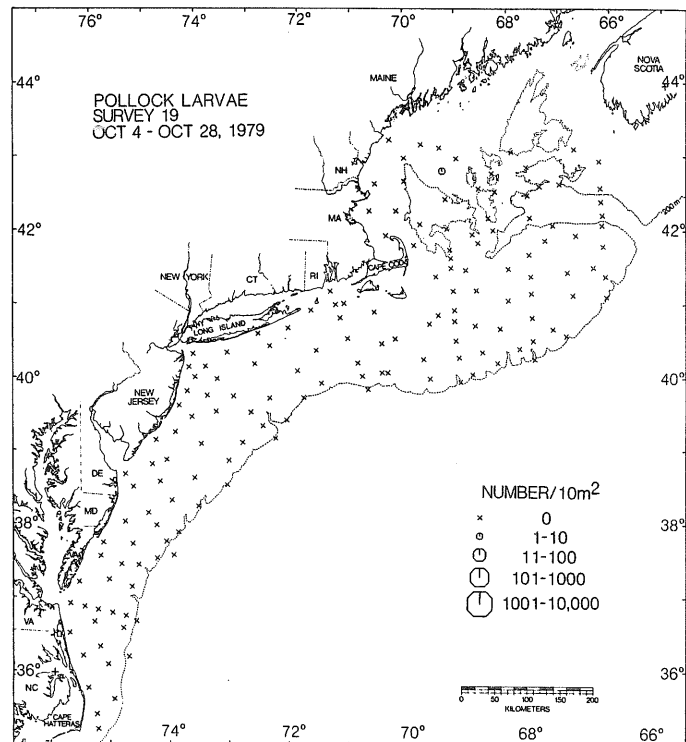
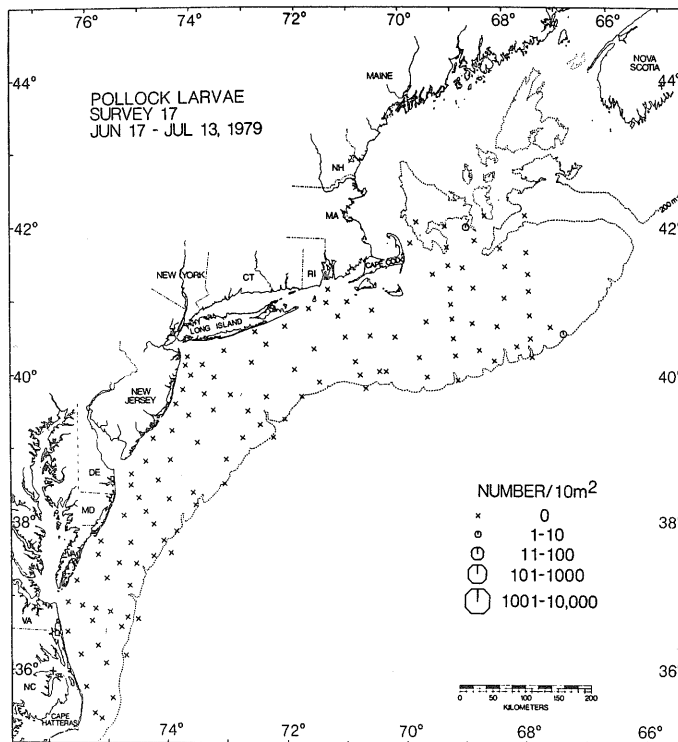


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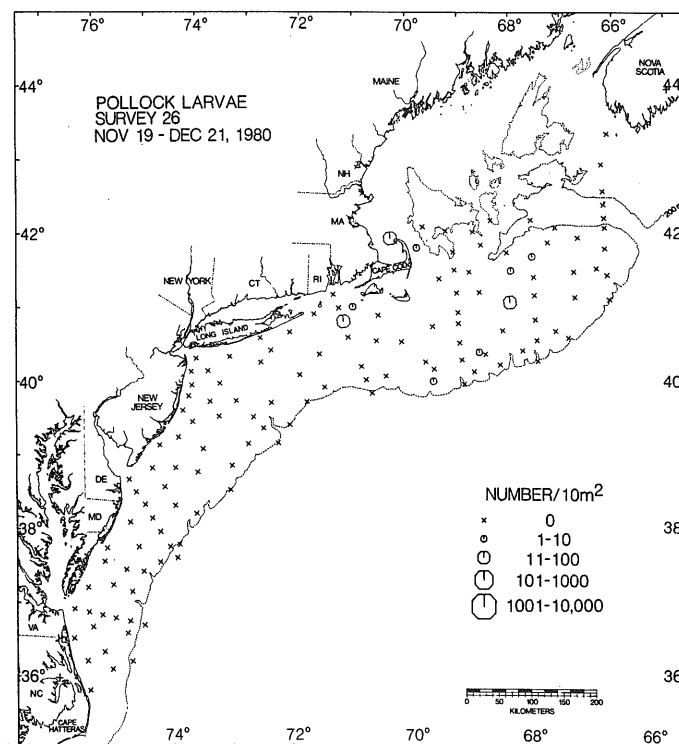
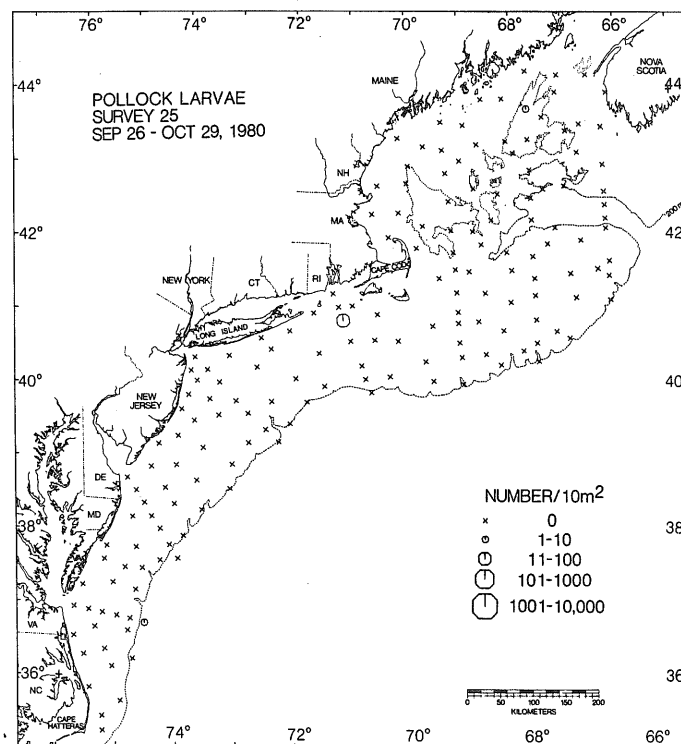
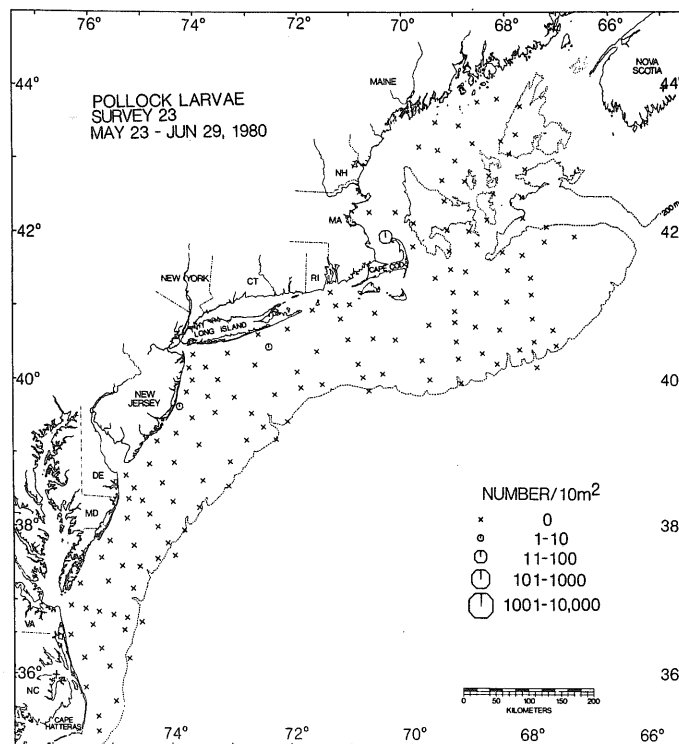
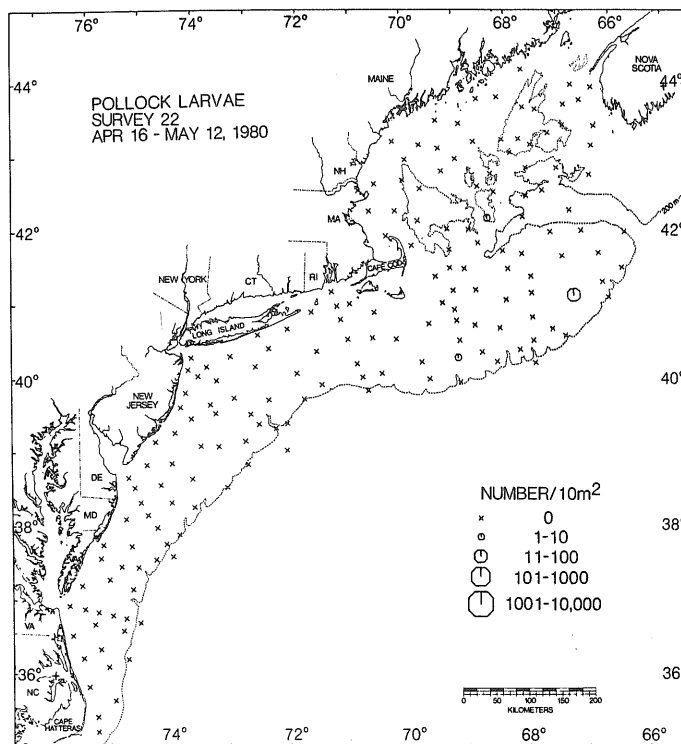


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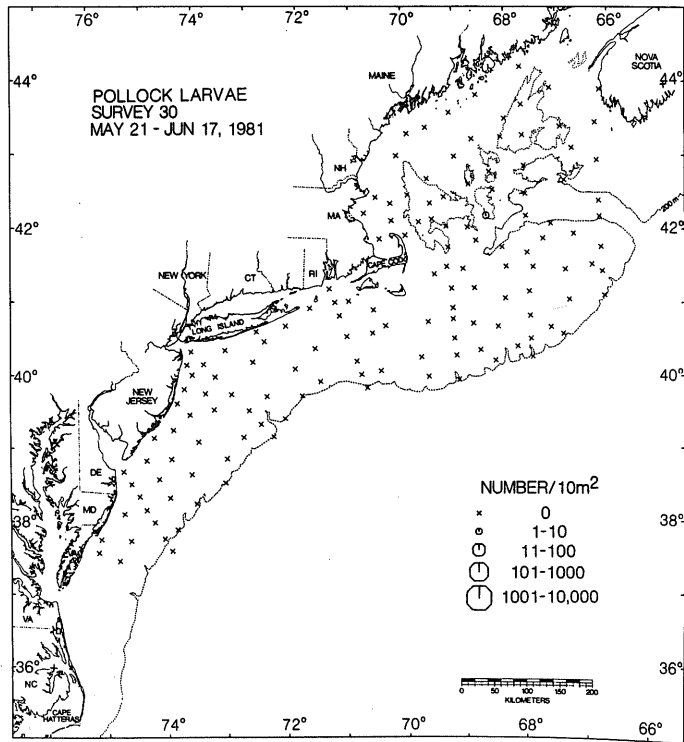
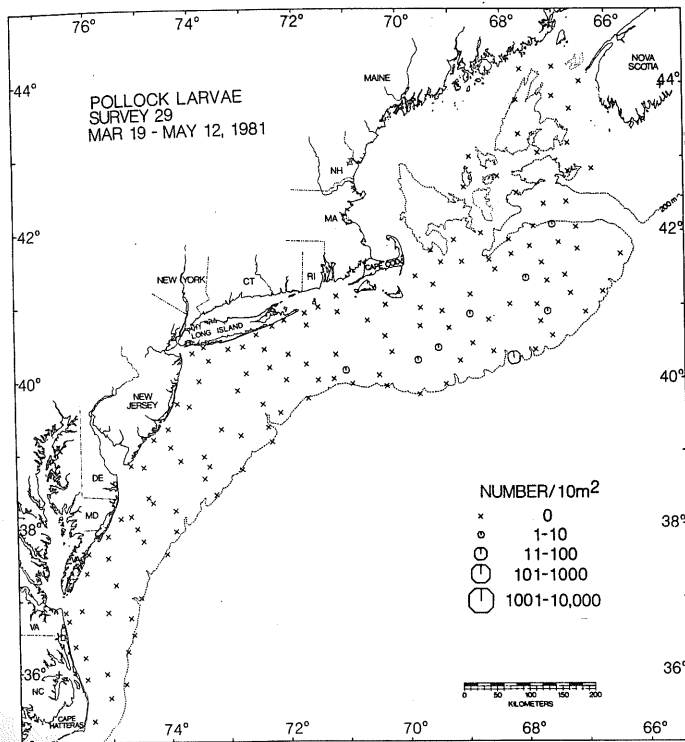
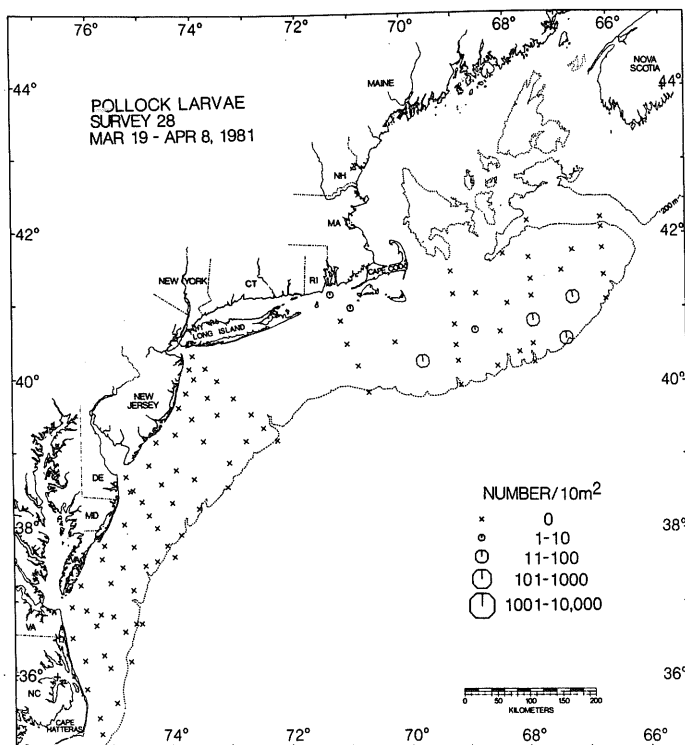
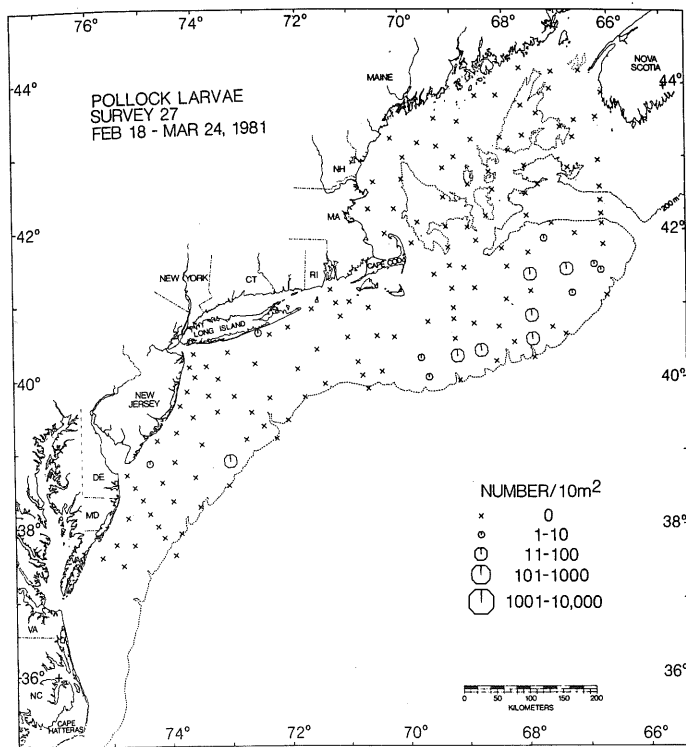


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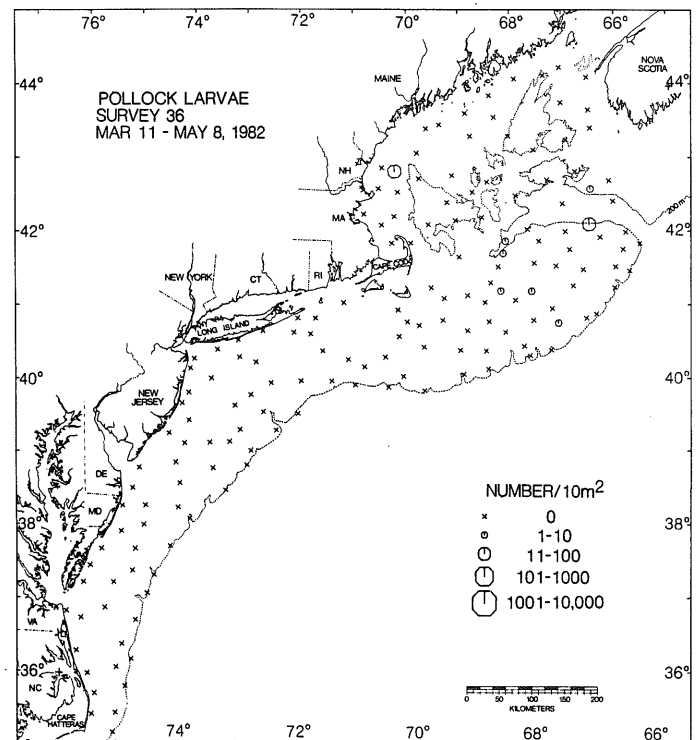
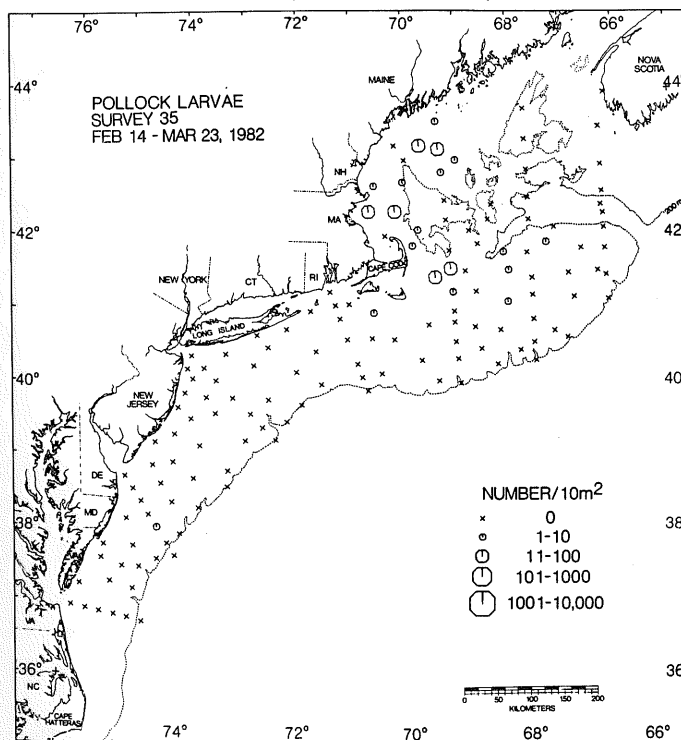
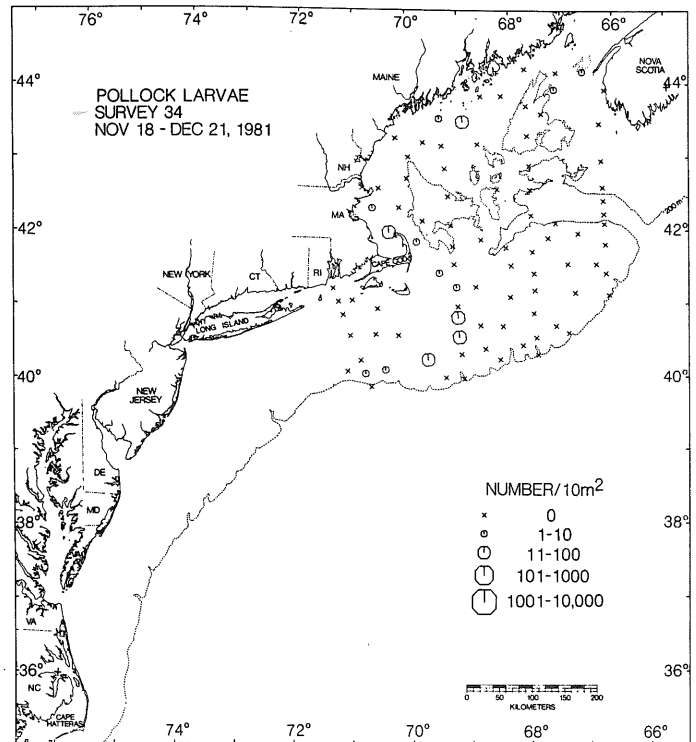
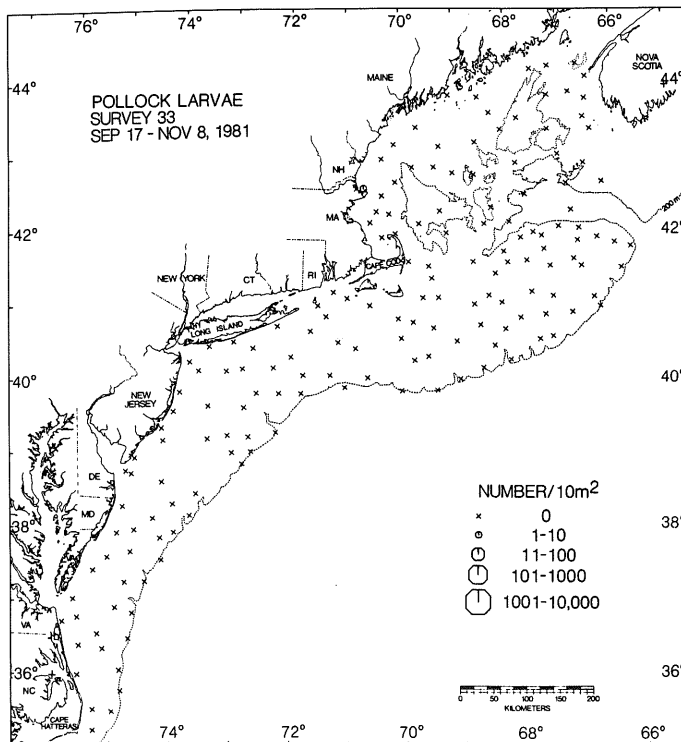


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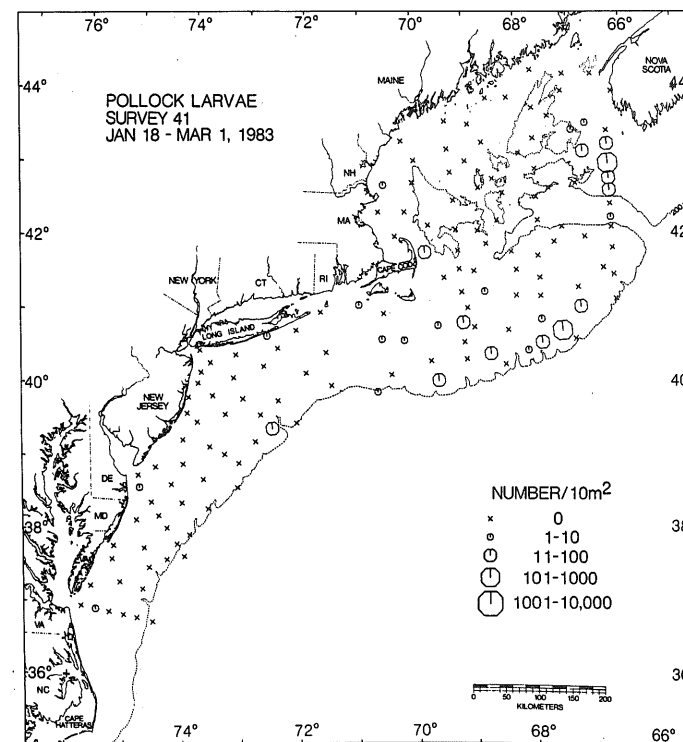
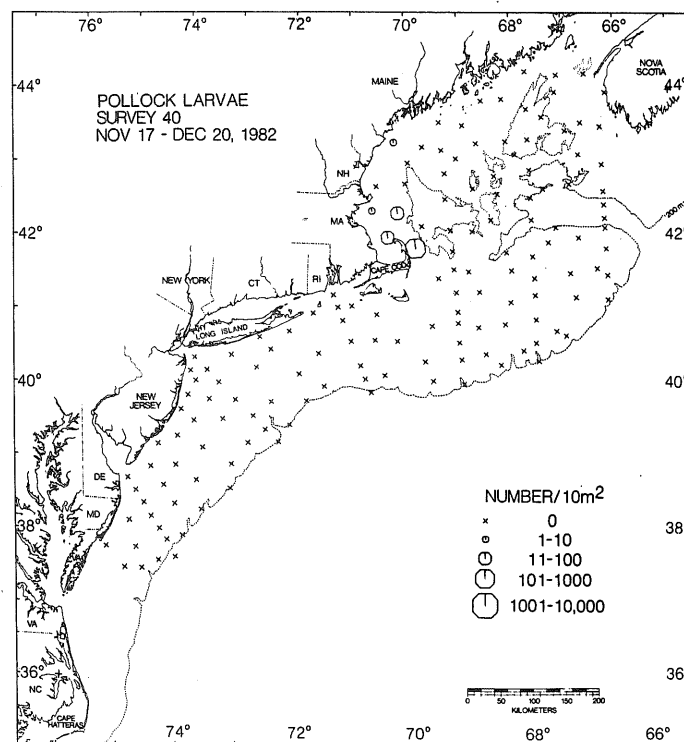
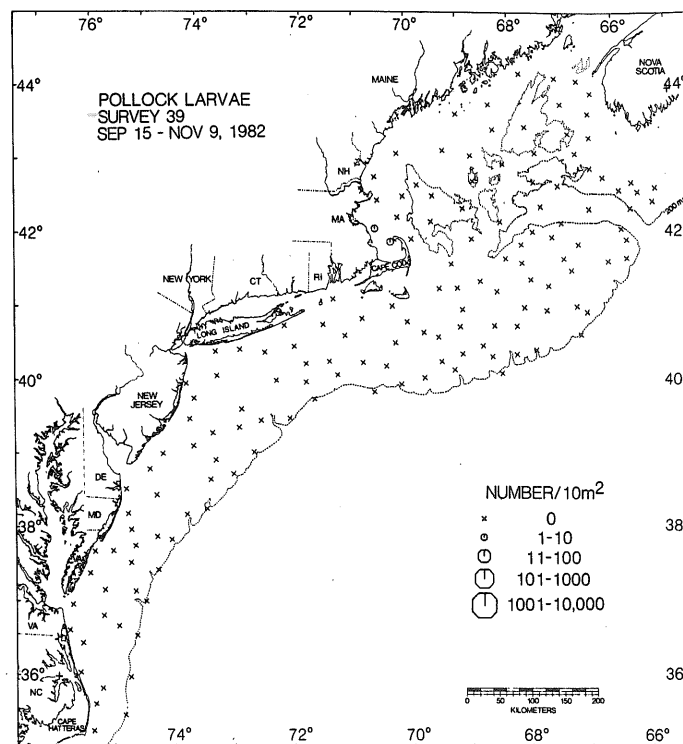
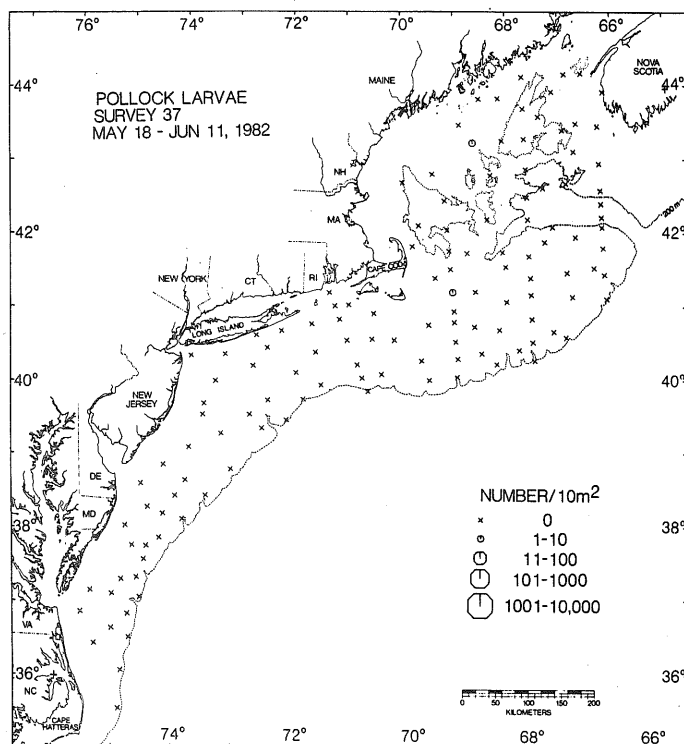


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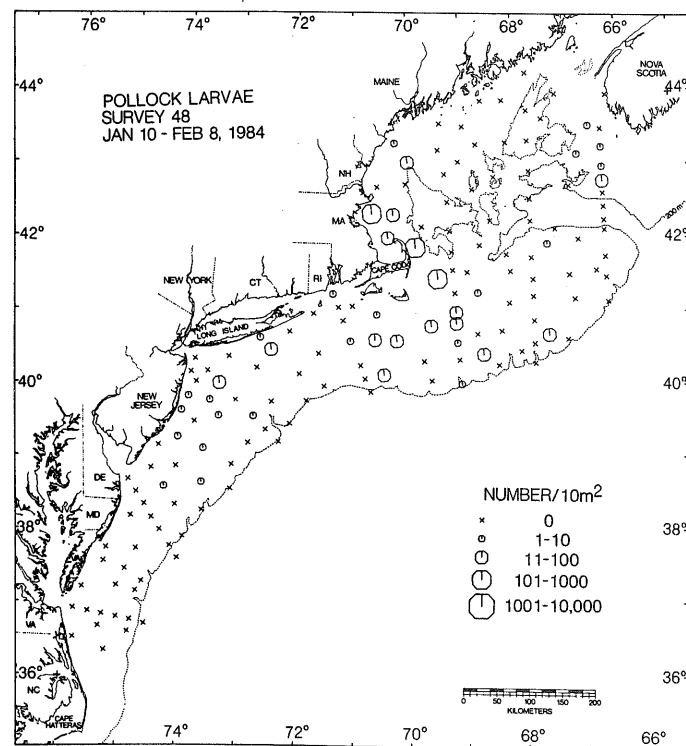
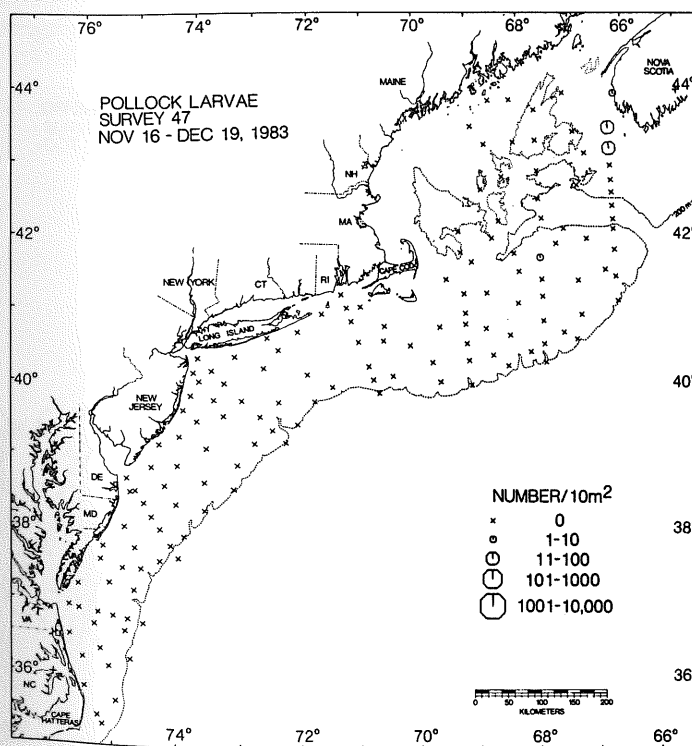
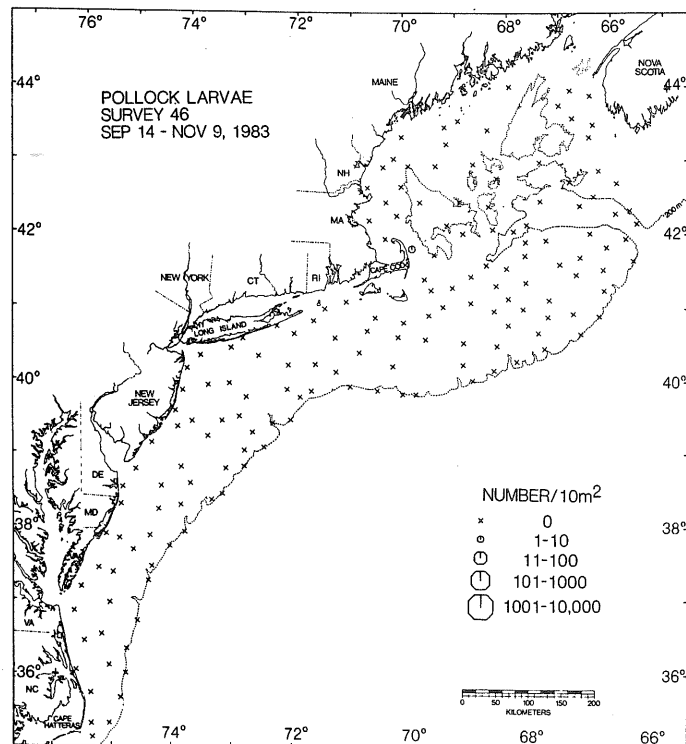
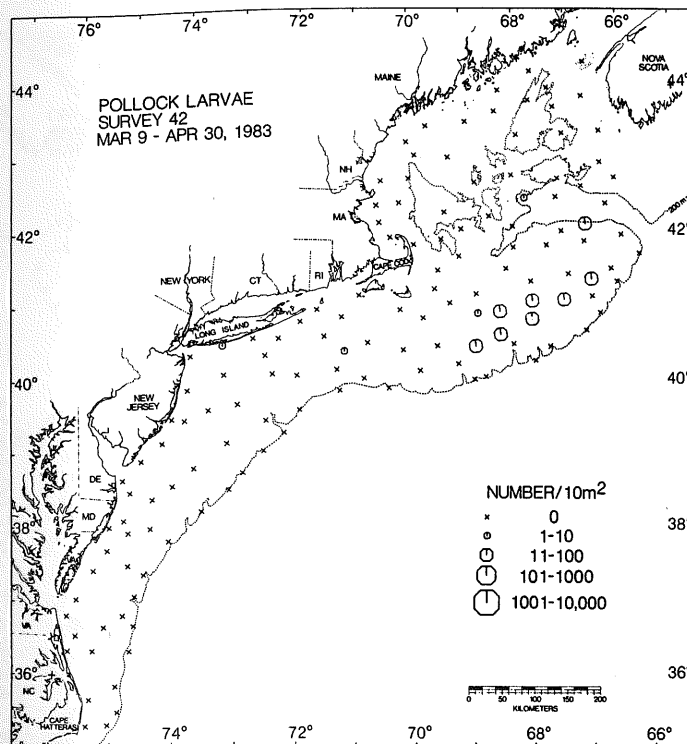


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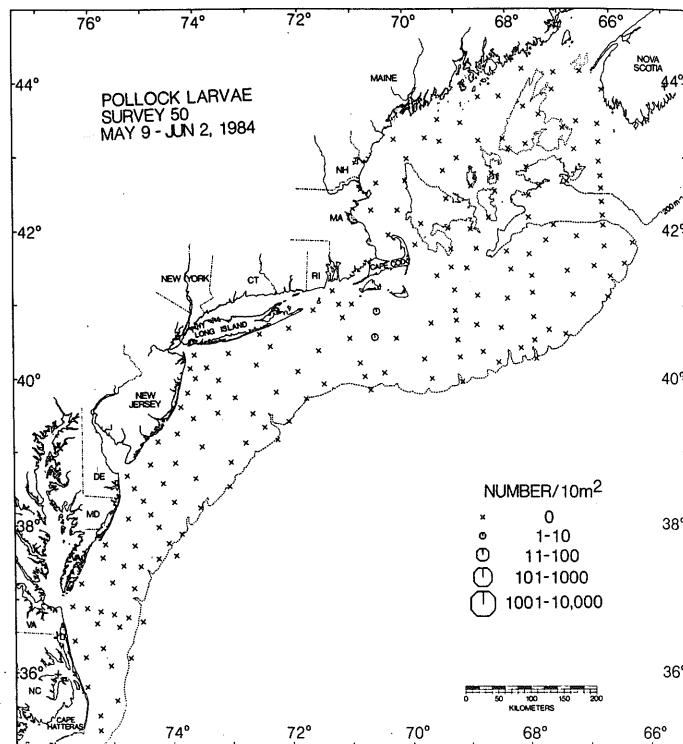
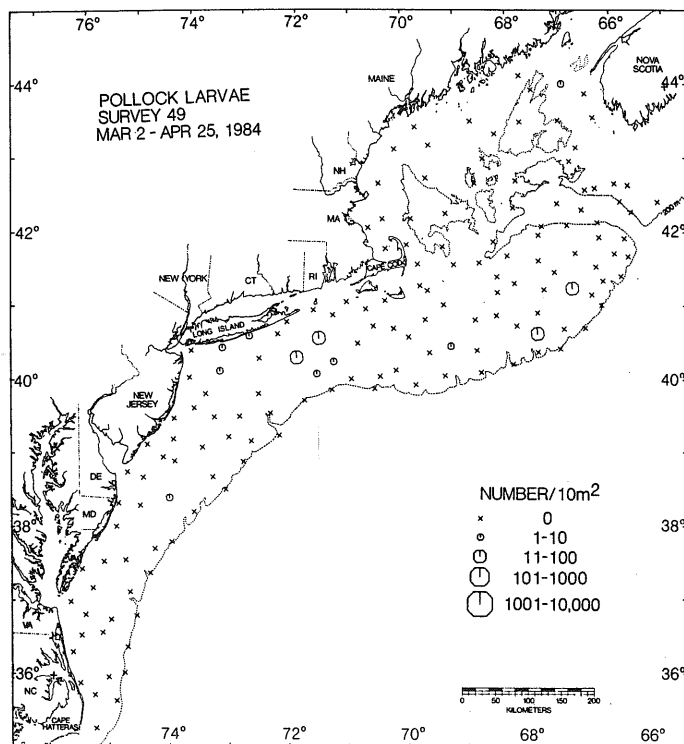


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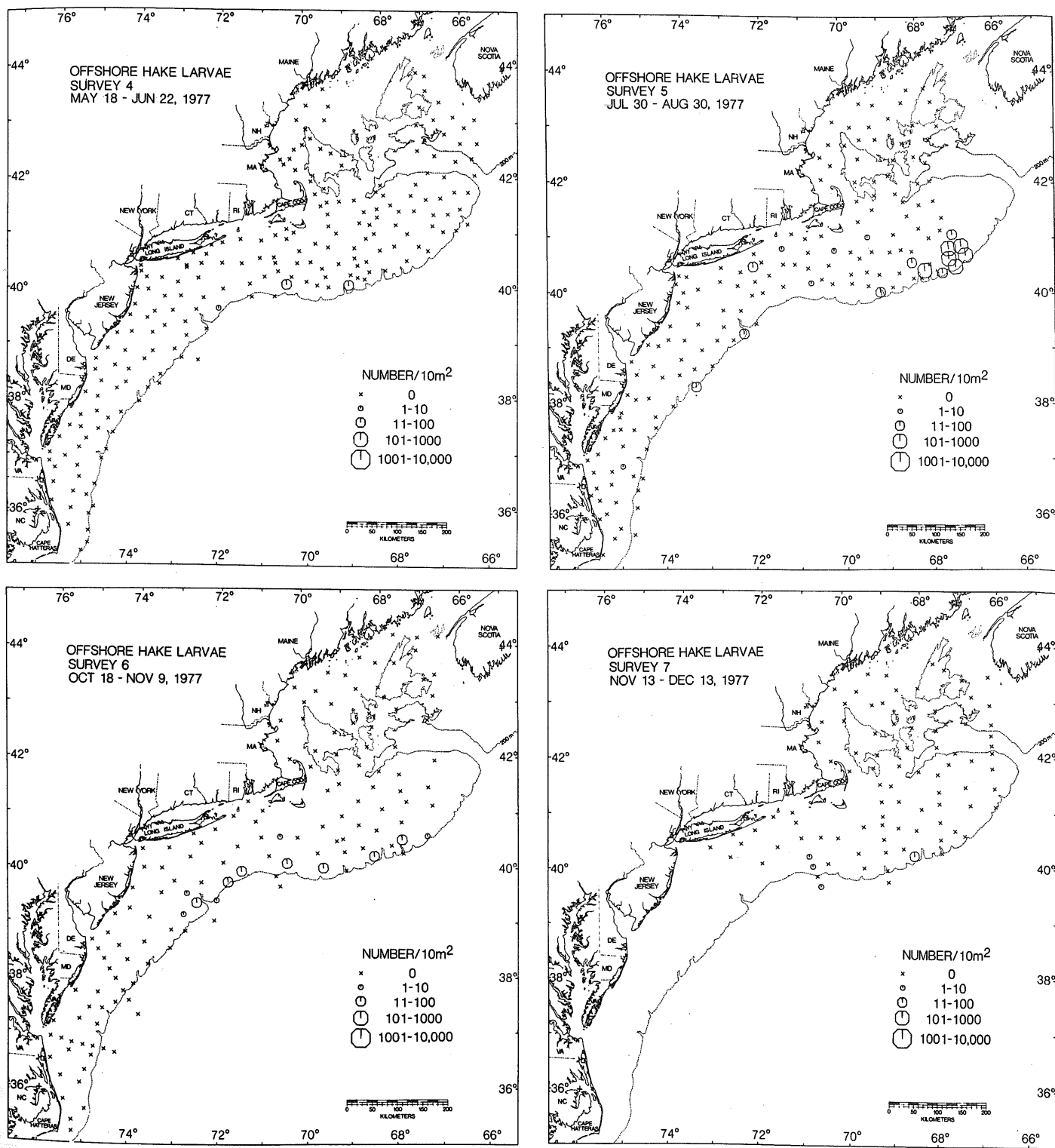


Figure 11. Distribution and abundance of offshore hake, *Merluccius albidus*, larvae off northeastern United States, winter 1977 through spring 1984.

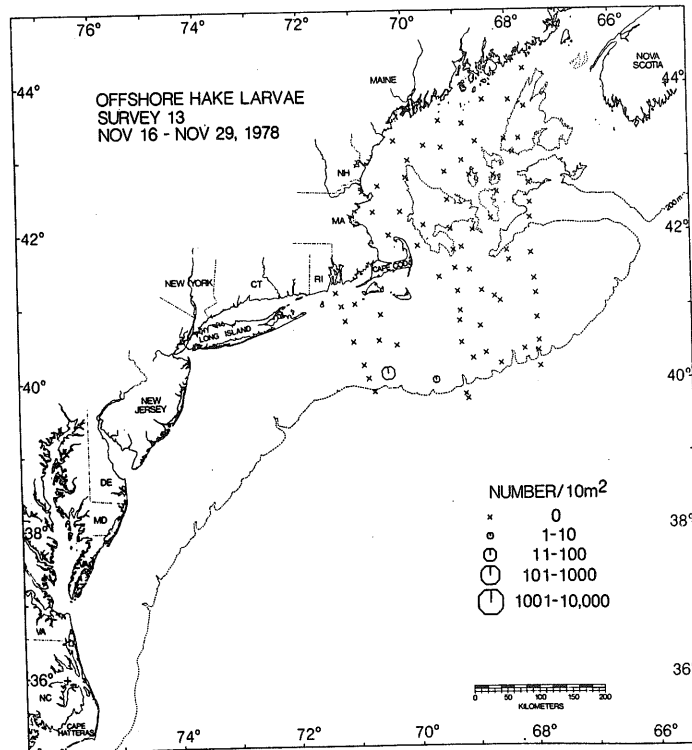
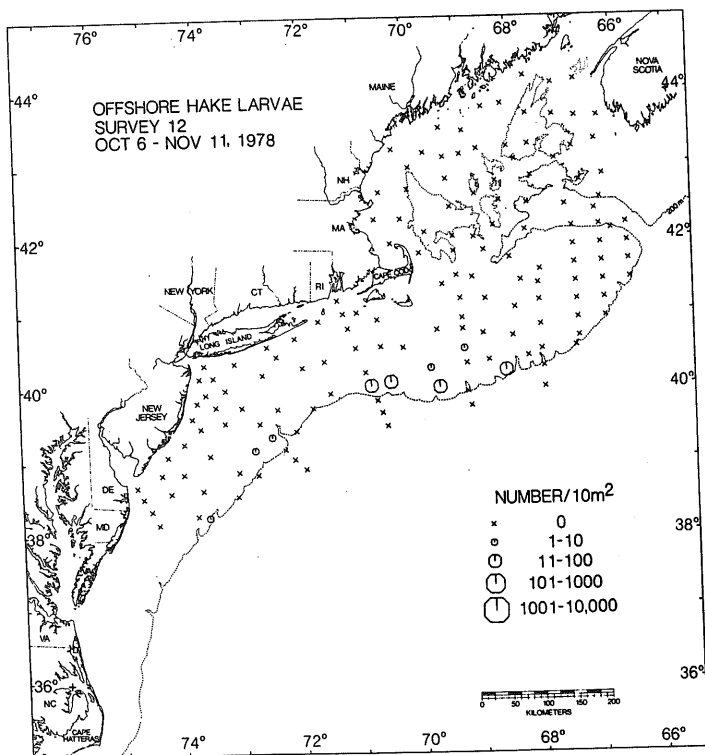
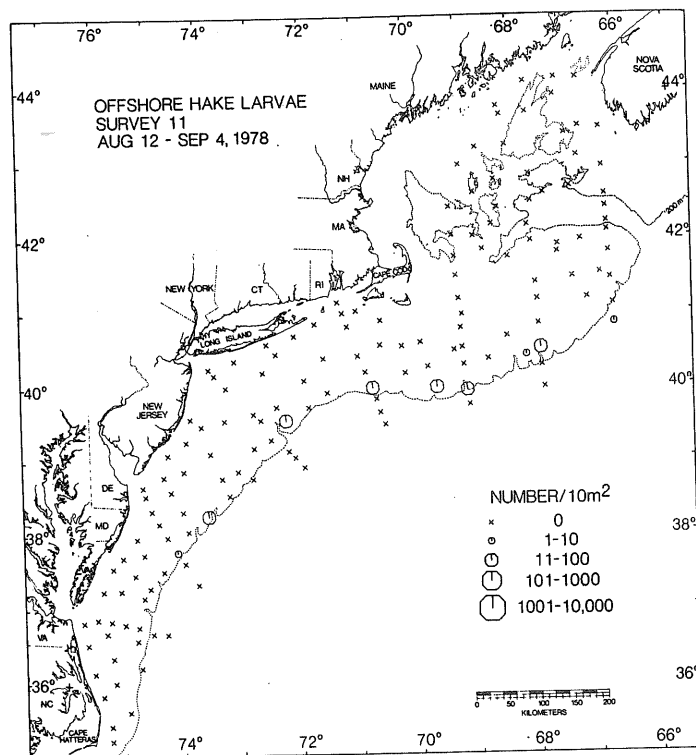
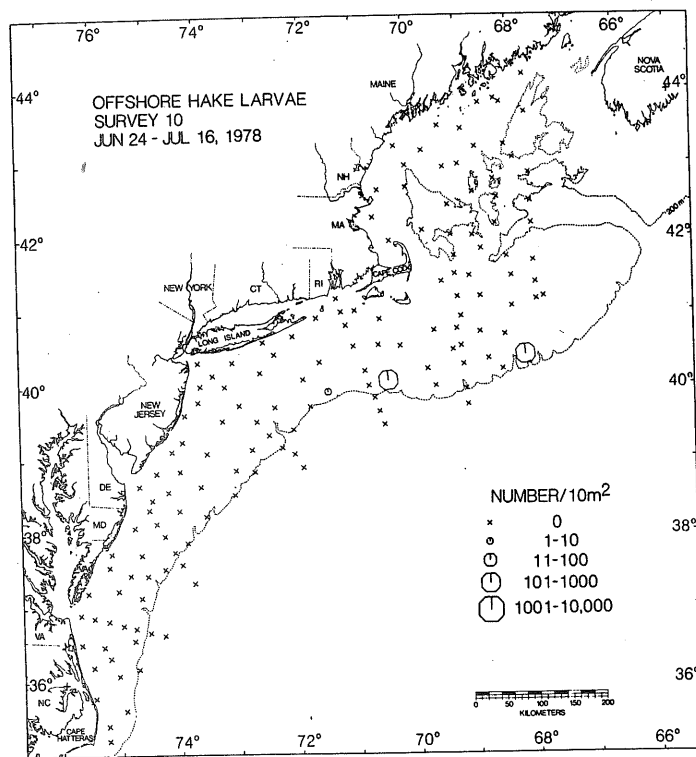


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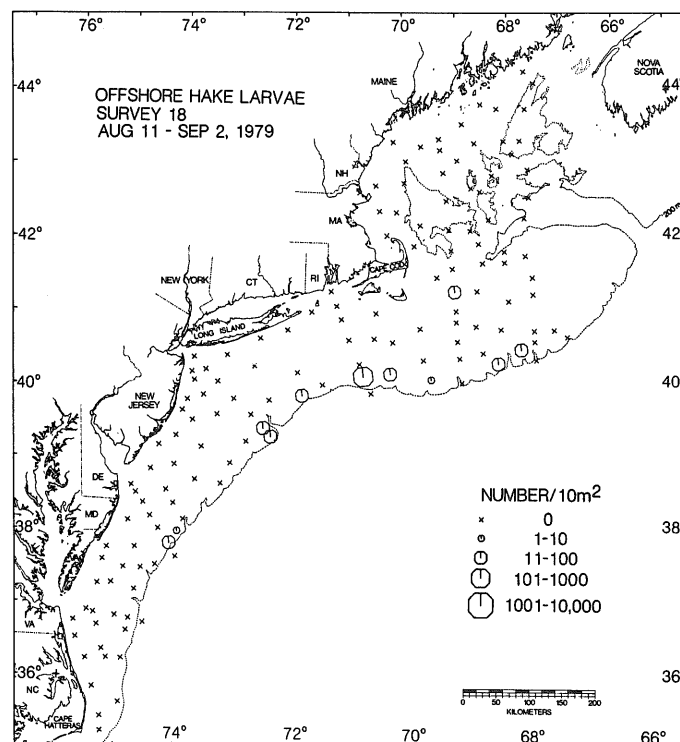
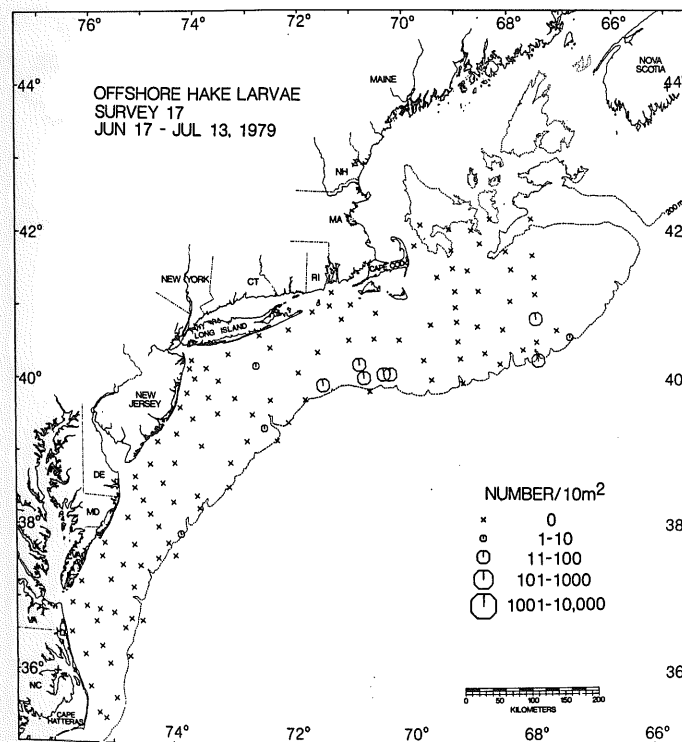
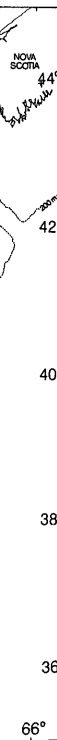
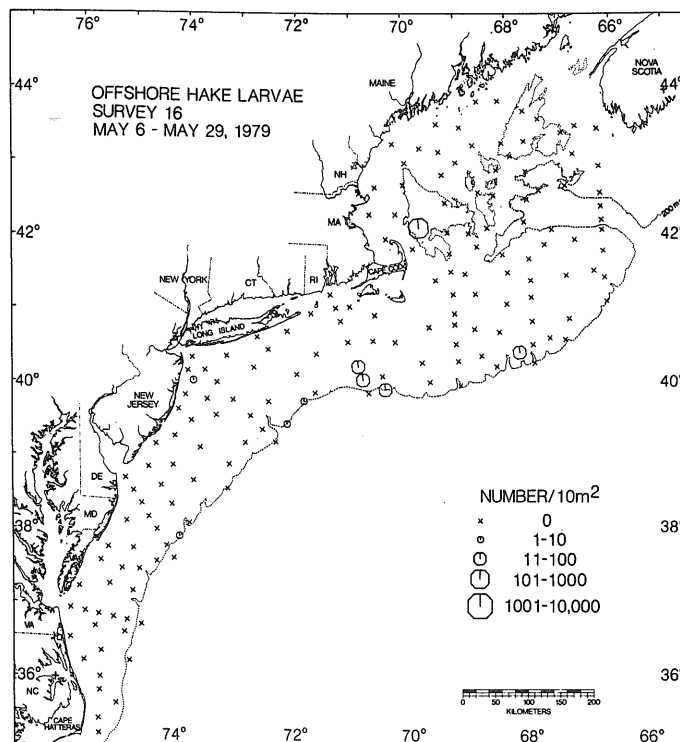
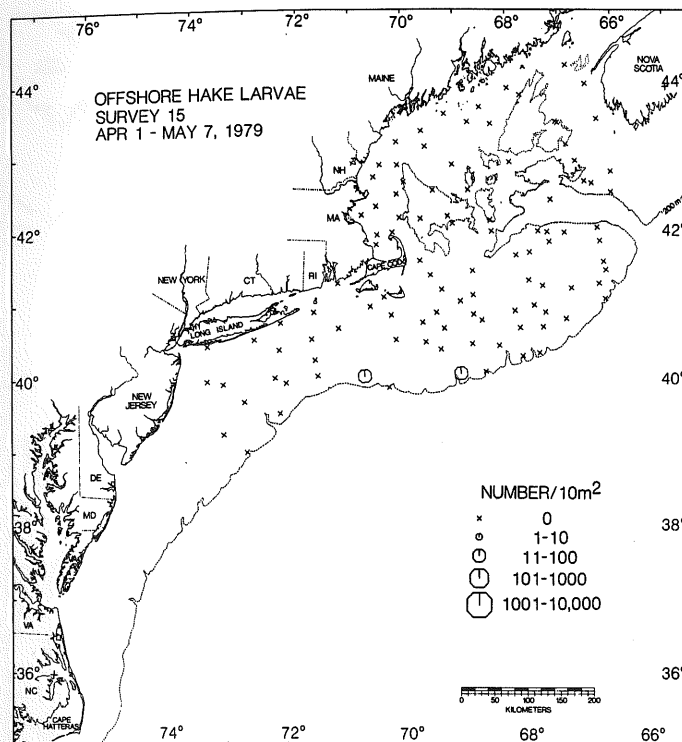
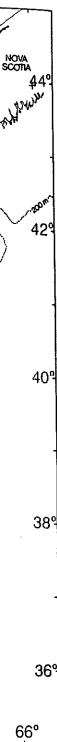


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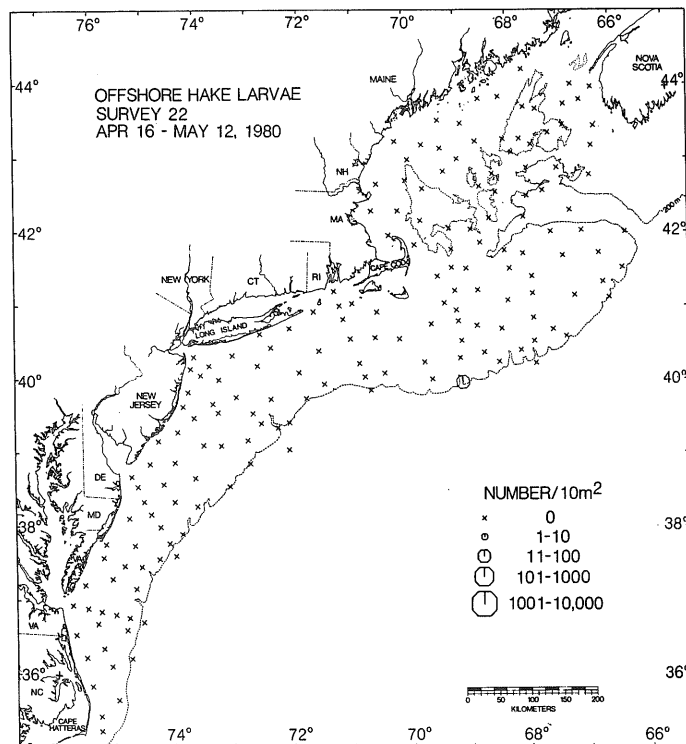
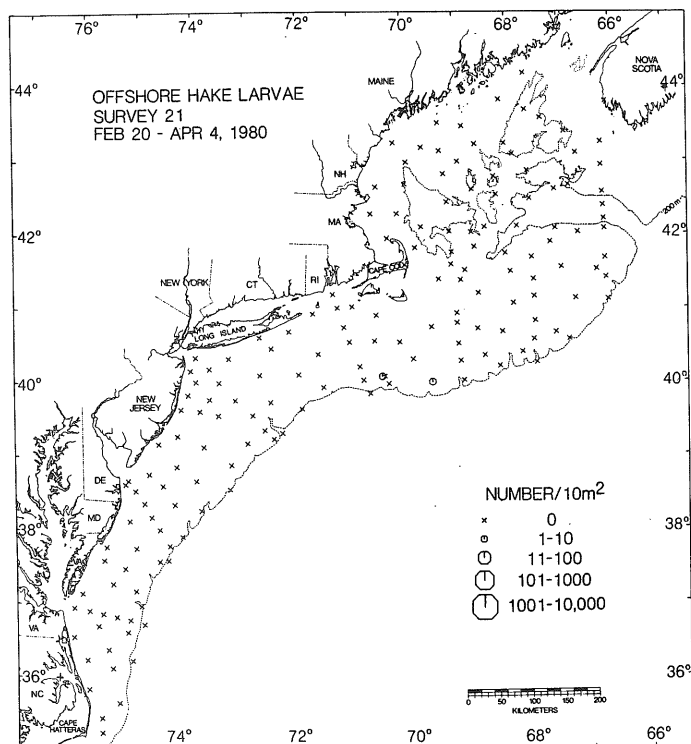
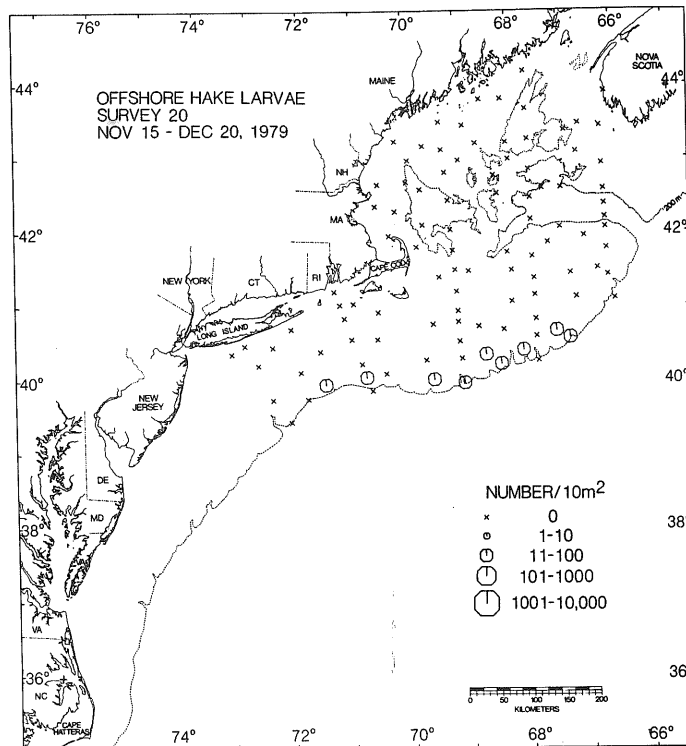
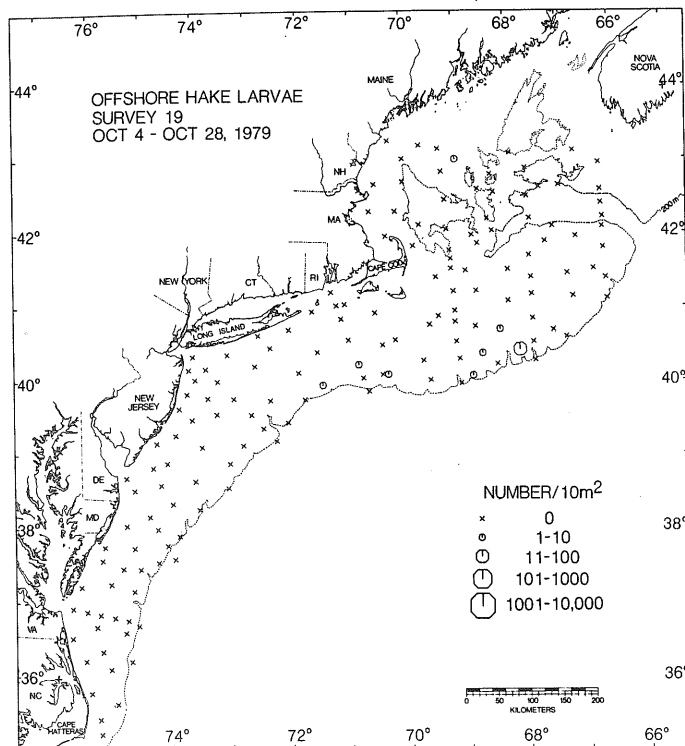


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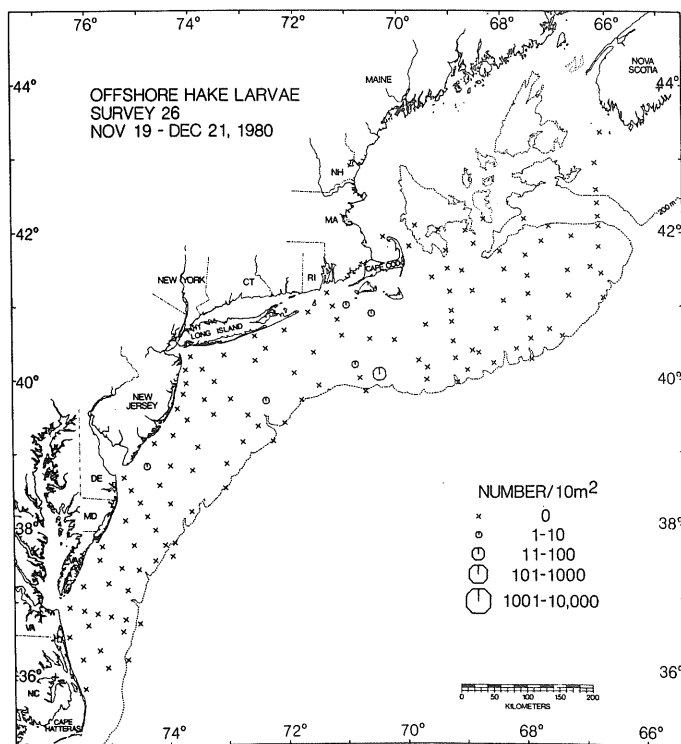
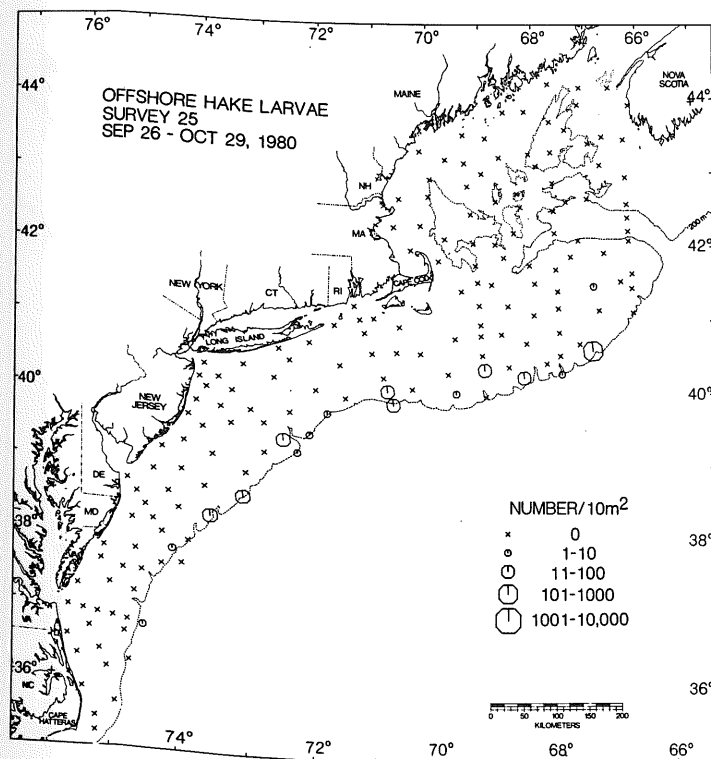
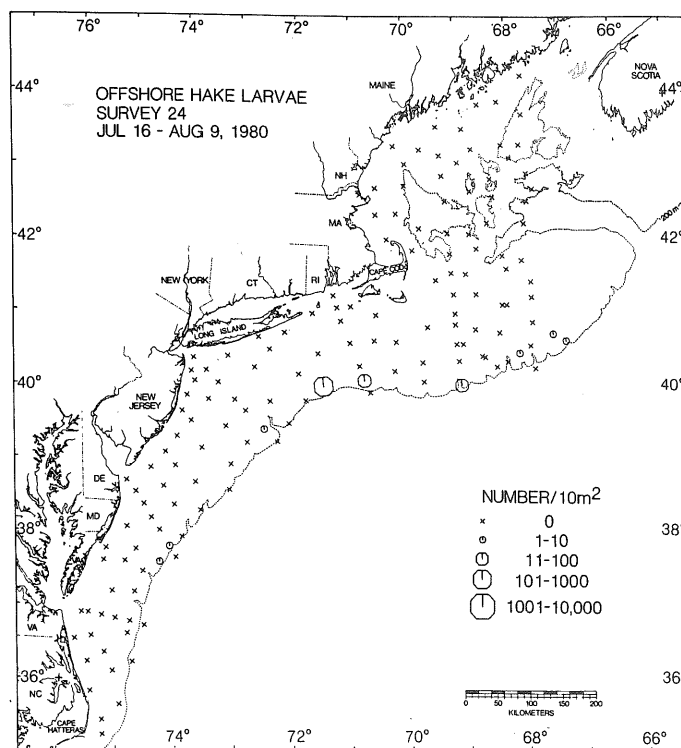
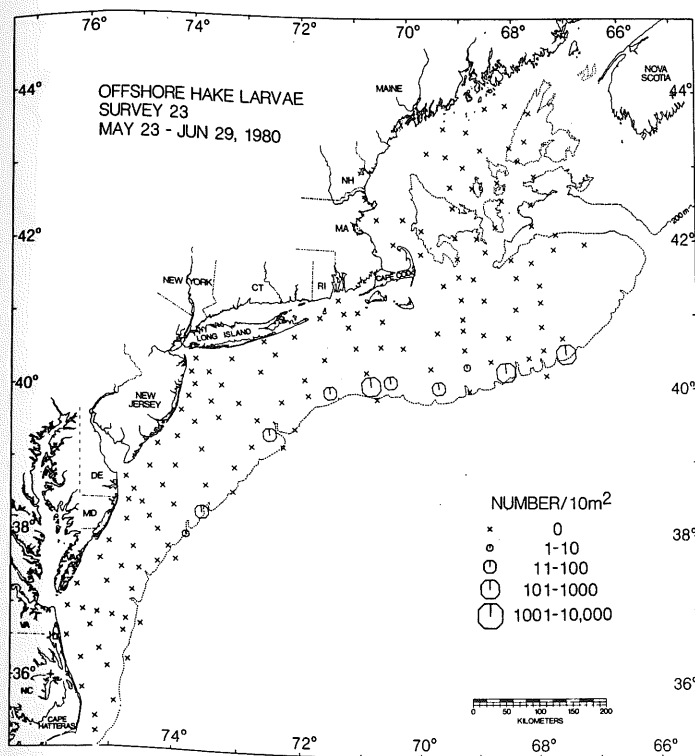


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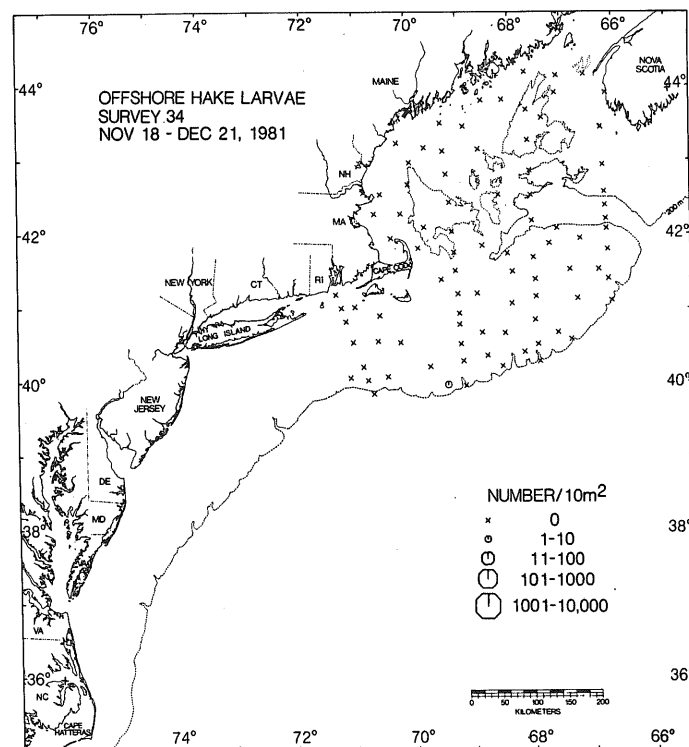
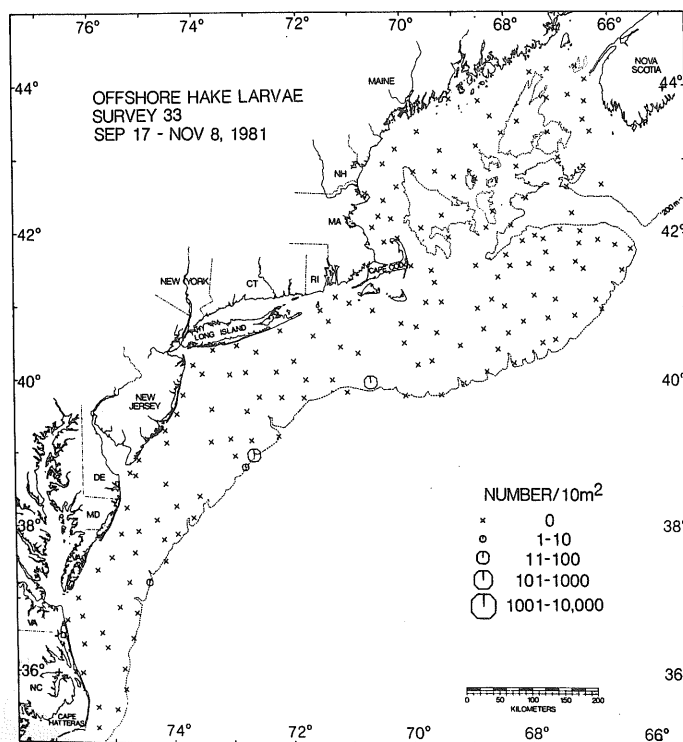
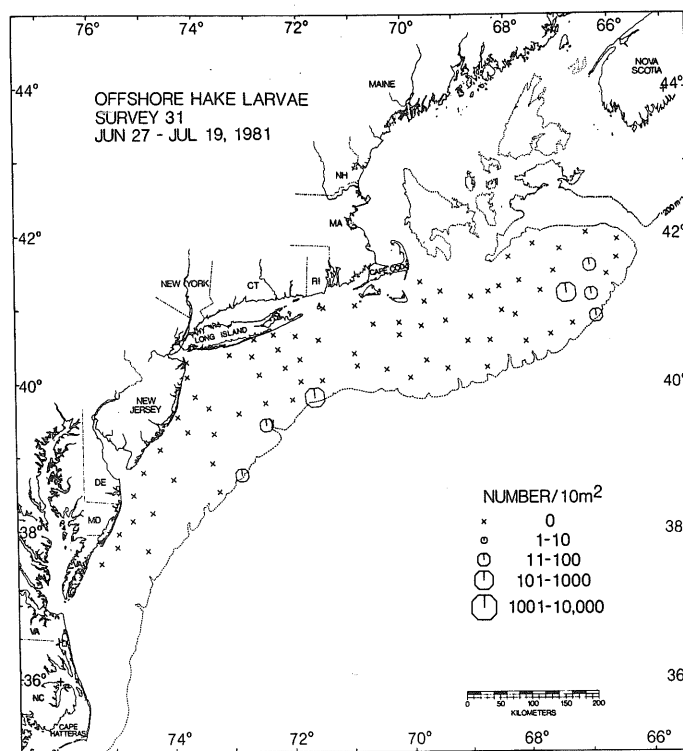
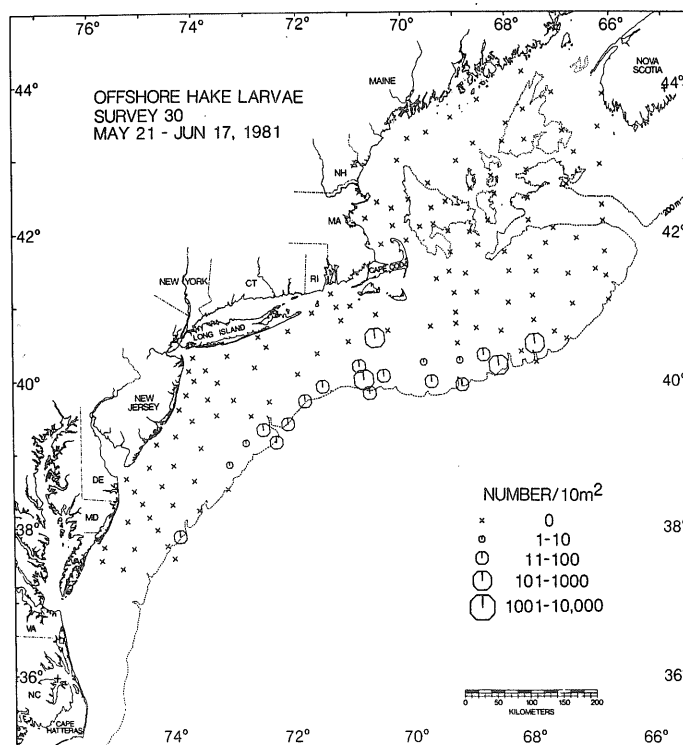


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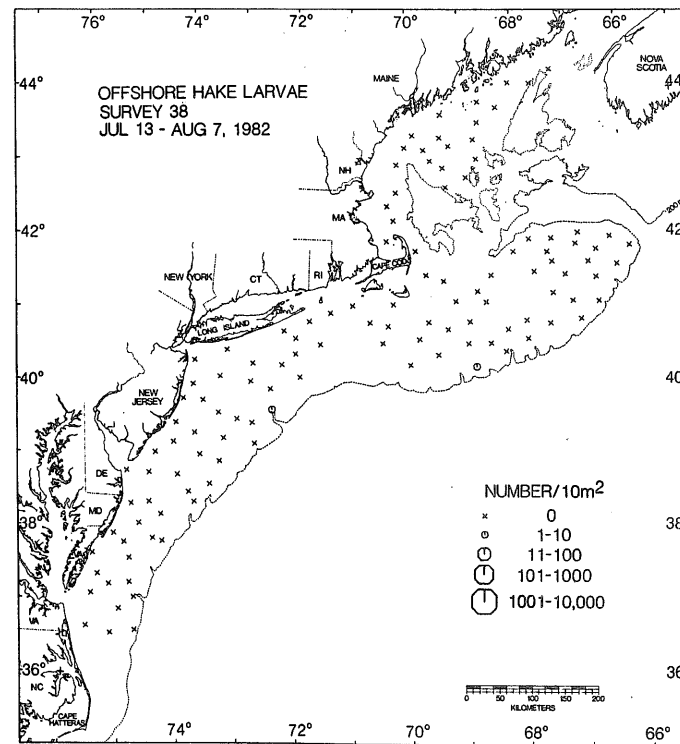
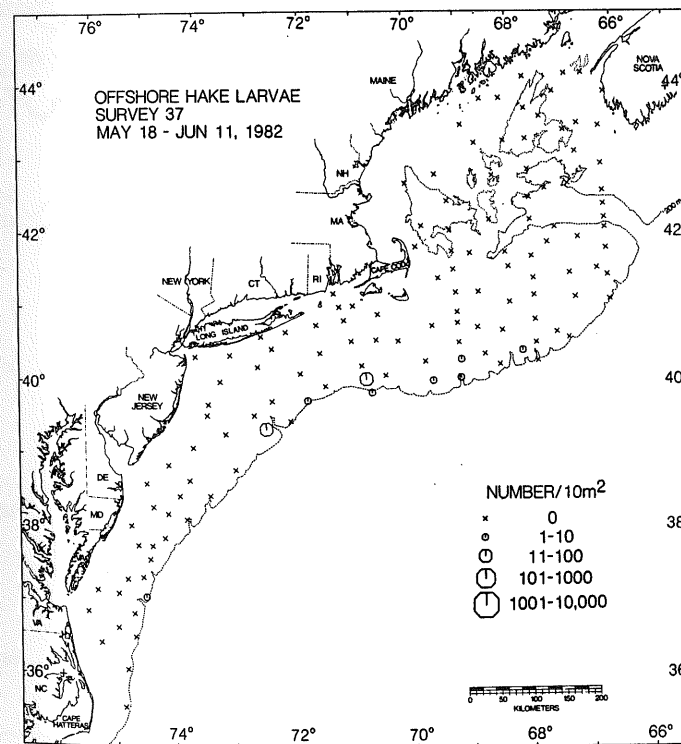
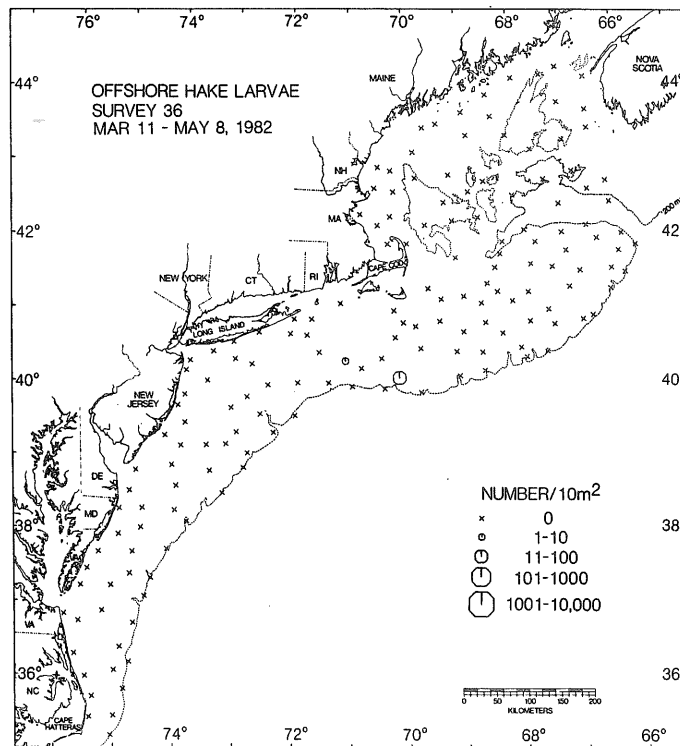
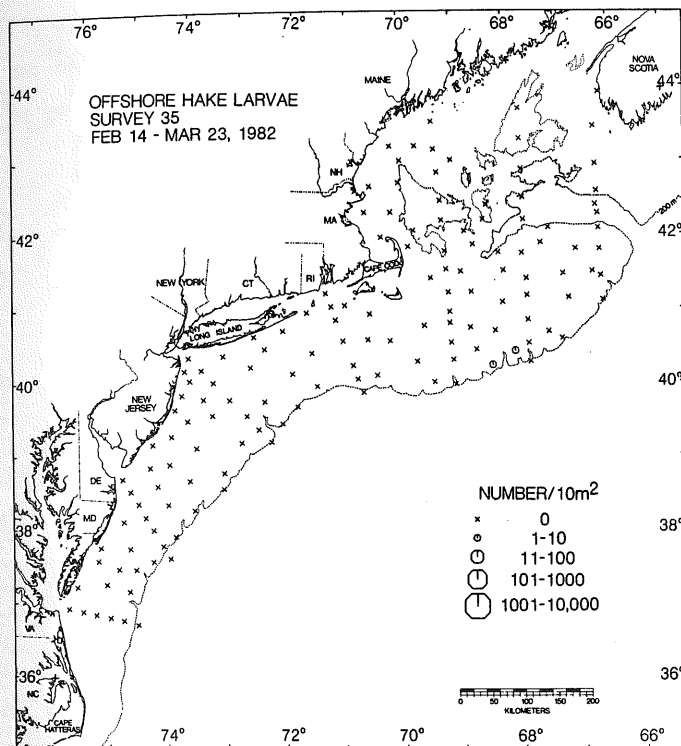


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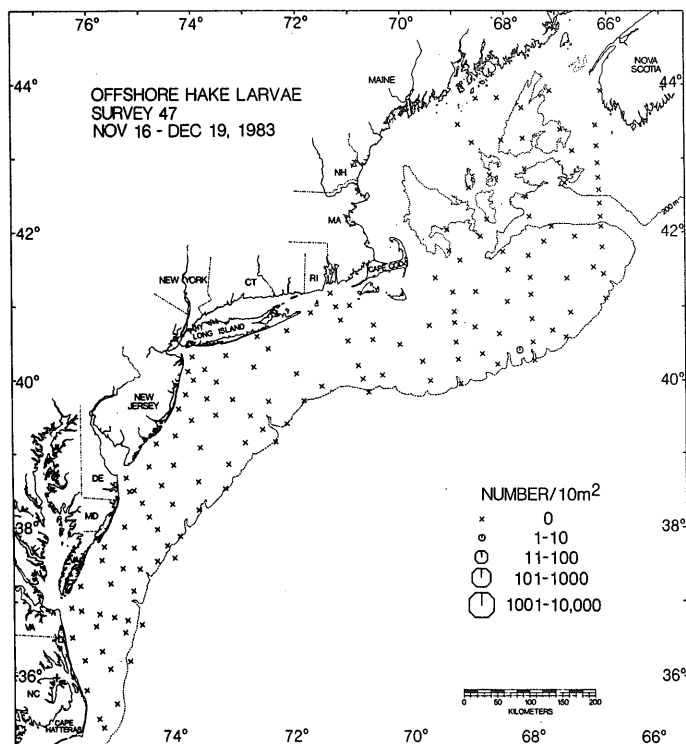
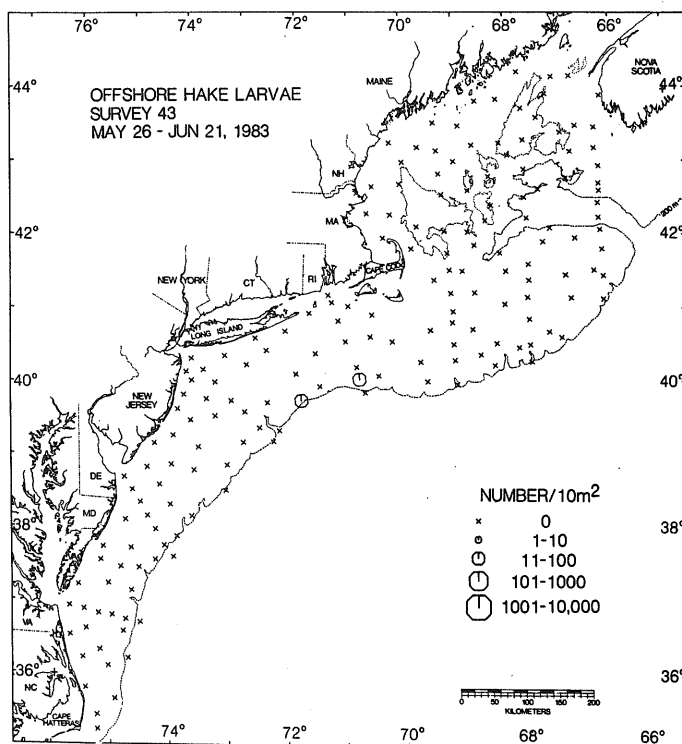
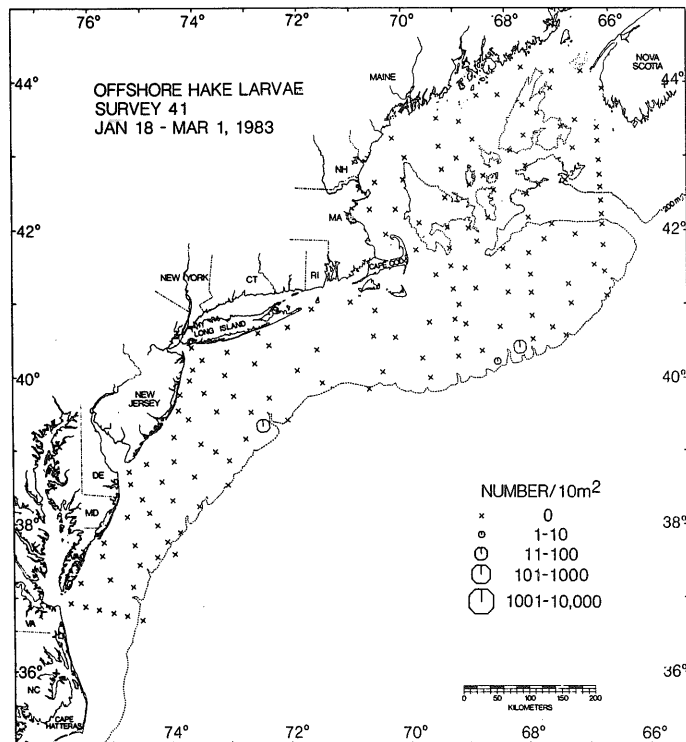
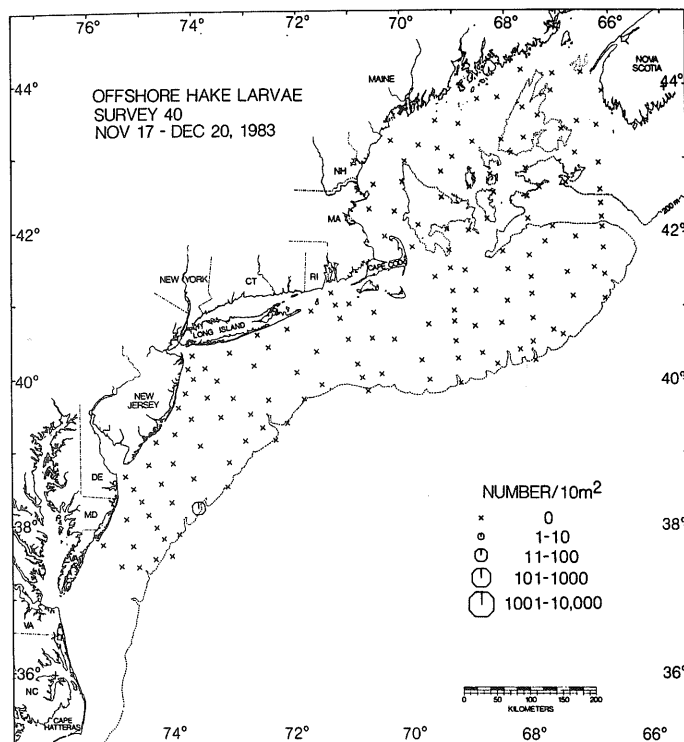


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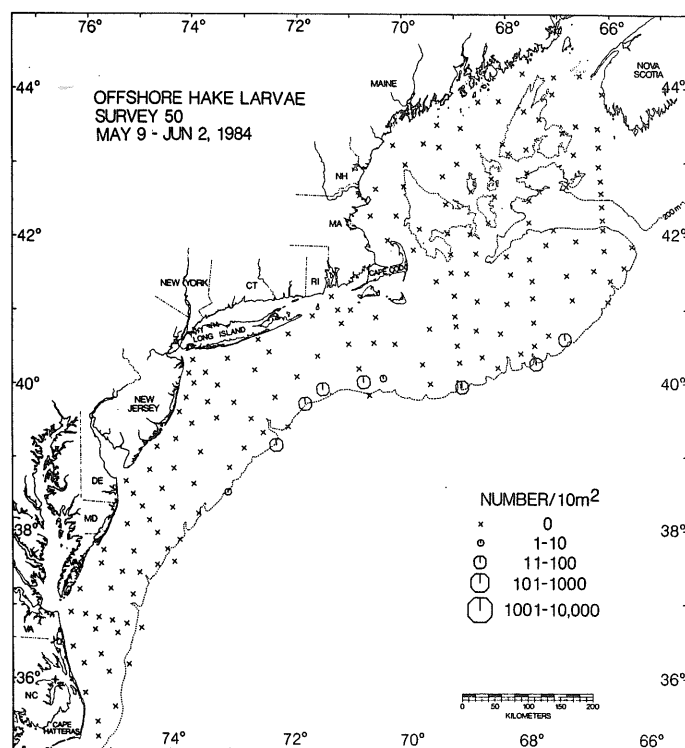
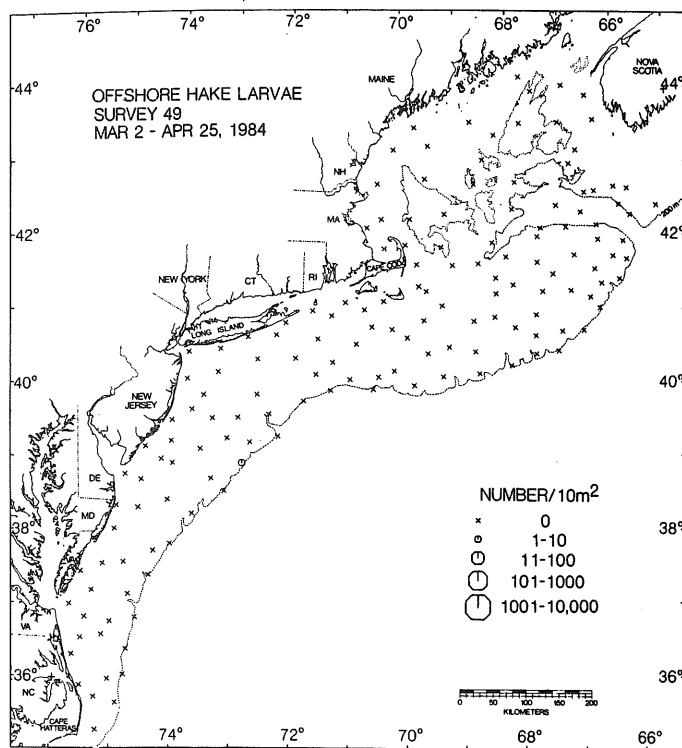


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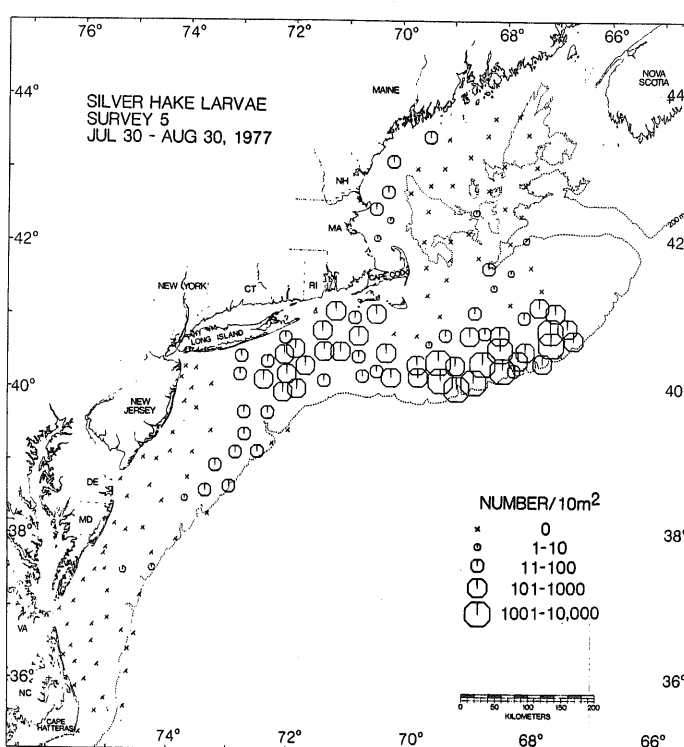
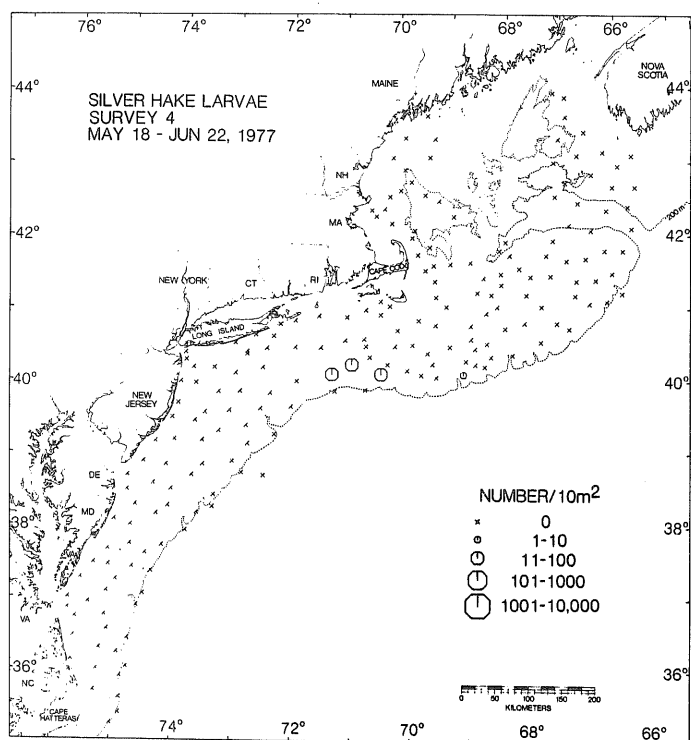
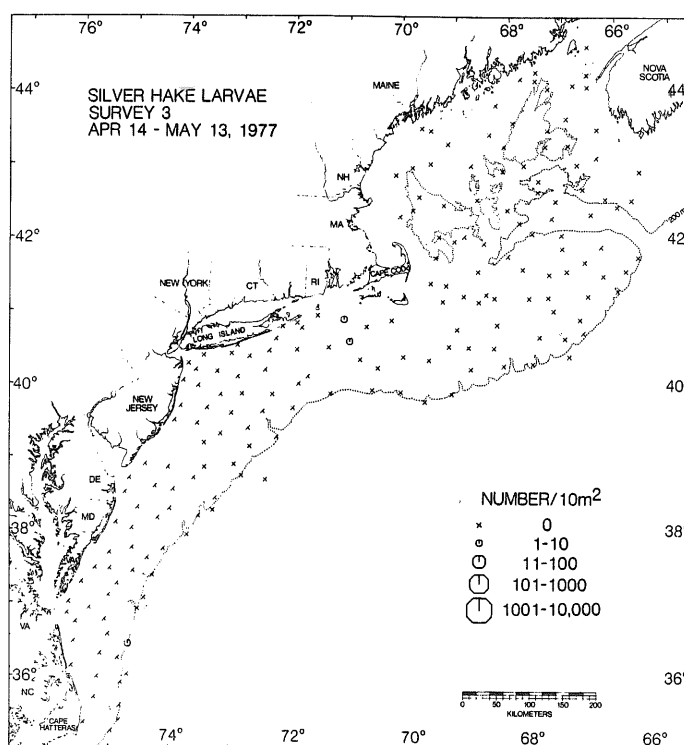
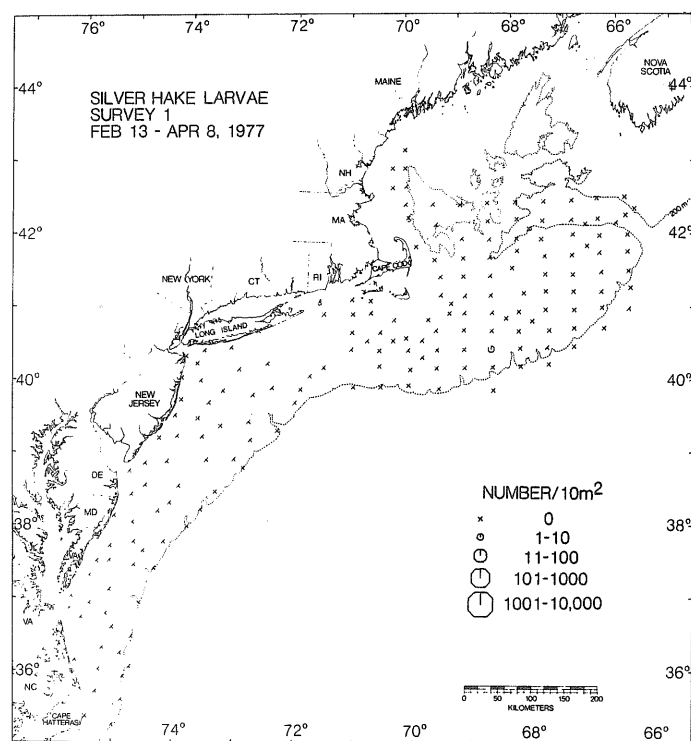


Figure 12. Distribution and abundance of silver hake, Merluccius bilinearis, larvae off northeastern United States, winter 1977 through spring 1984.

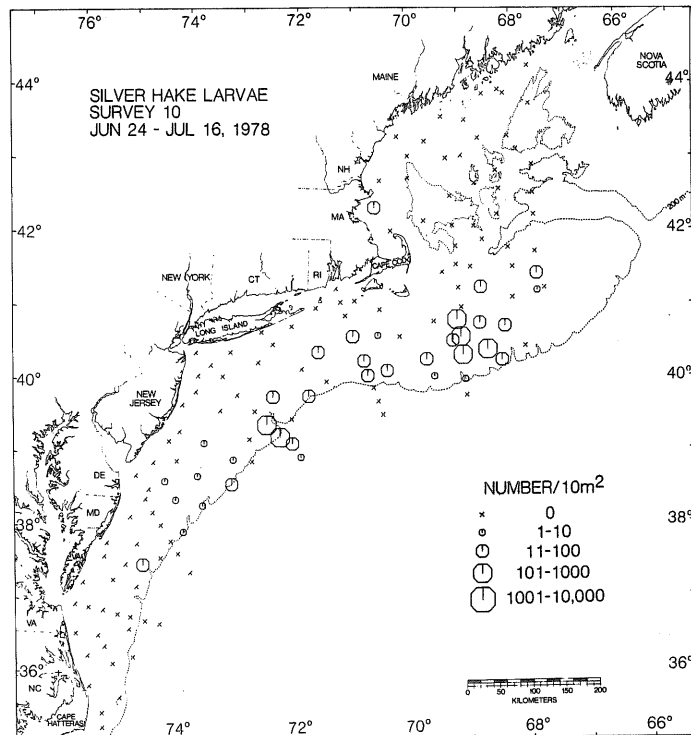
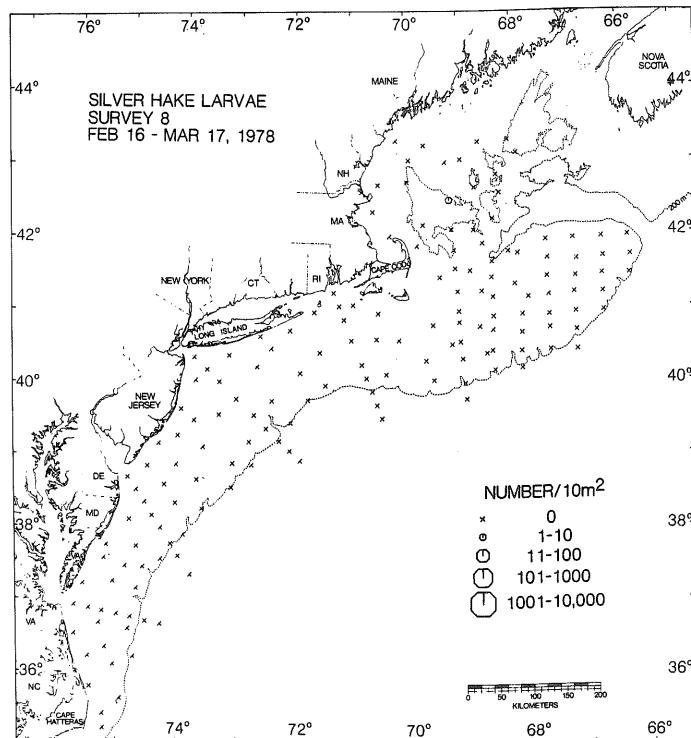
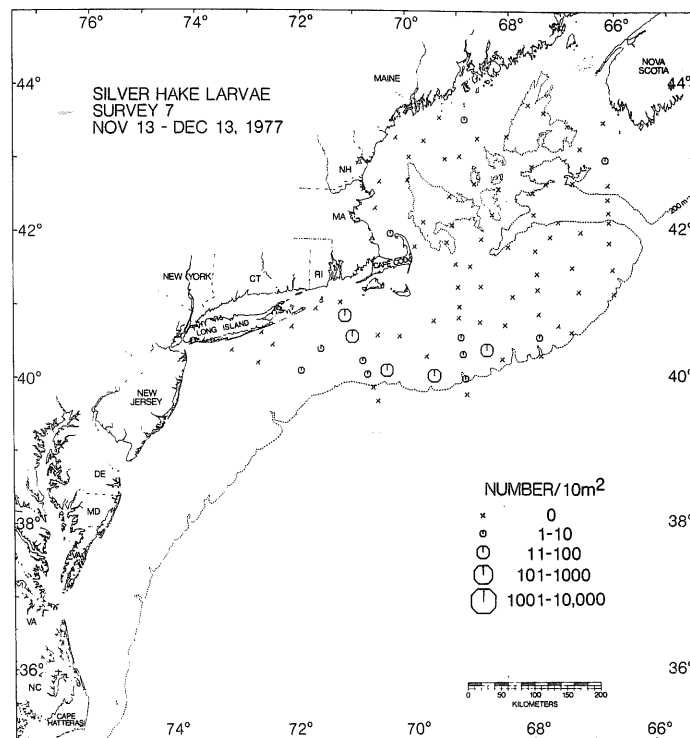
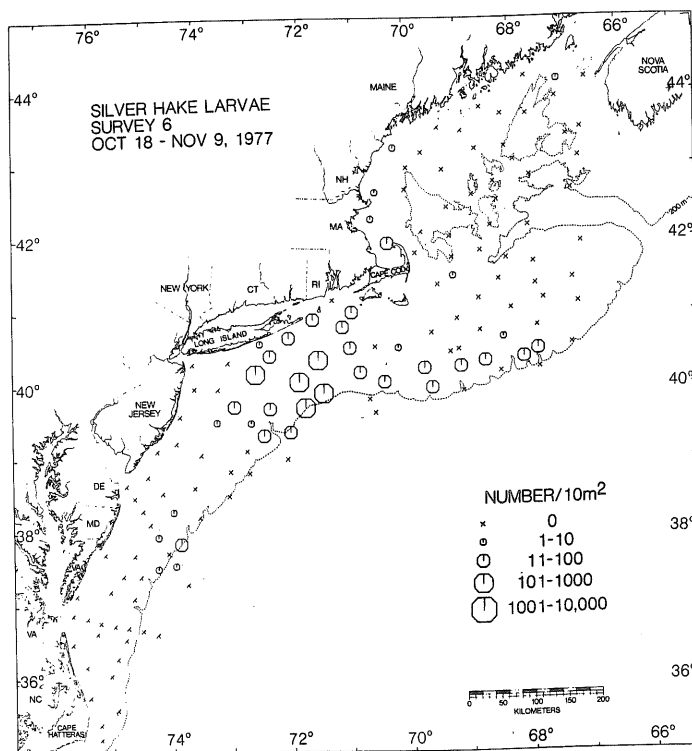


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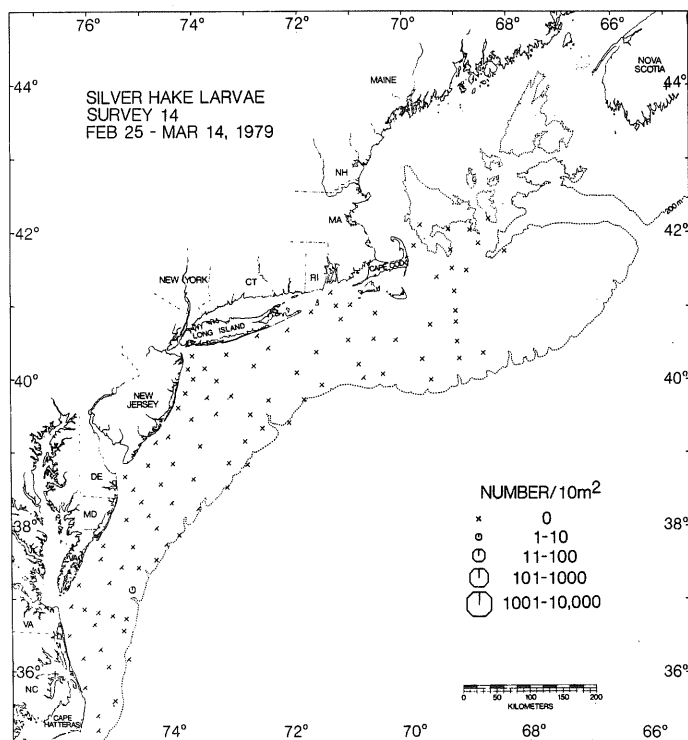
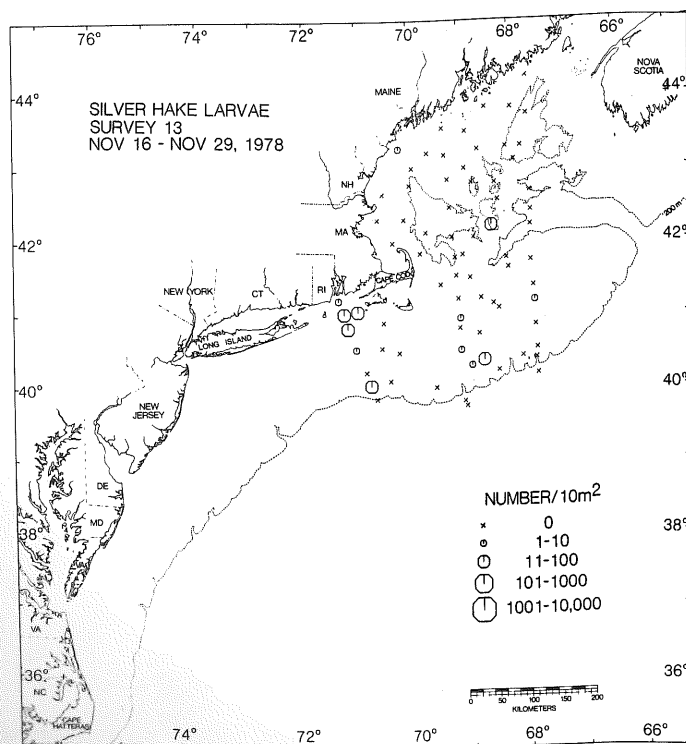
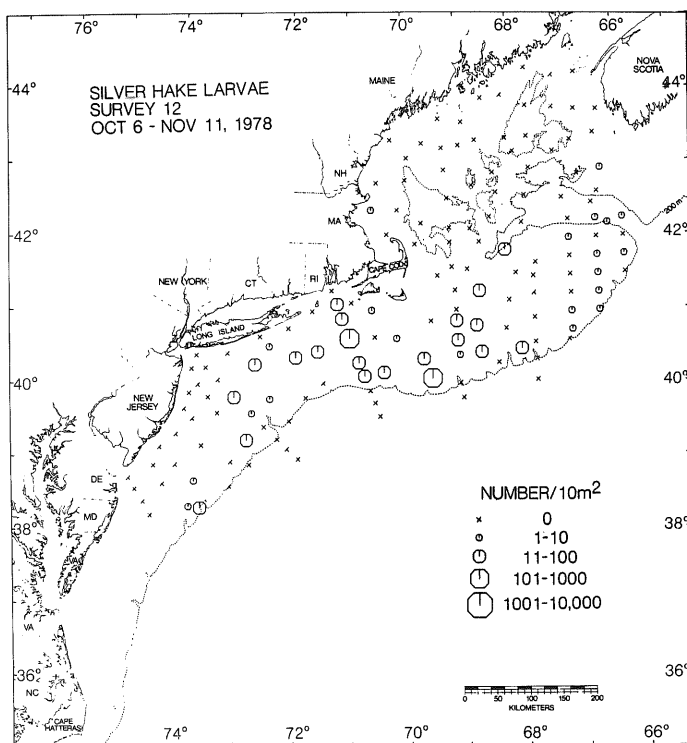
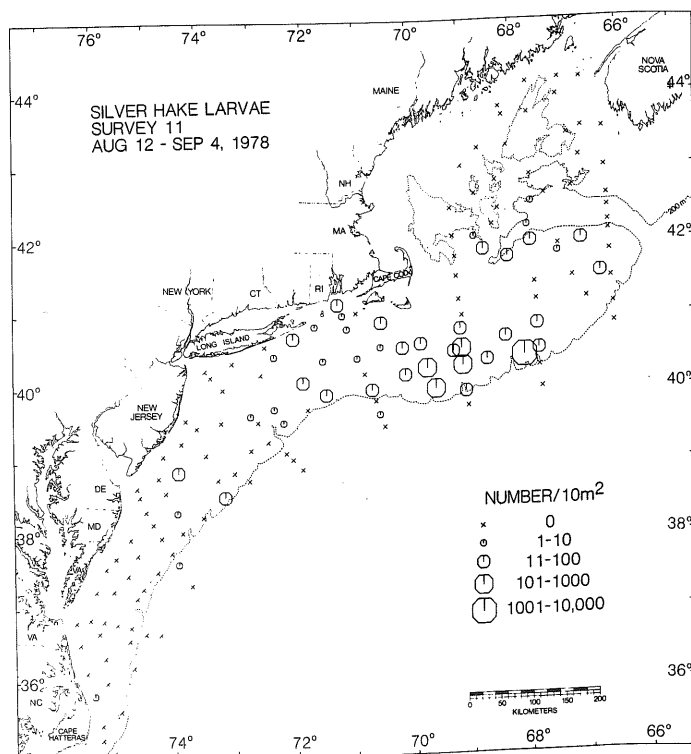


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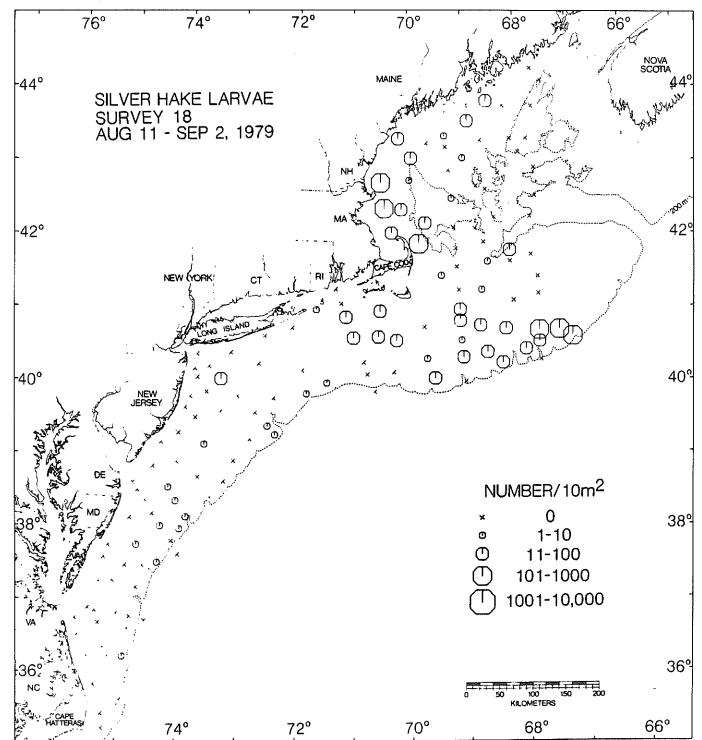
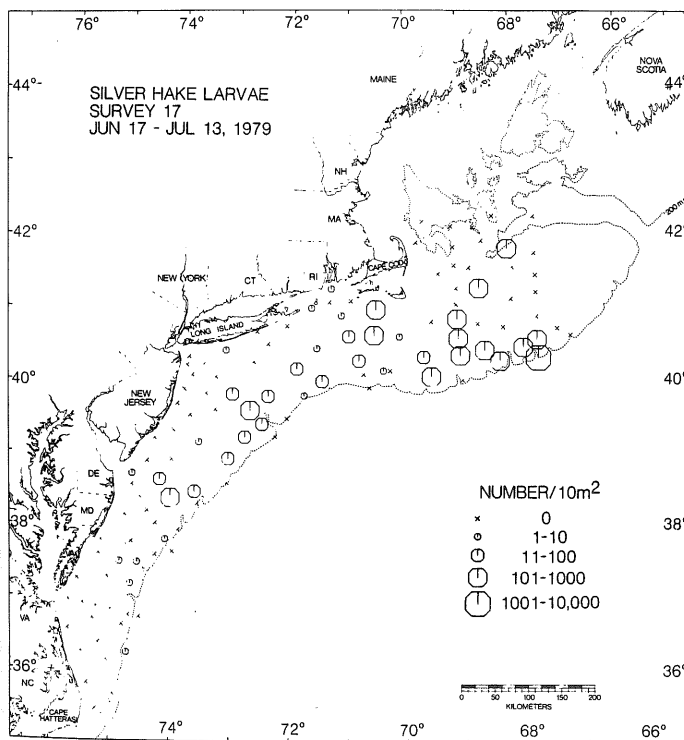
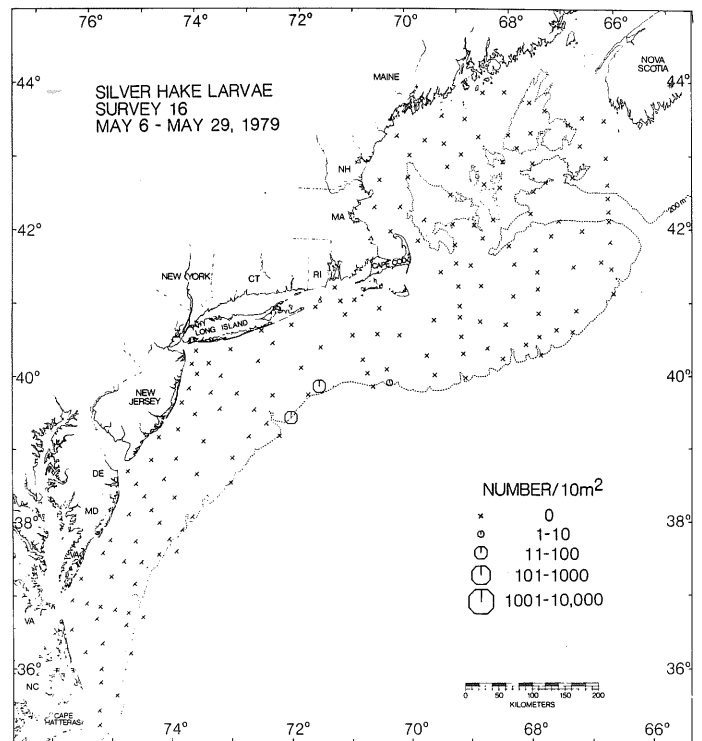
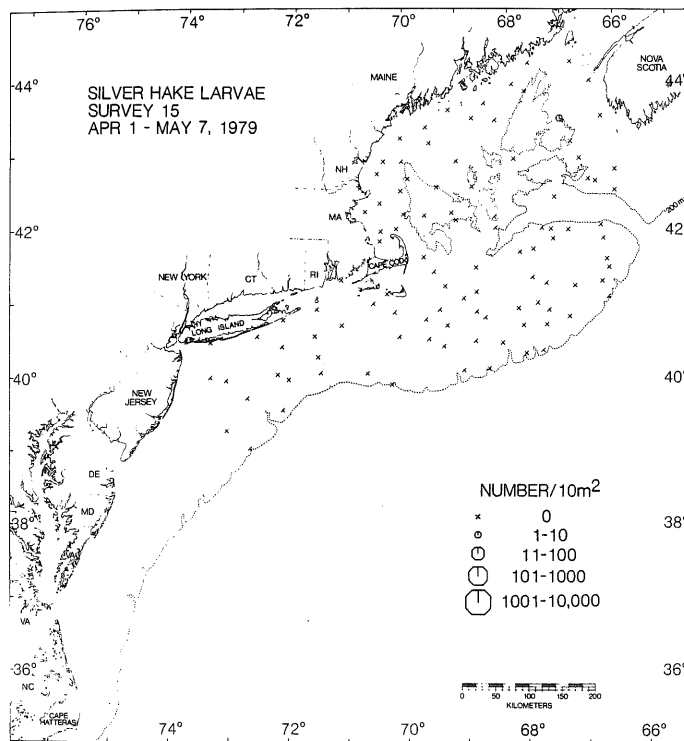


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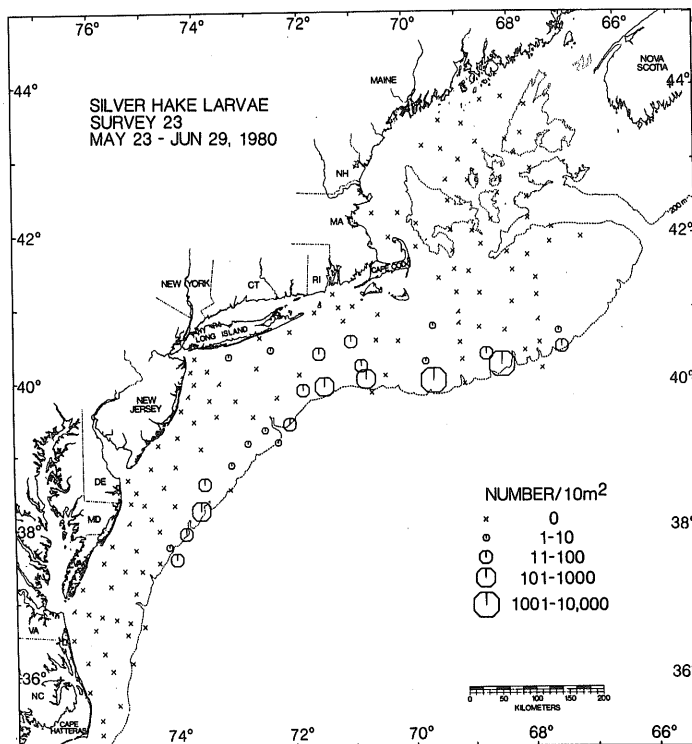
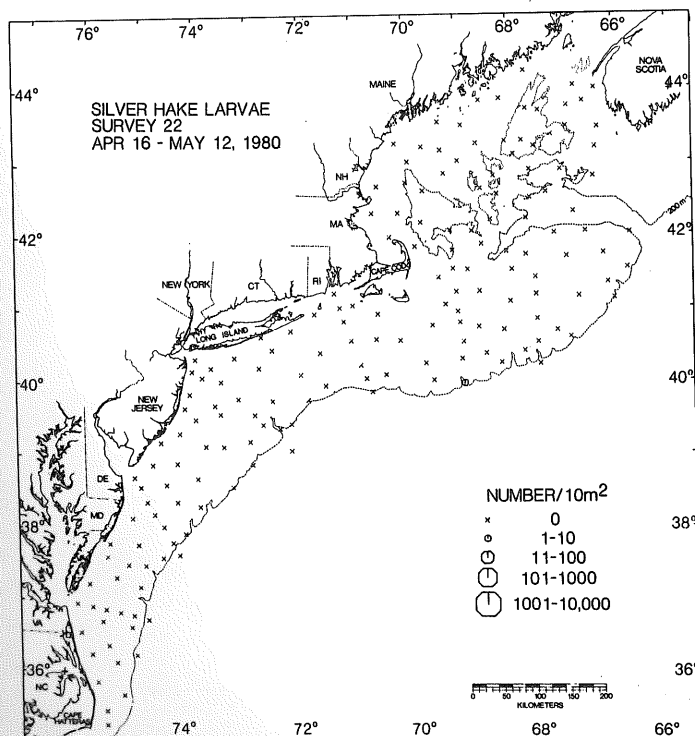
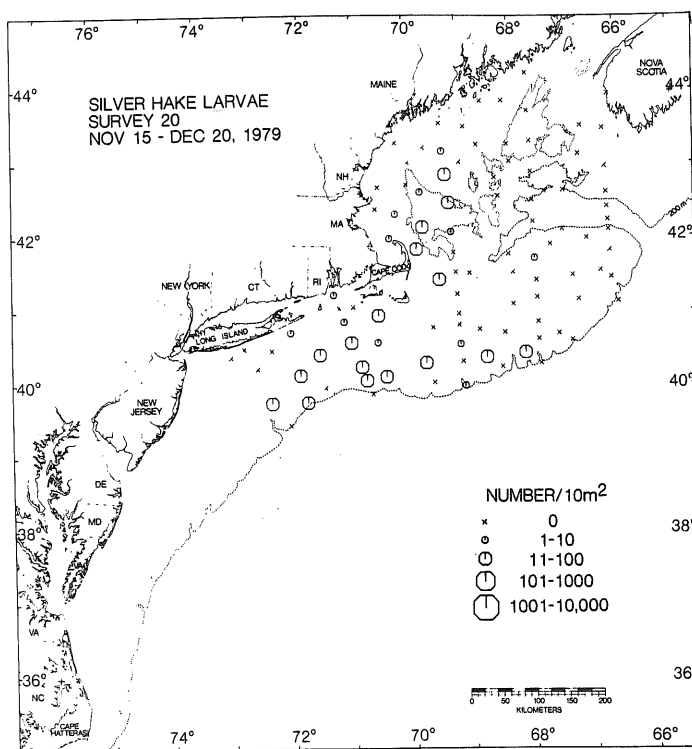
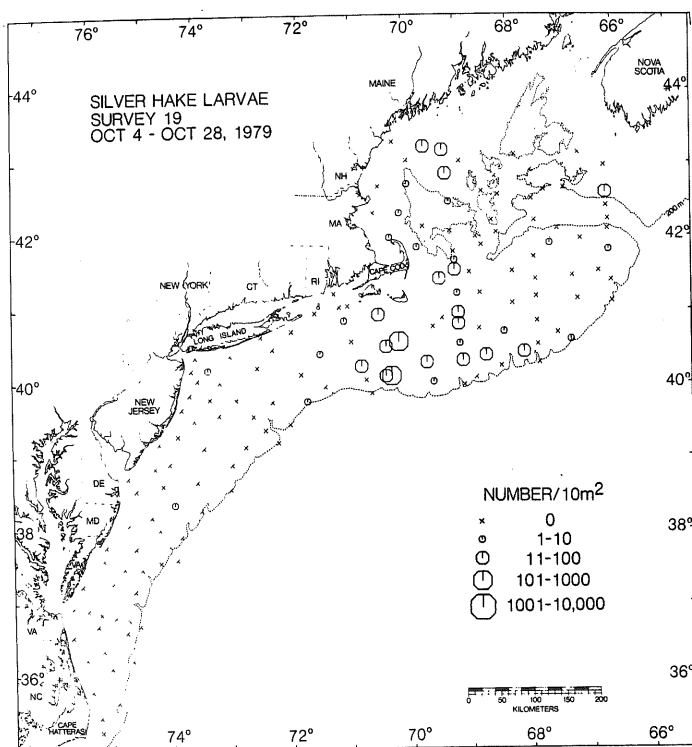


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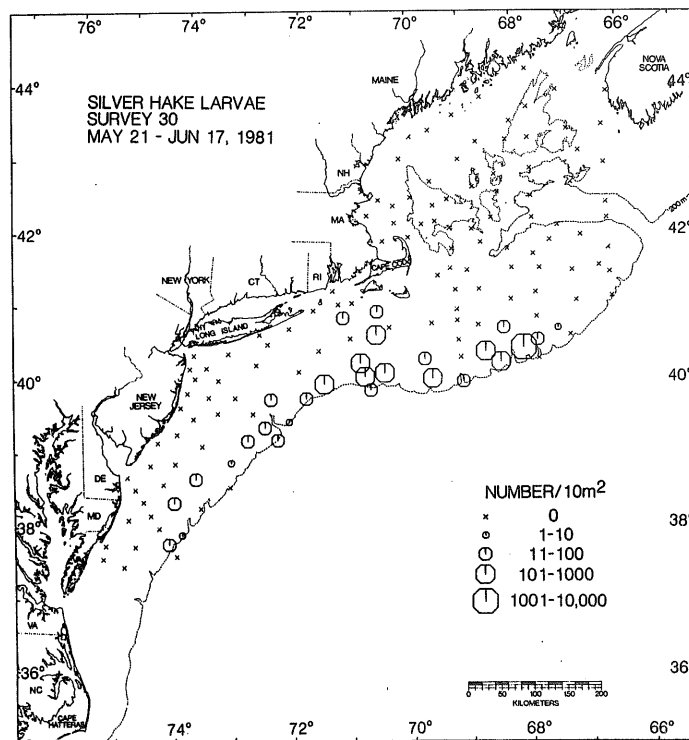
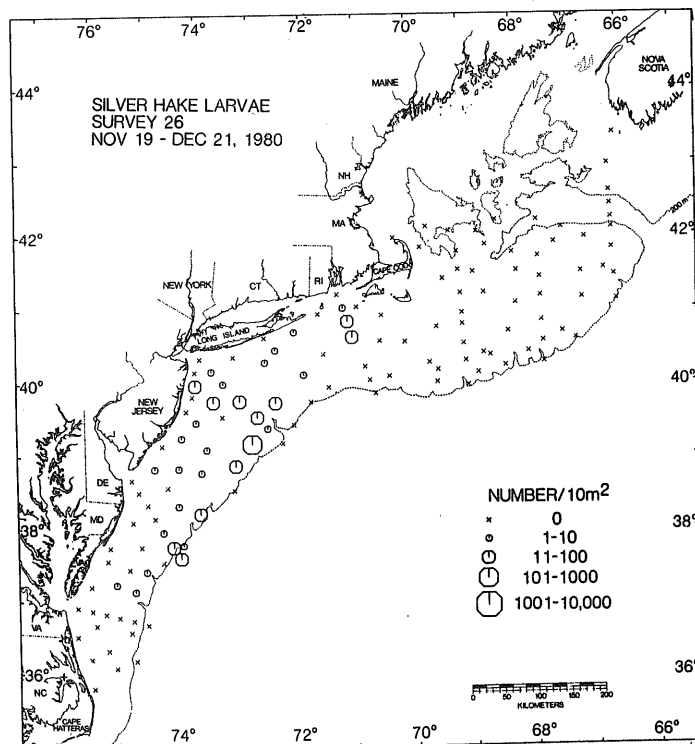
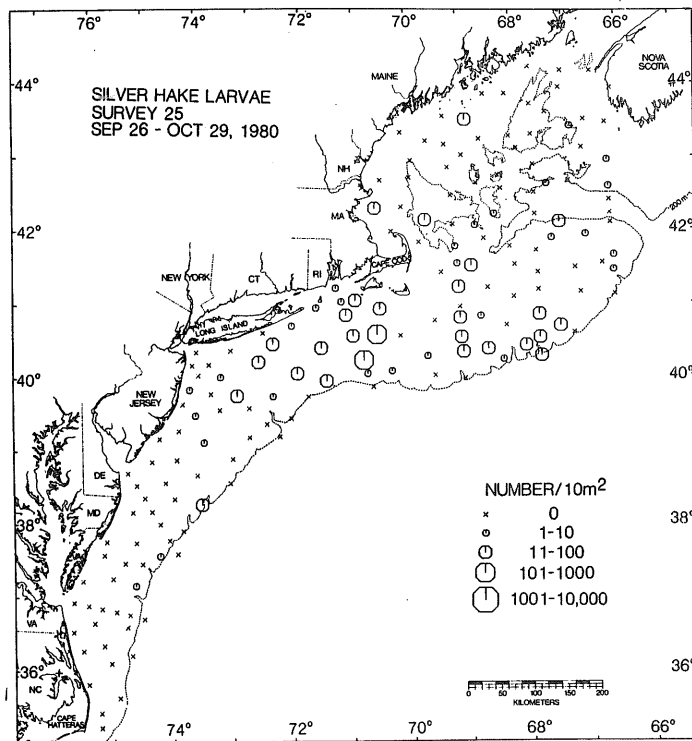
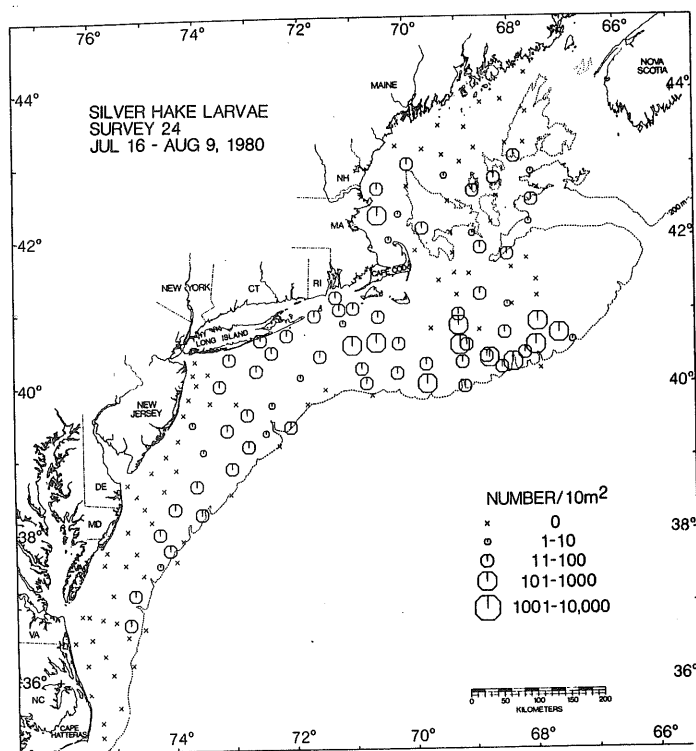


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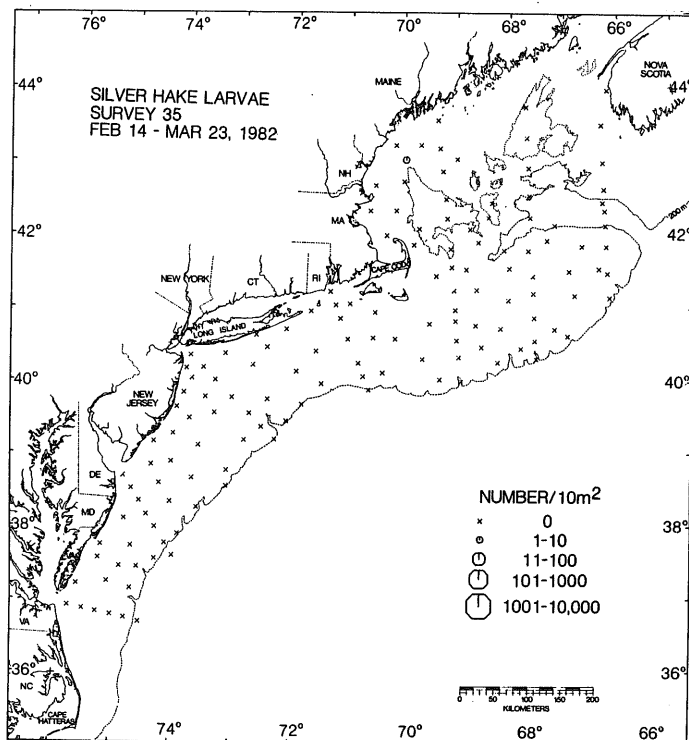
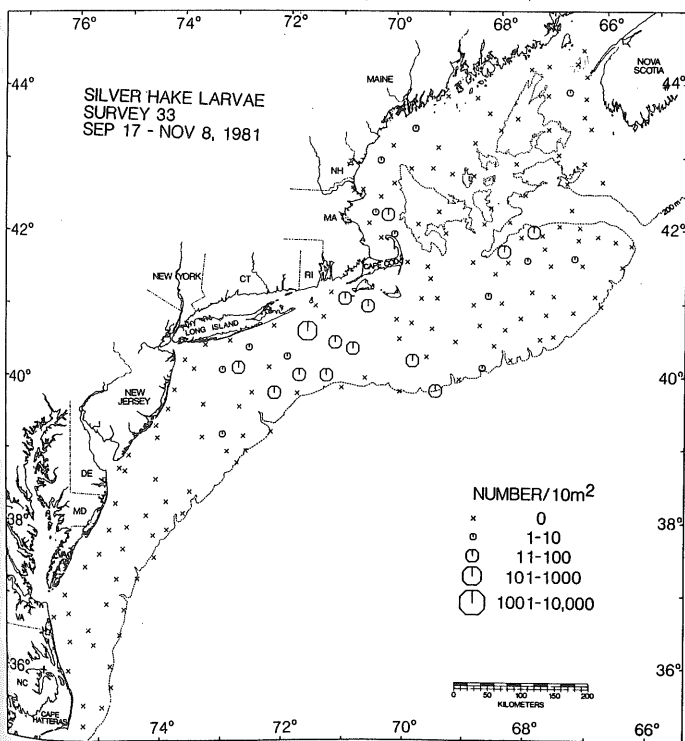
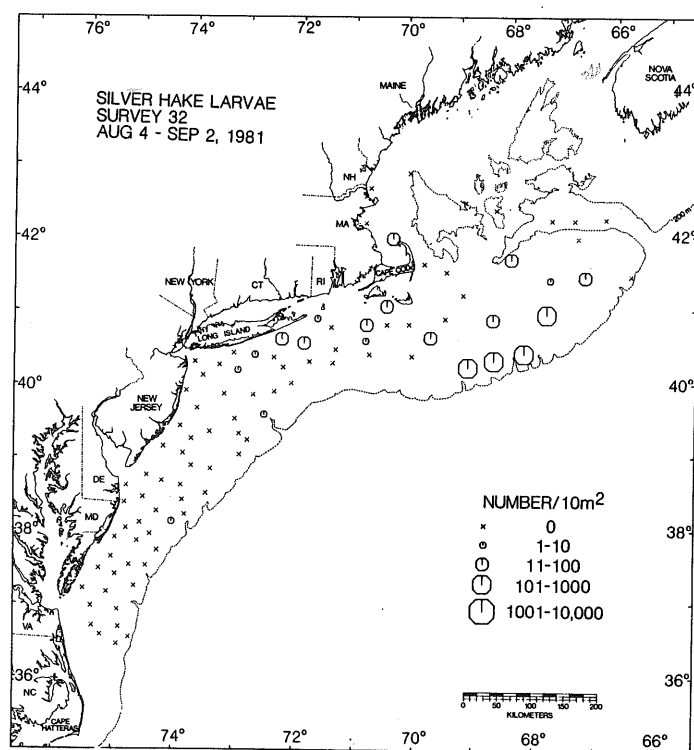
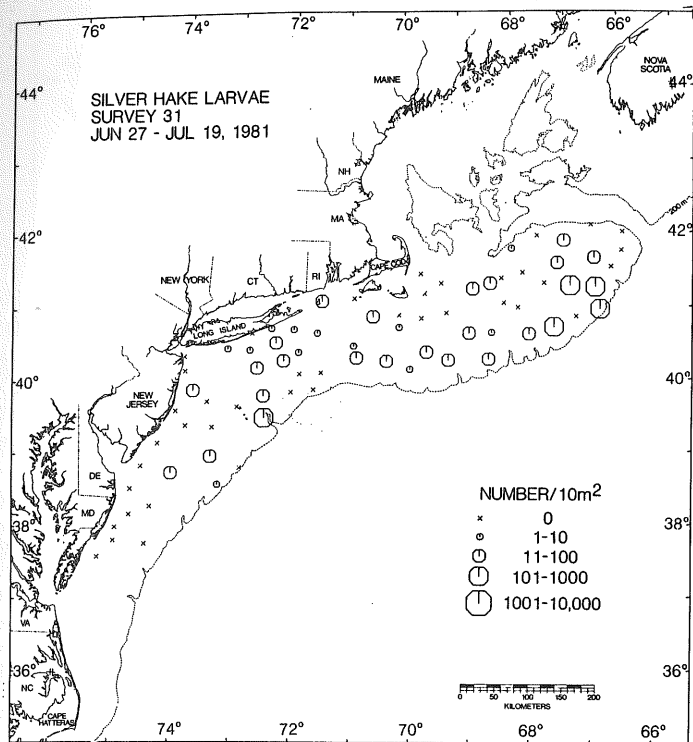


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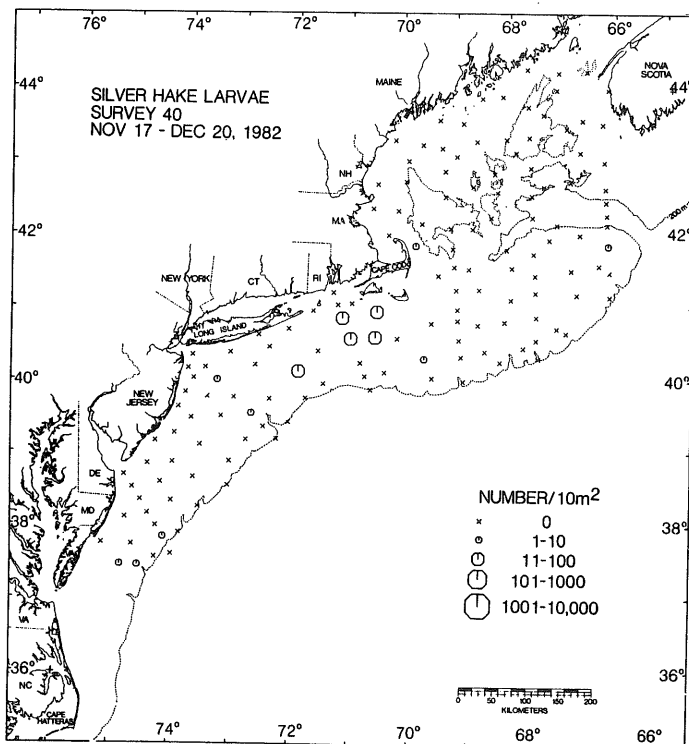
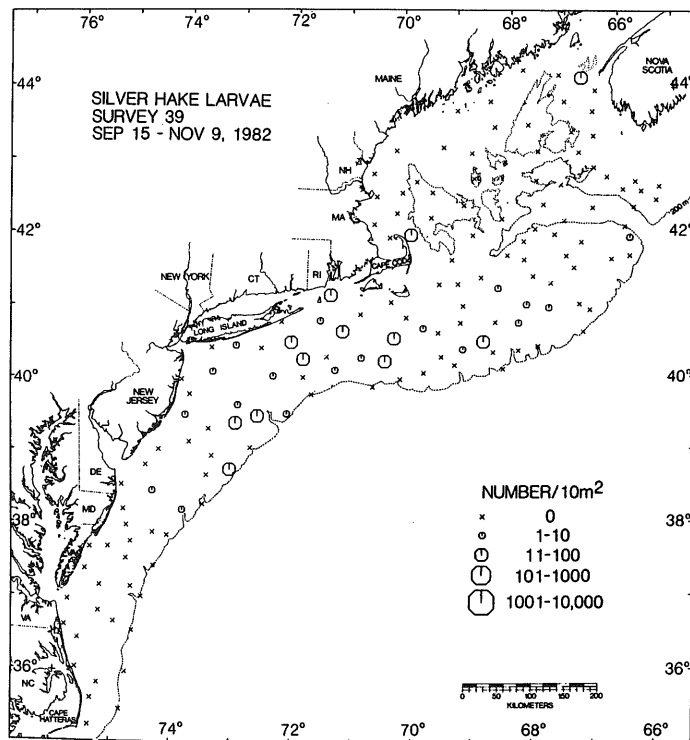
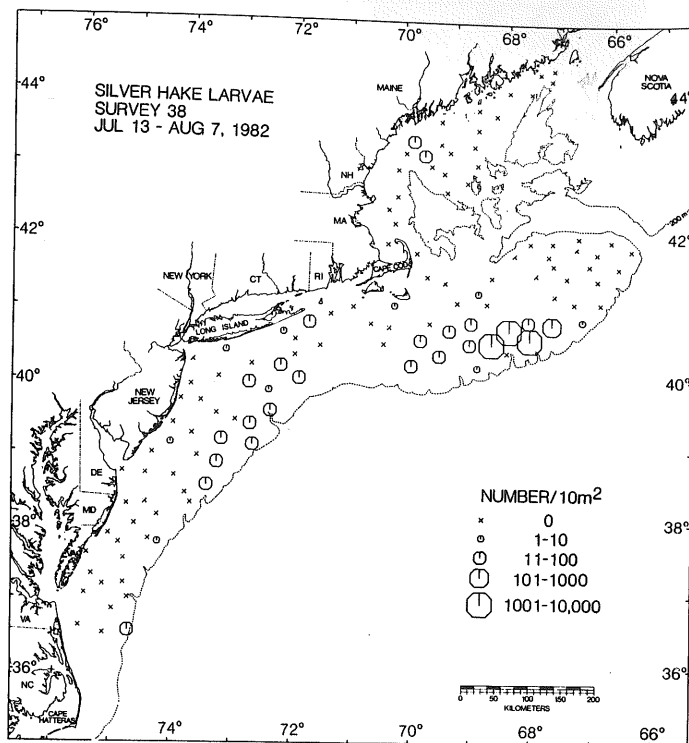
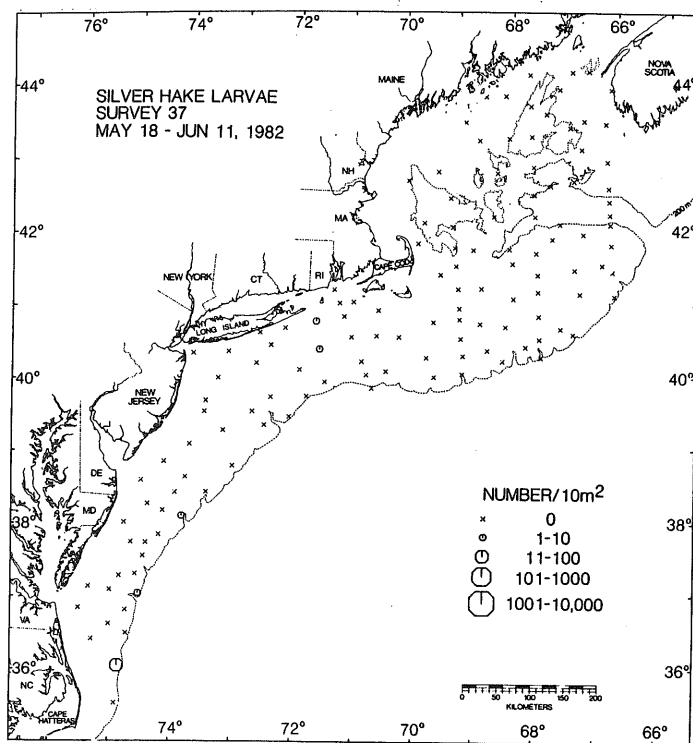
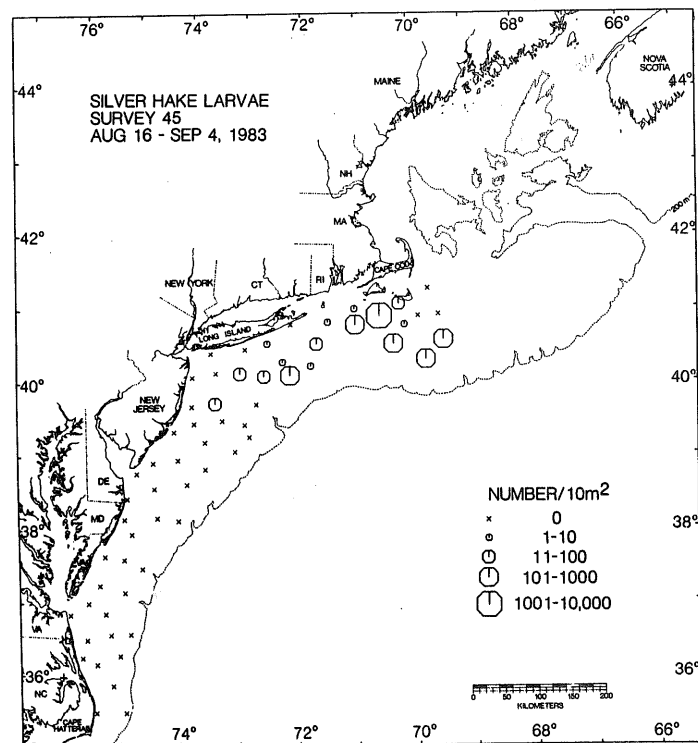
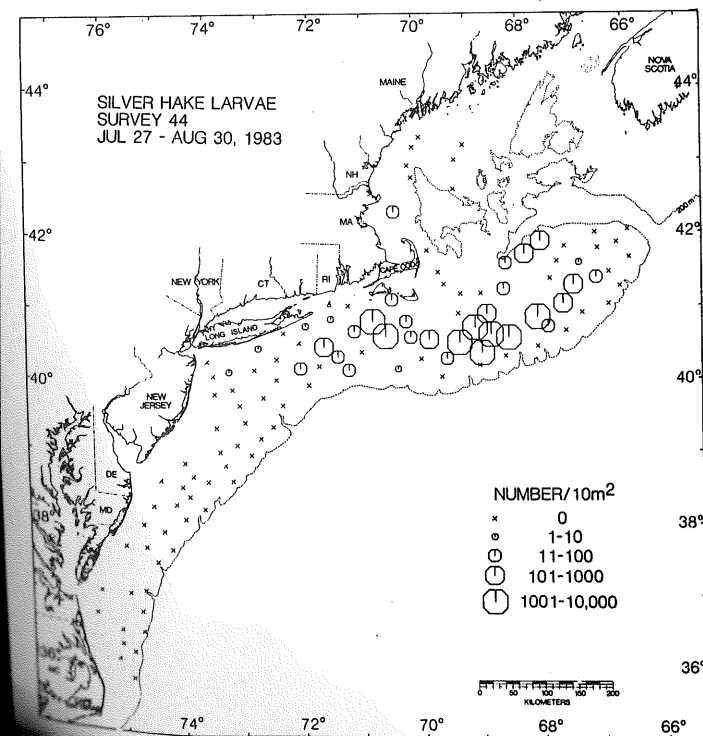
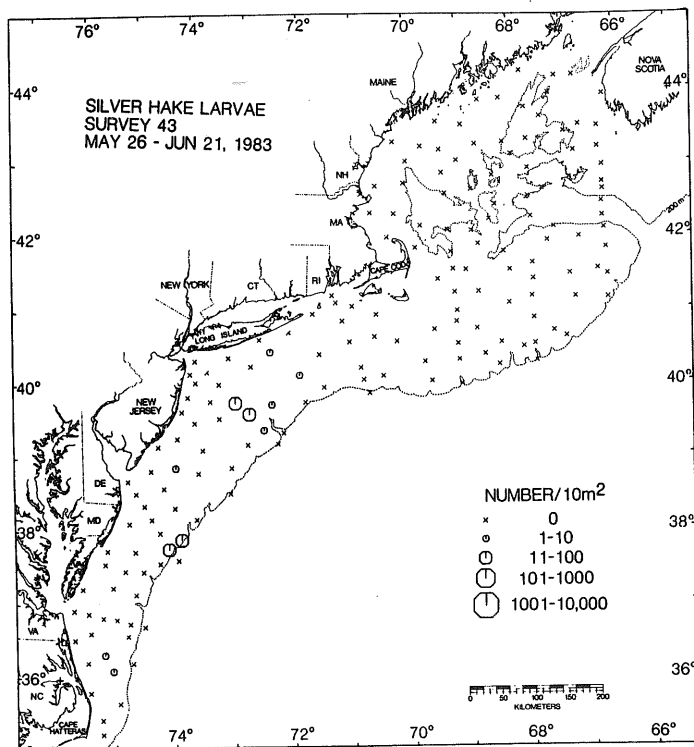
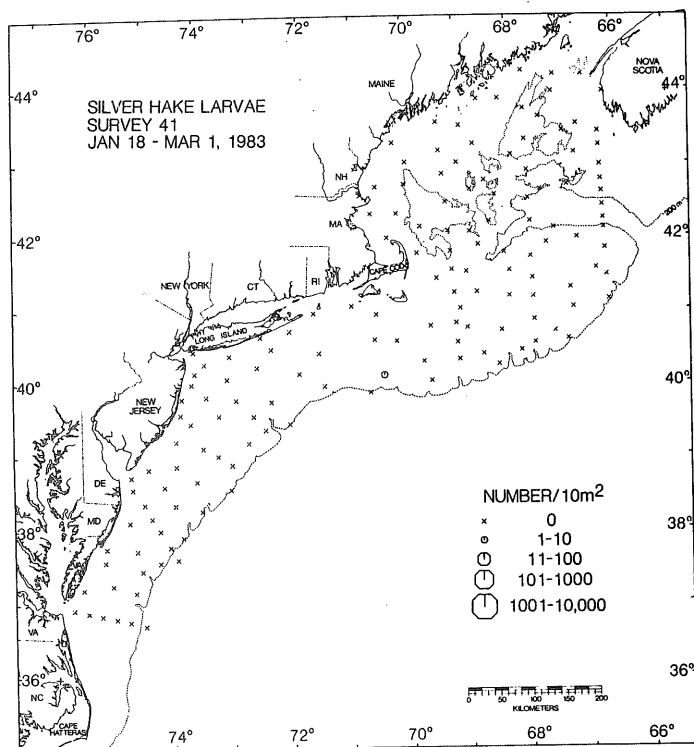


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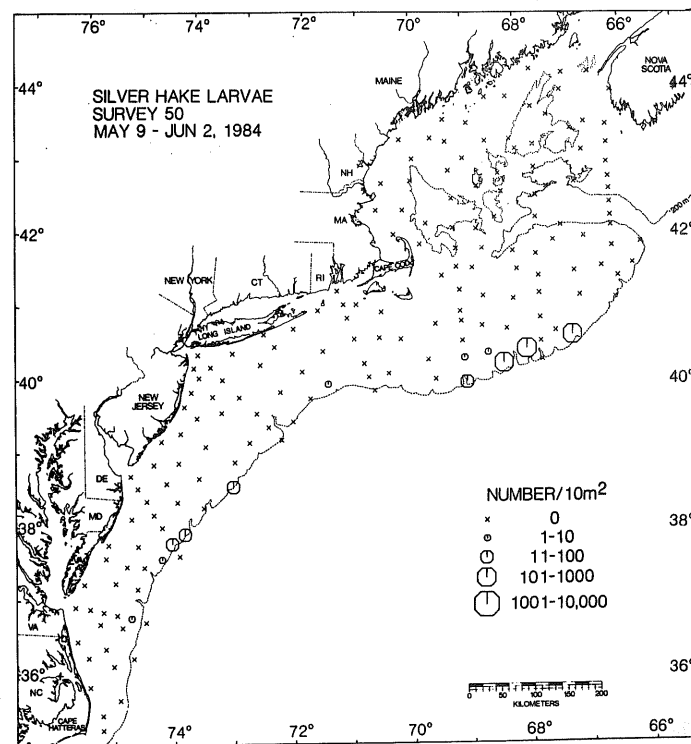
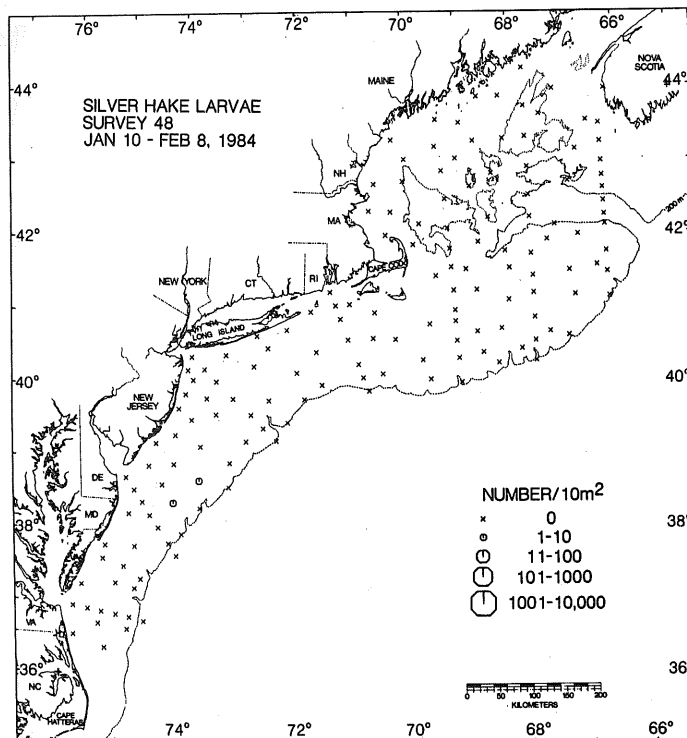
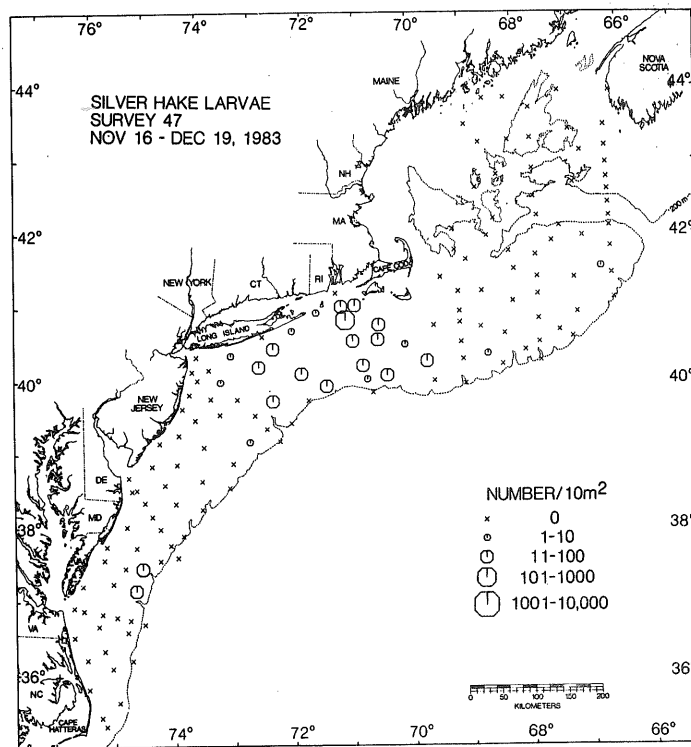
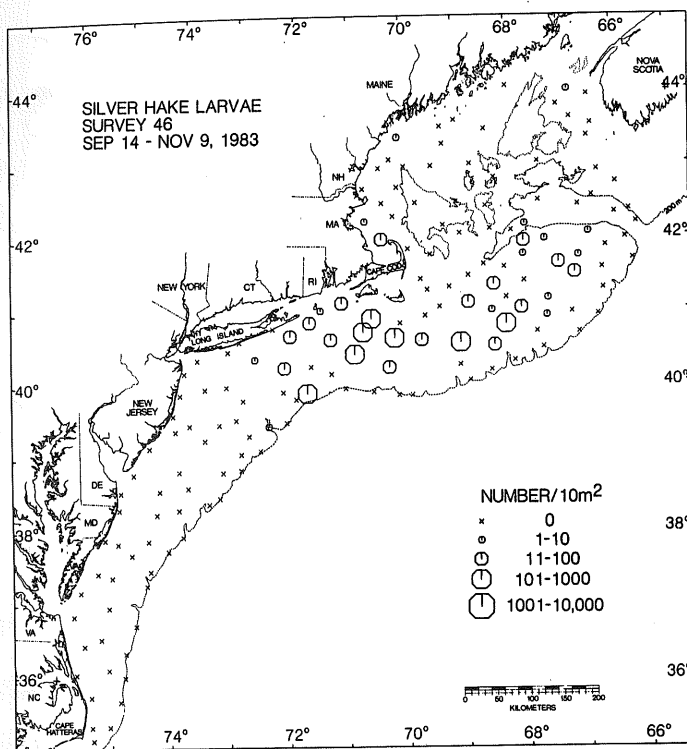


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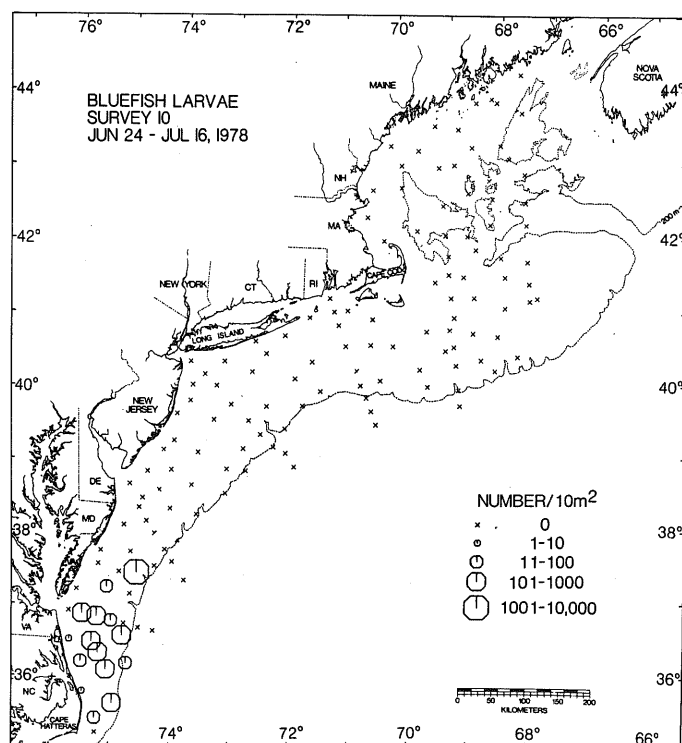
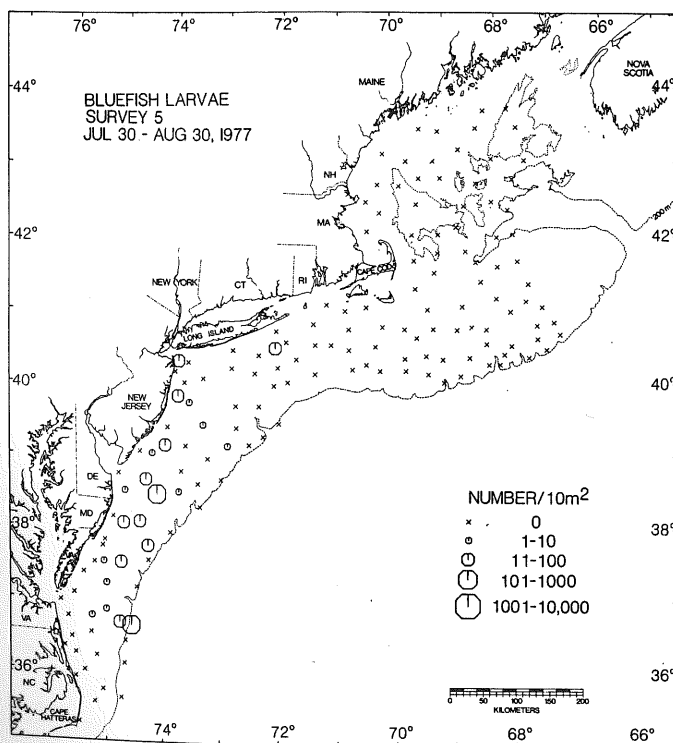
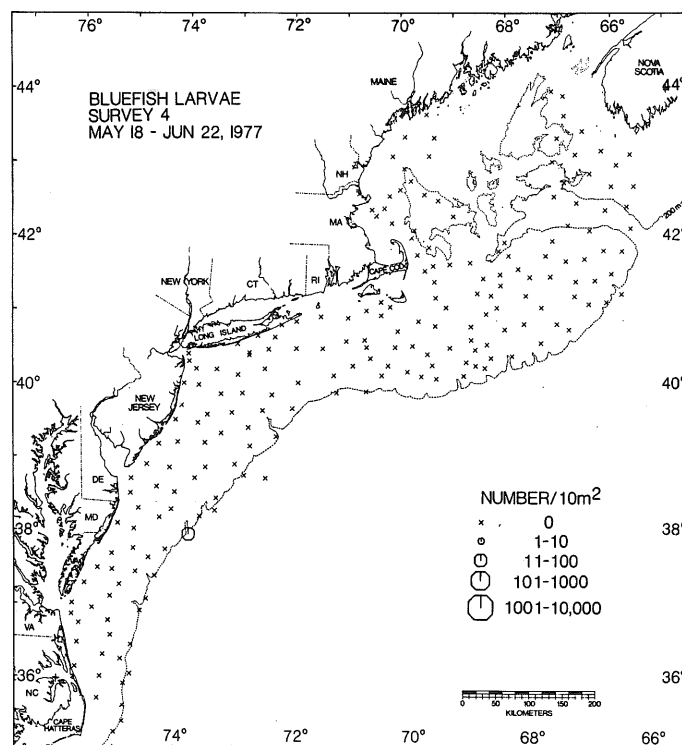
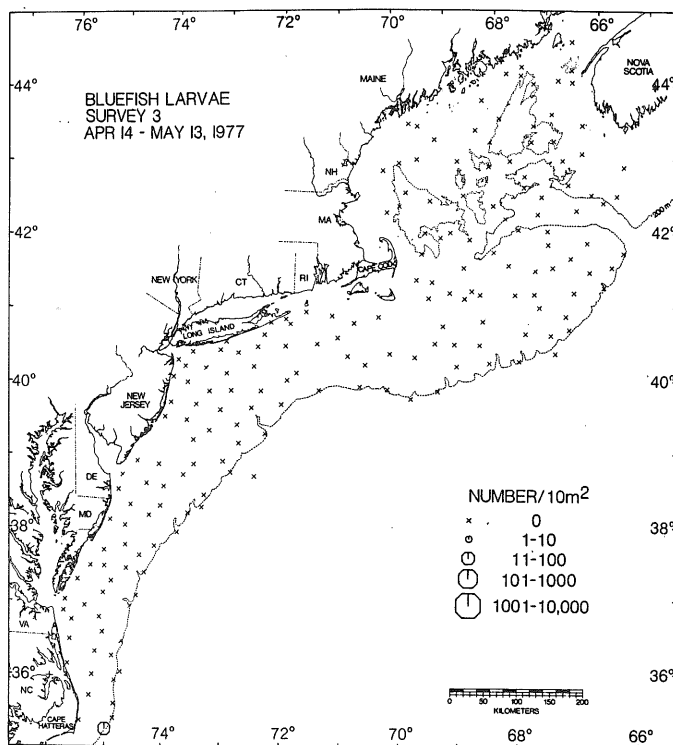


Figure 13. Distribution and abundance of bluefish, Pomatomus saltatrix, larvae off northeastern United States, winter 1977 through spring 1984.

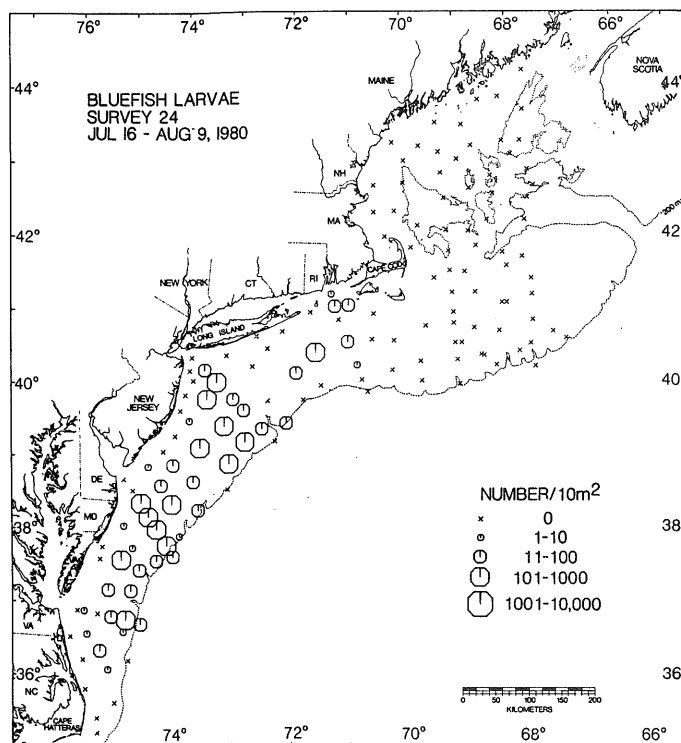
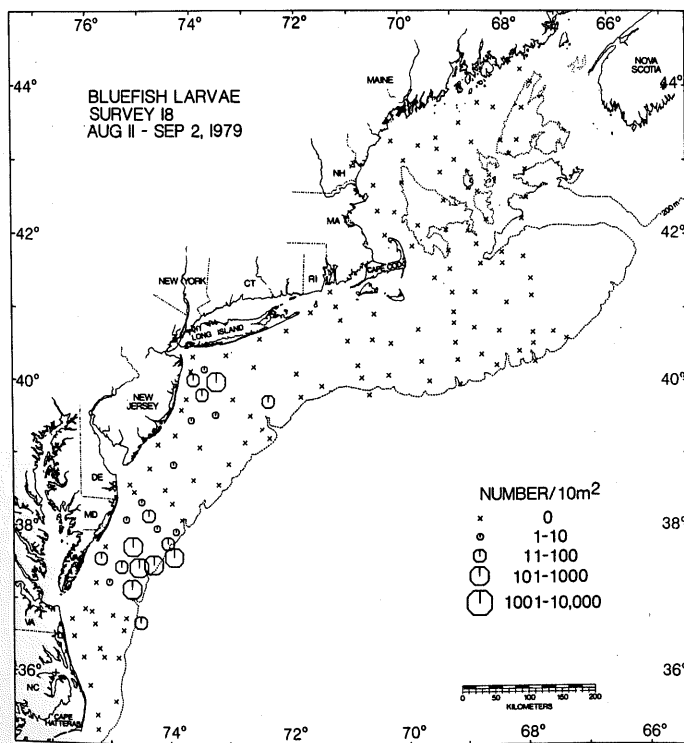
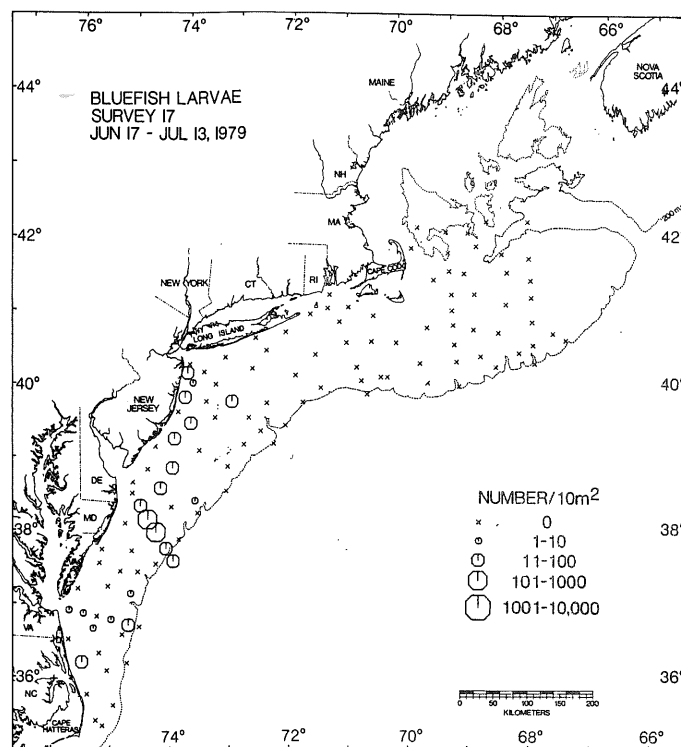
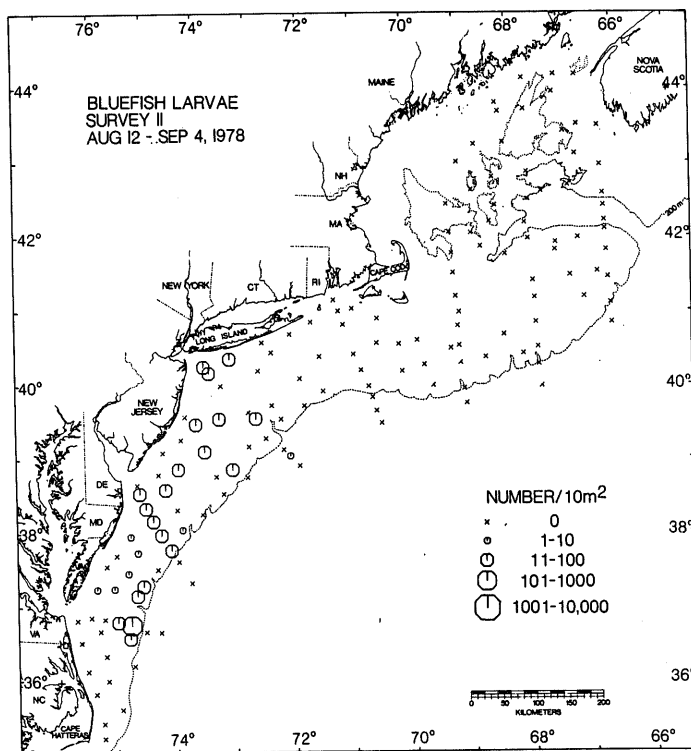


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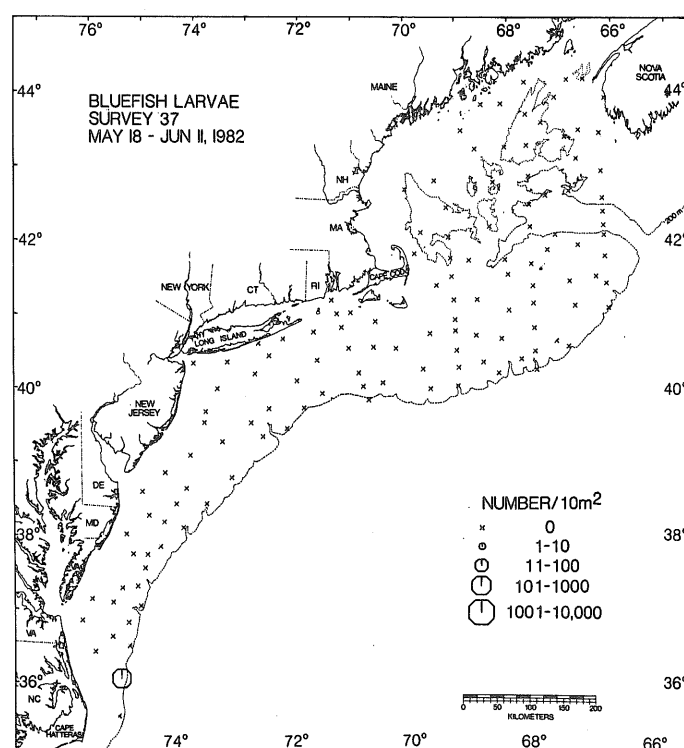
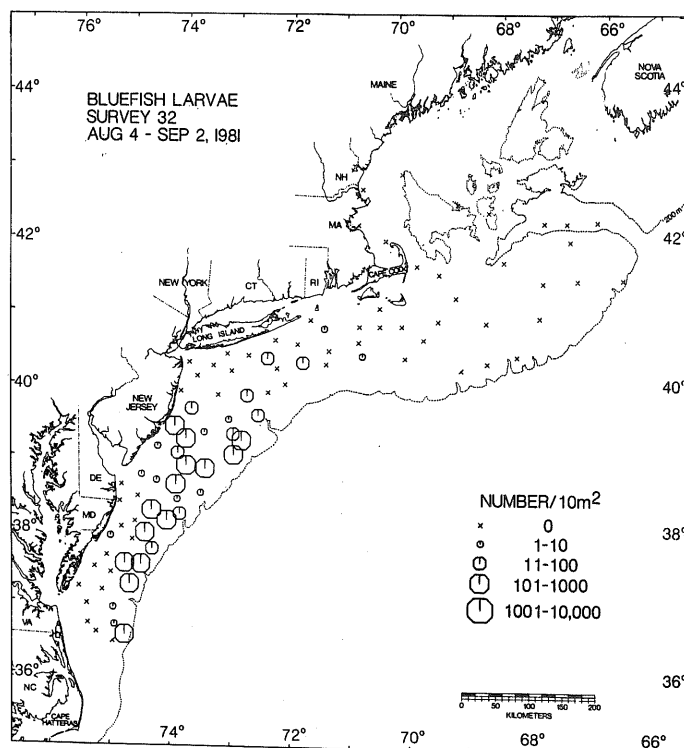
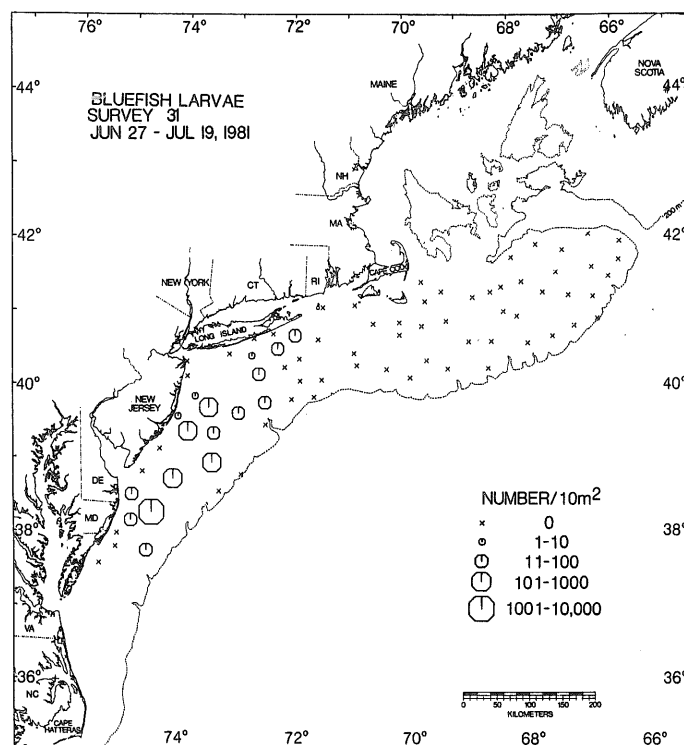
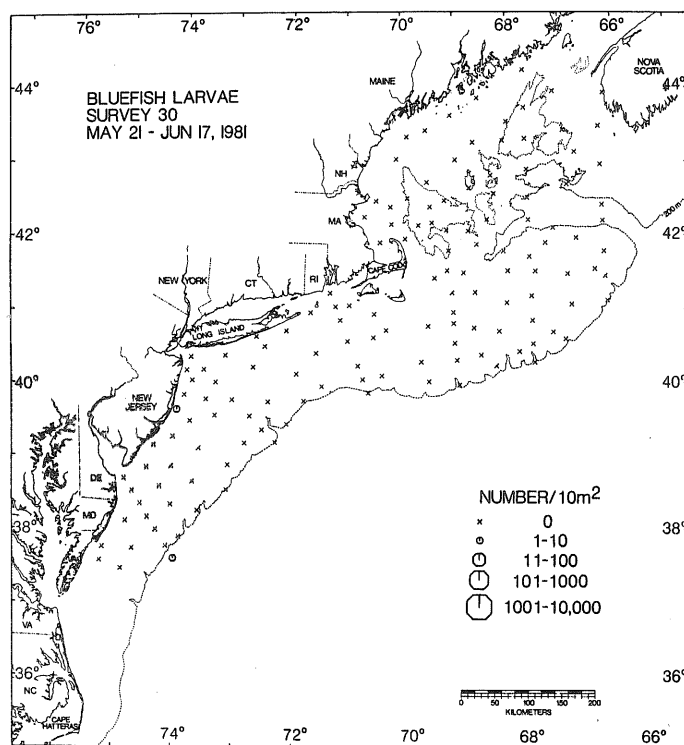


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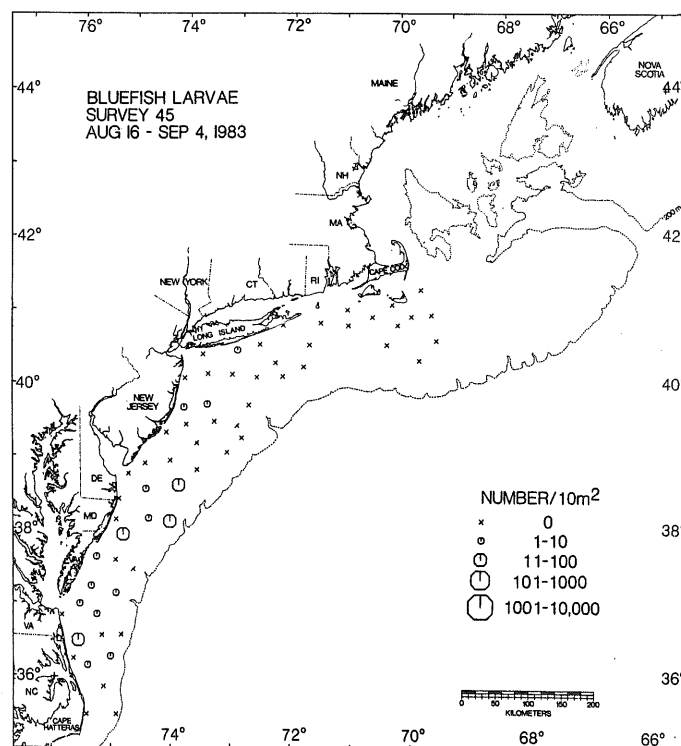
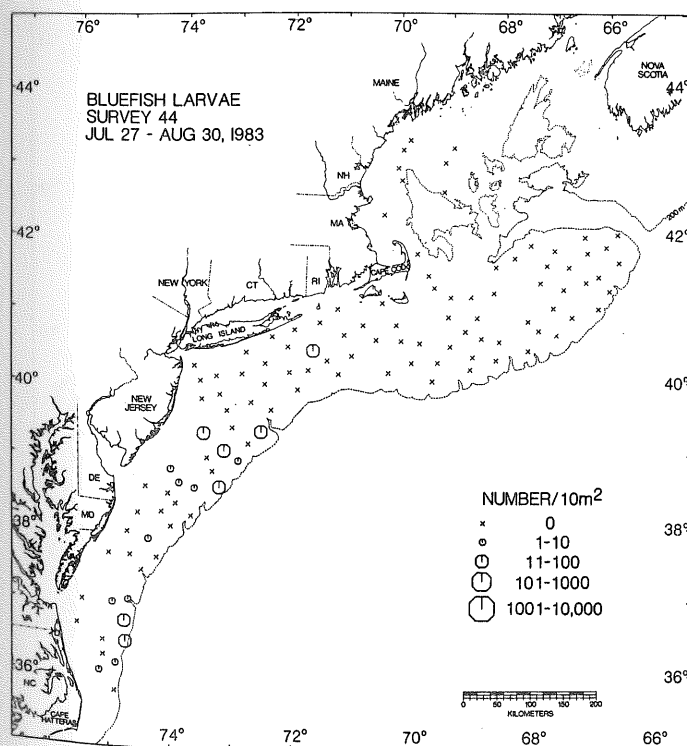
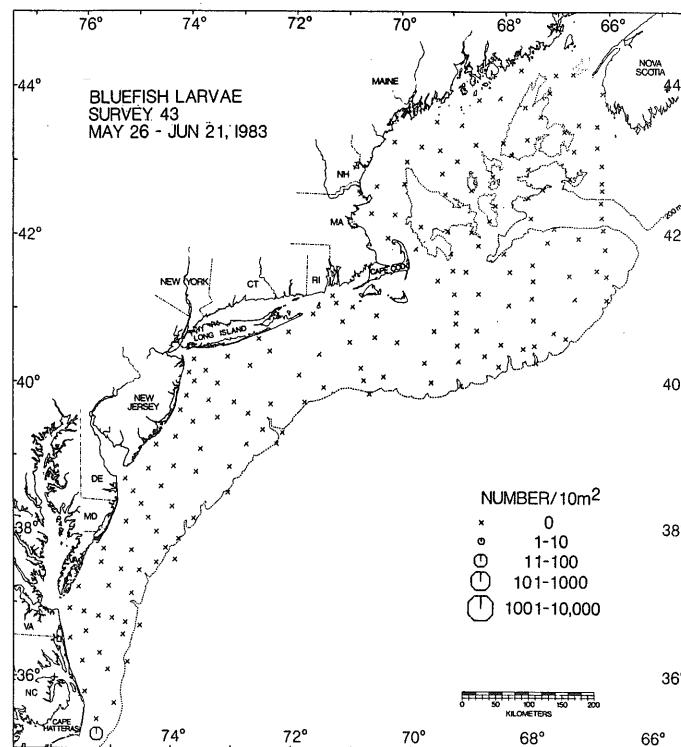
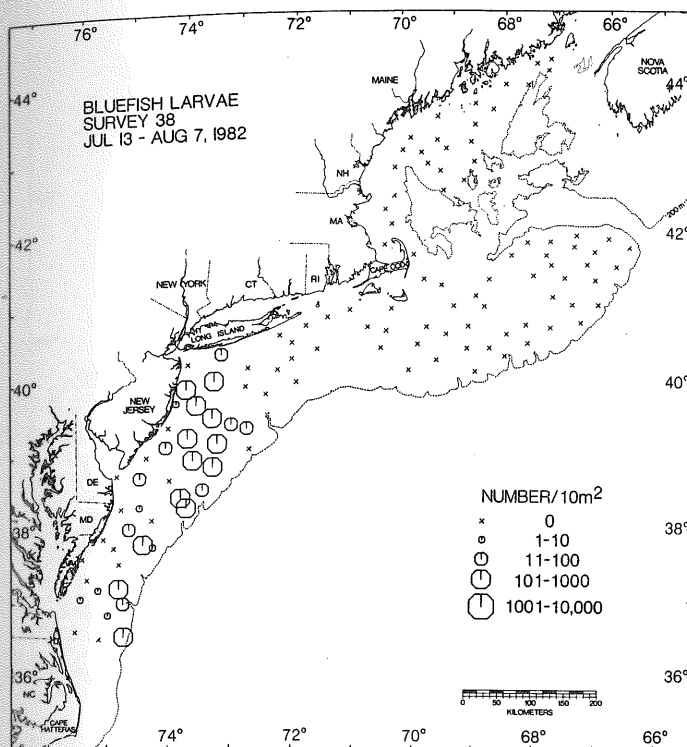


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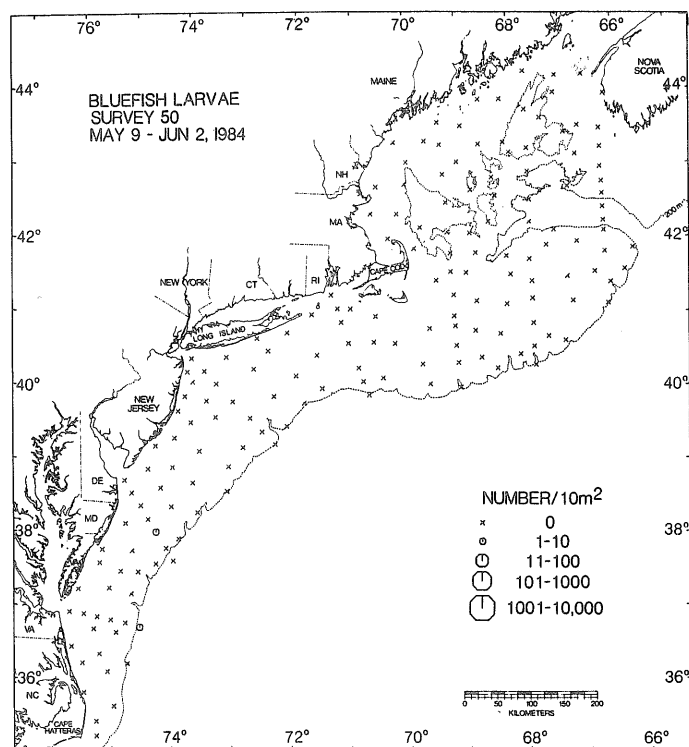


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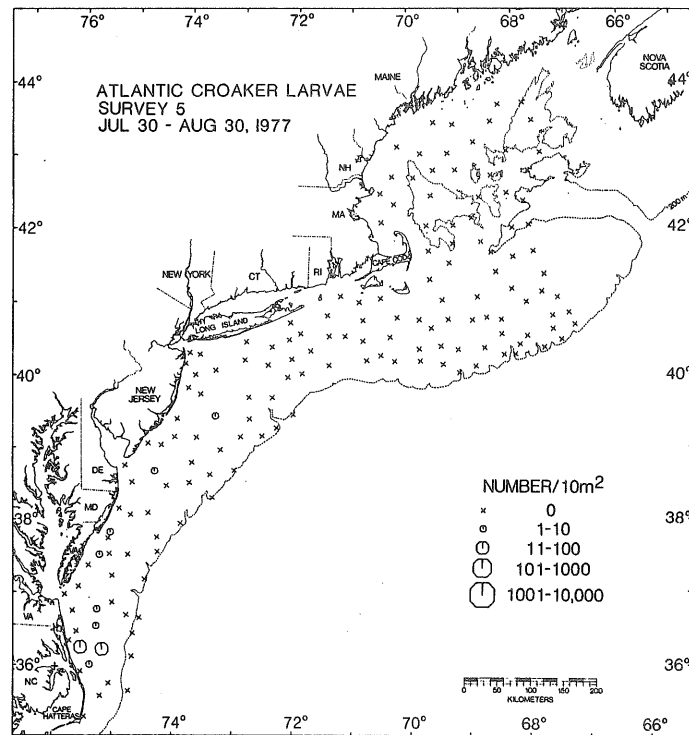
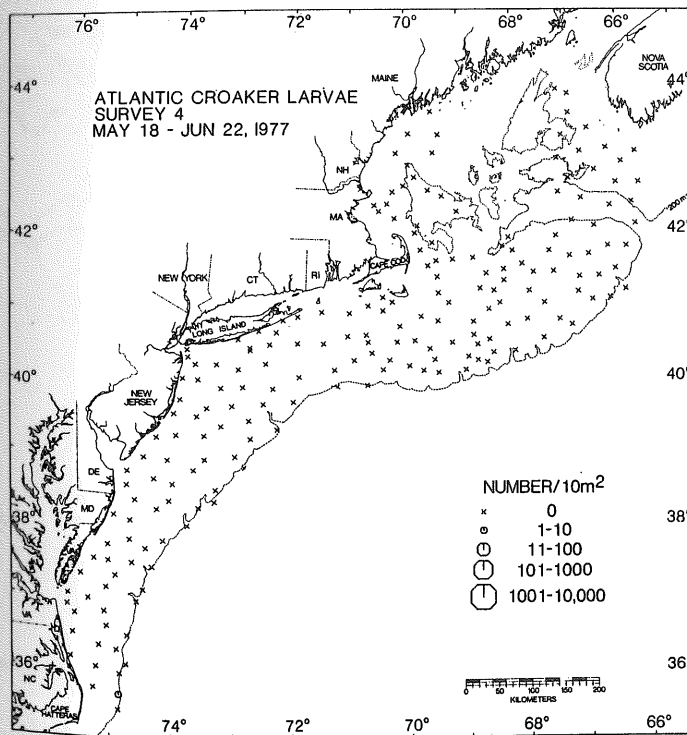
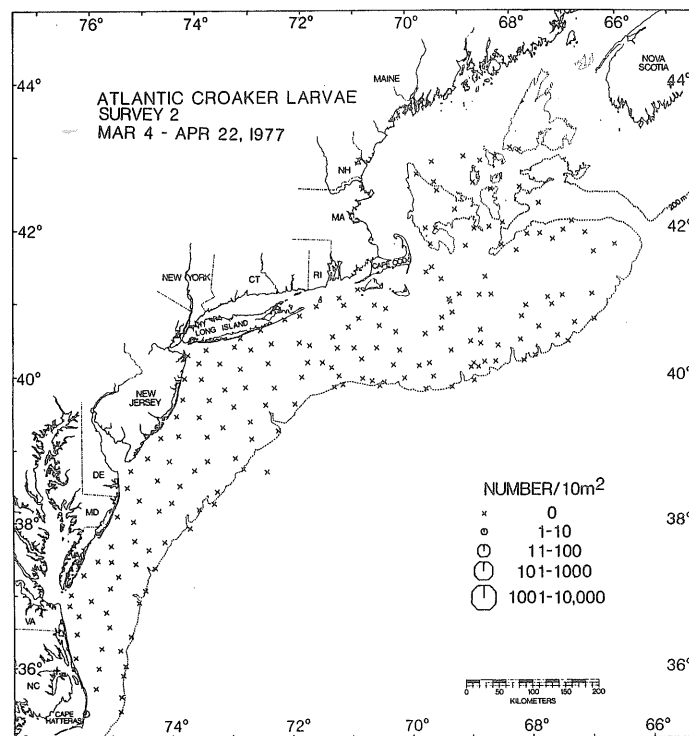
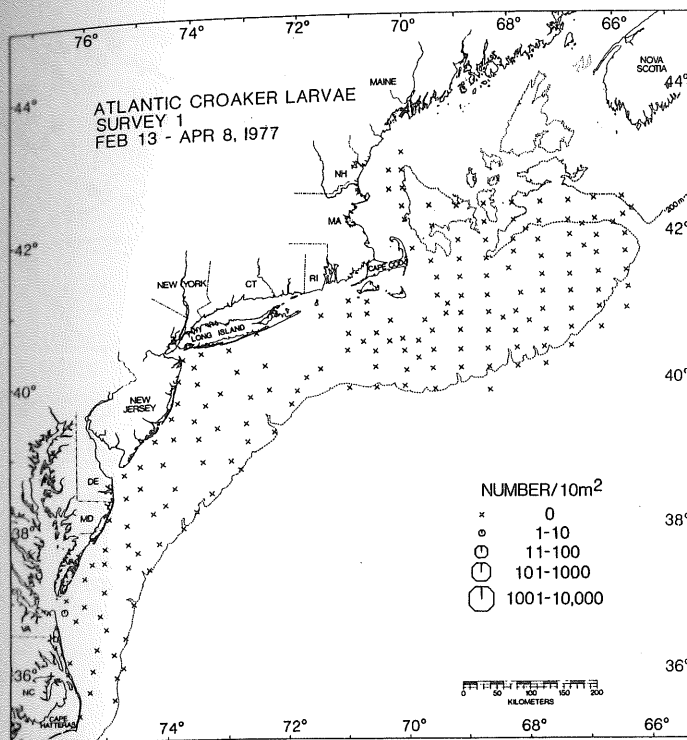


Figure 14. Distribution and abundance of Atlantic croaker, *Micropogonias undulatus*, larvae off northeastern United States, winter 1977 through spring 1984.

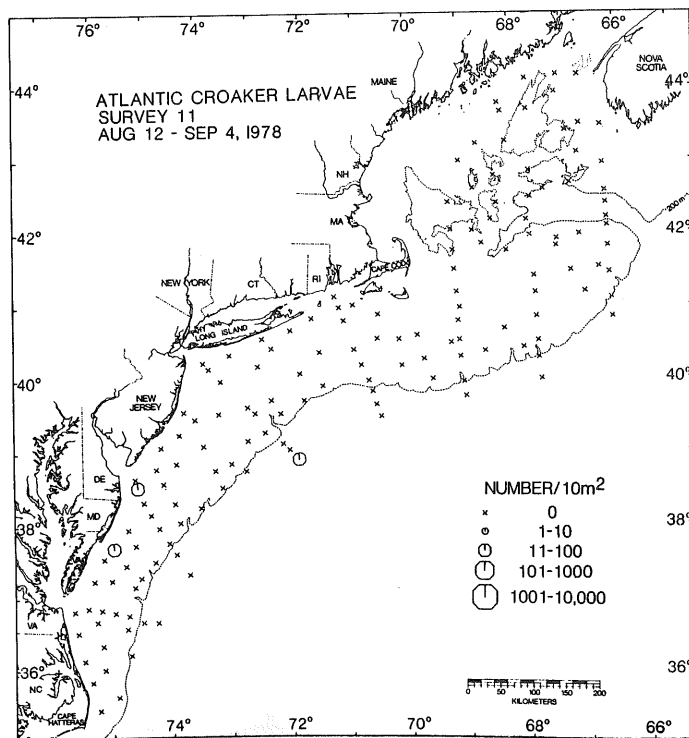
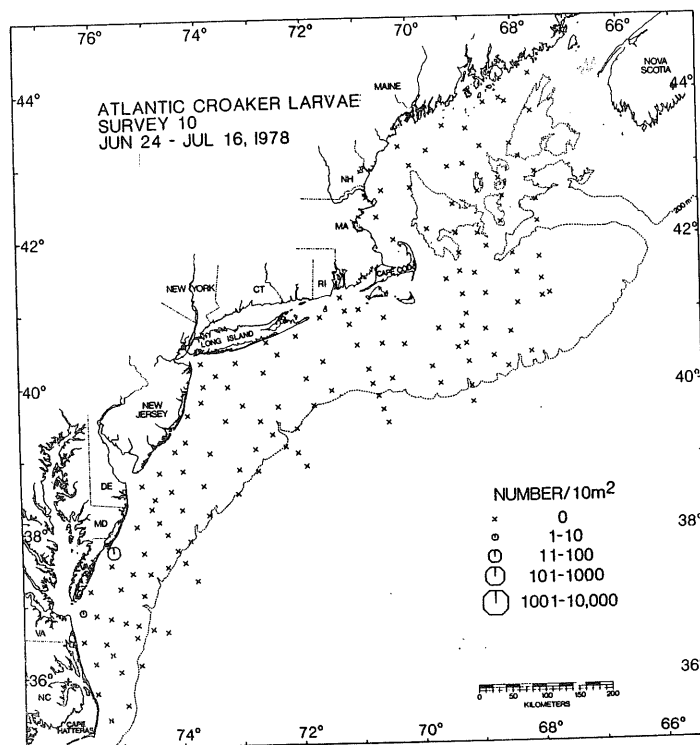
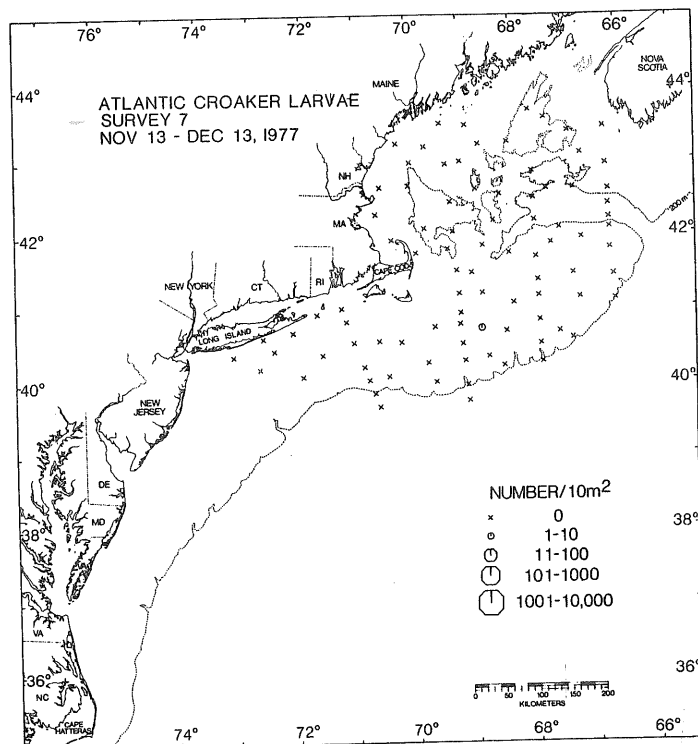
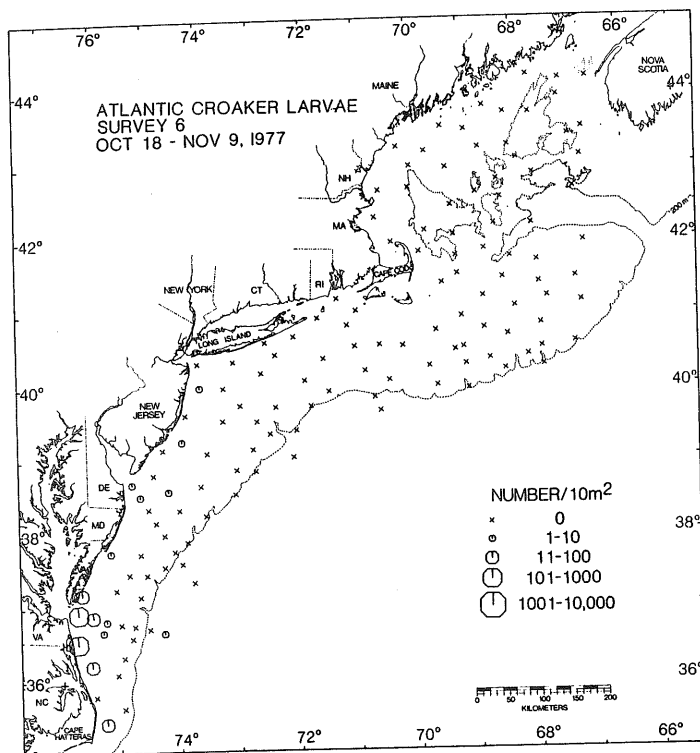


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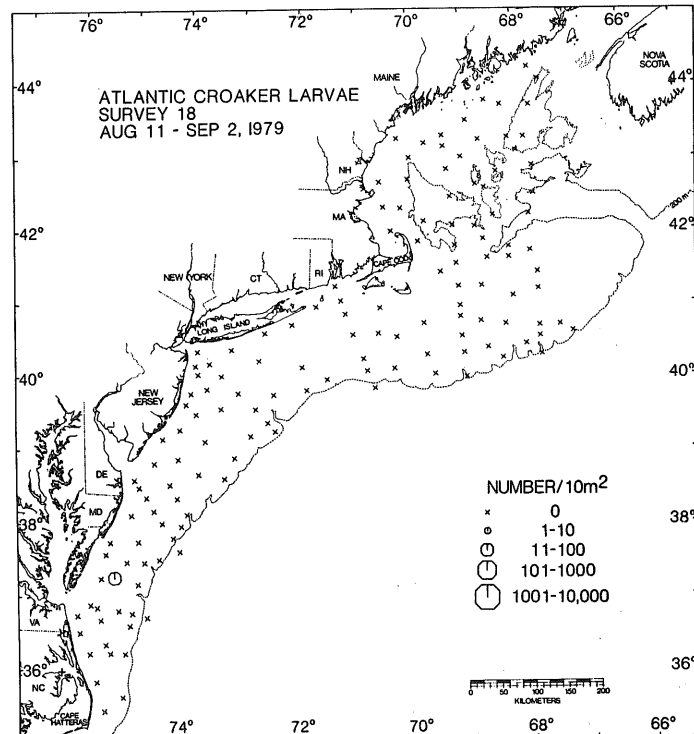
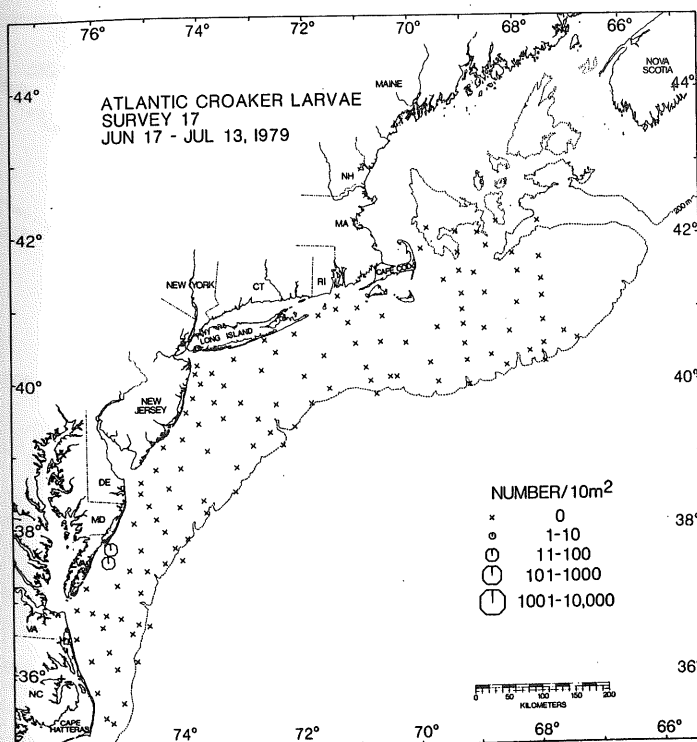
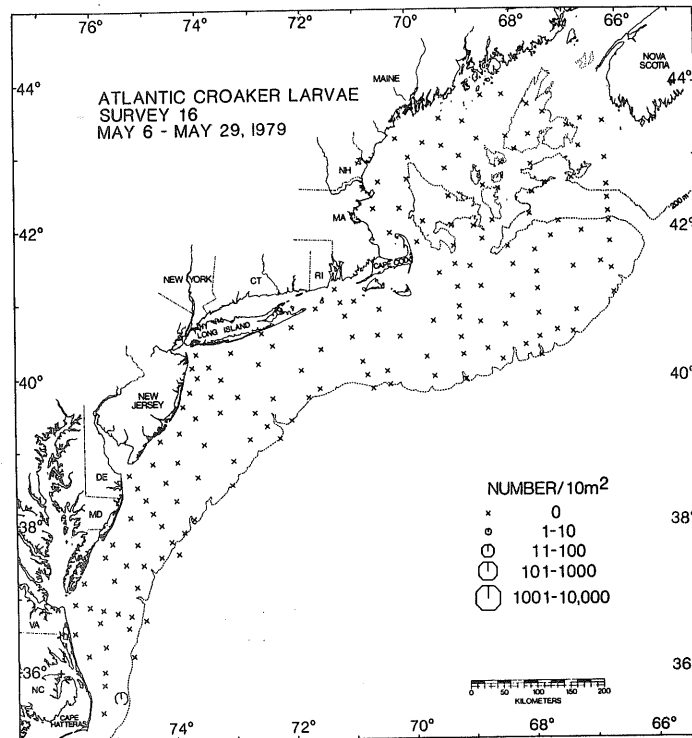
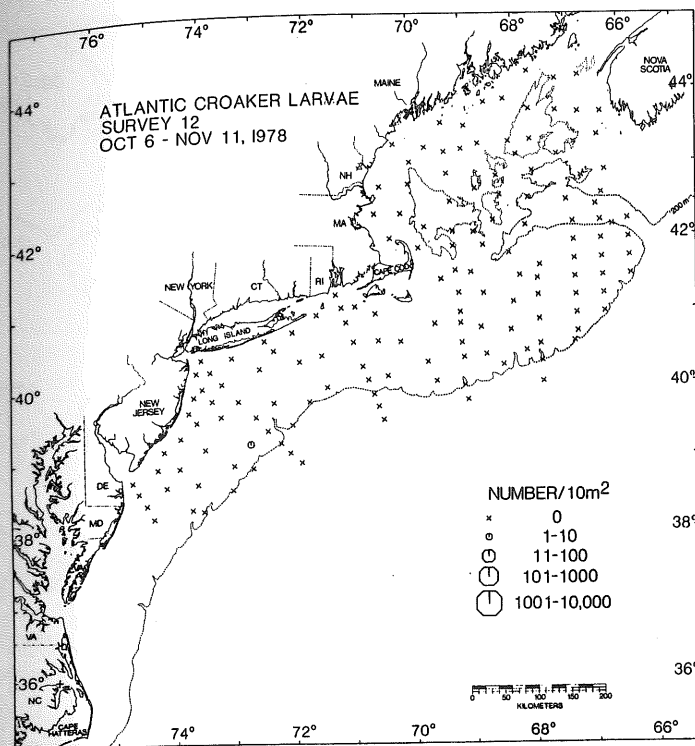


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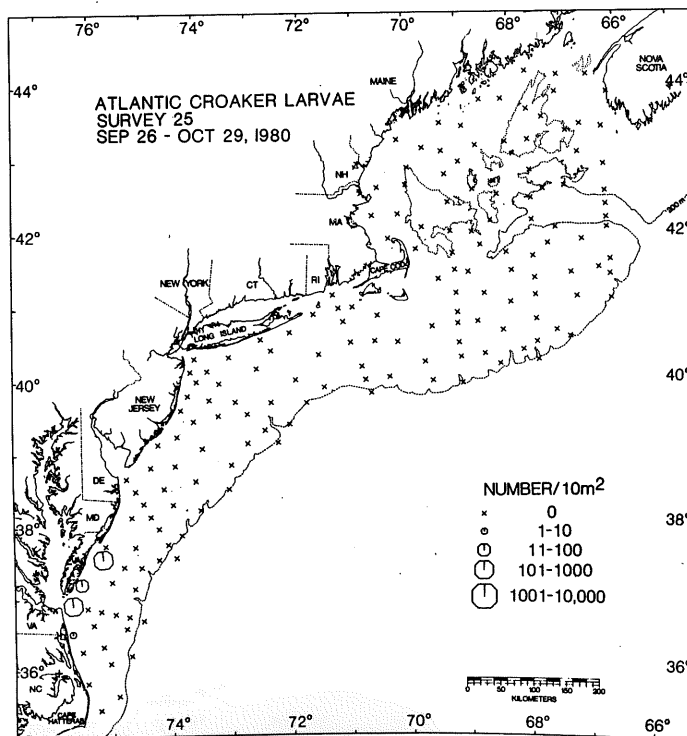
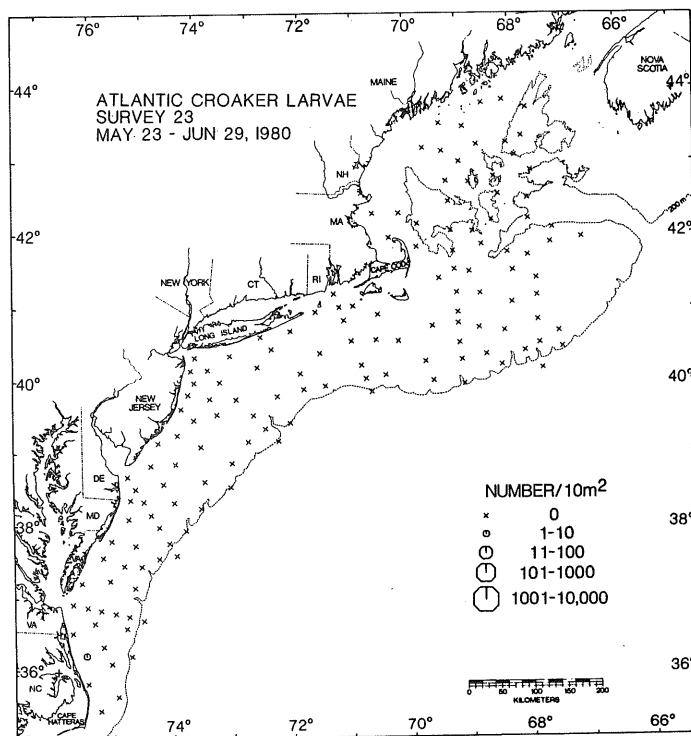
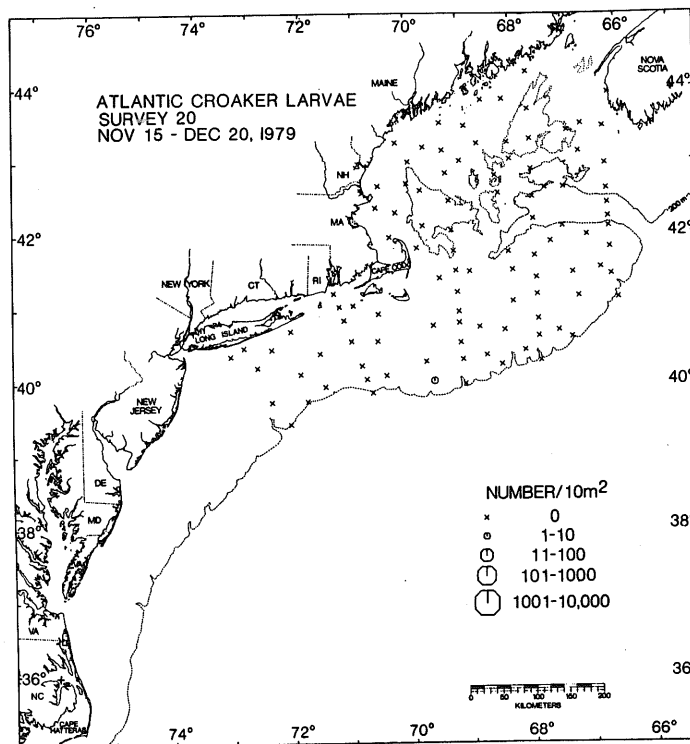
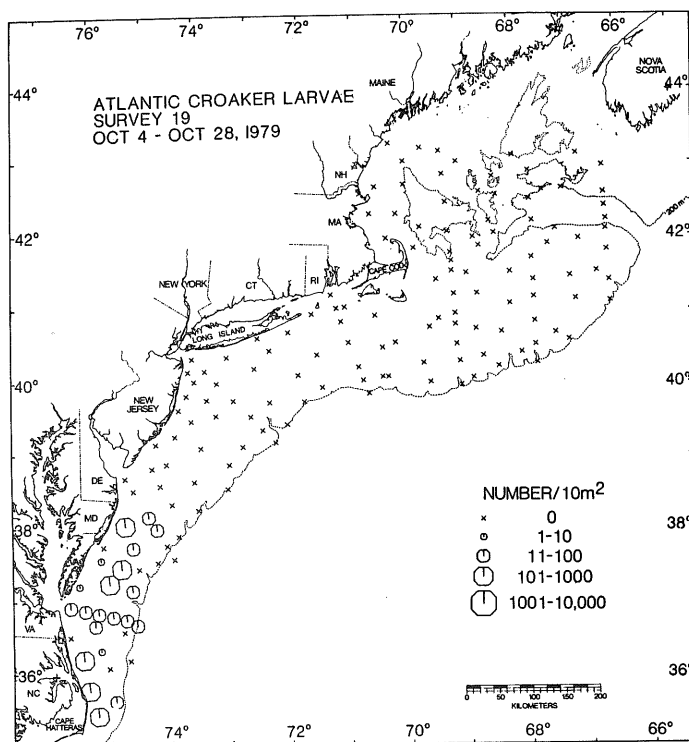


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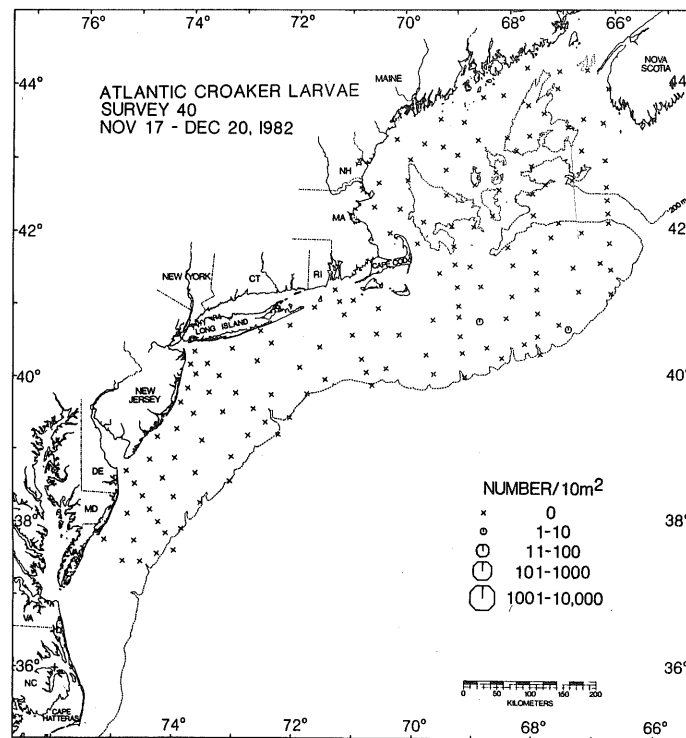
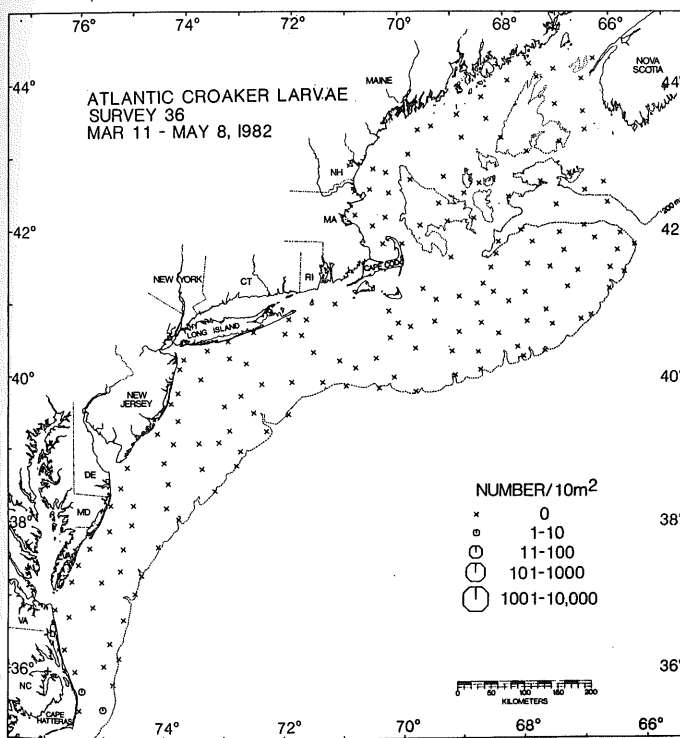
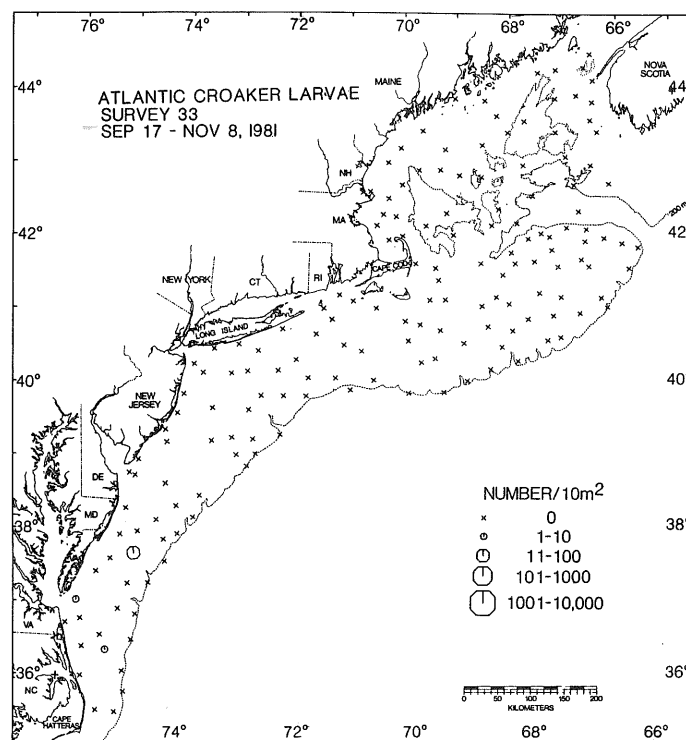
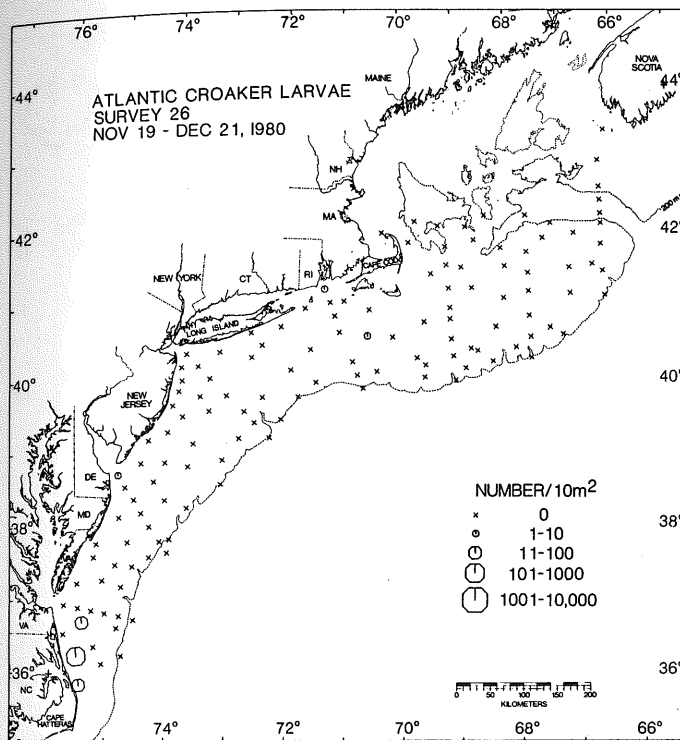


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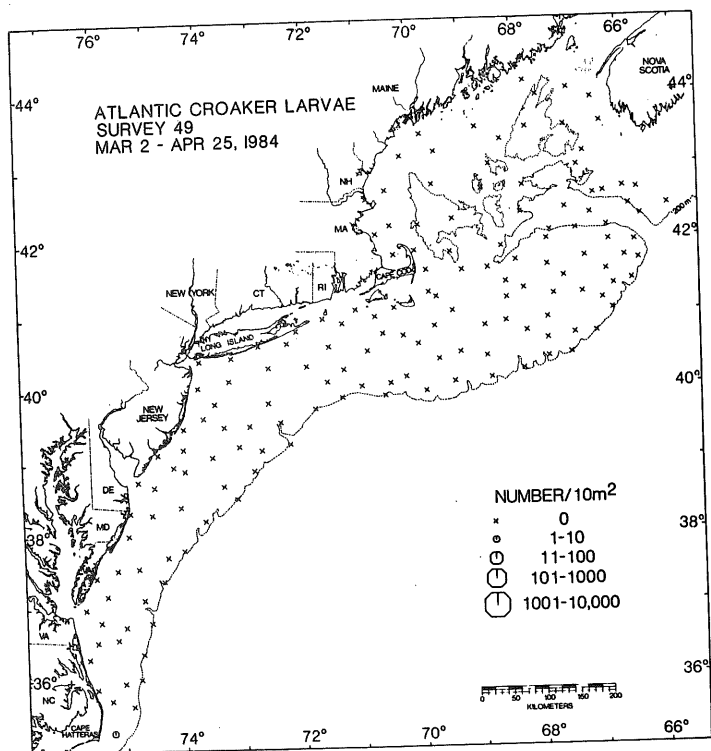
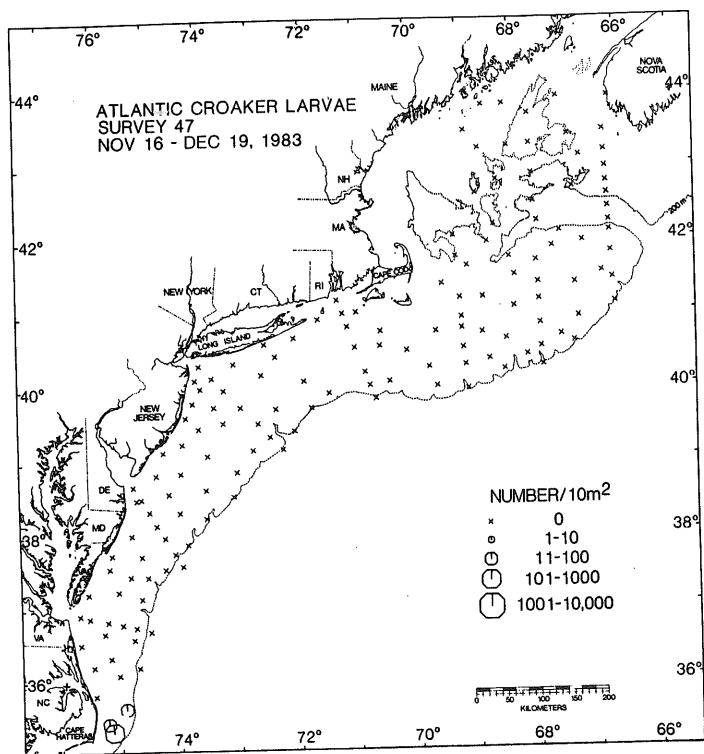
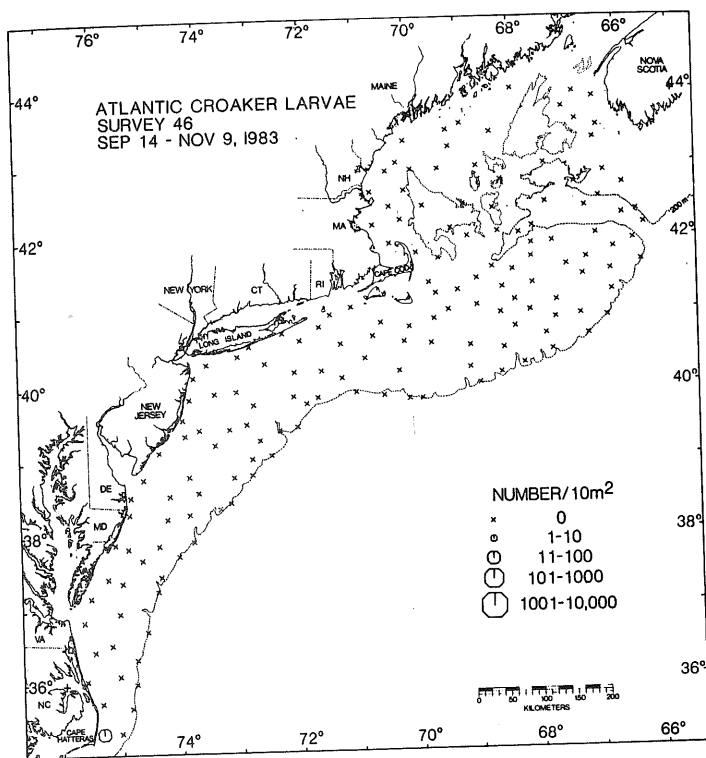


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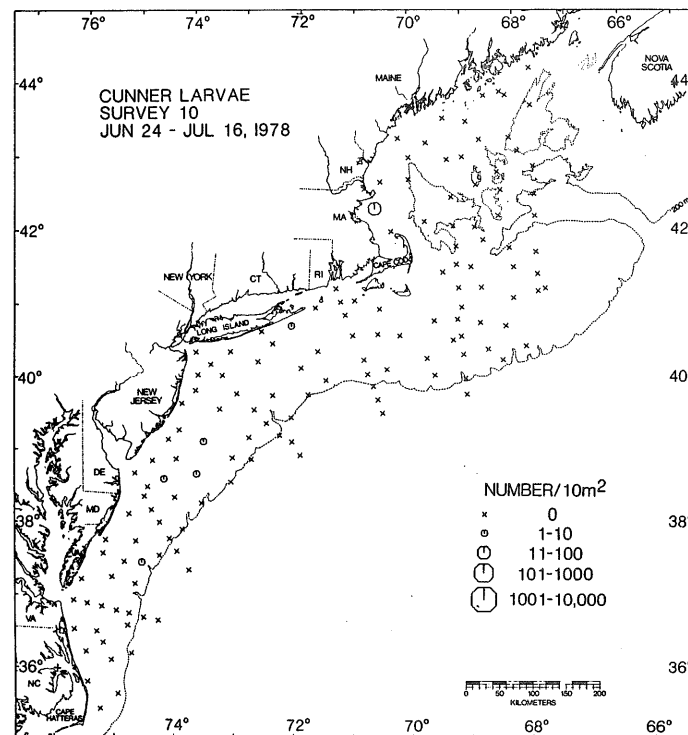
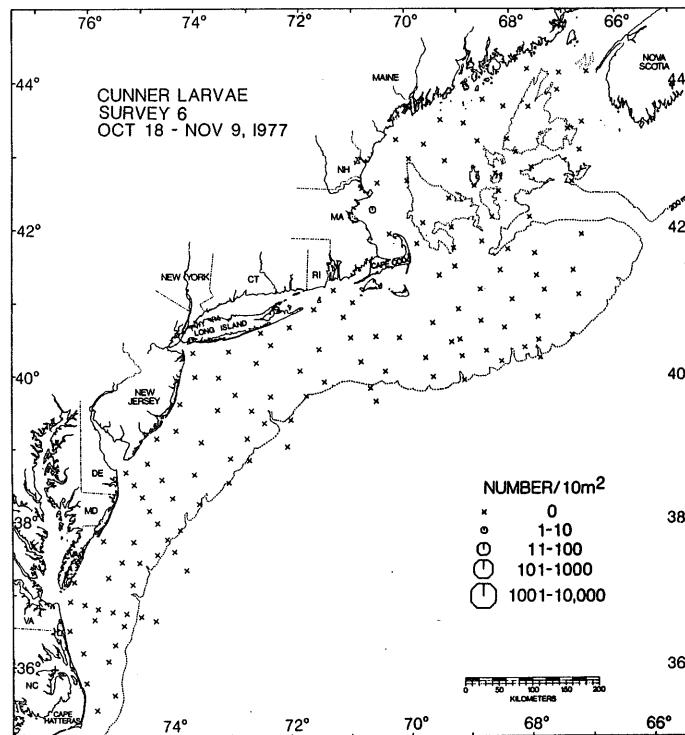
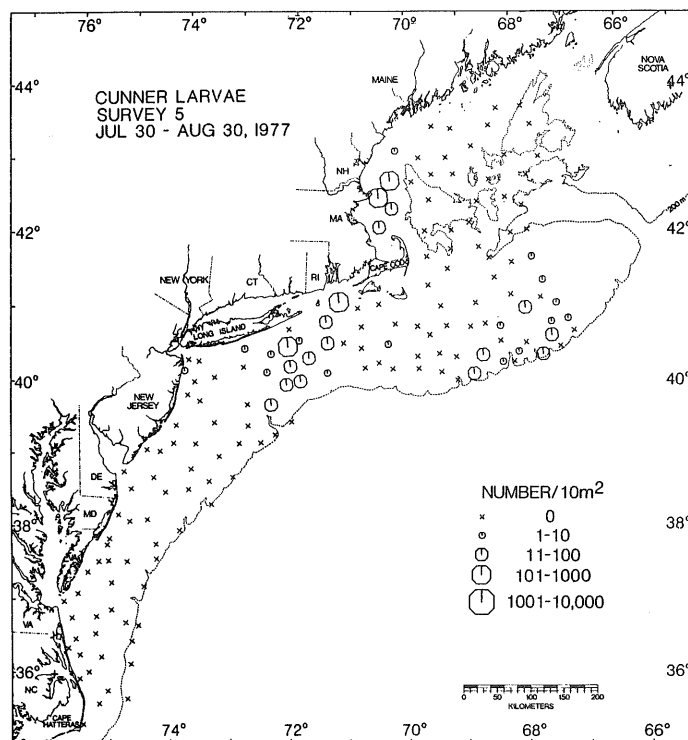
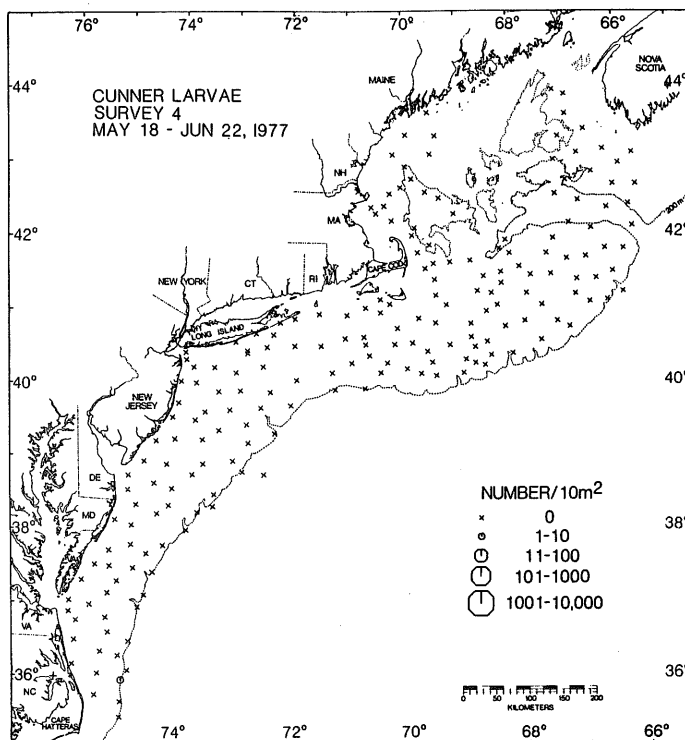


Figure 15. Distribution and abundance of cunner, Tautoglabrus adspersus, larvae off northeastern United States, winter 1977 through spring 1984.

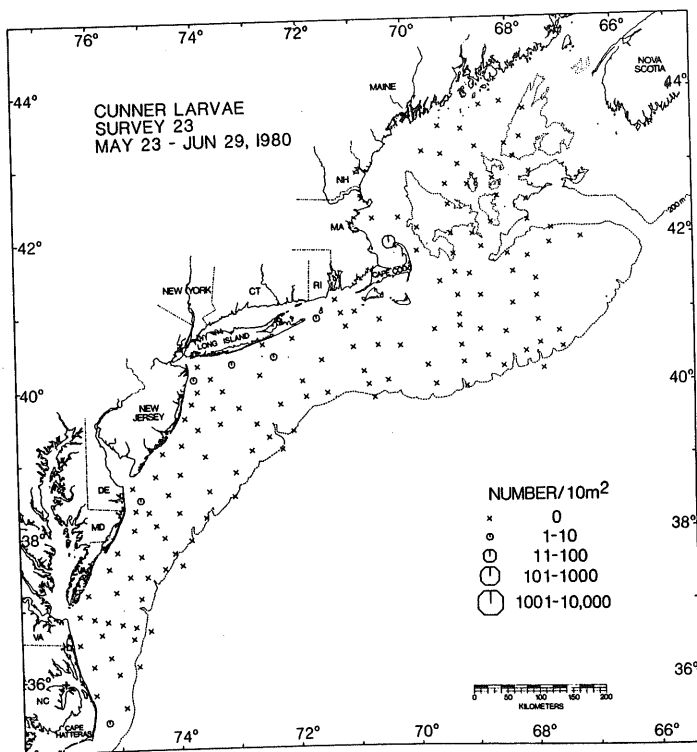
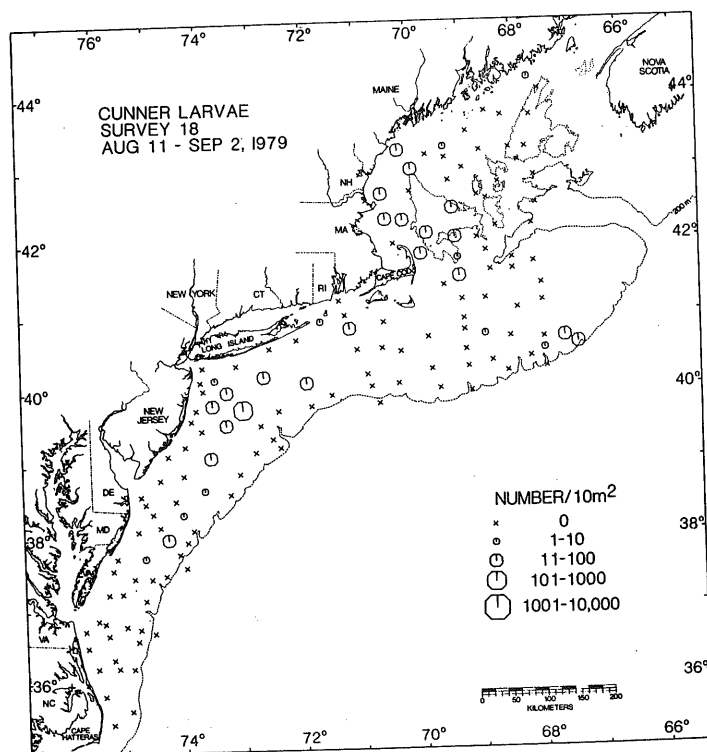
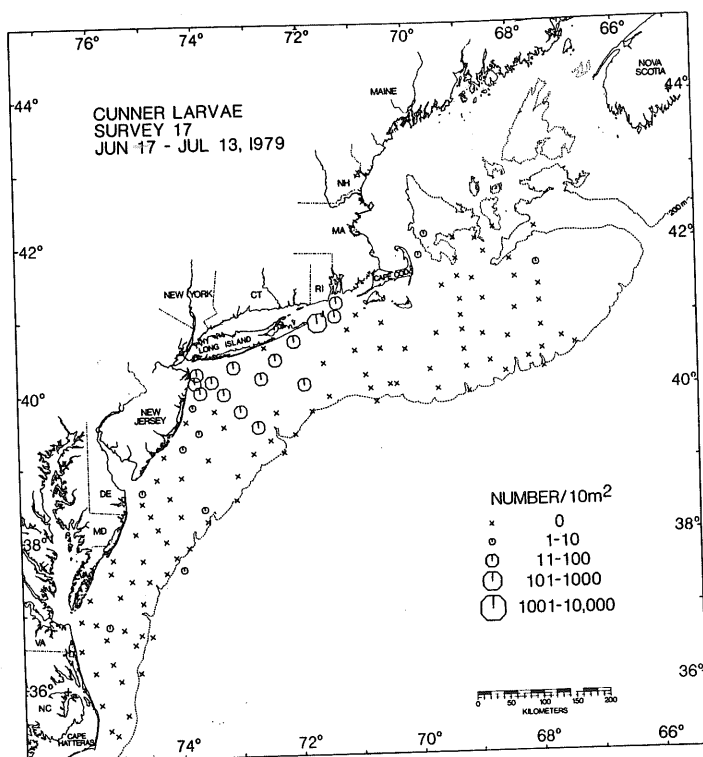
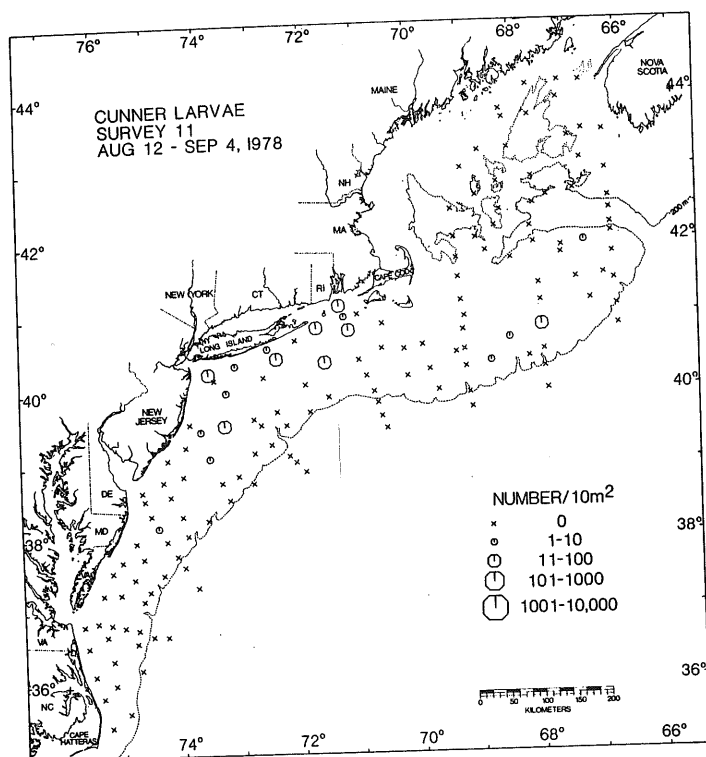


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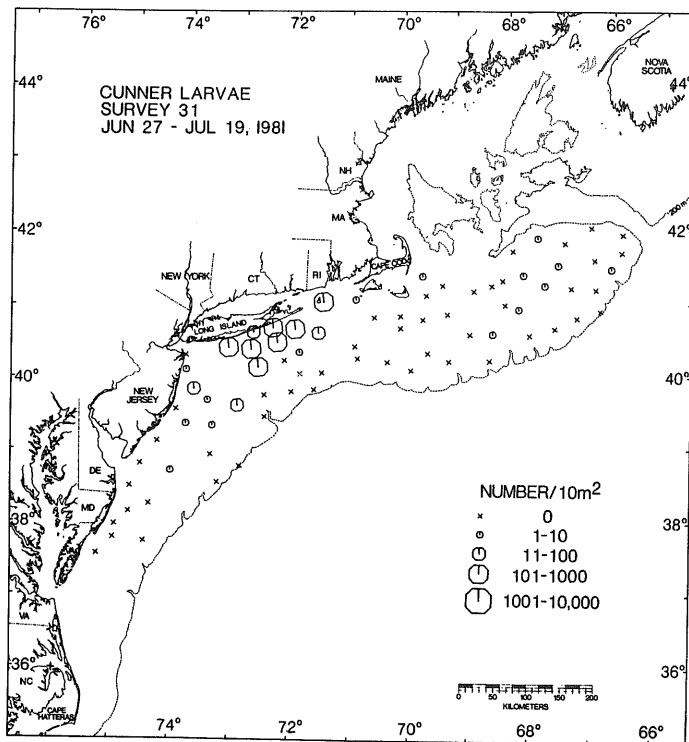
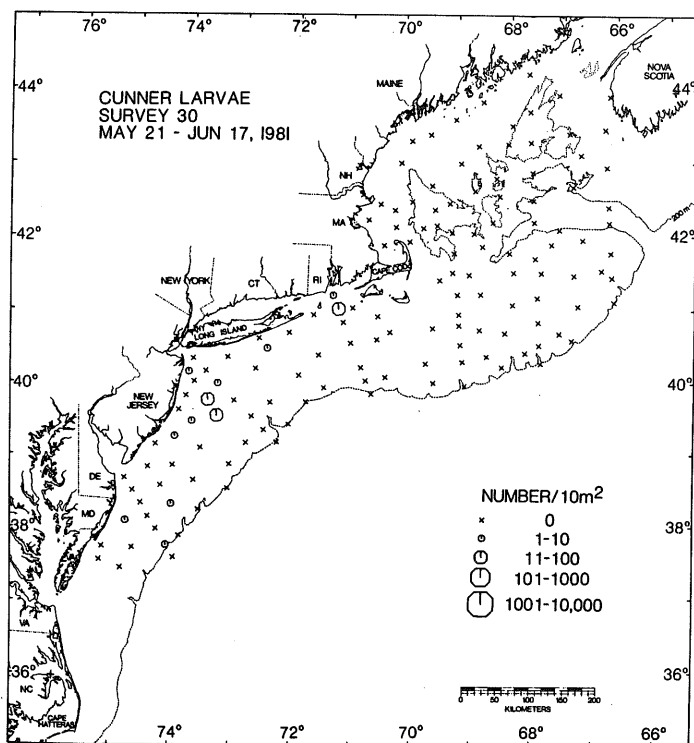
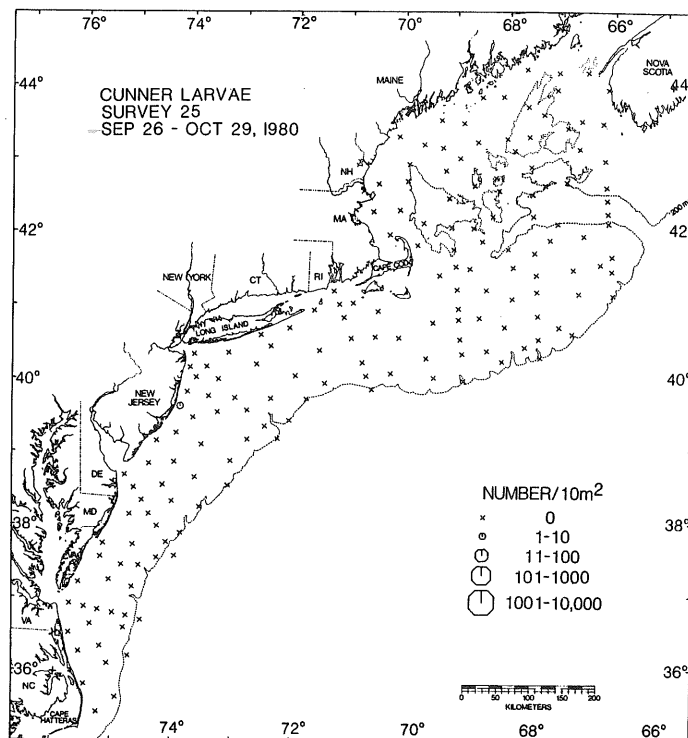
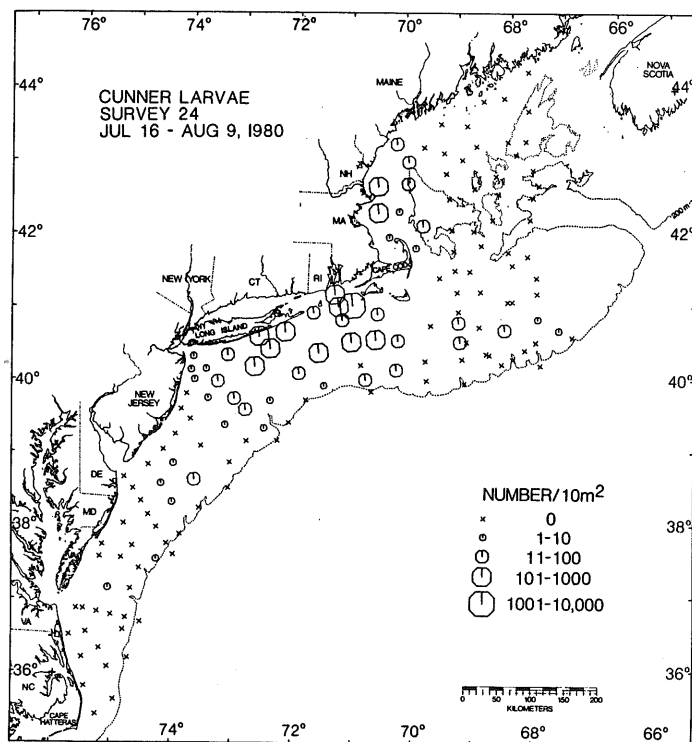


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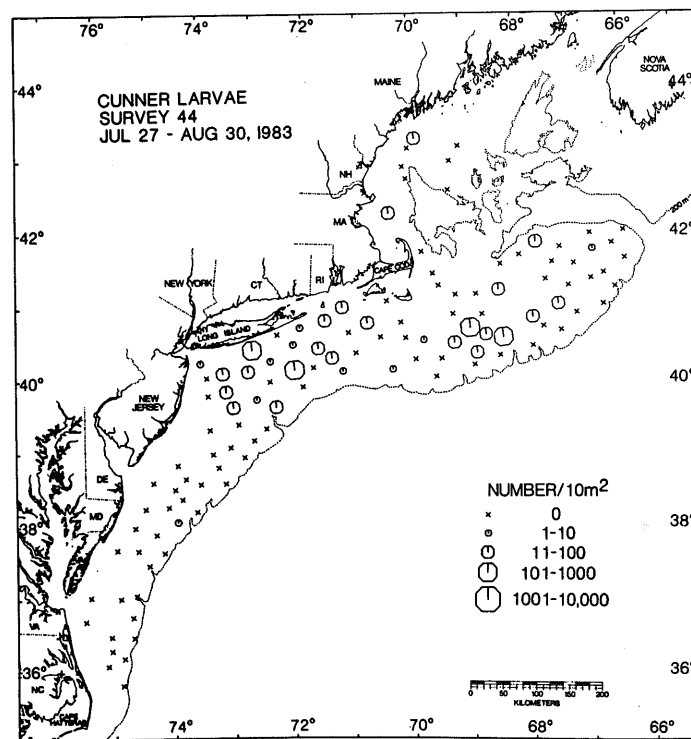
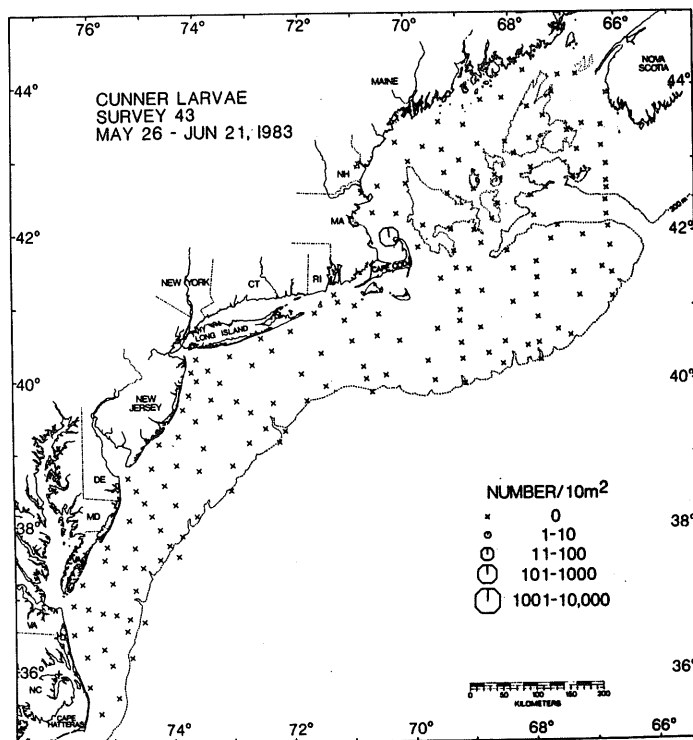
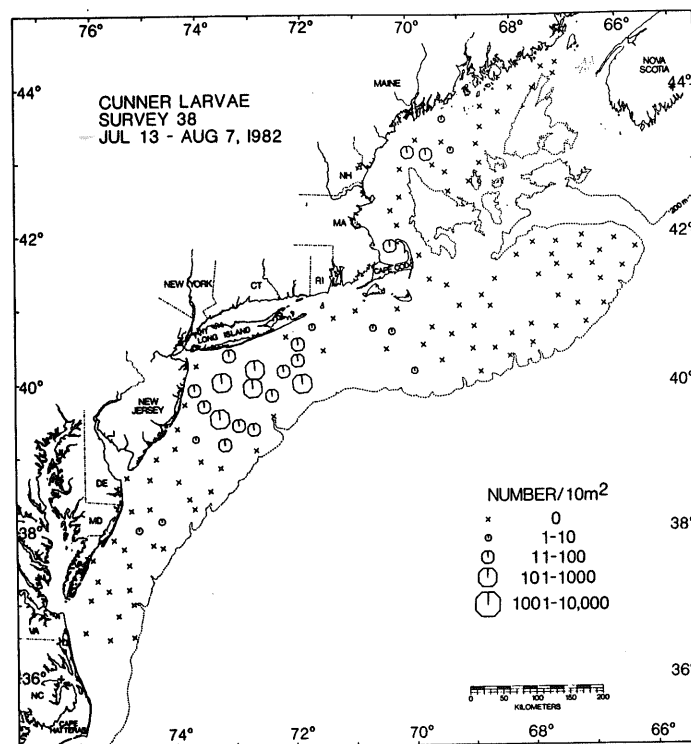
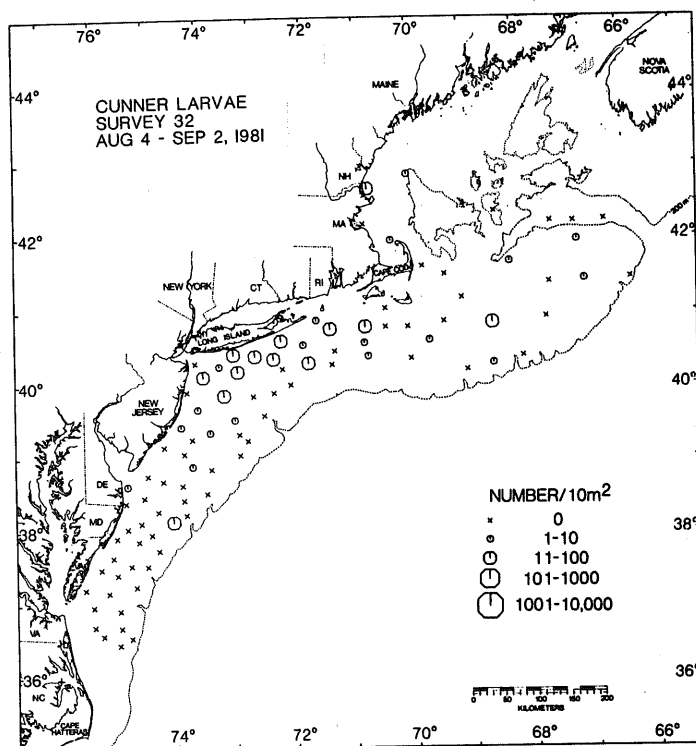


Figure 15. continued.

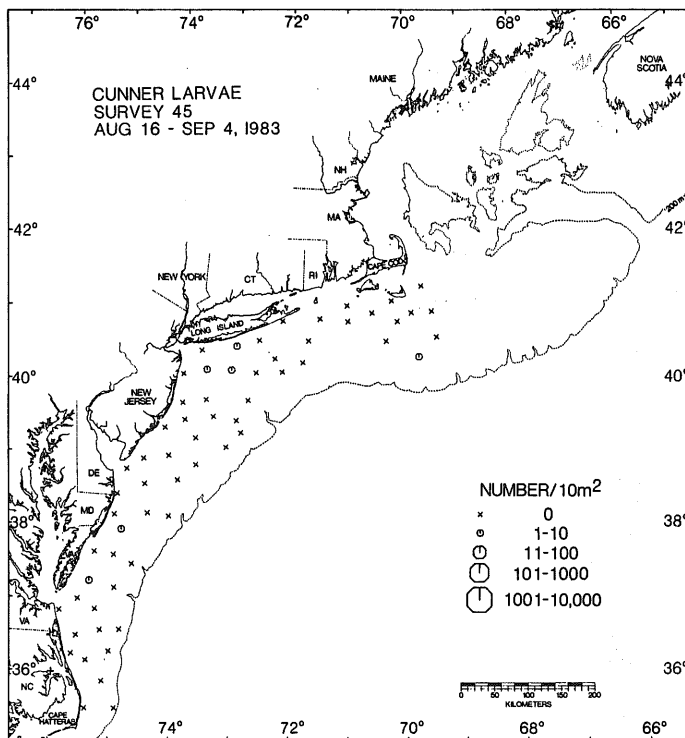


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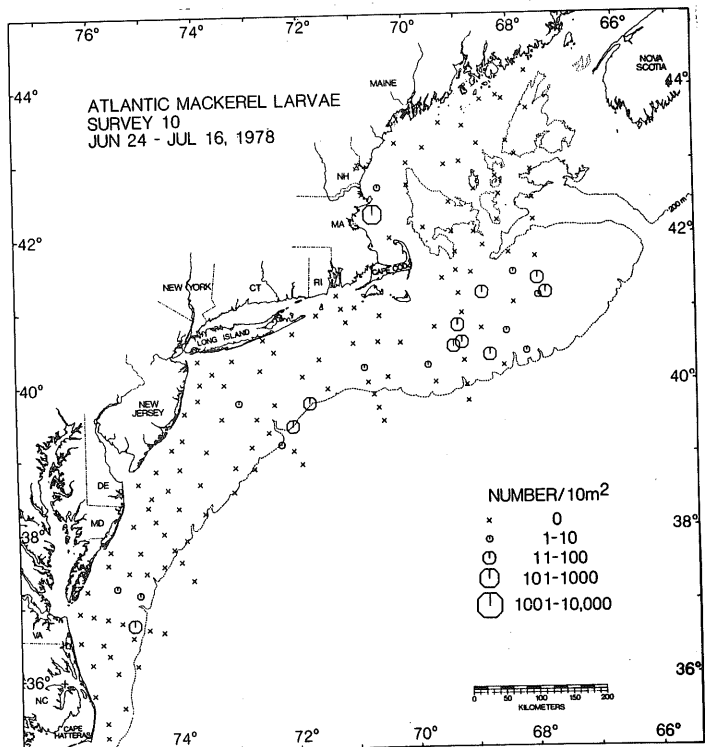
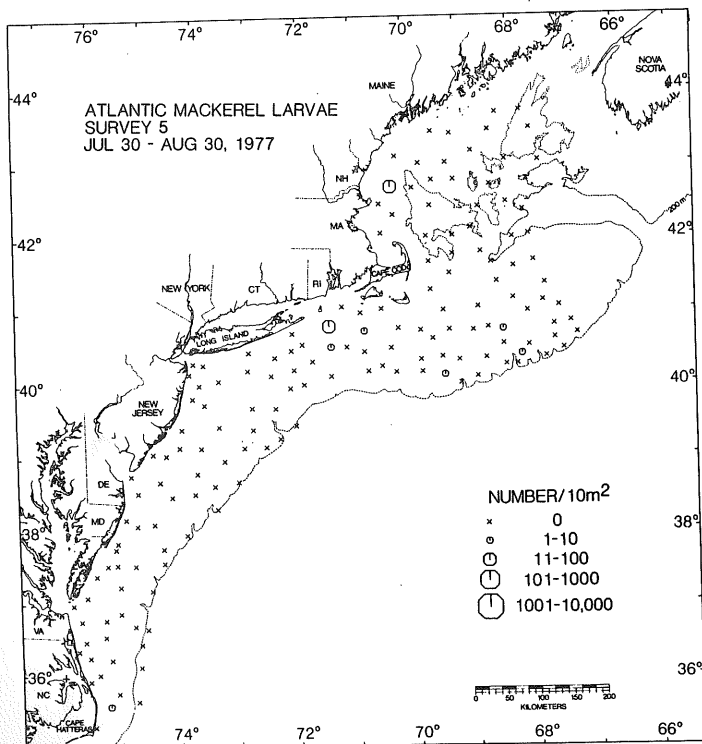
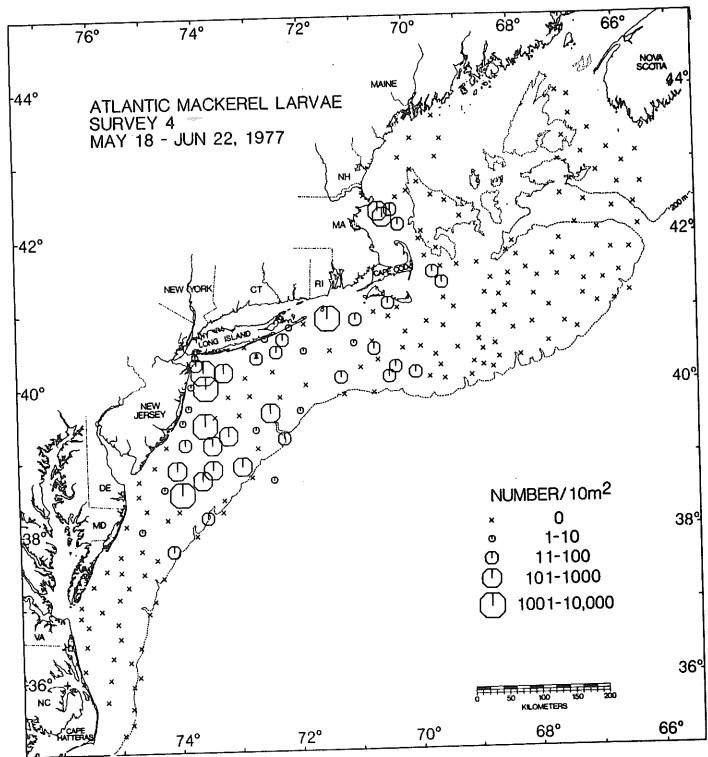
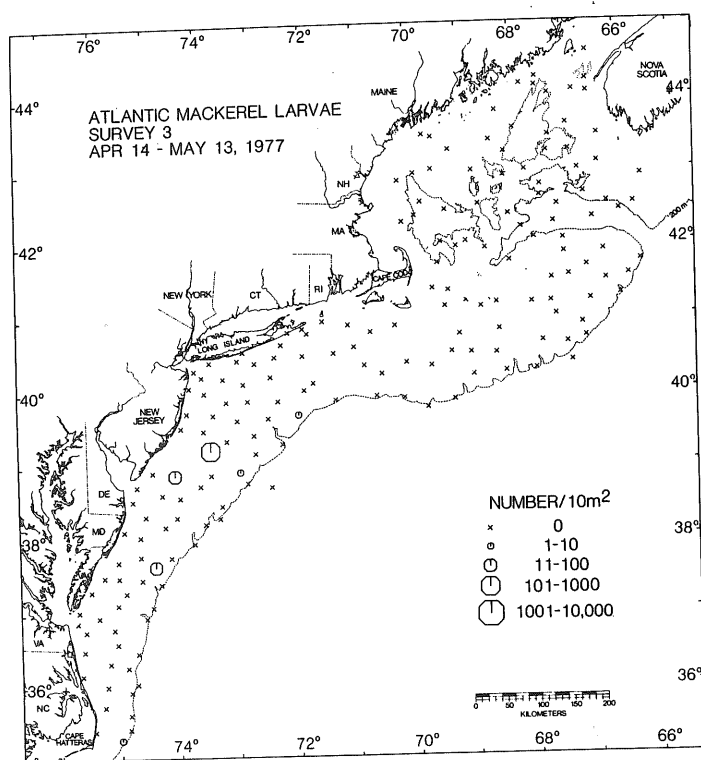


Figure 16. Distribution and abundance of Atlantic mackerel, Scomber scombrus, larvae off northeastern United States, winter 1977 through spring 1984.

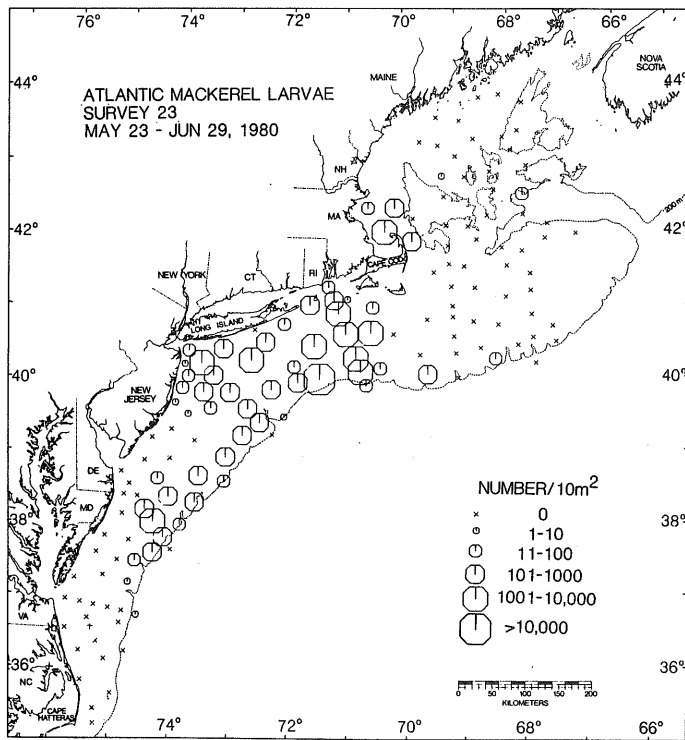
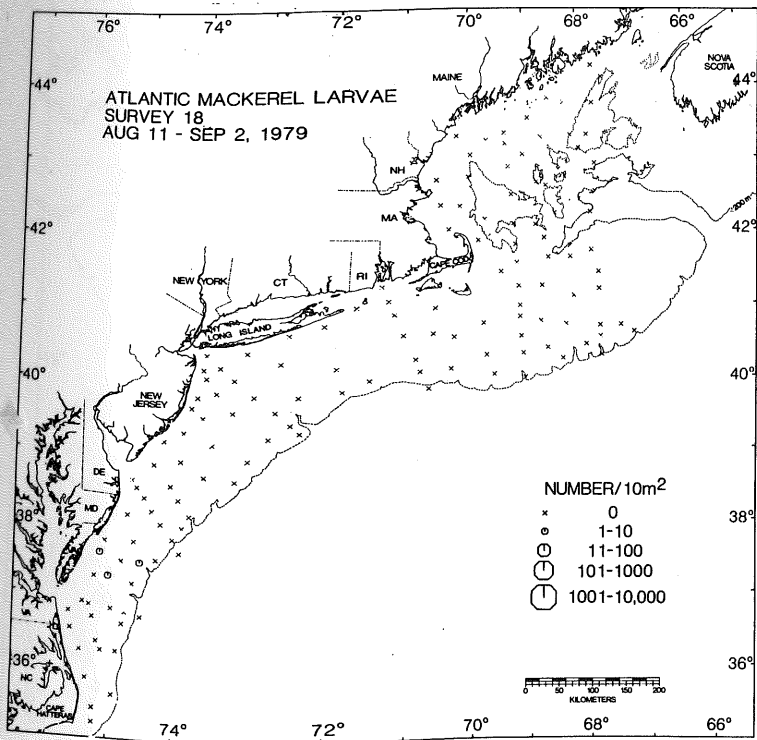
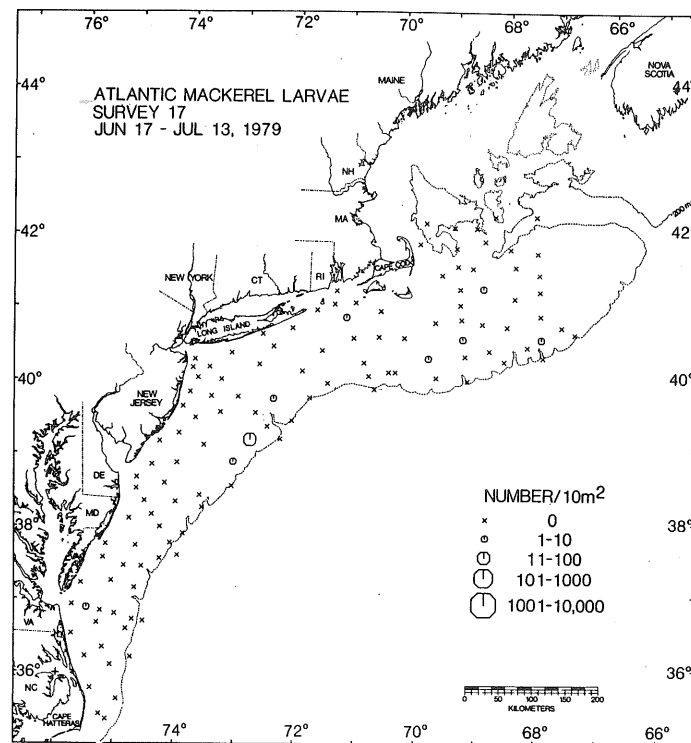
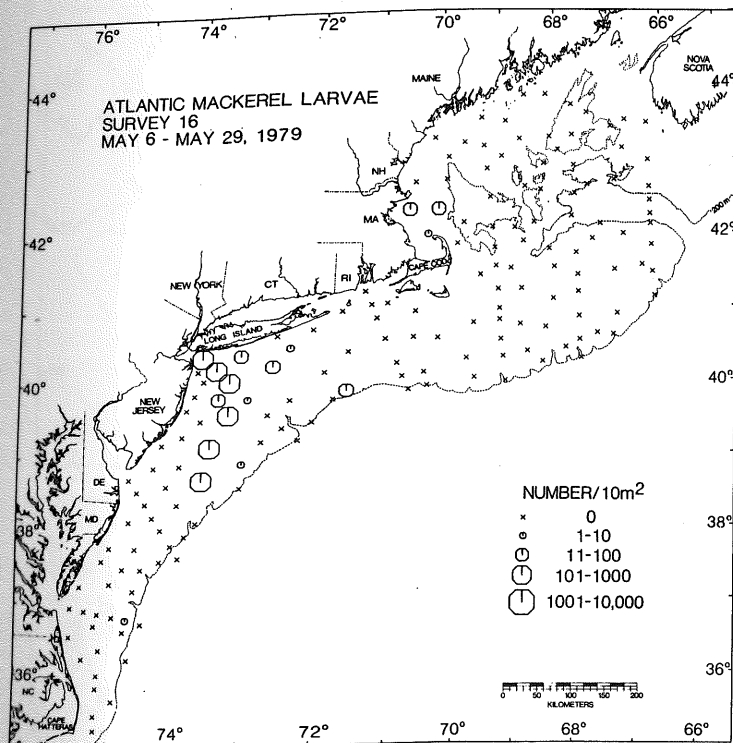


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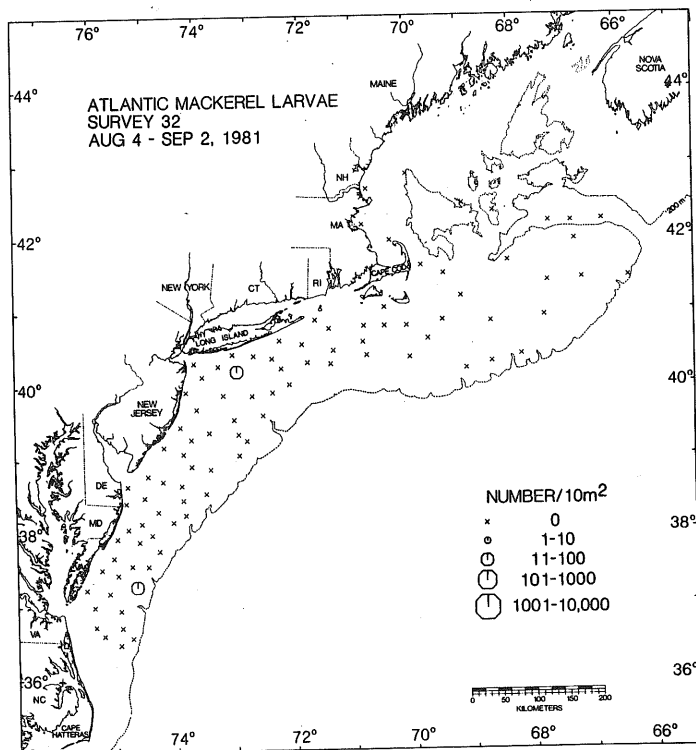
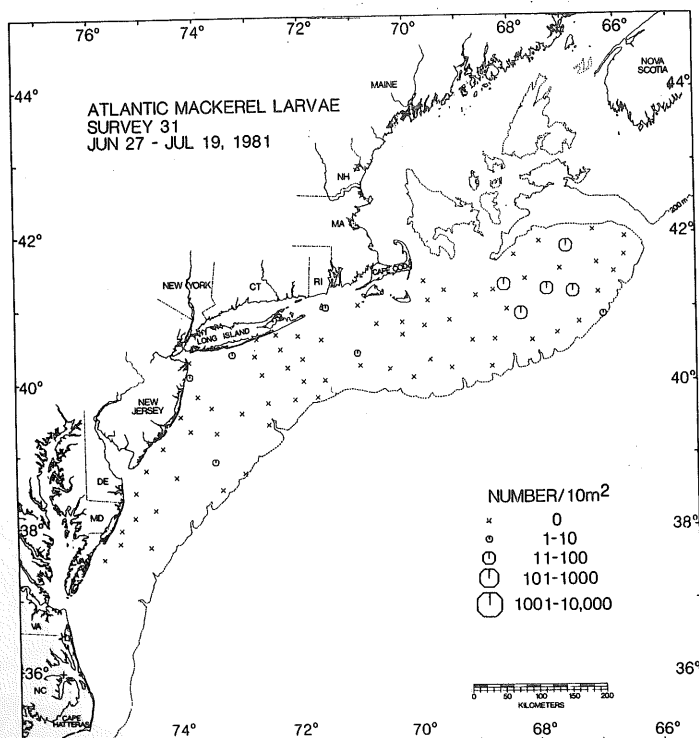
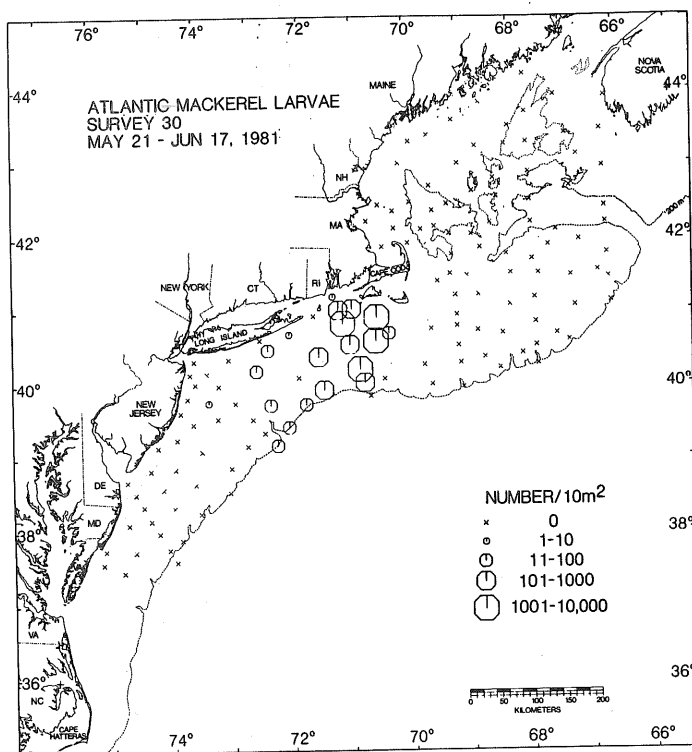
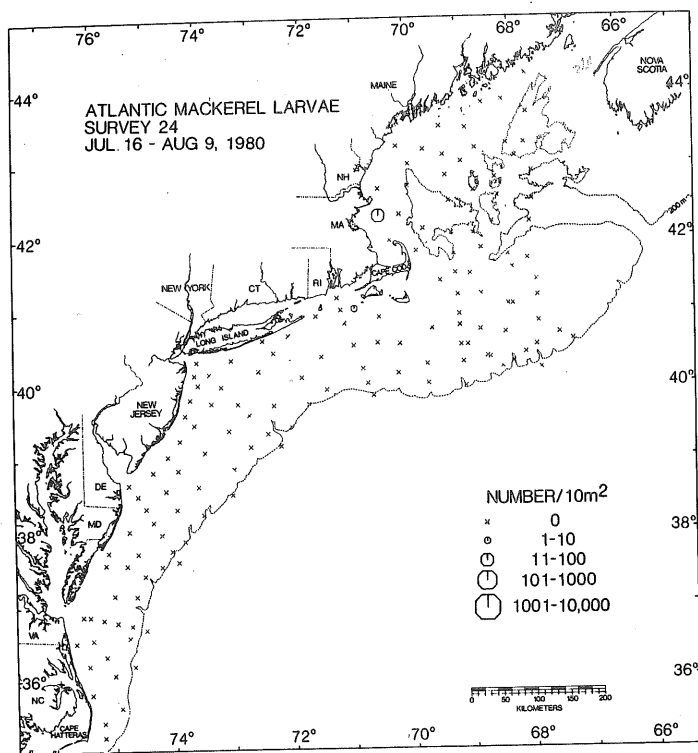


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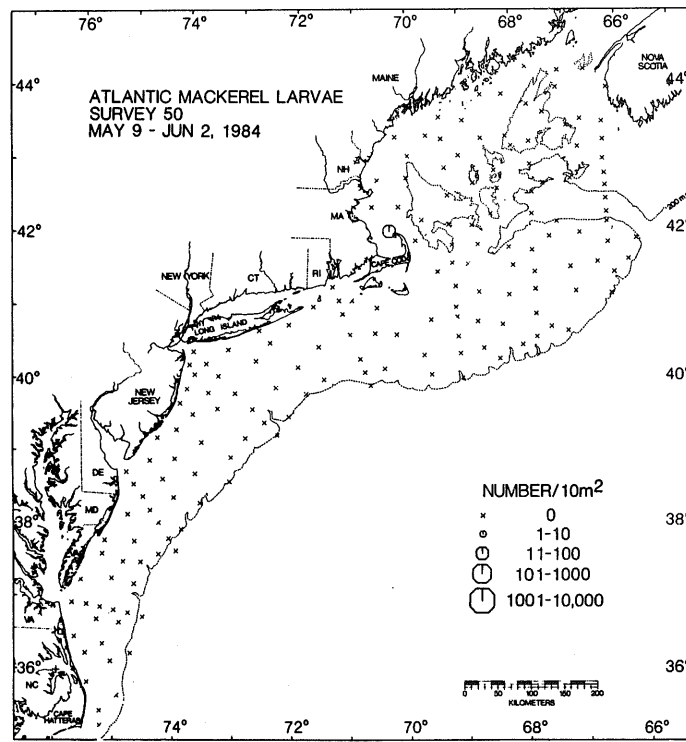
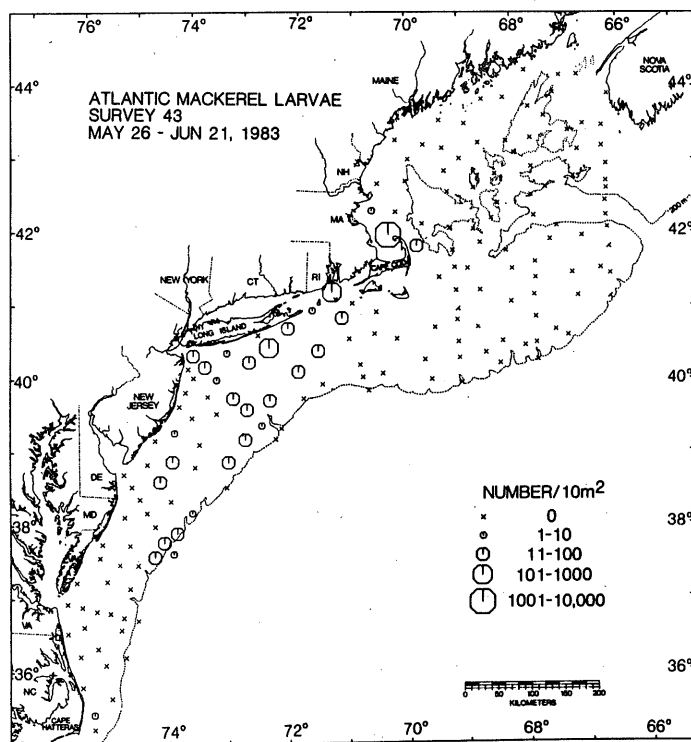
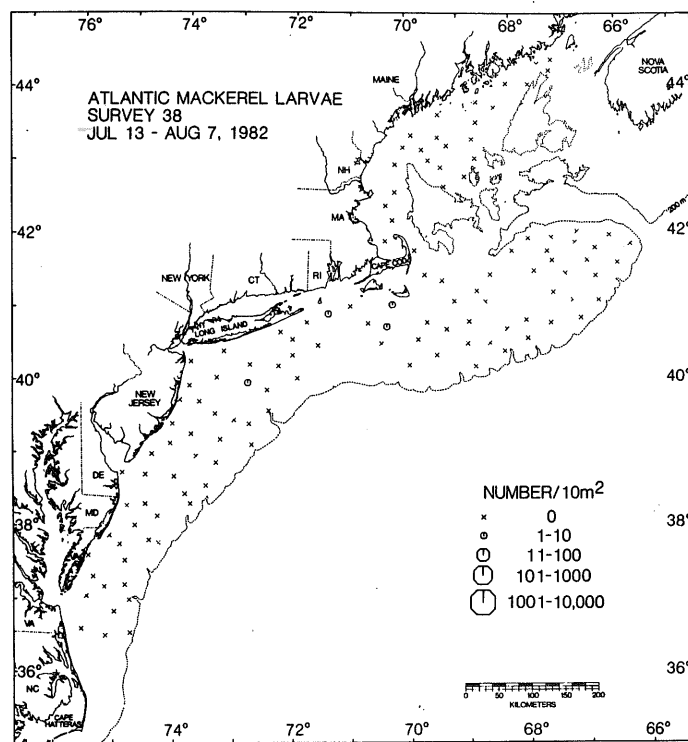
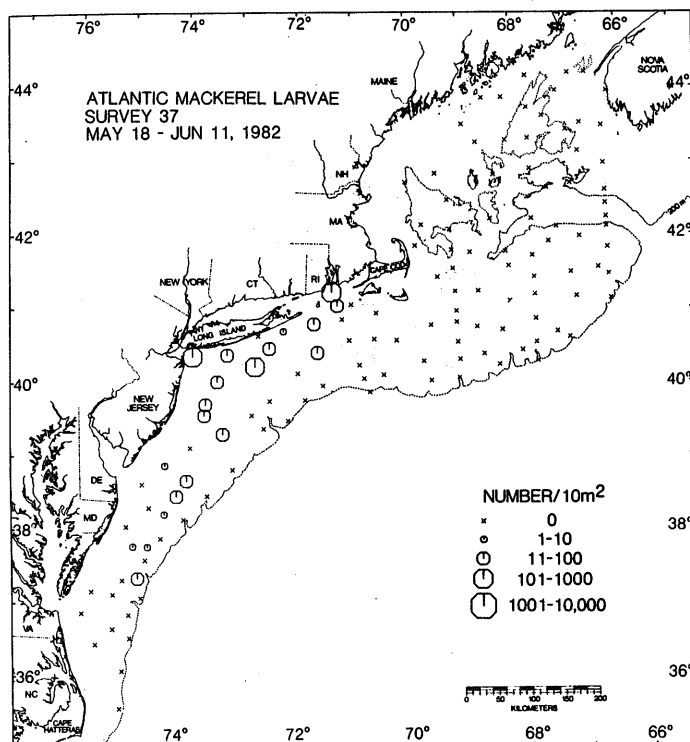


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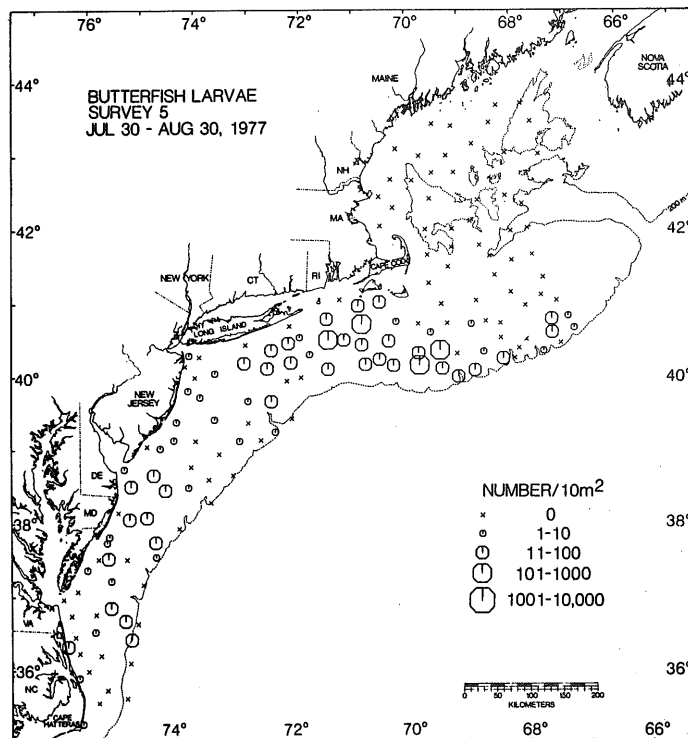
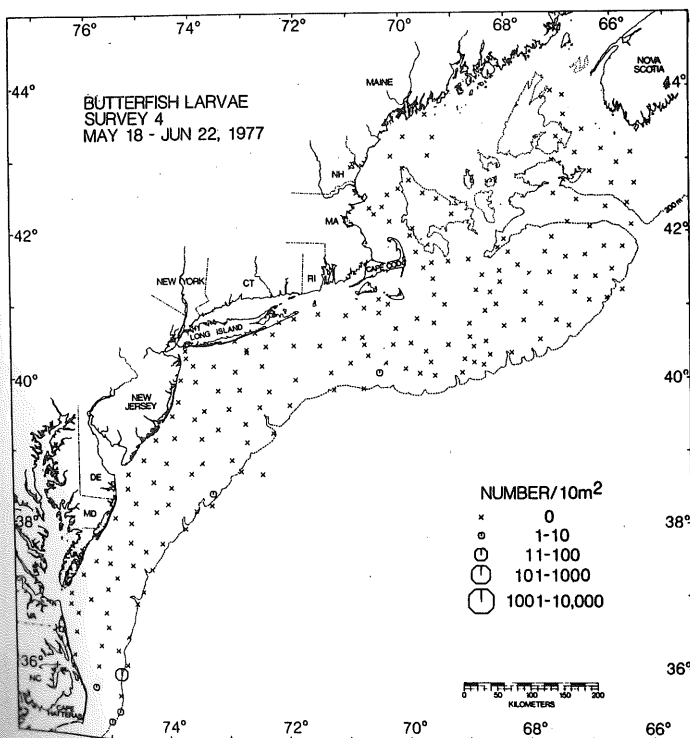
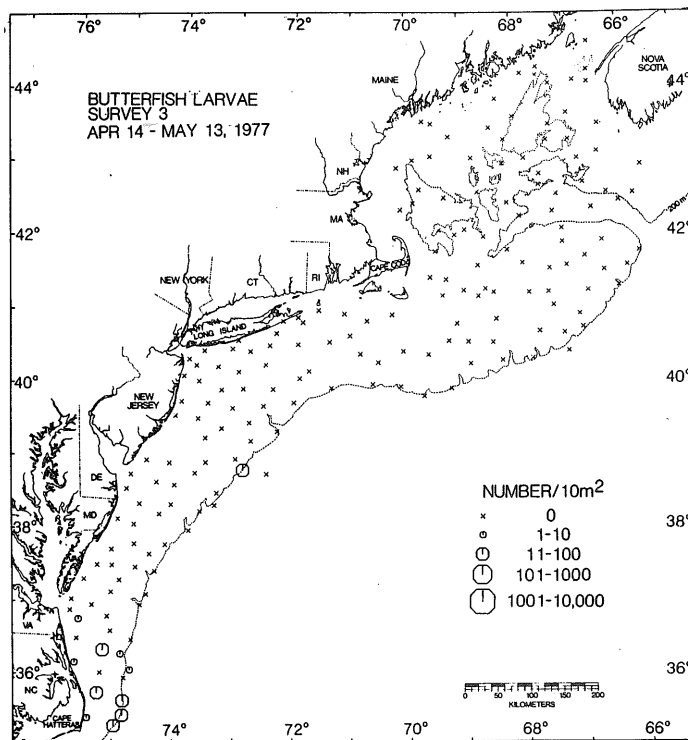
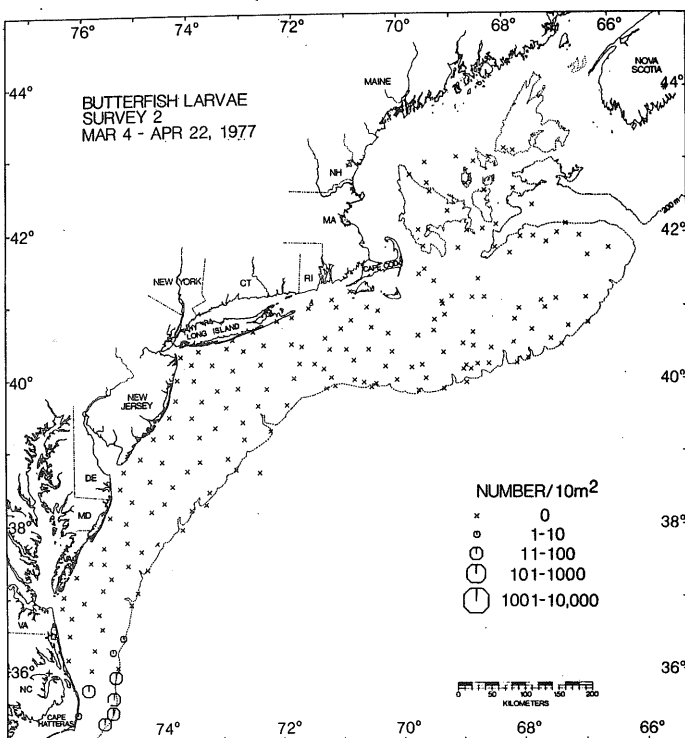


Figure 17. Distribution and abundance of butterfish, Peprilus triacanthus, larvae off northeastern United States, winter 1977 through spring 1984.

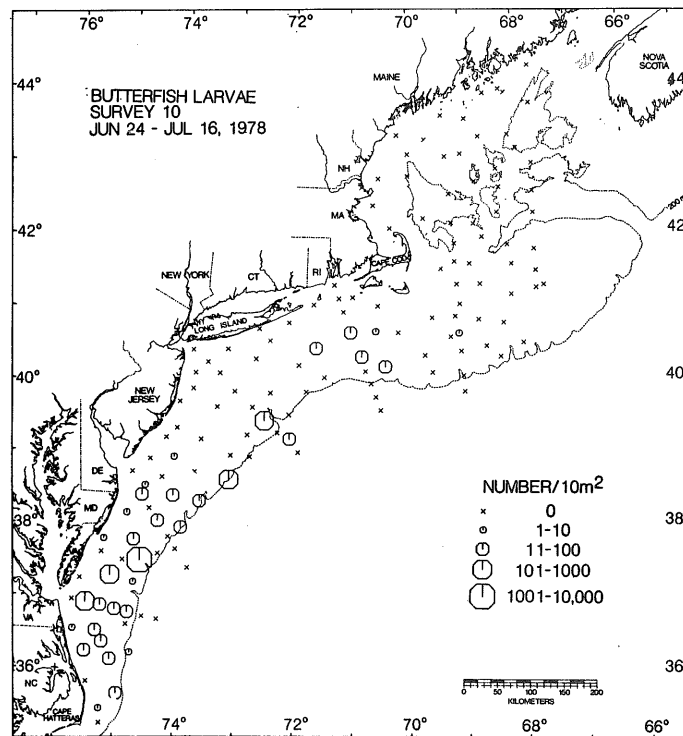
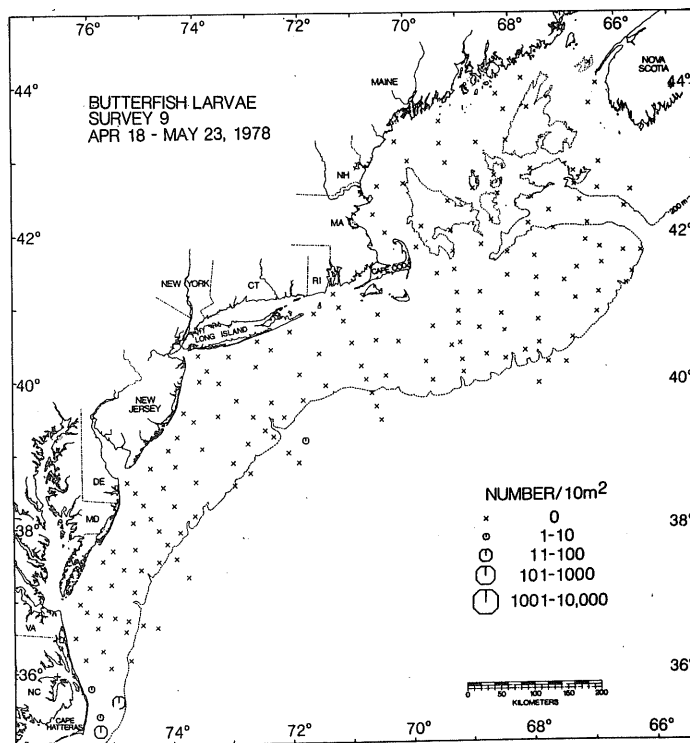
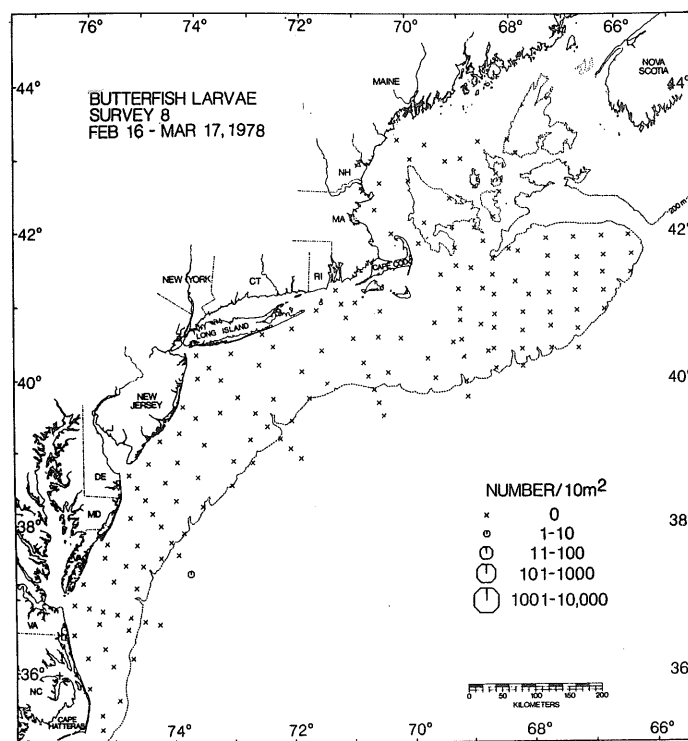
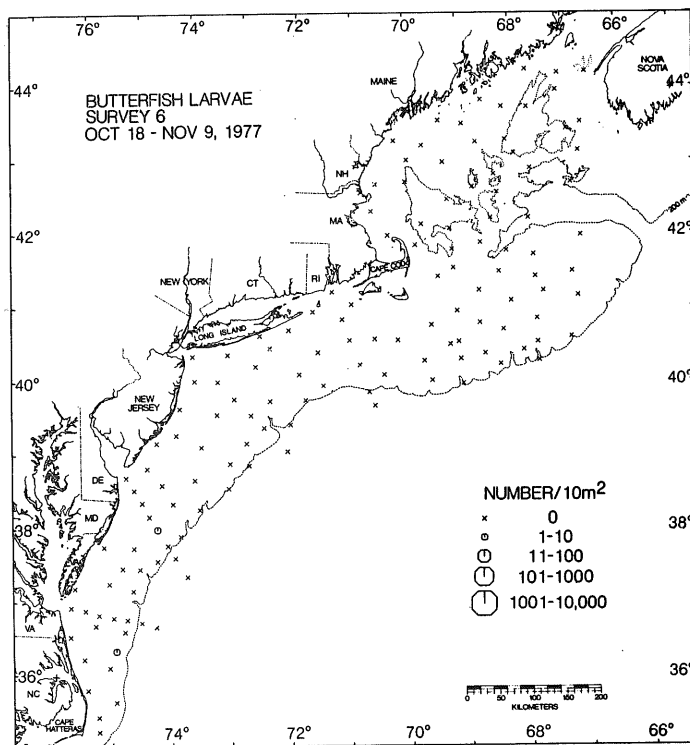


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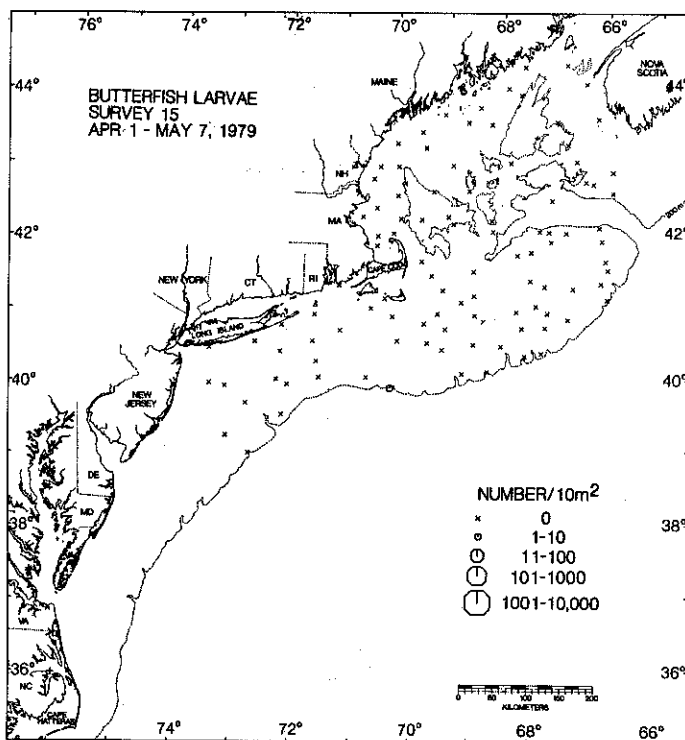
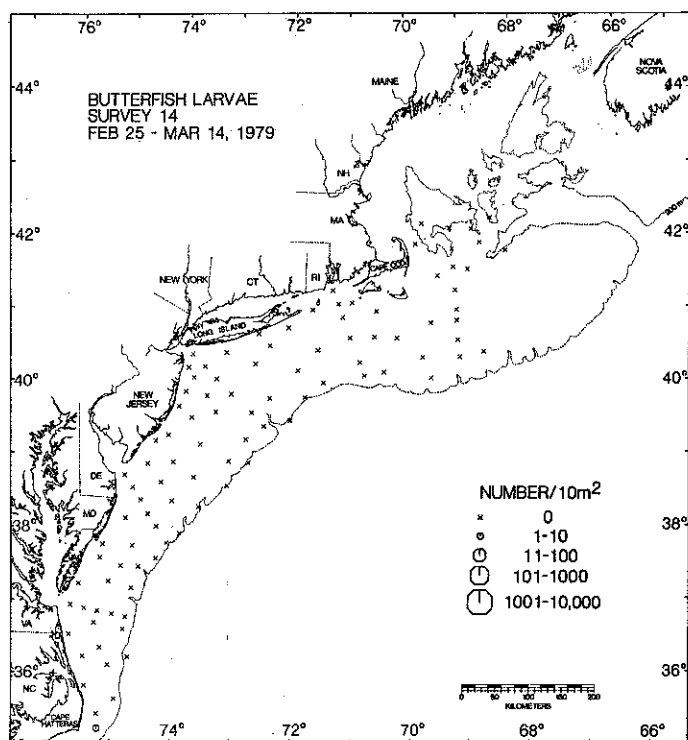
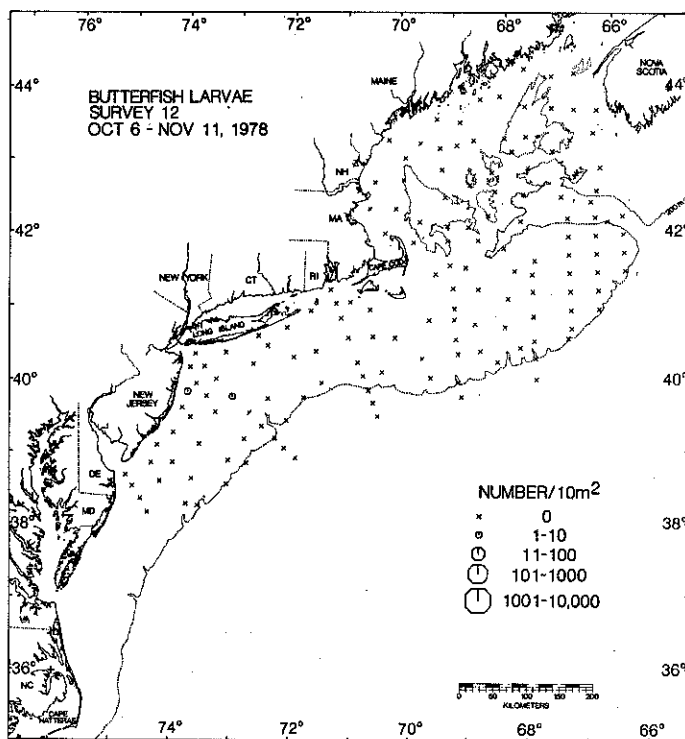
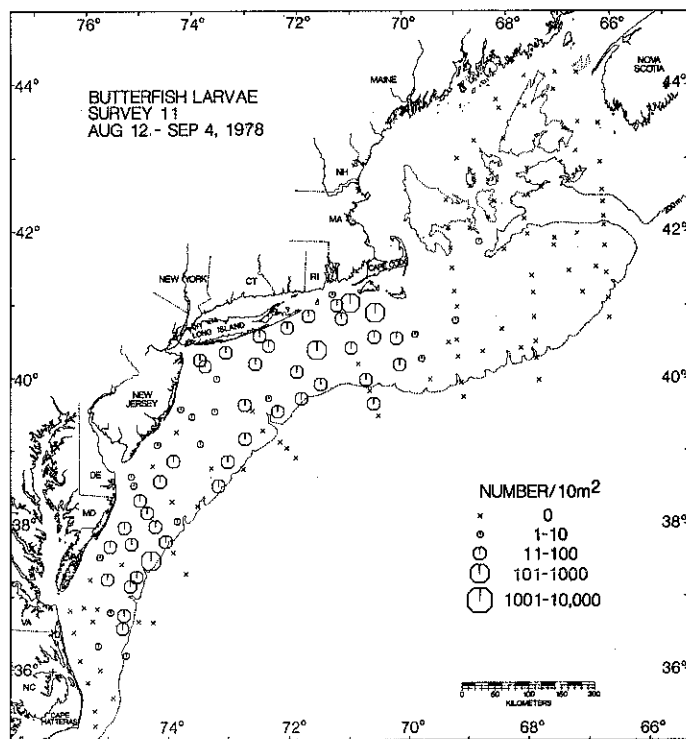


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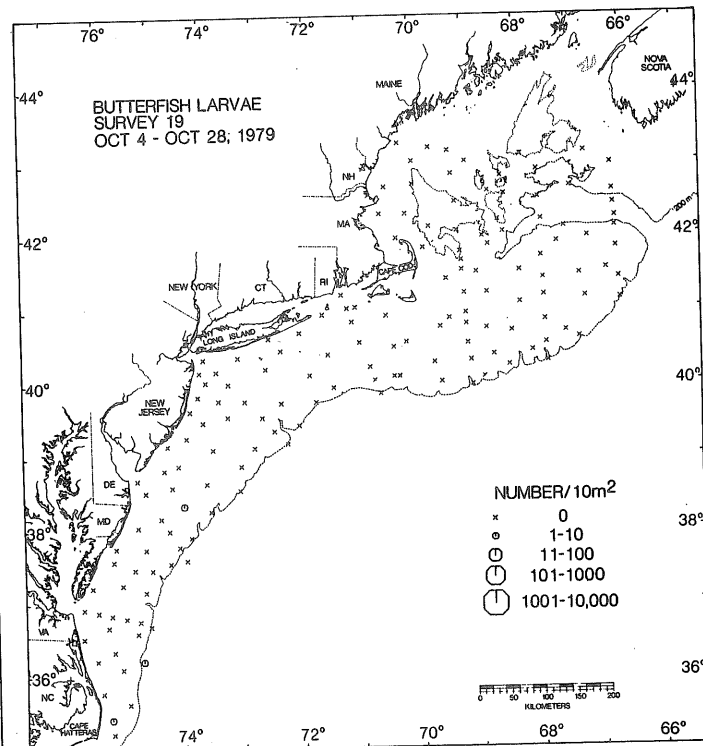
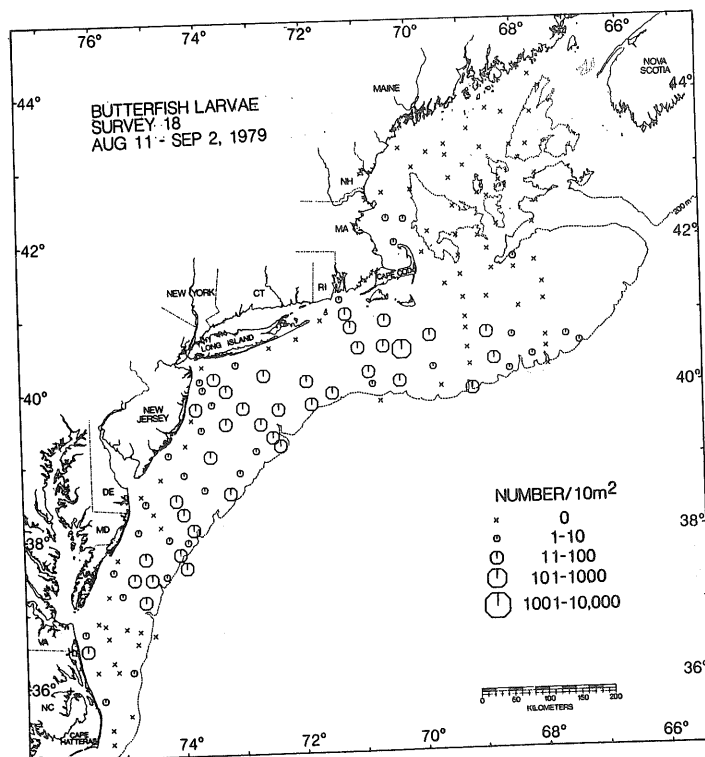
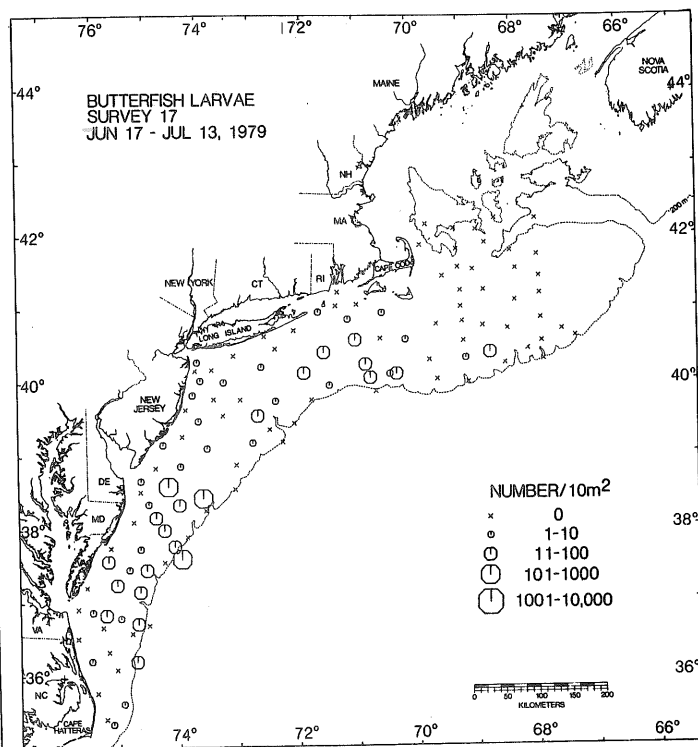
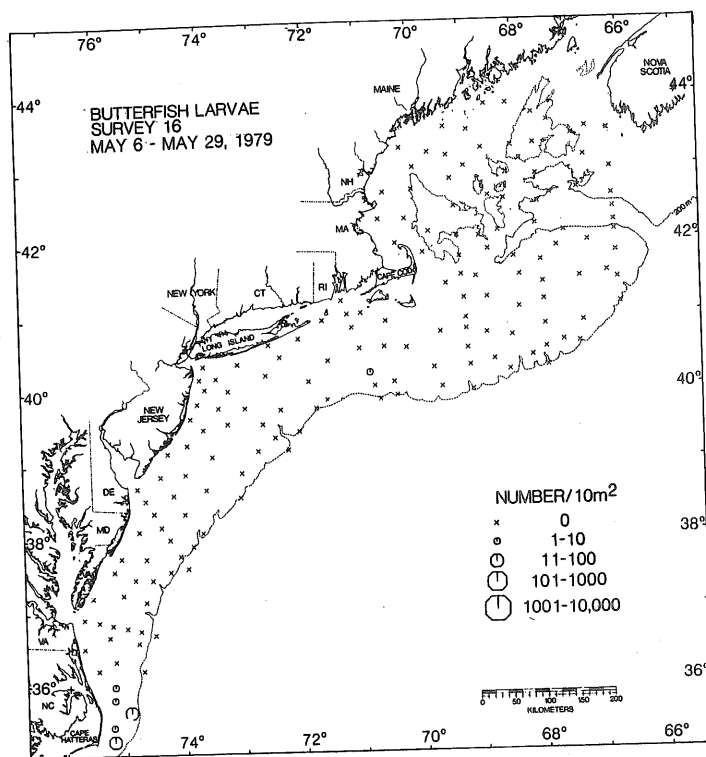


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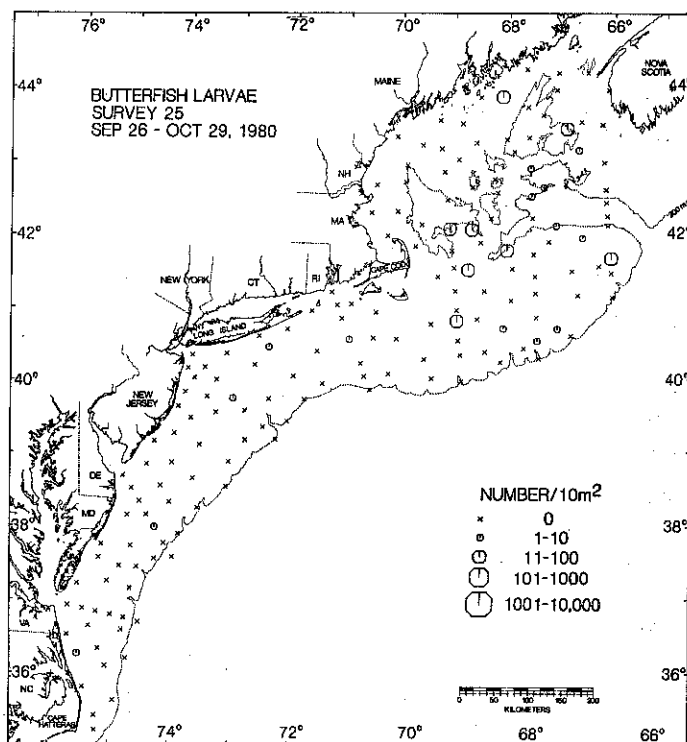
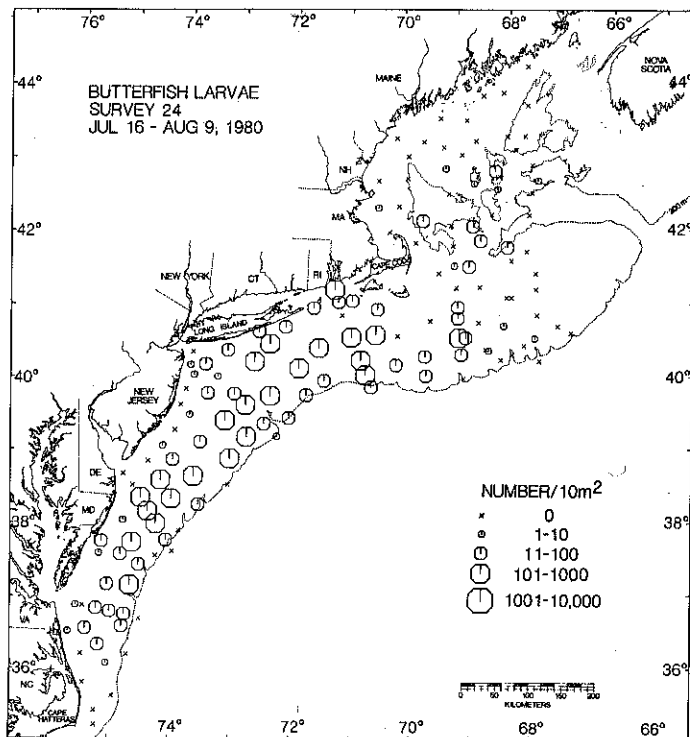
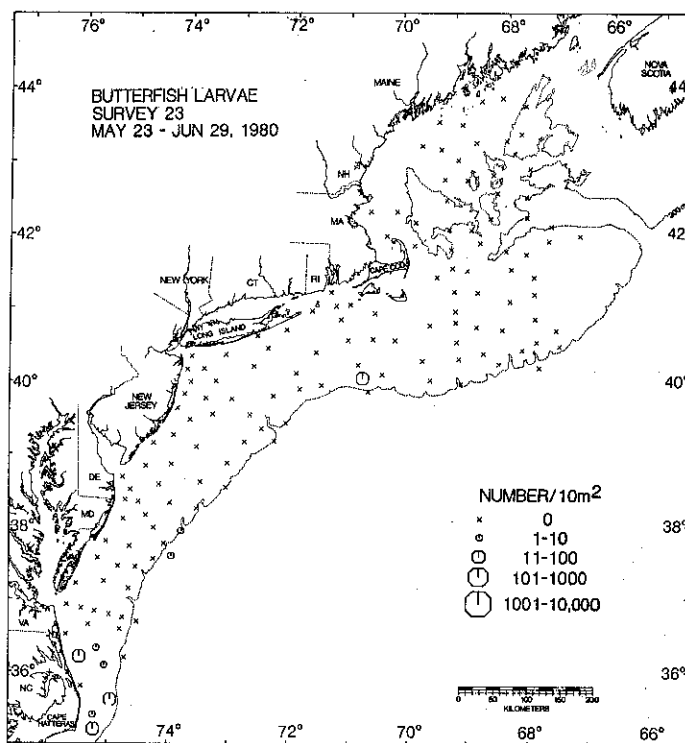
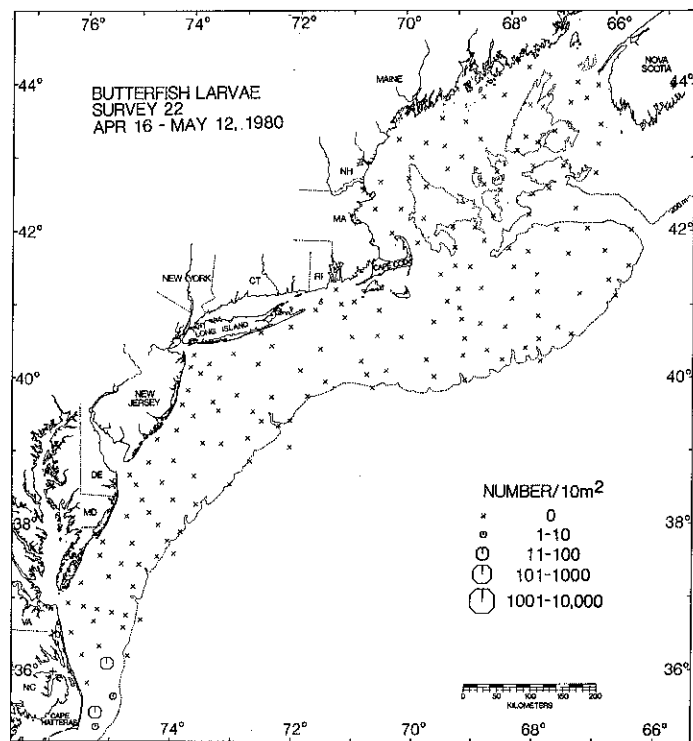


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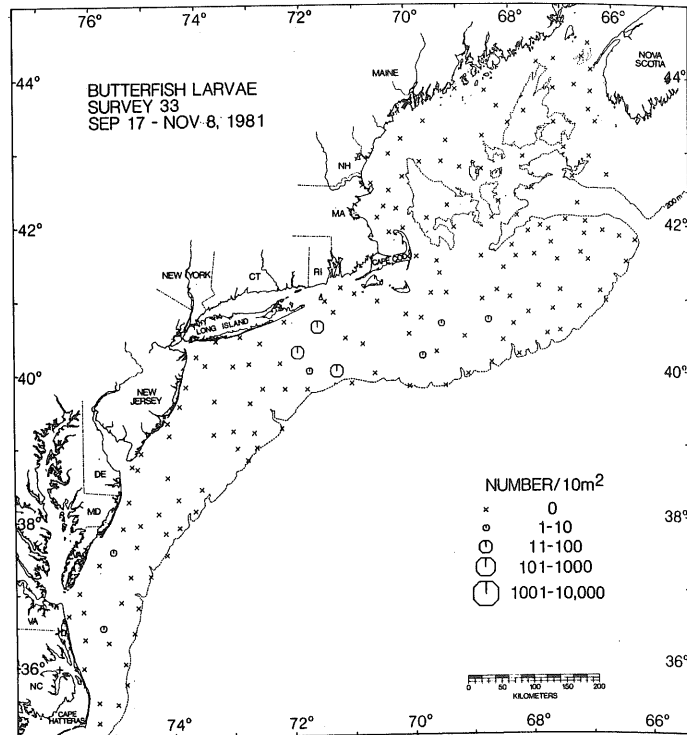
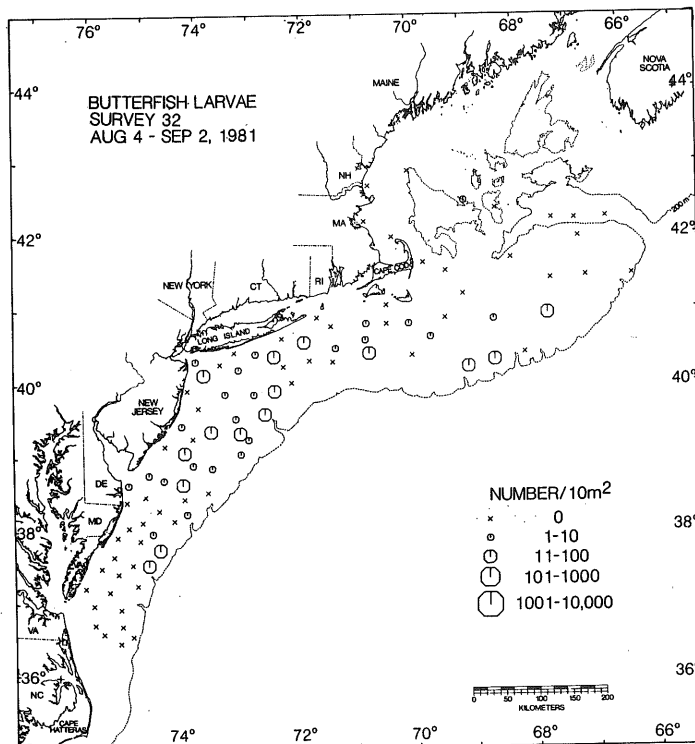
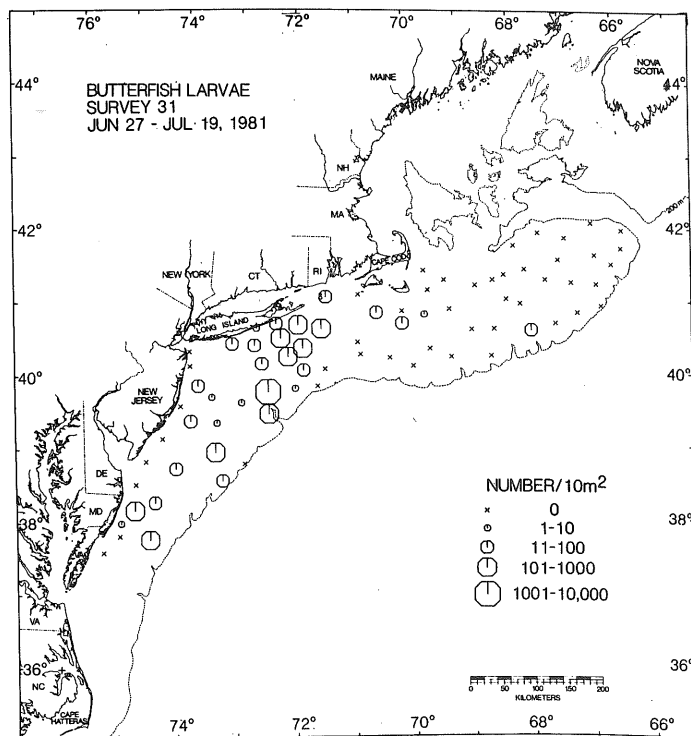
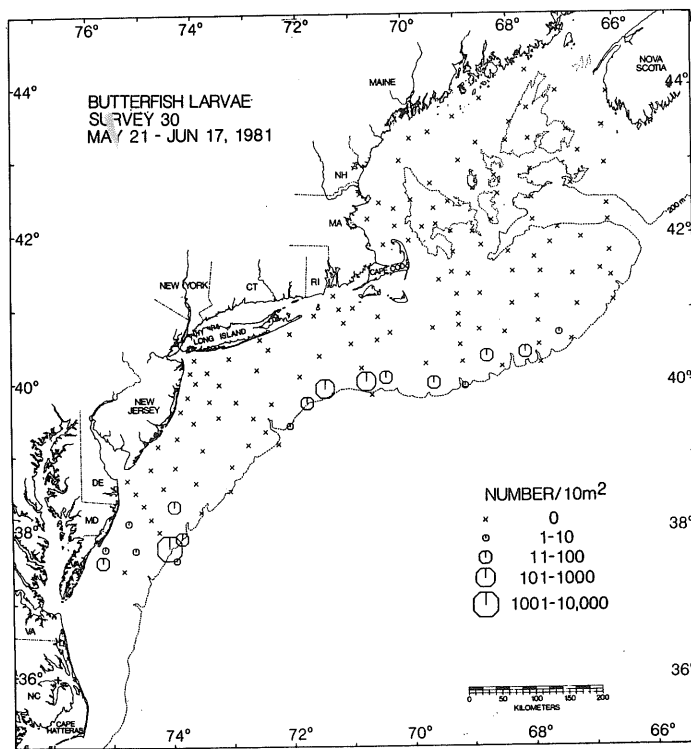


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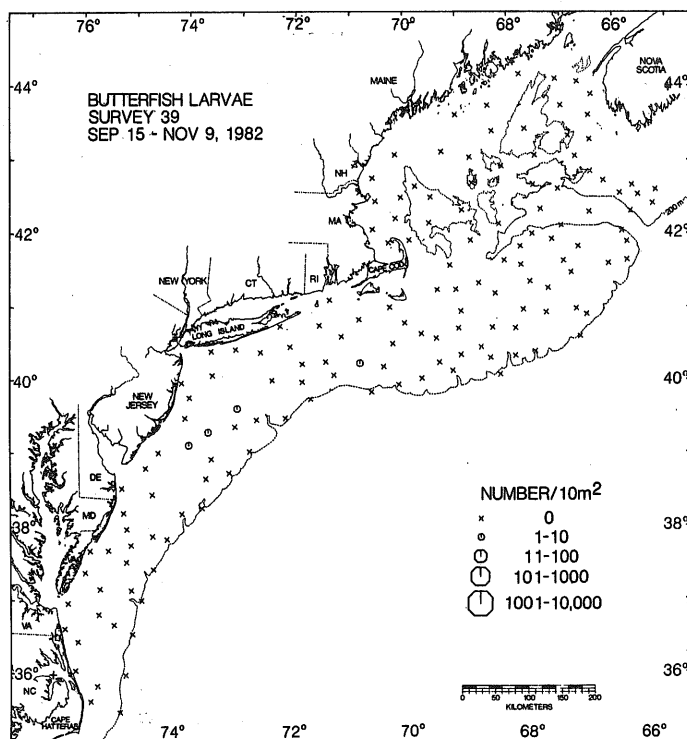
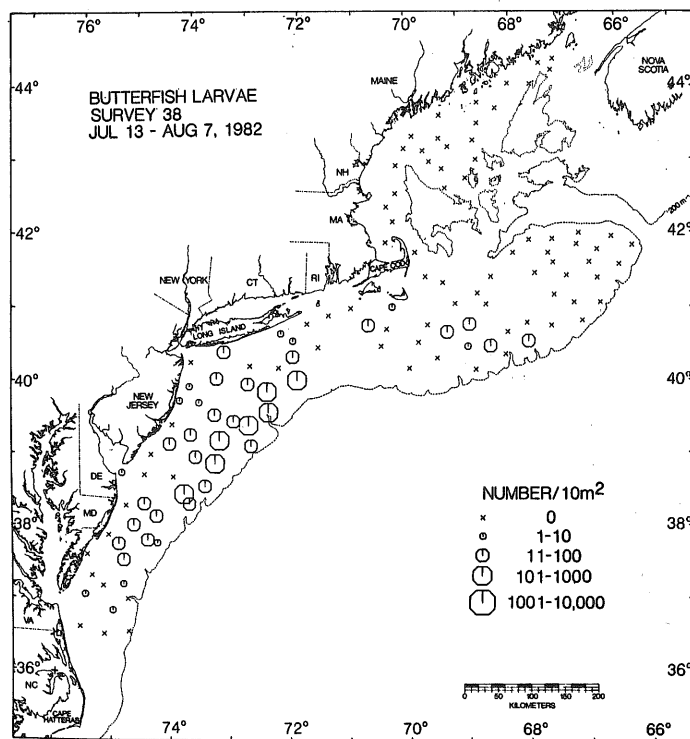
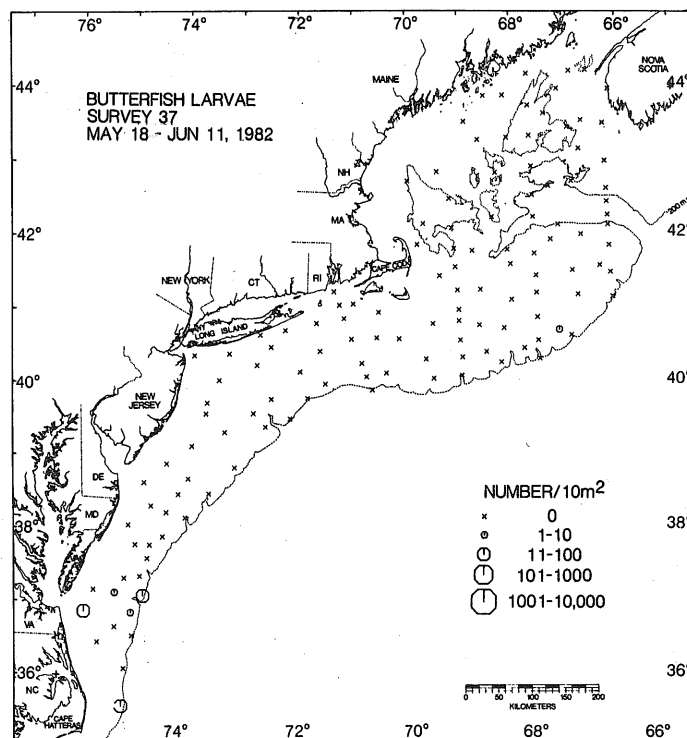
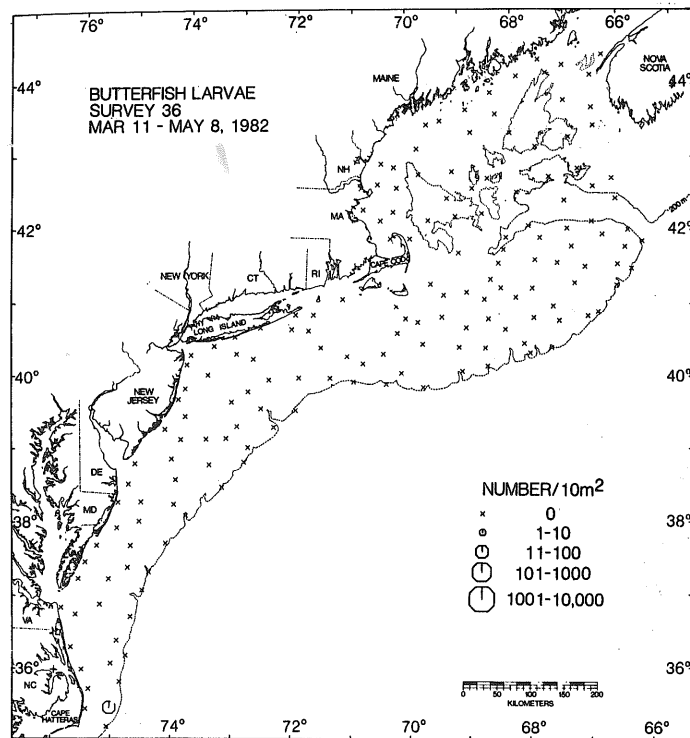


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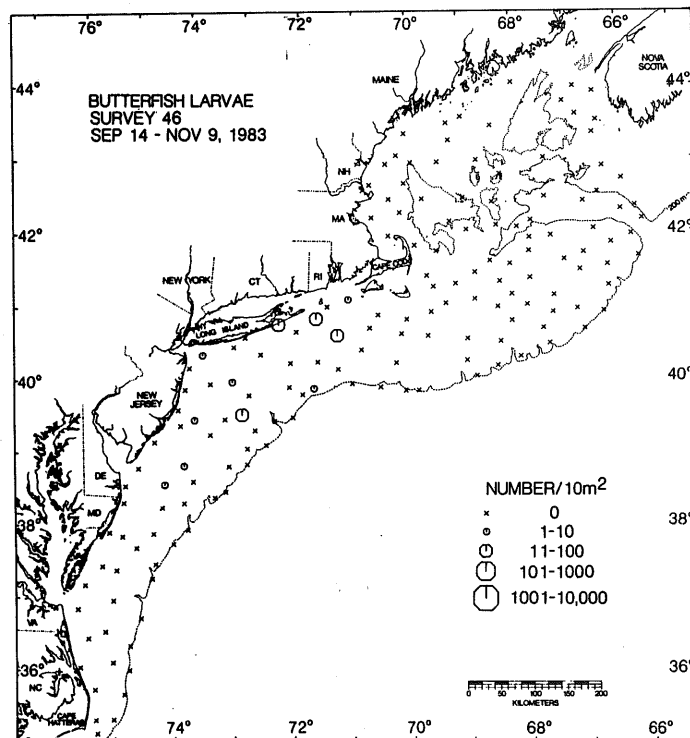
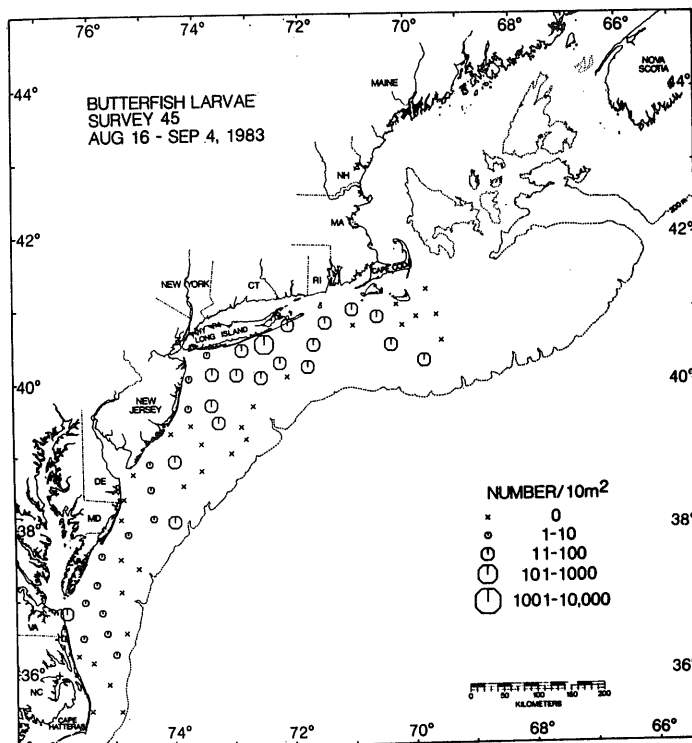
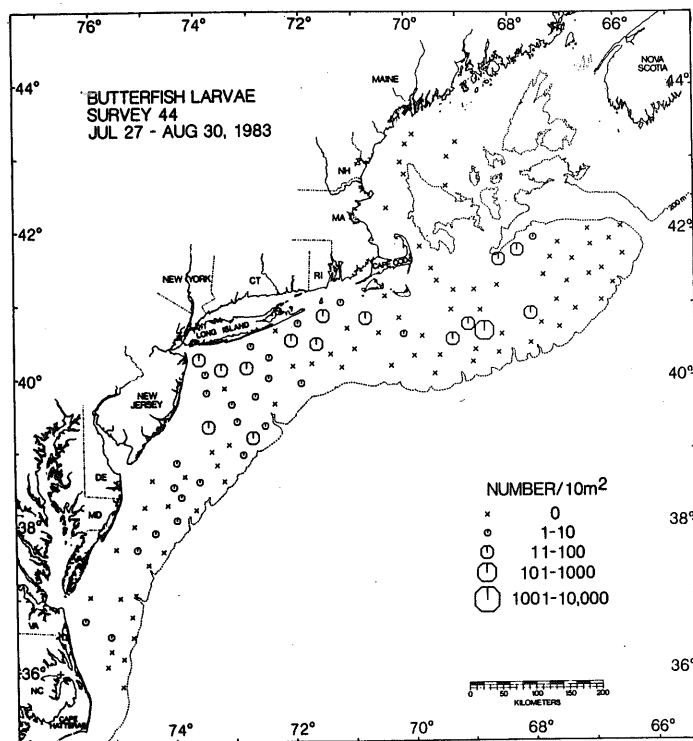
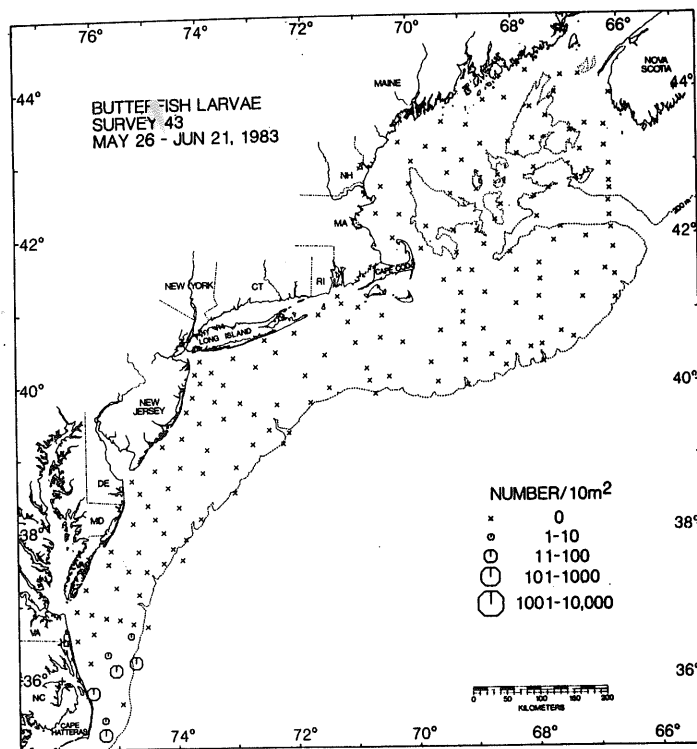


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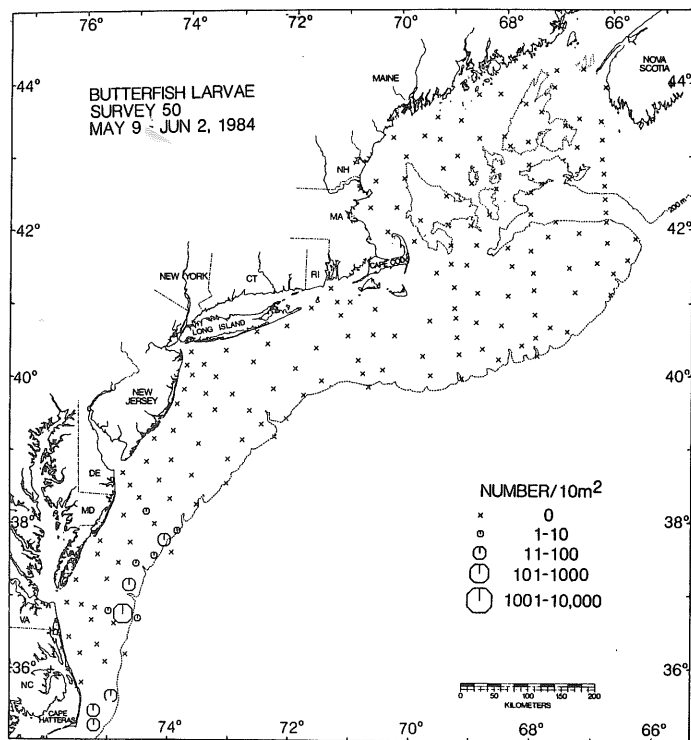


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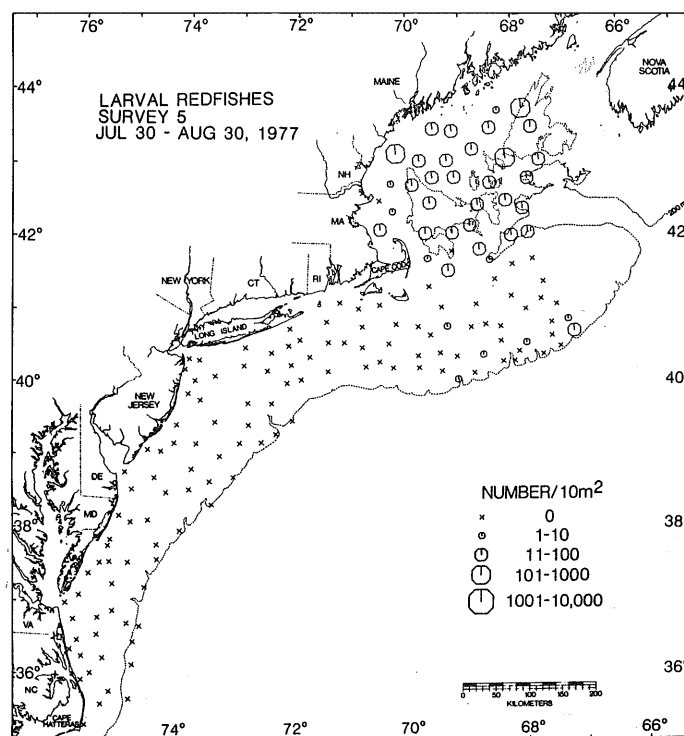
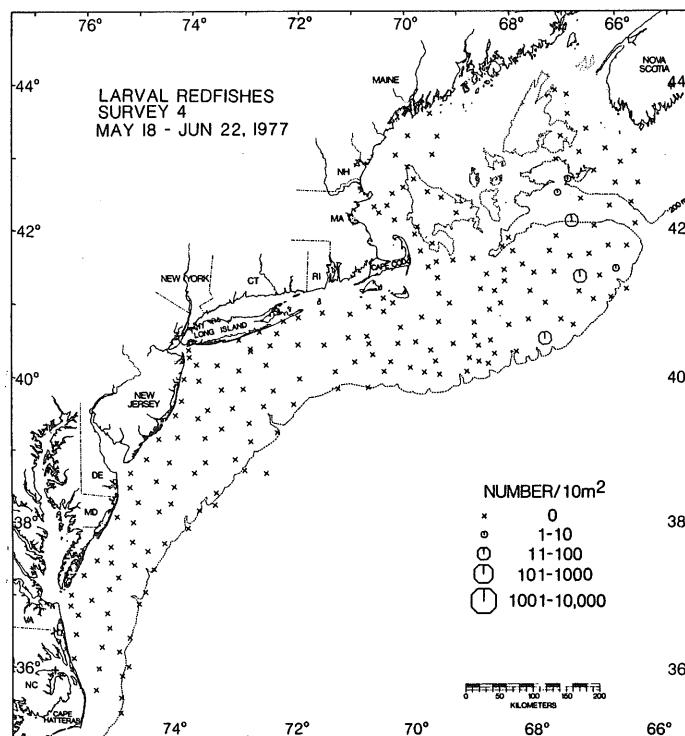
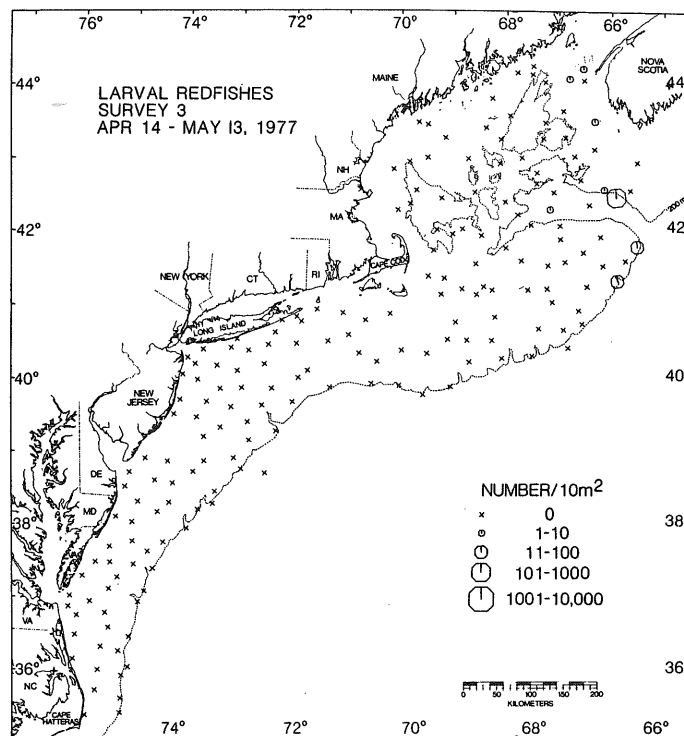
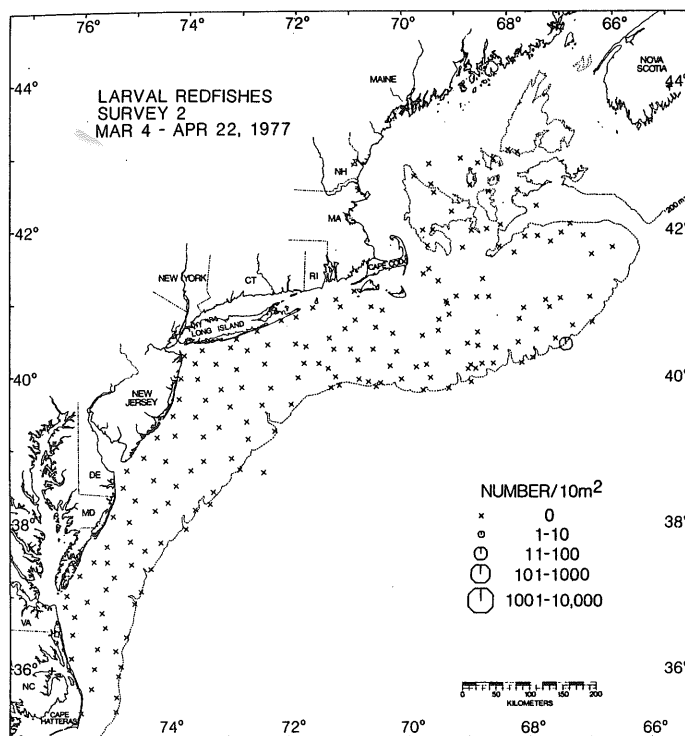


Figure 18. Distribution and abundance of larval redfishes, Sebastes spp., off northeastern United States, winter 1977 through spring 1984.

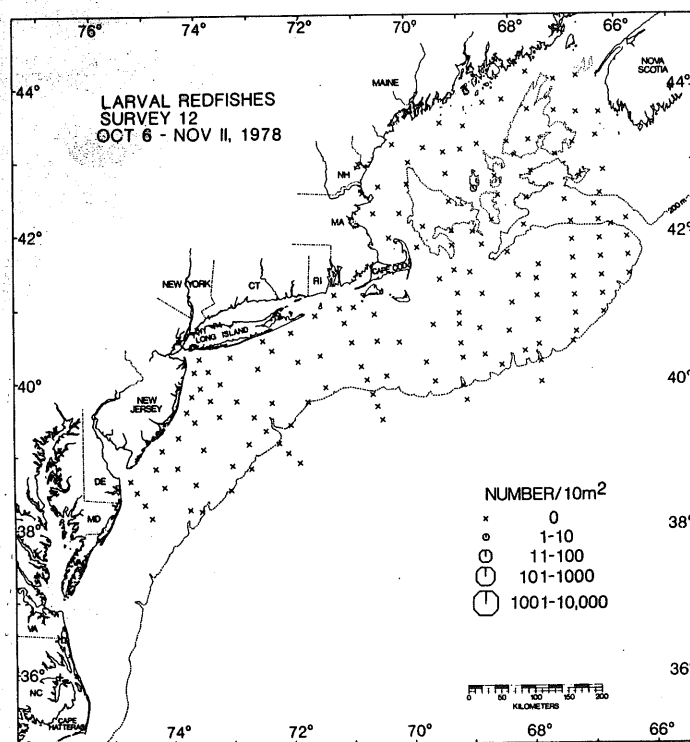
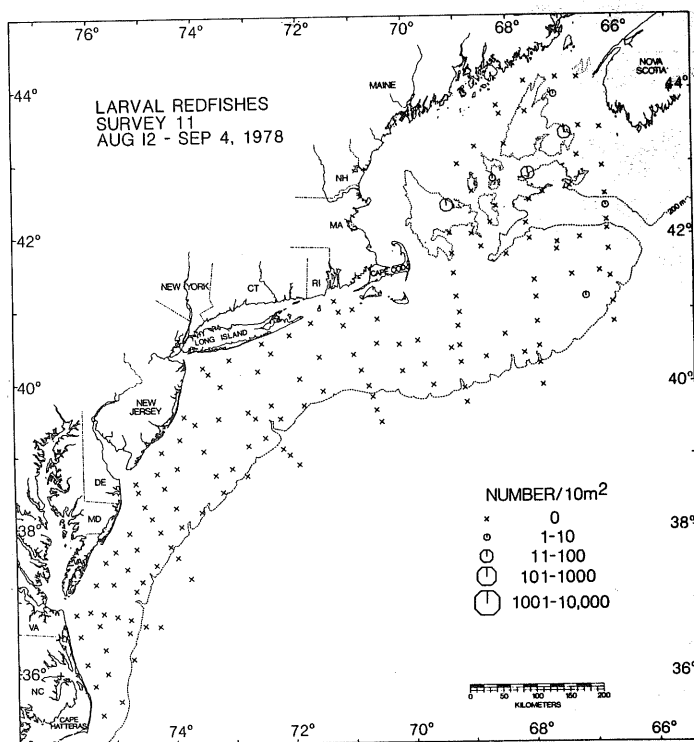
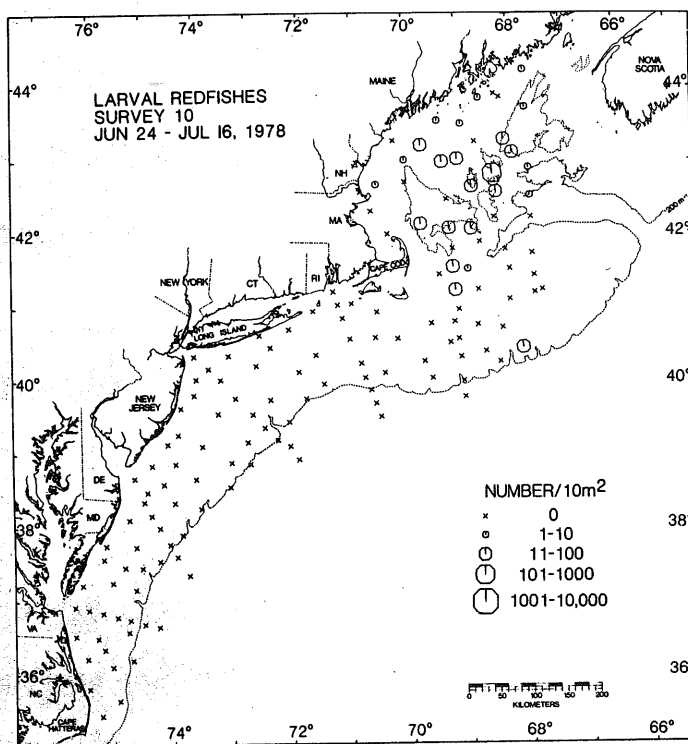
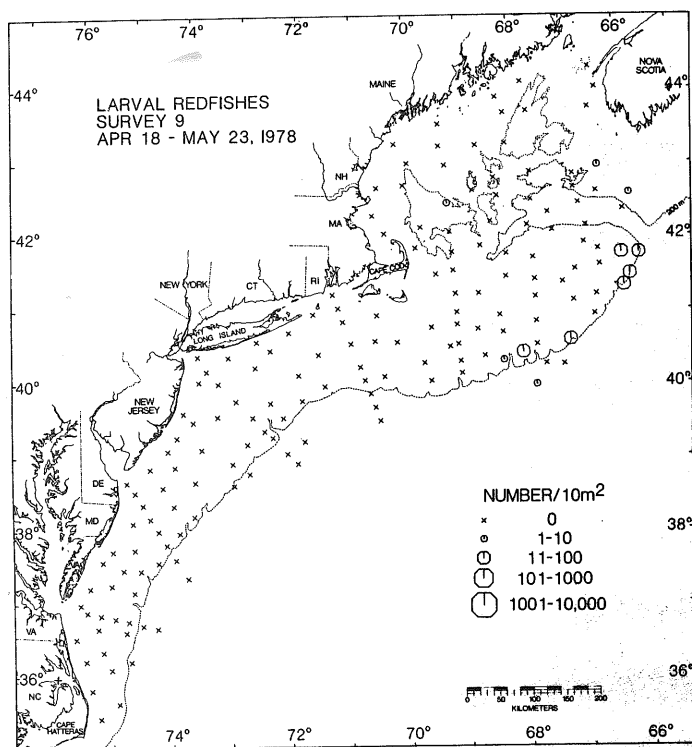


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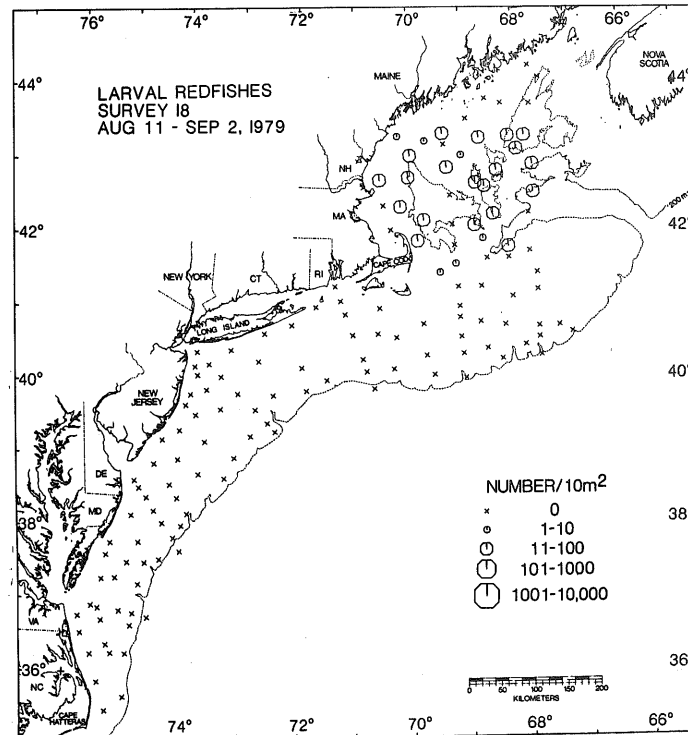
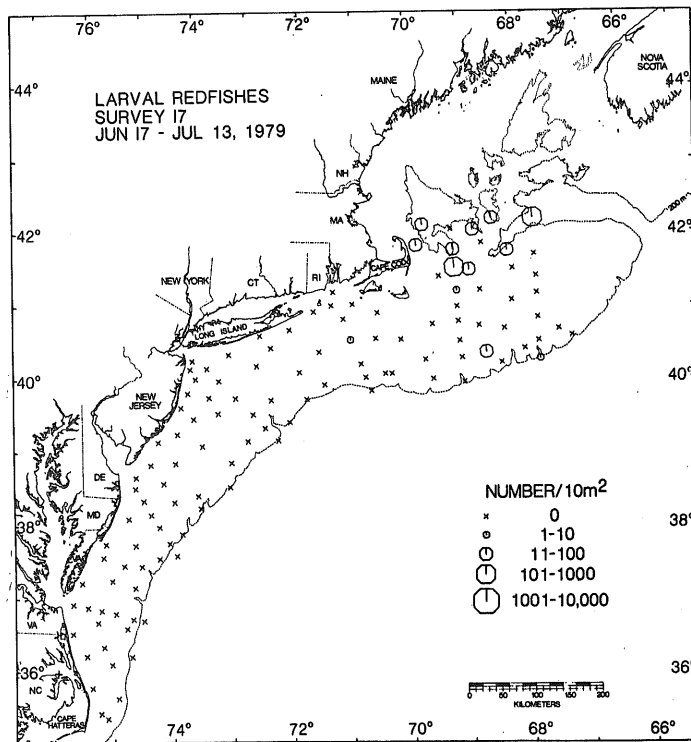
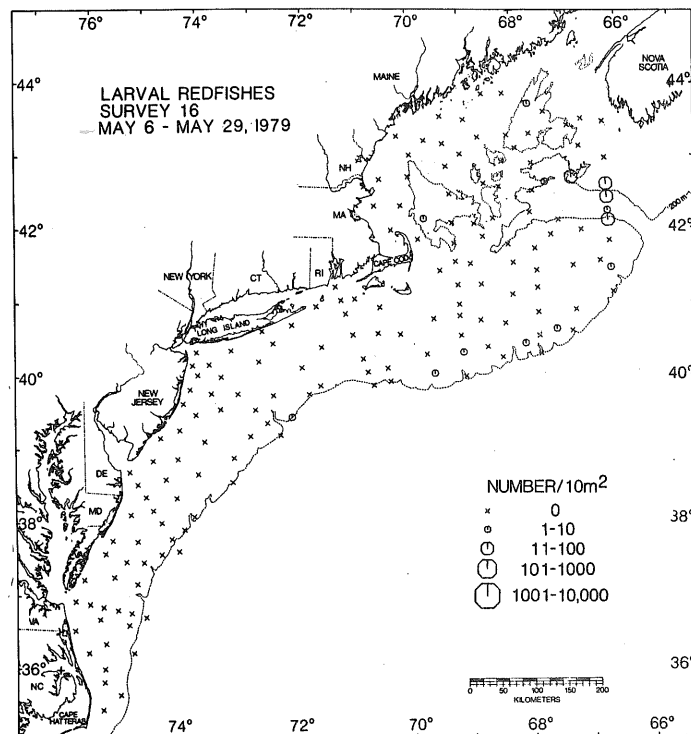
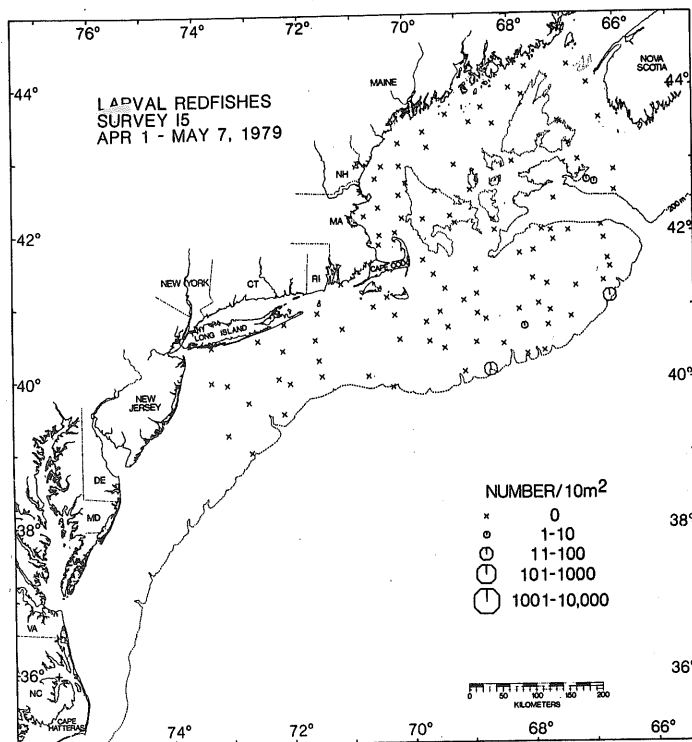


Figure 18. continued.

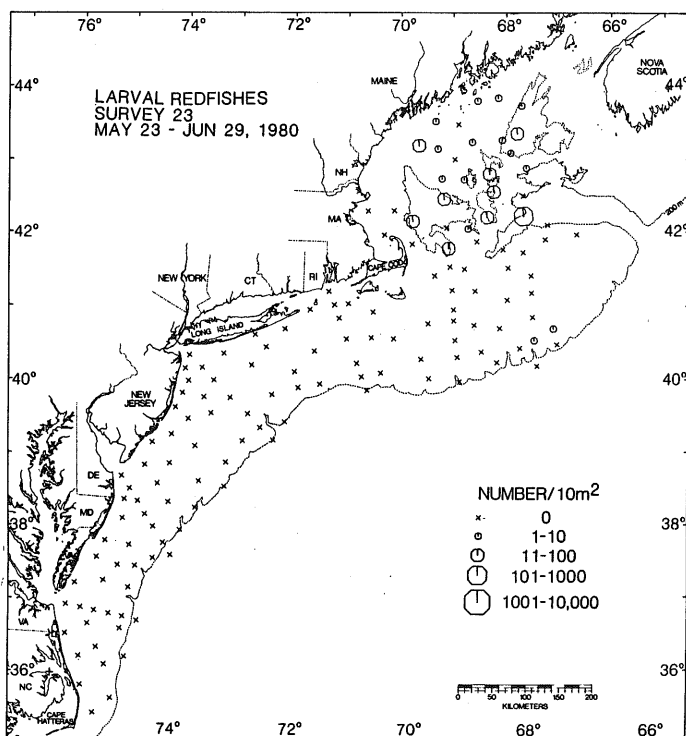
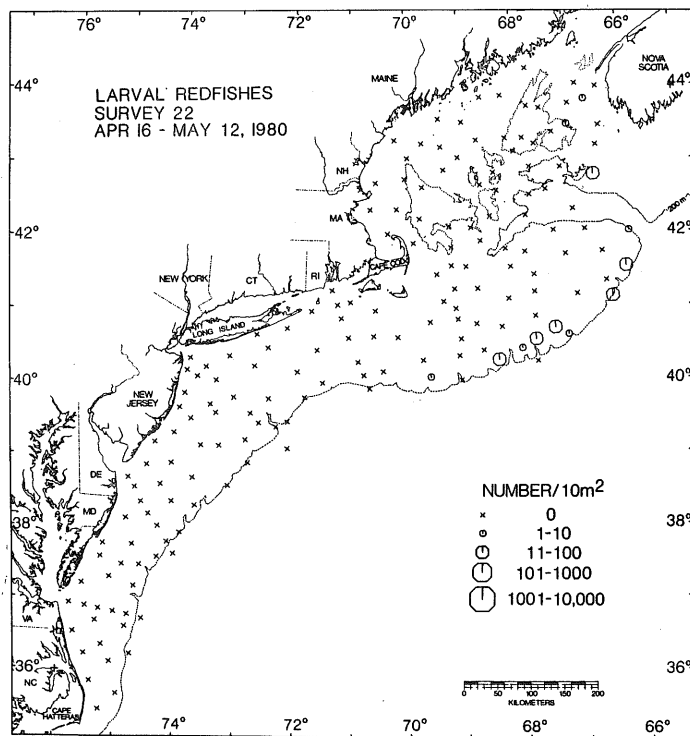
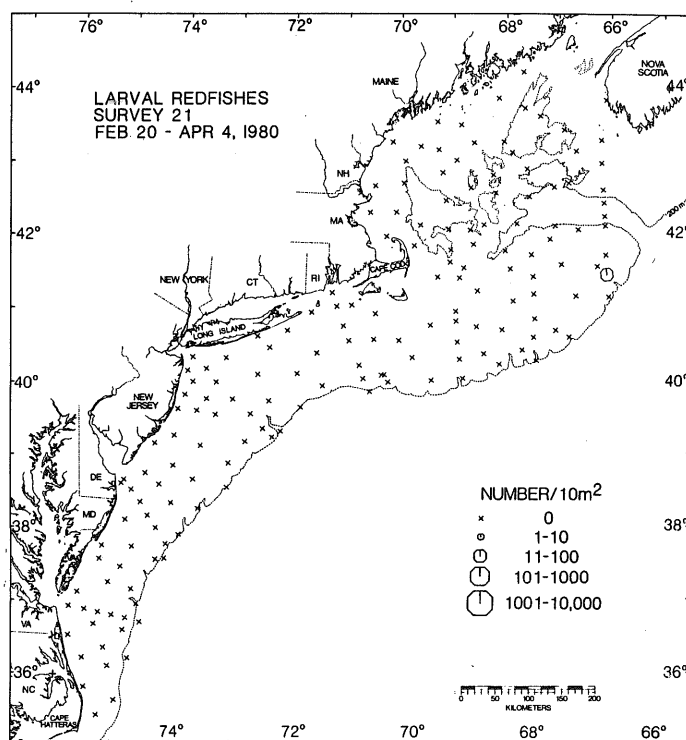
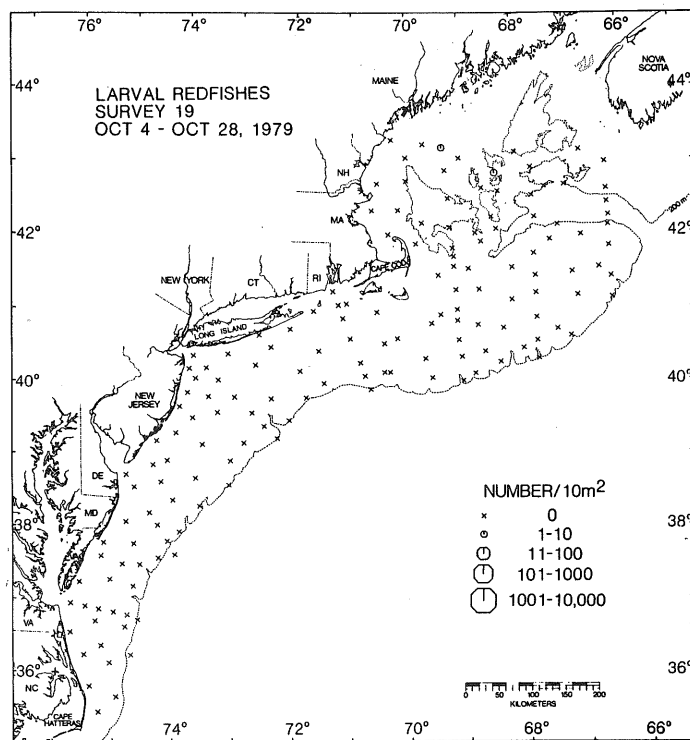


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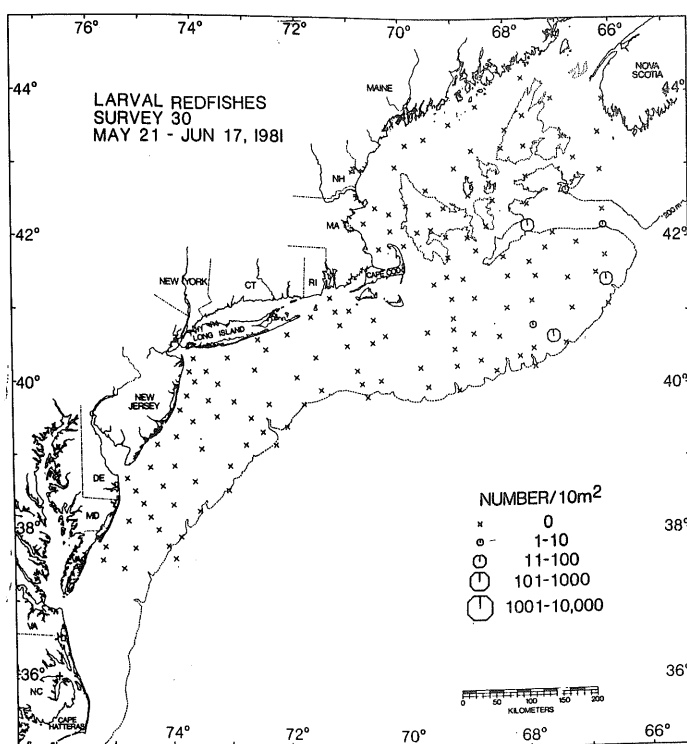
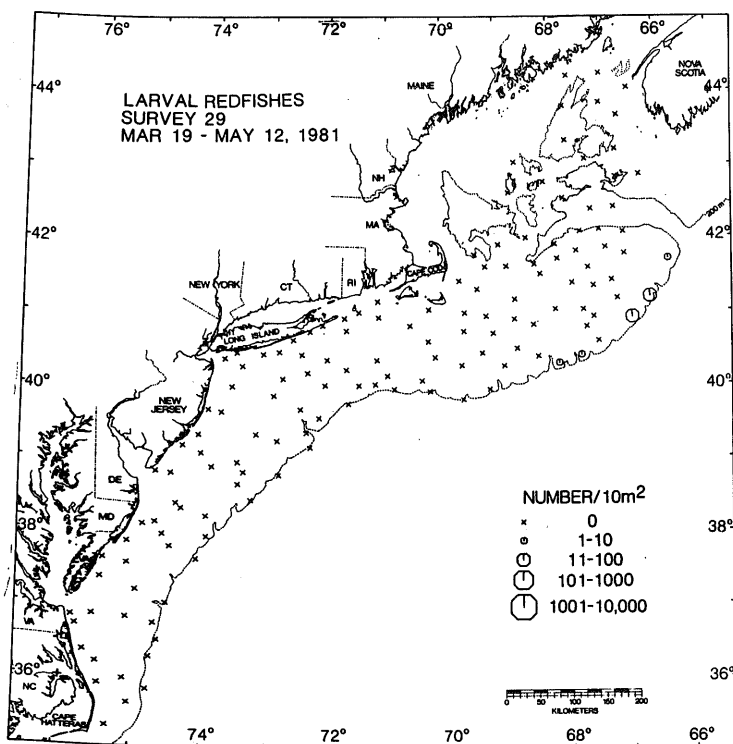
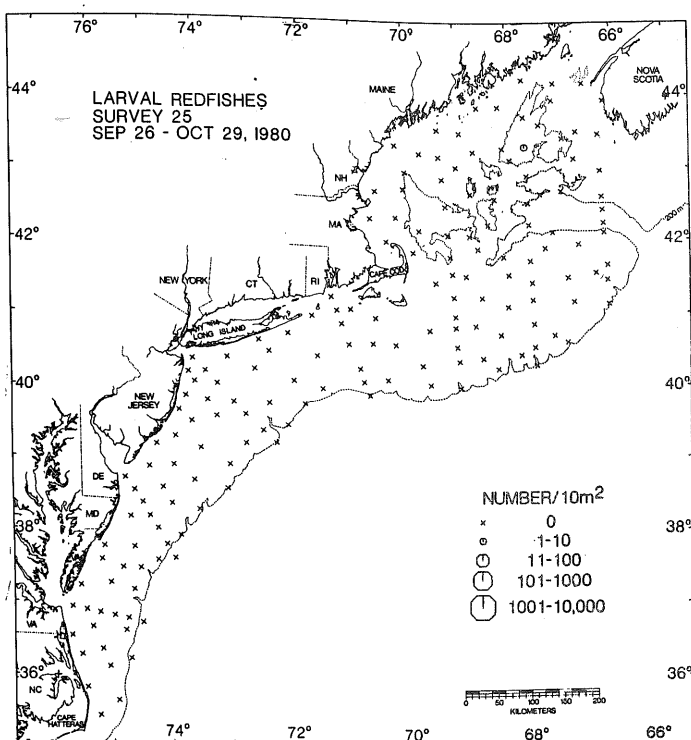
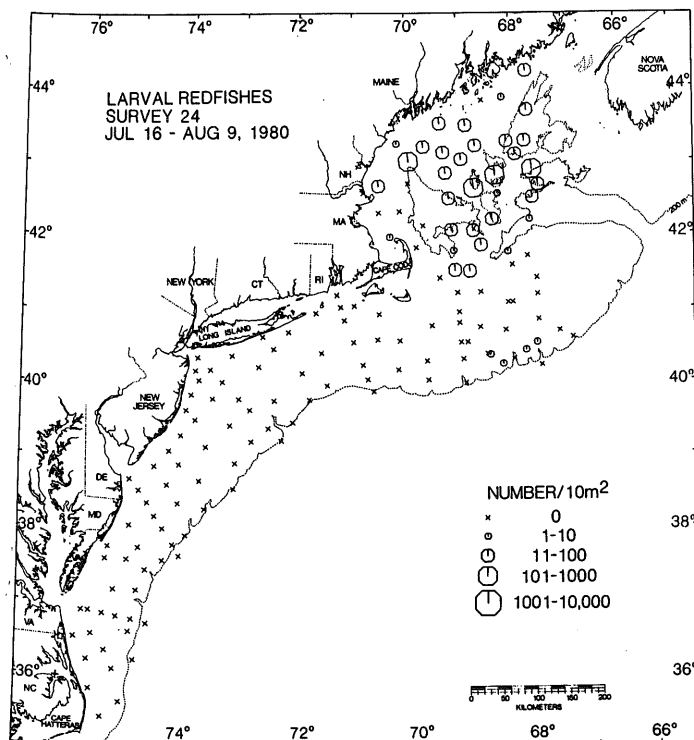


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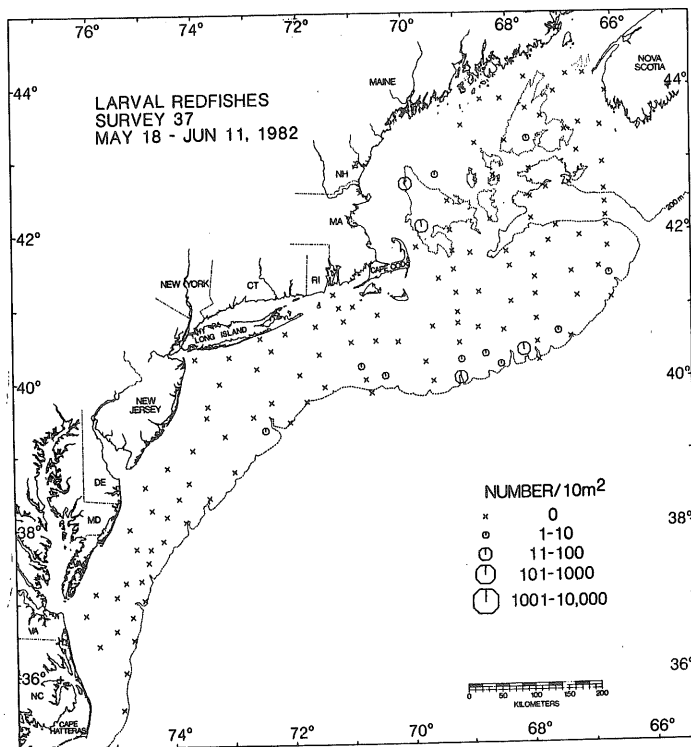
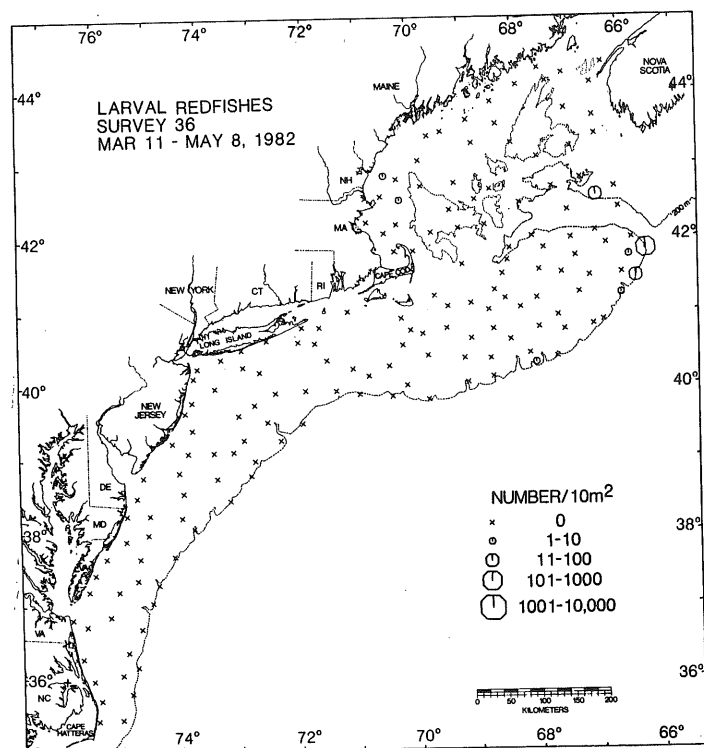
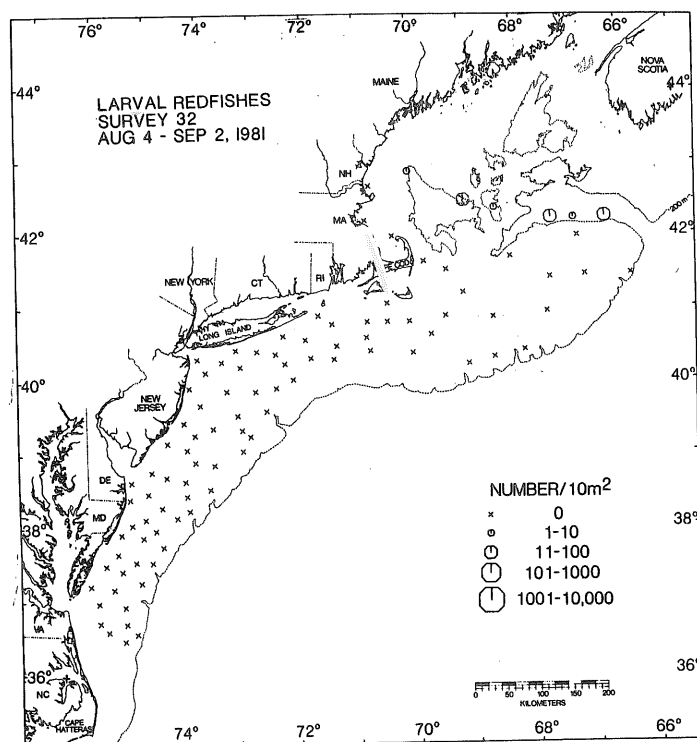
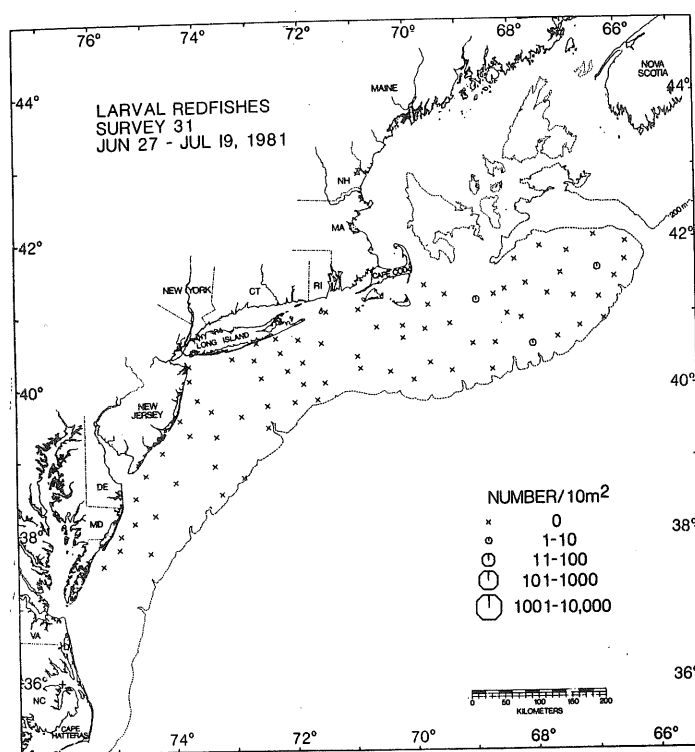


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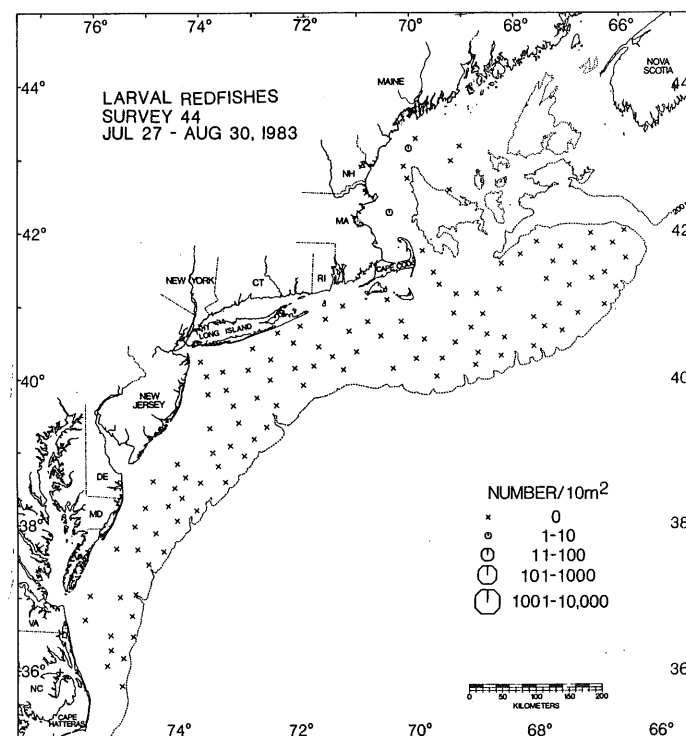
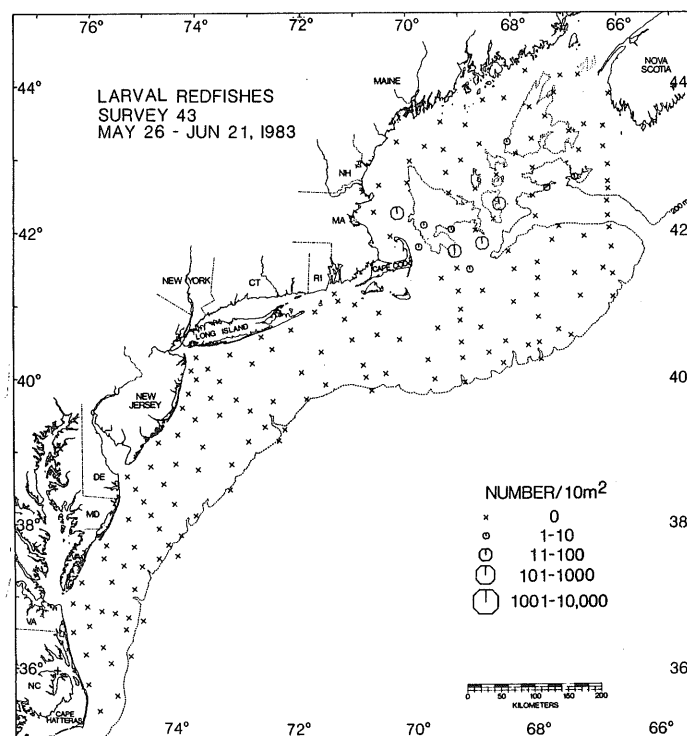
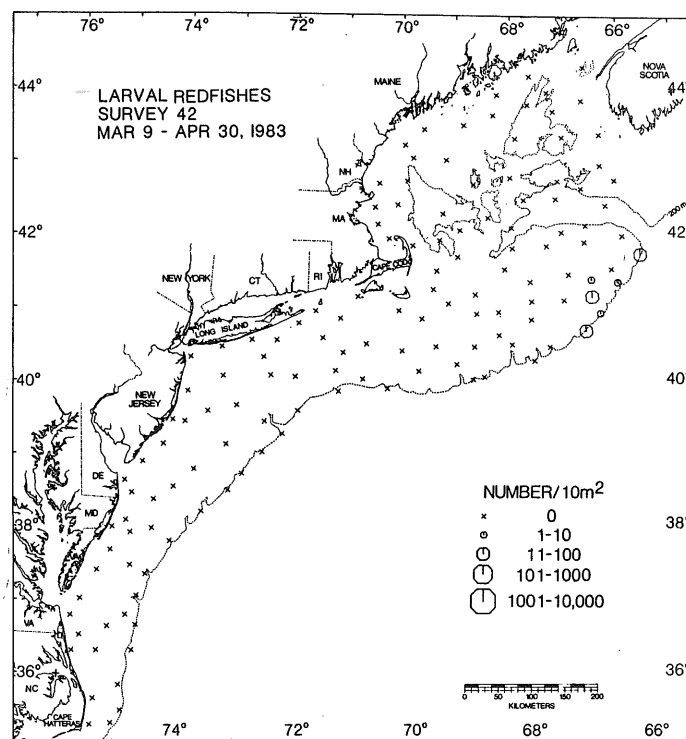
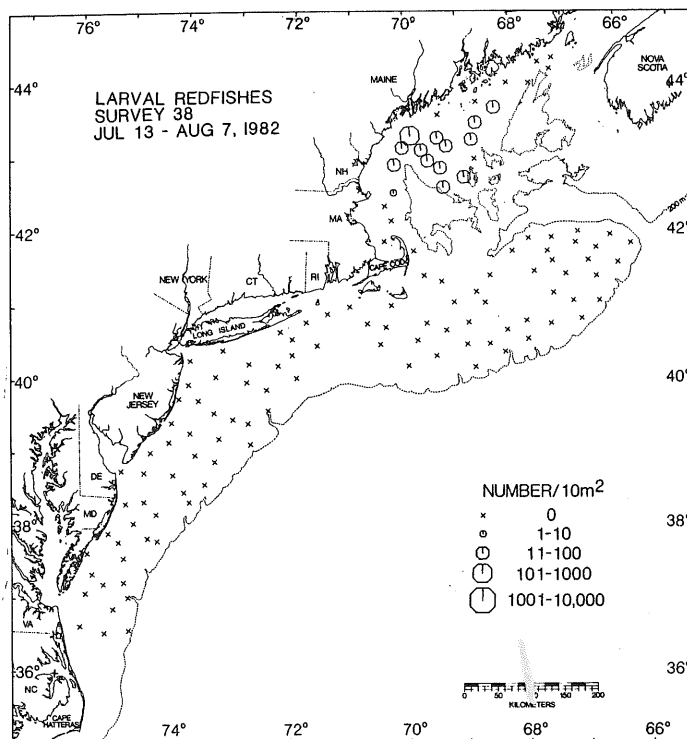


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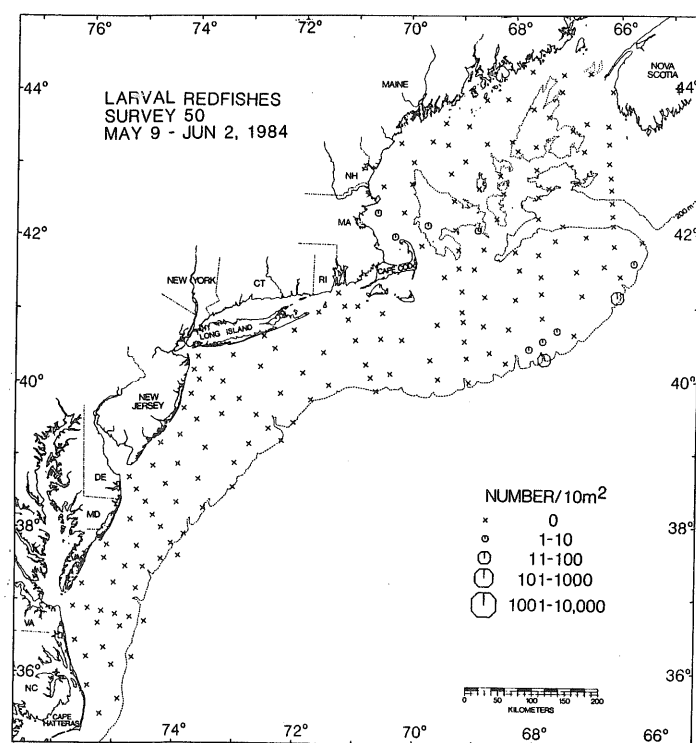
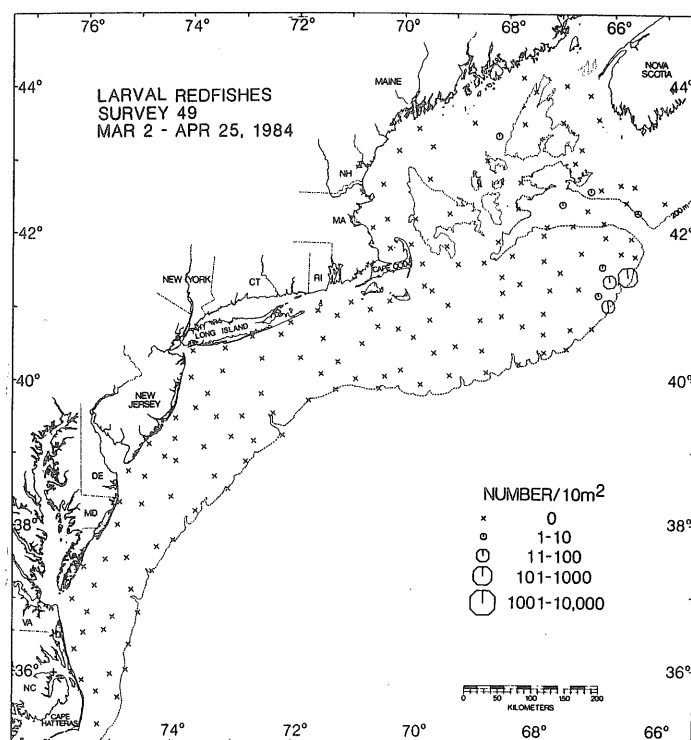


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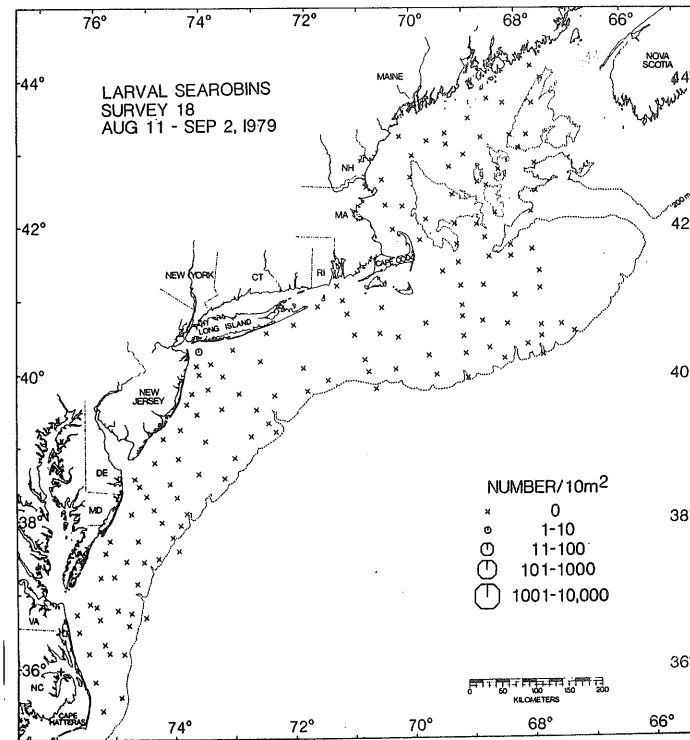
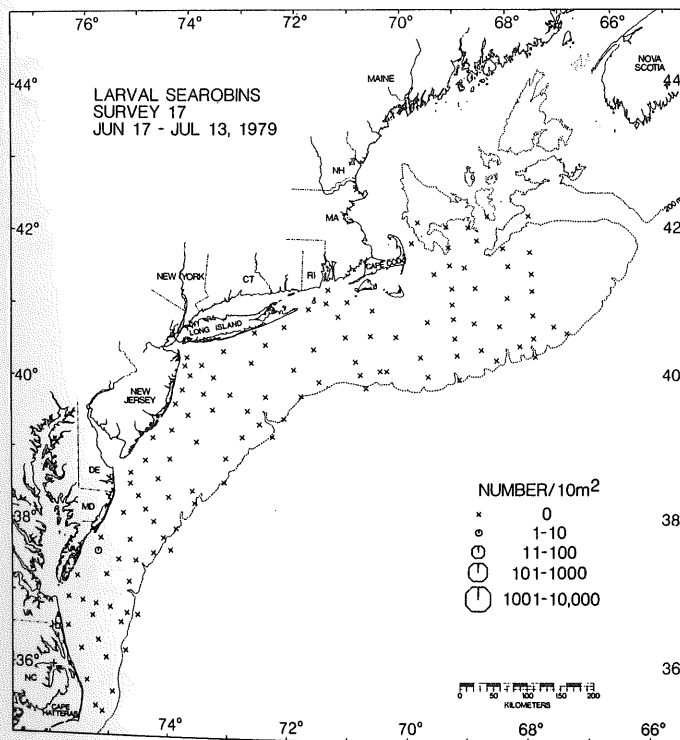
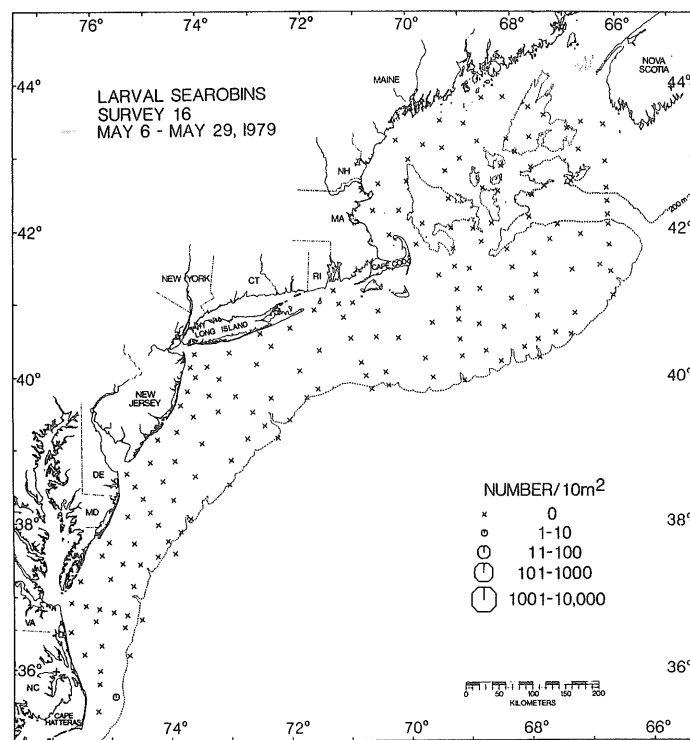
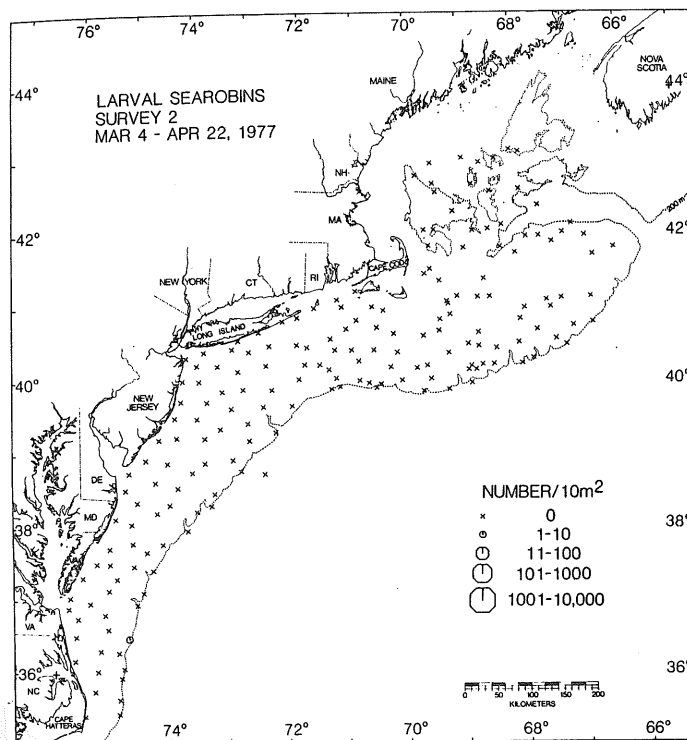


Figure 19. Distribution and abundance of larval searobins, *Prionotus* spp., off northeastern United States, winter 1977 through spring 1984.

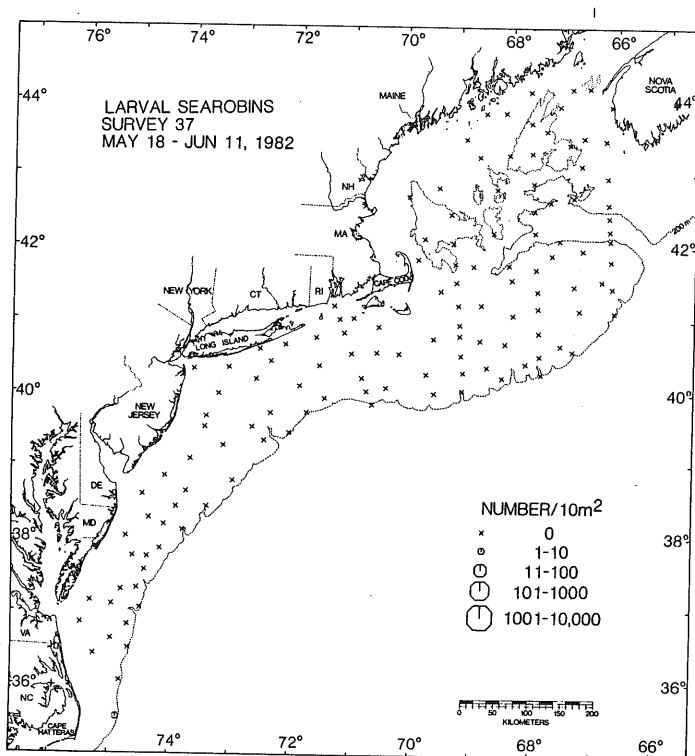
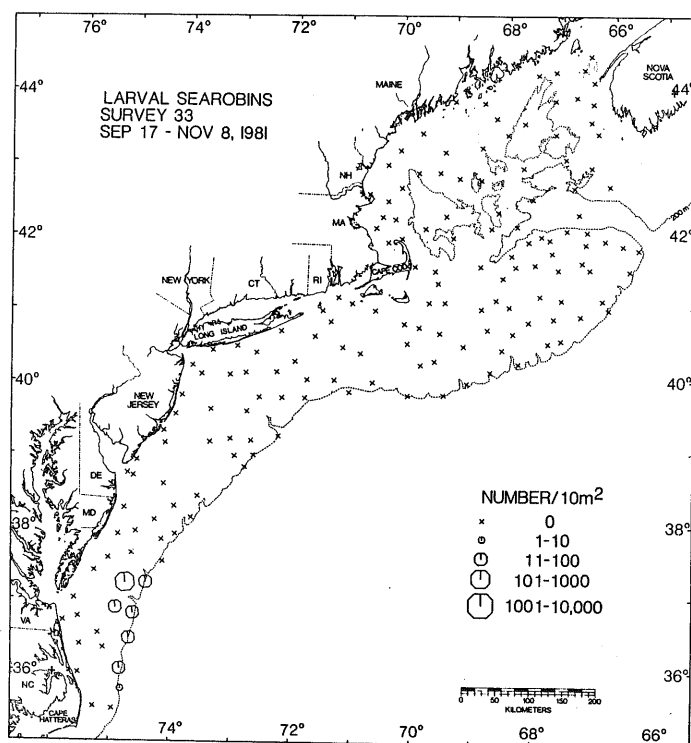
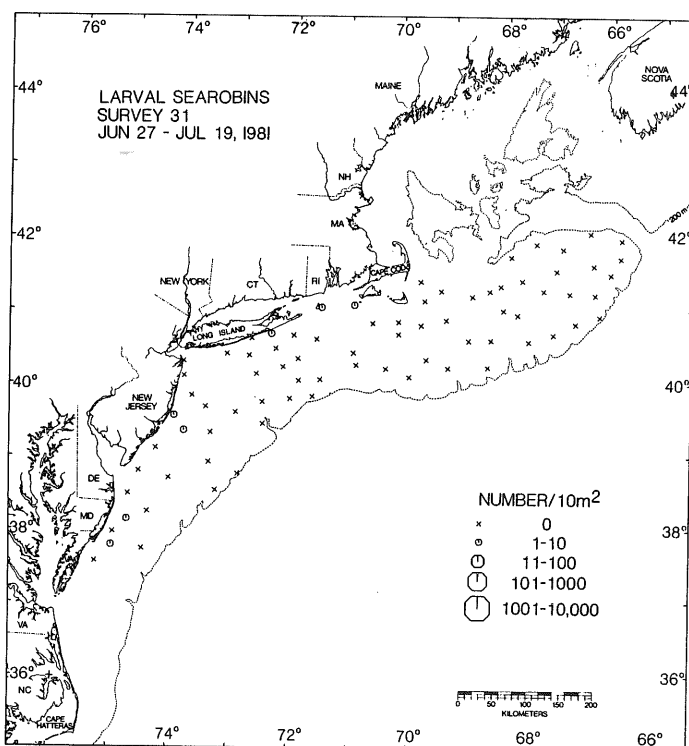
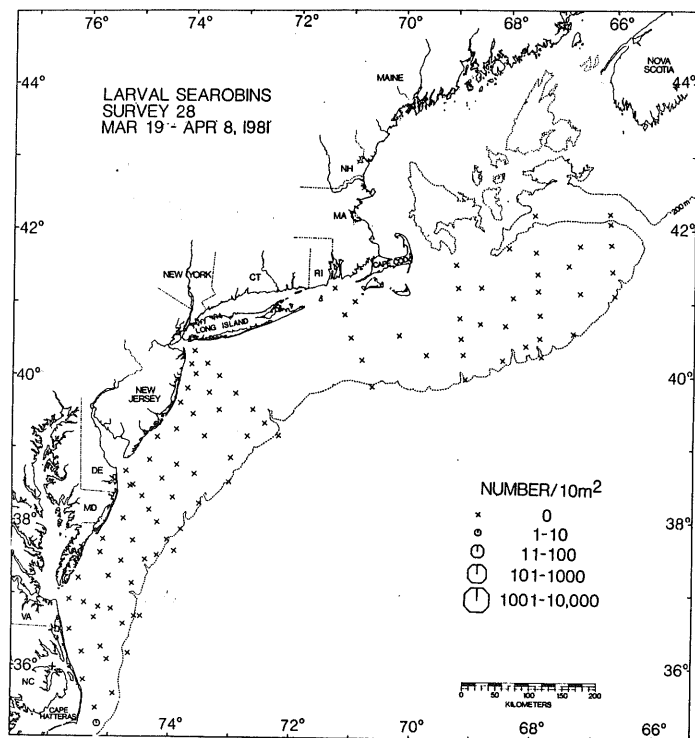


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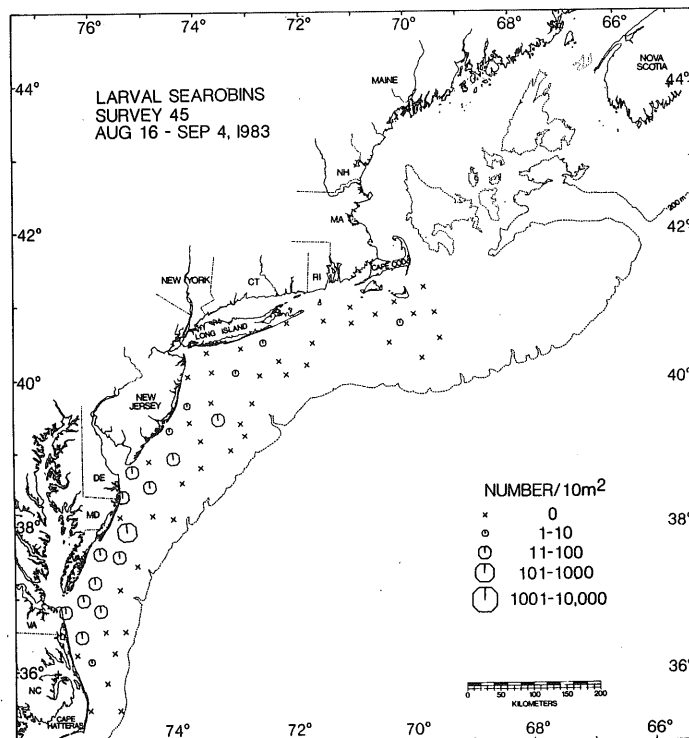
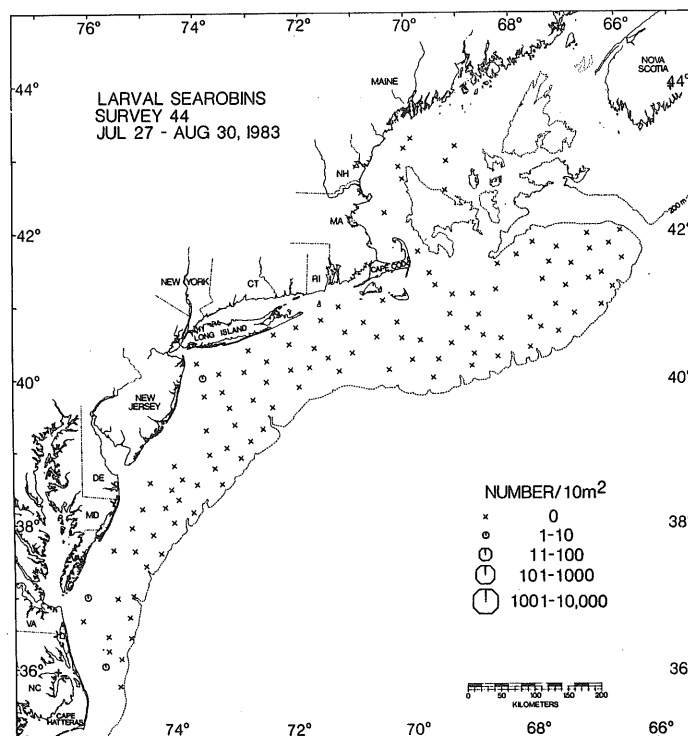
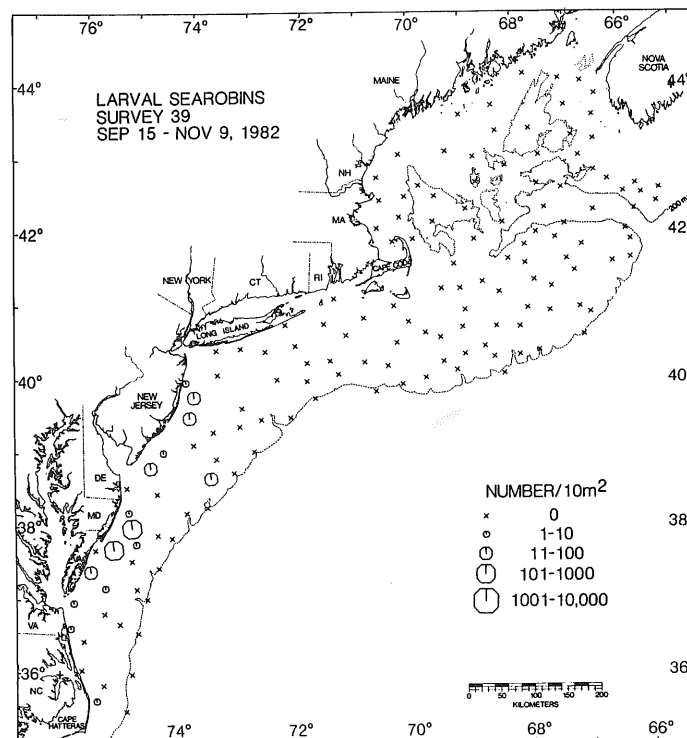
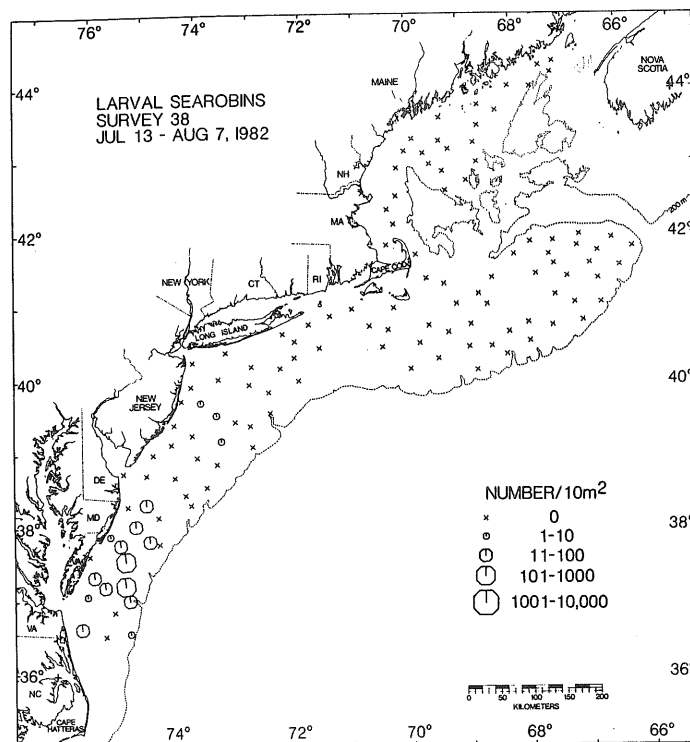


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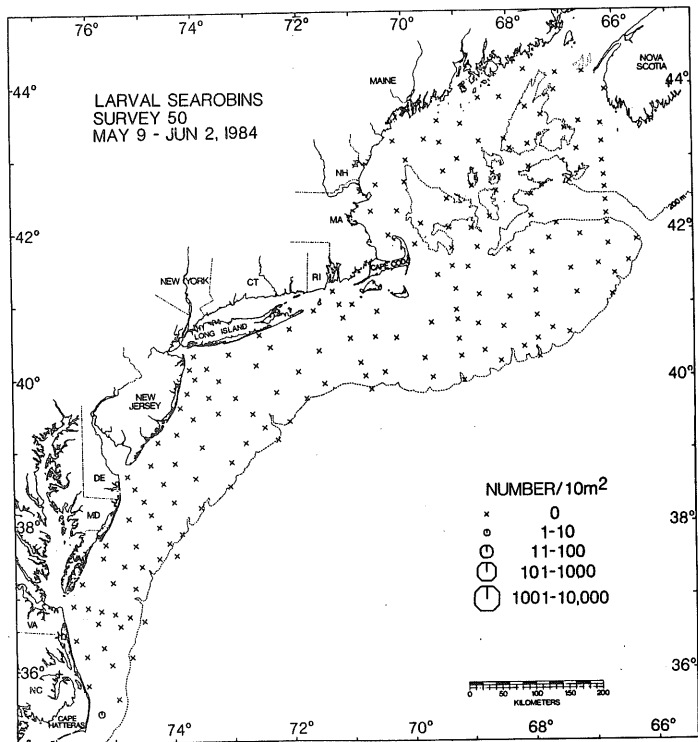
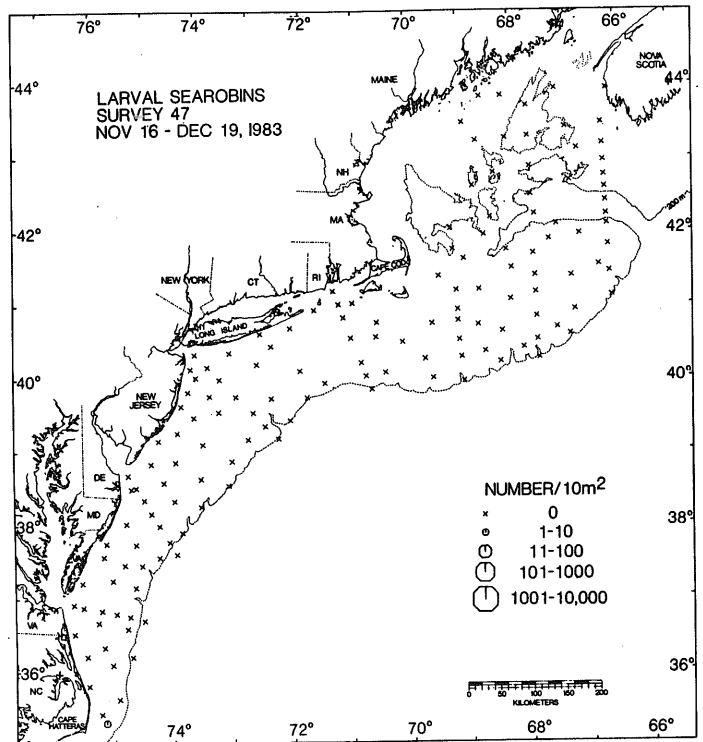
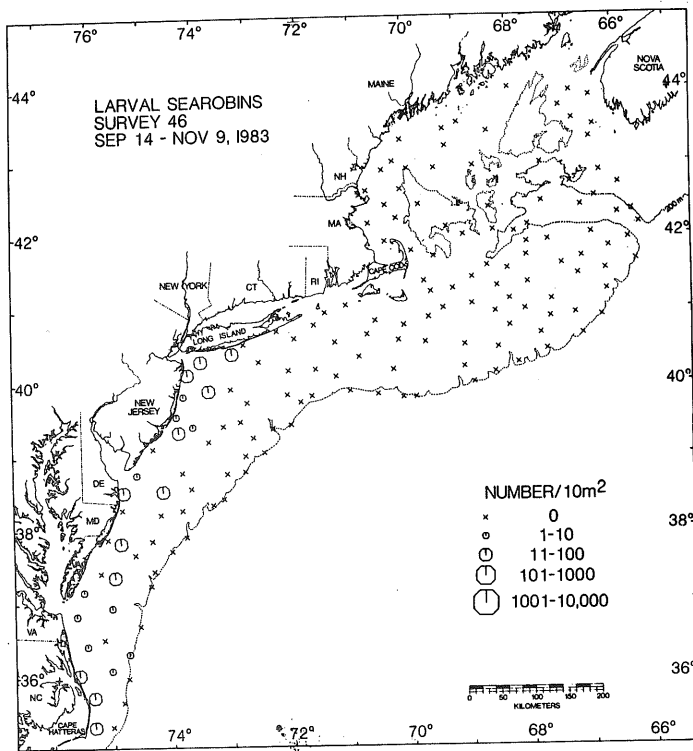


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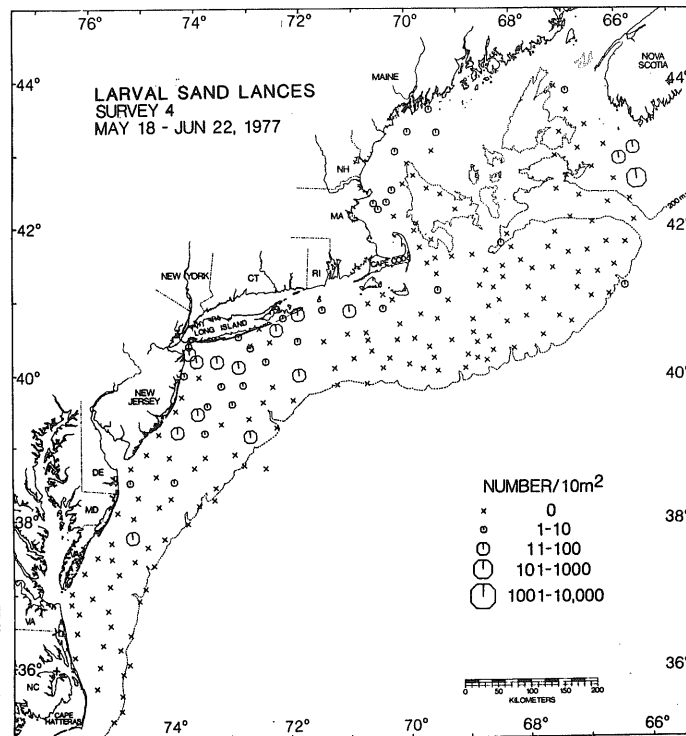
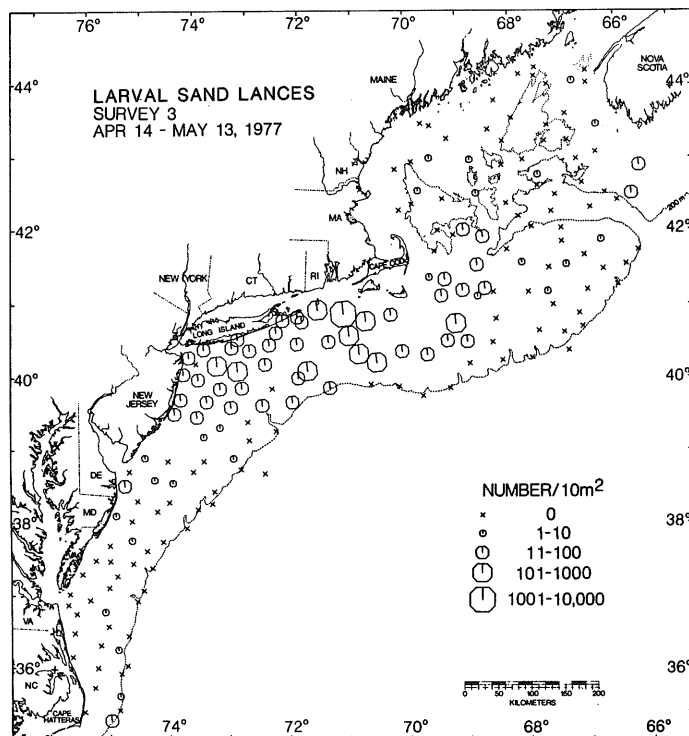
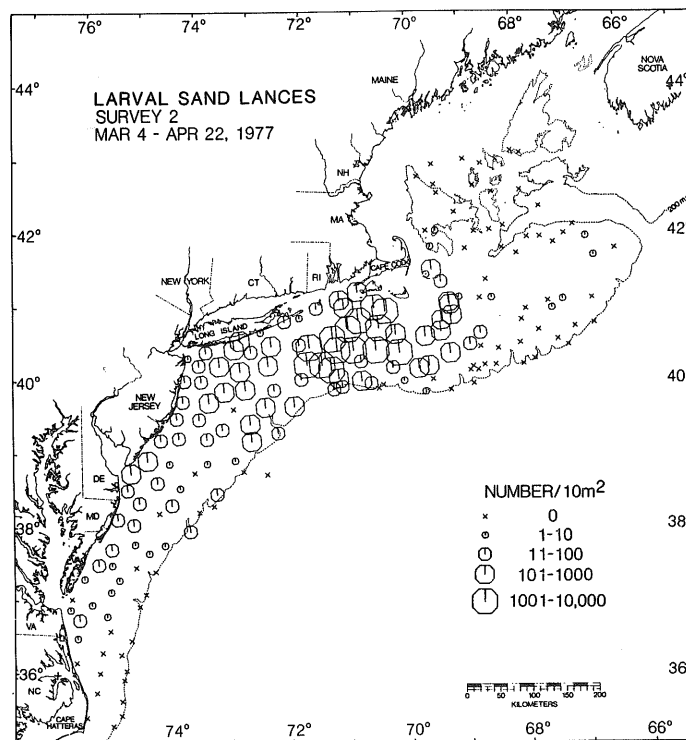
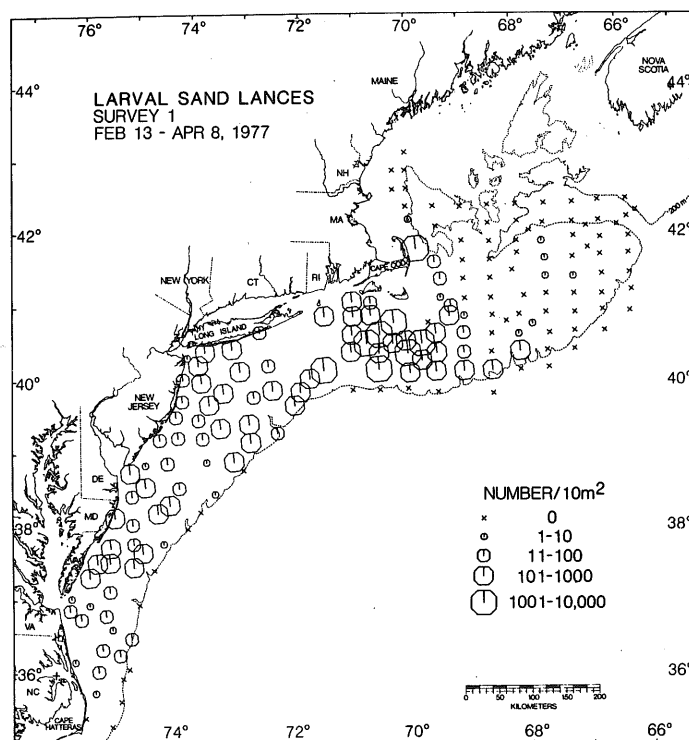


Figure 20. Distribution and abundance of larval sandlances, *Ammodytes* spp., off northeastern United States, winter 1977 through spring 1984.

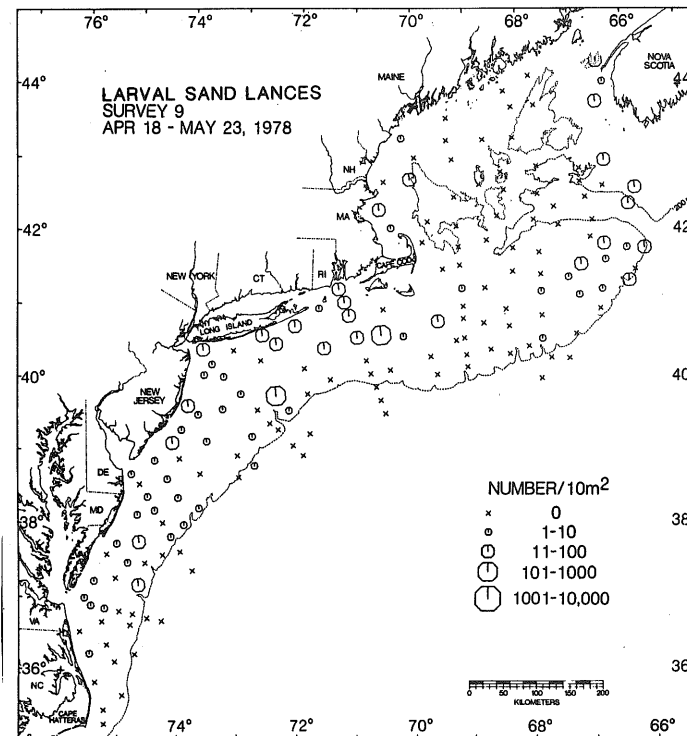
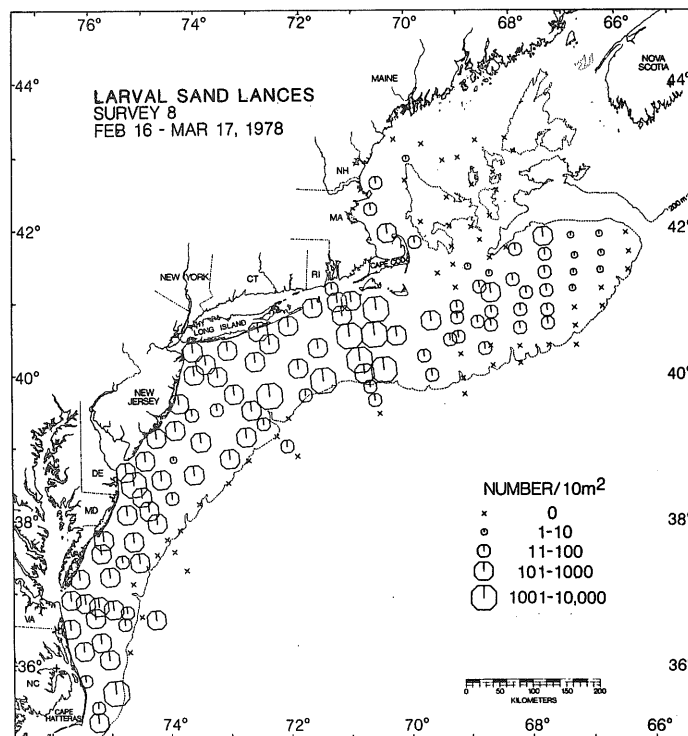
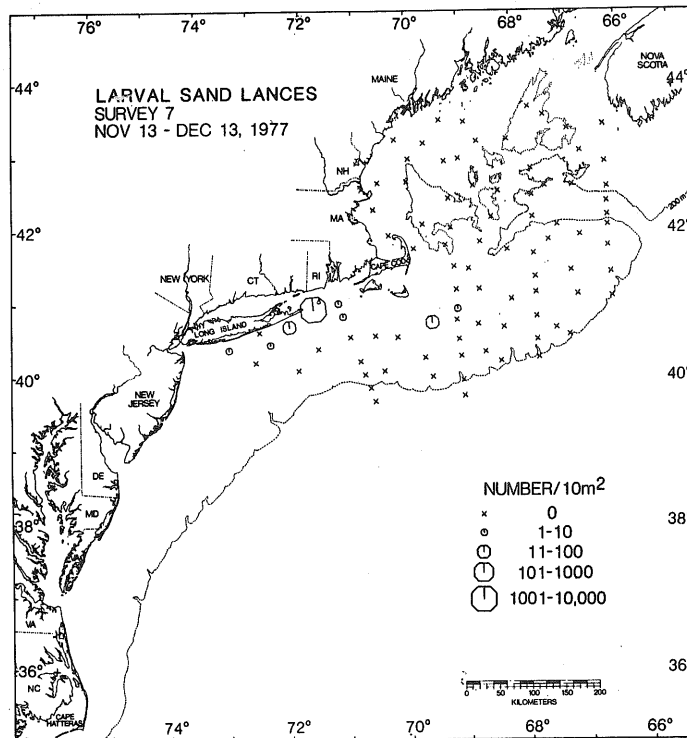
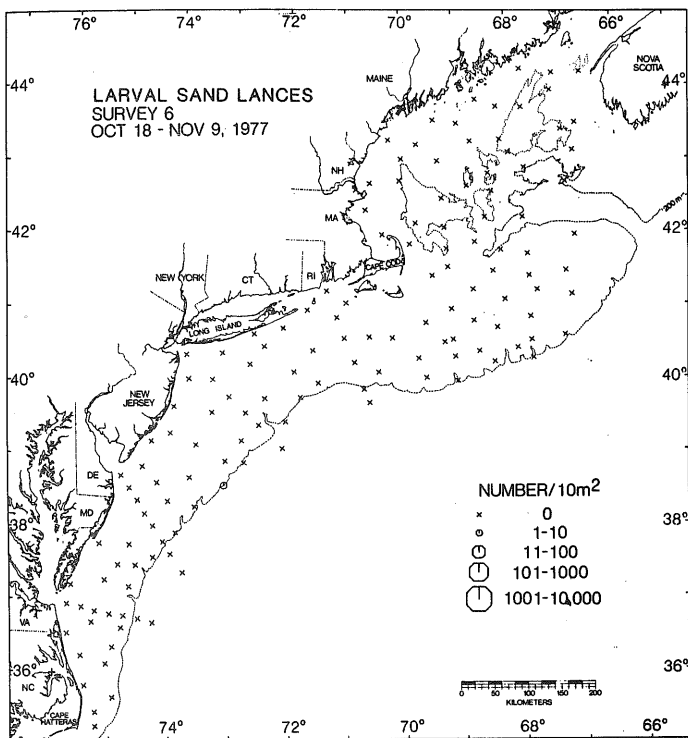


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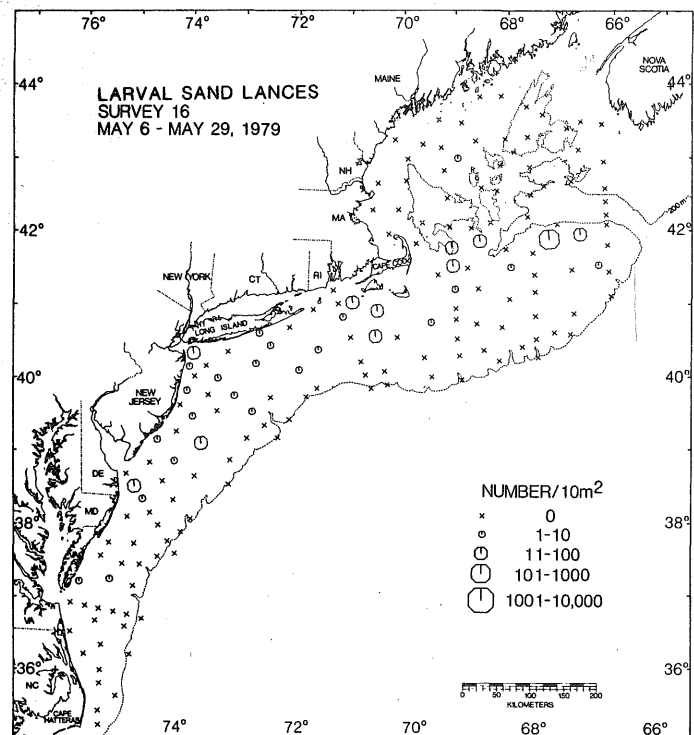
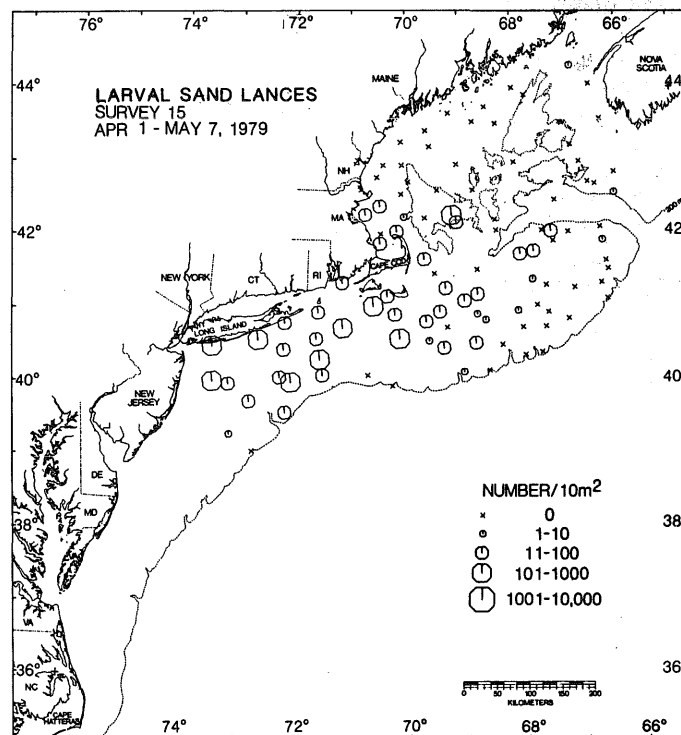
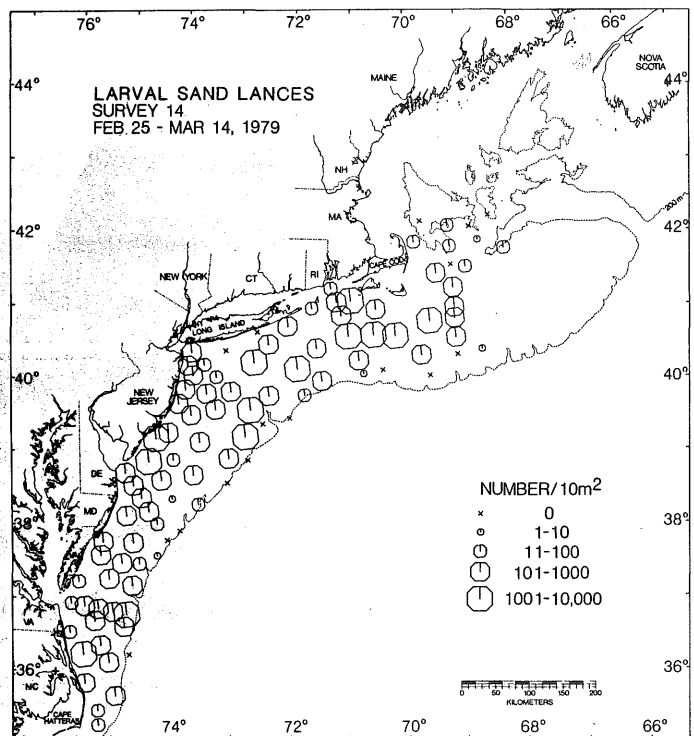
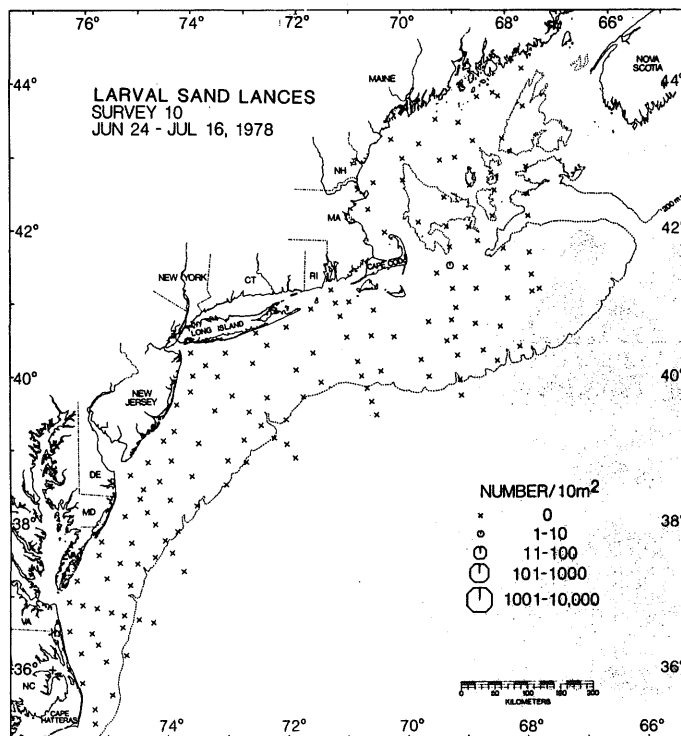


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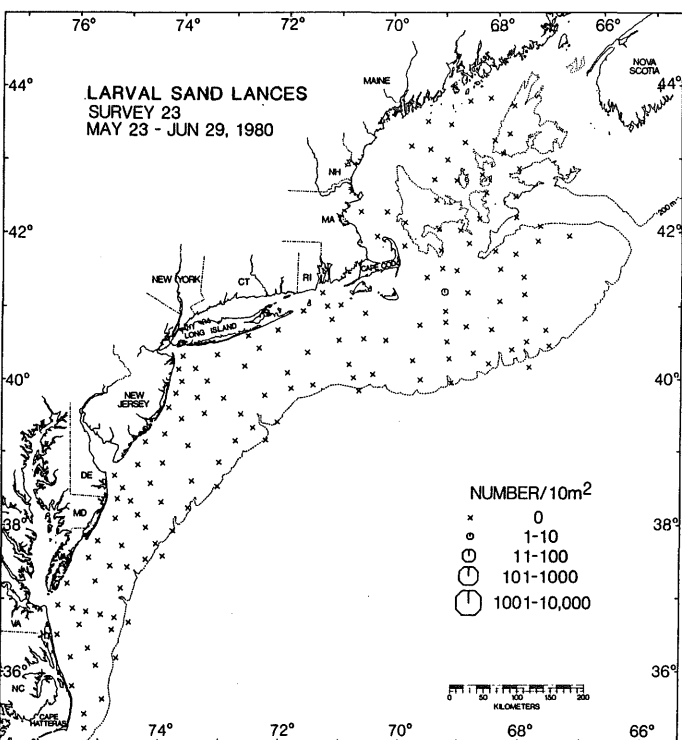
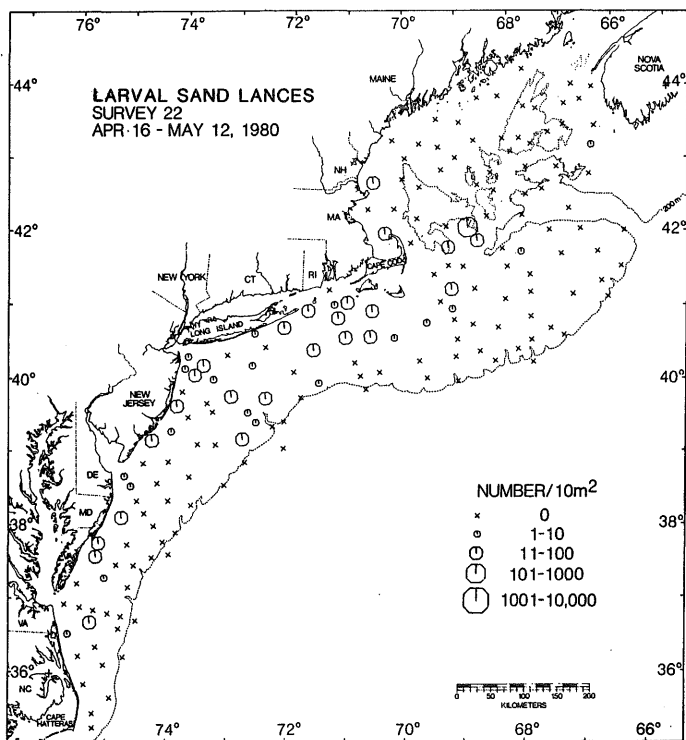
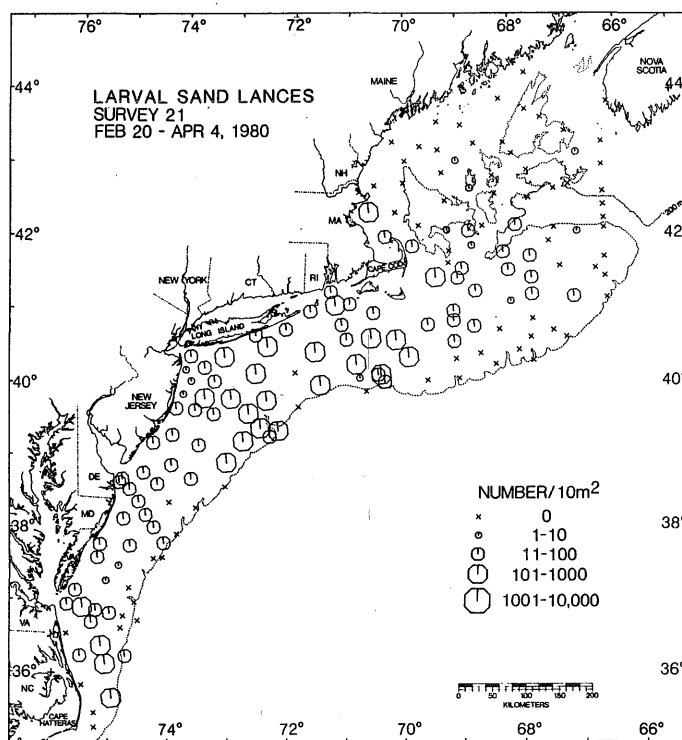
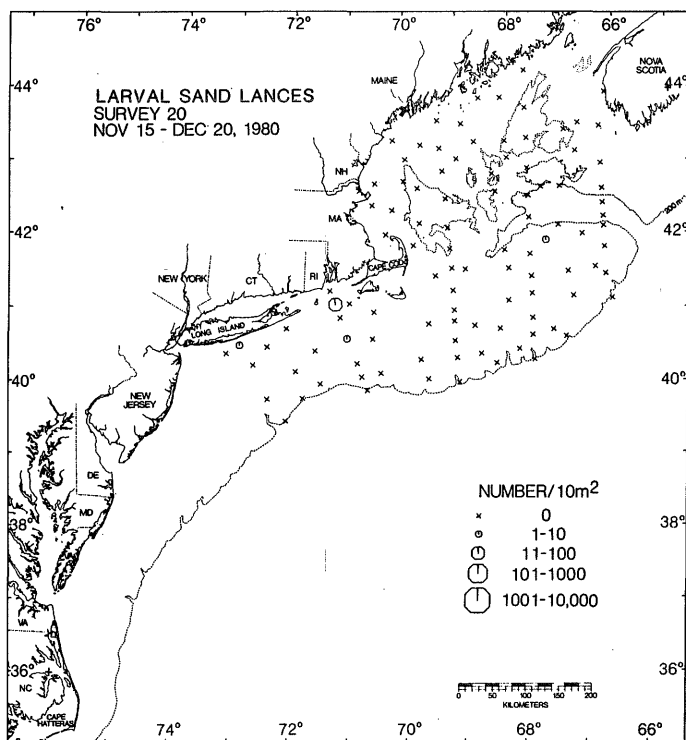


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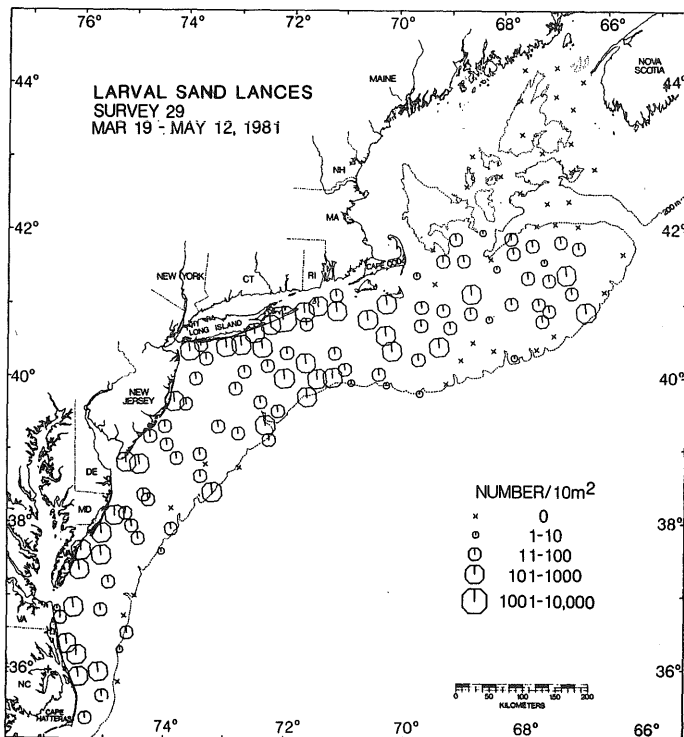
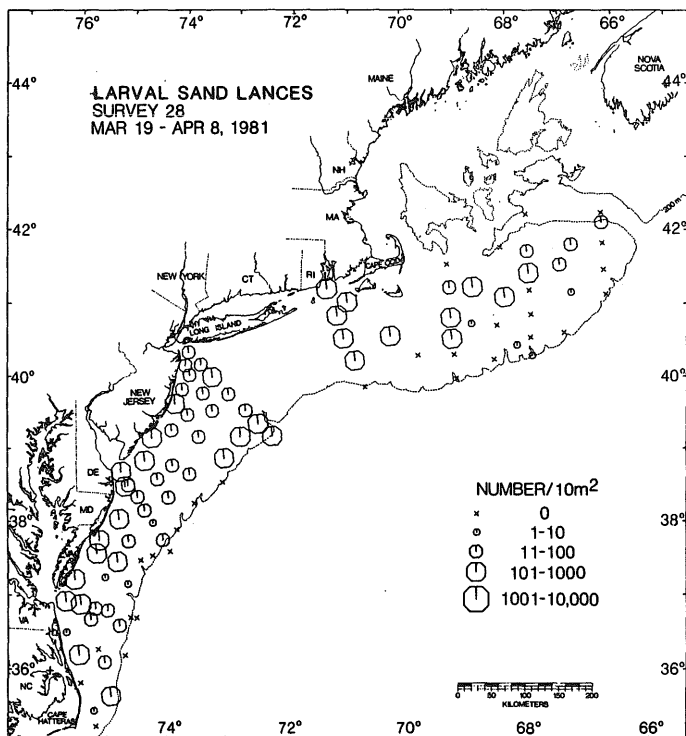
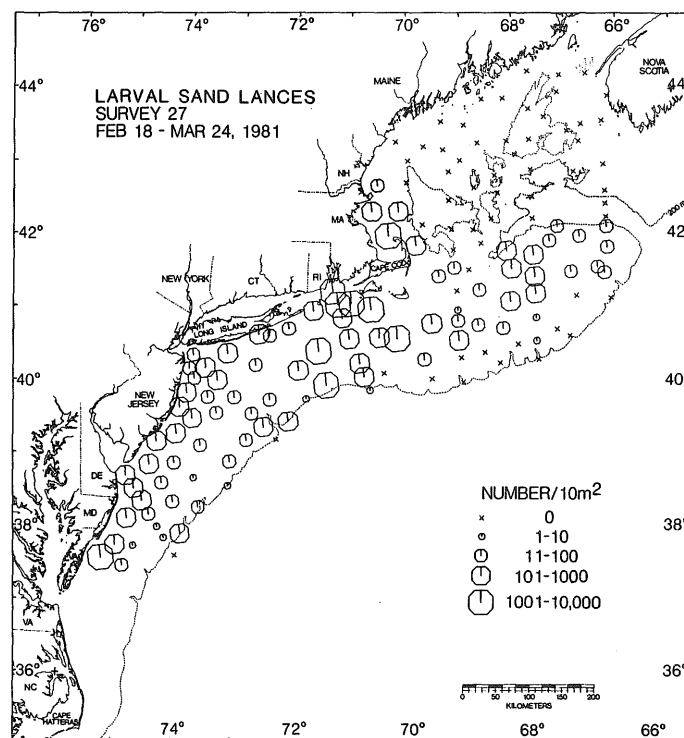
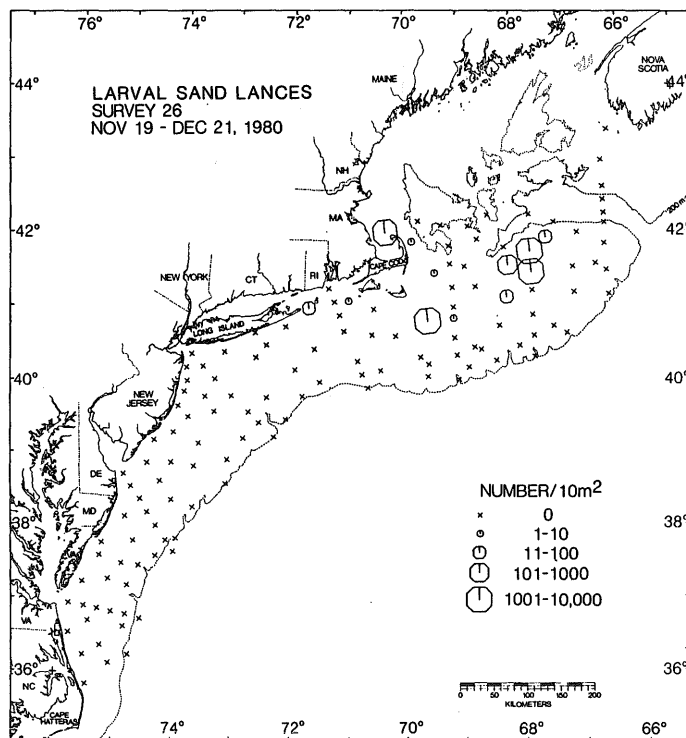


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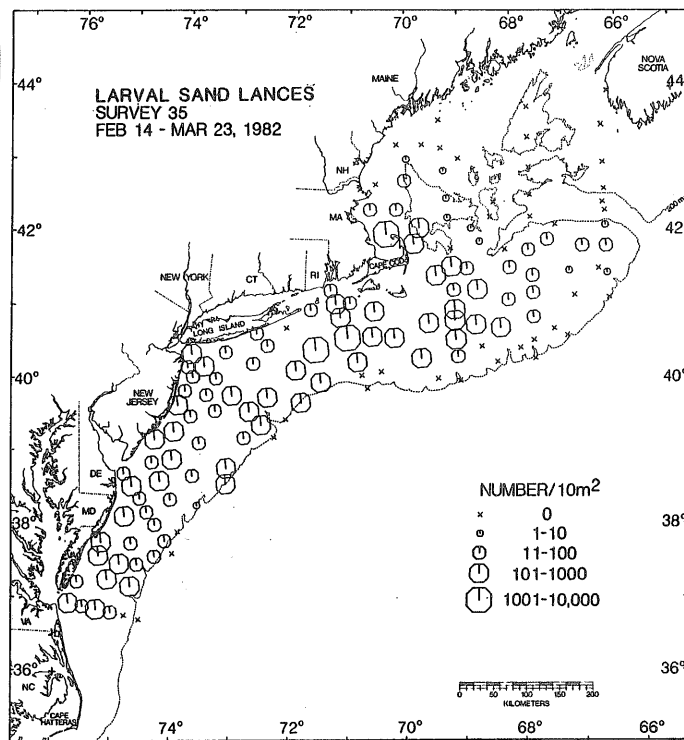
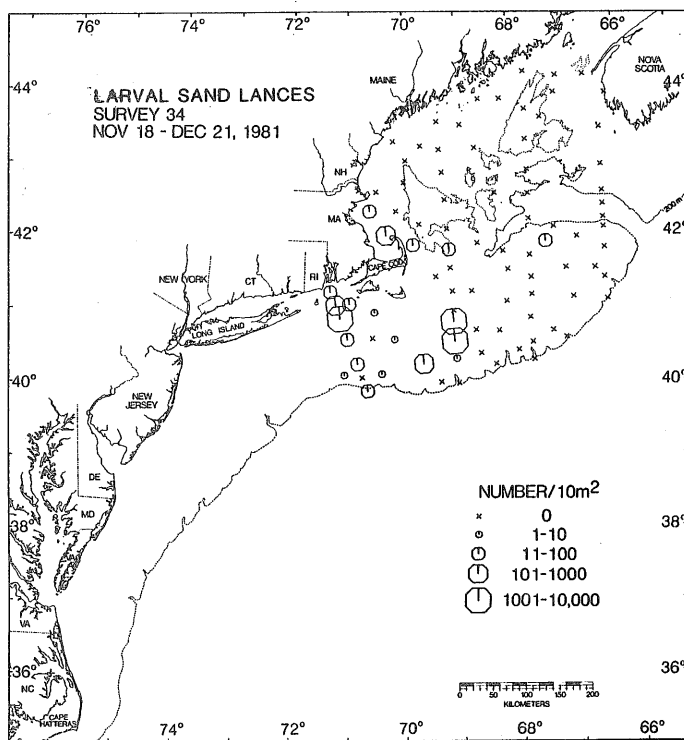
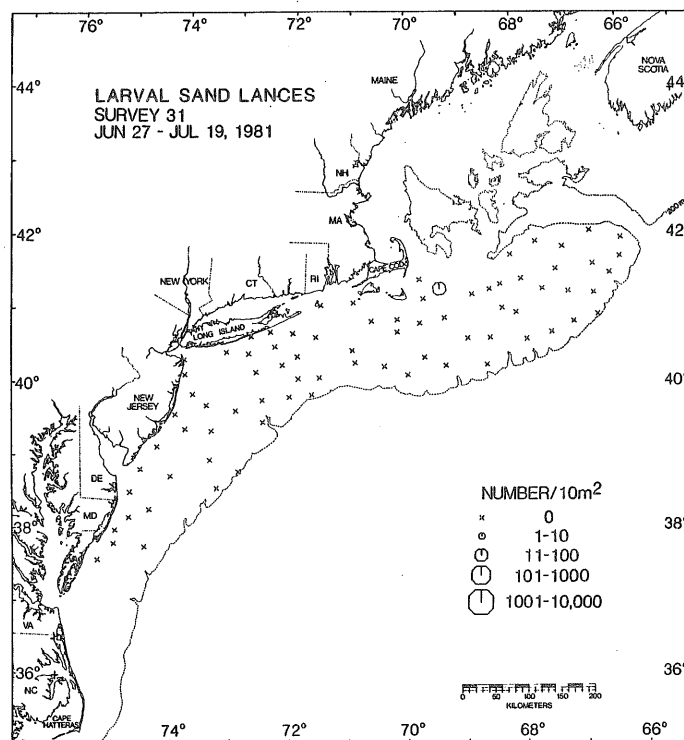
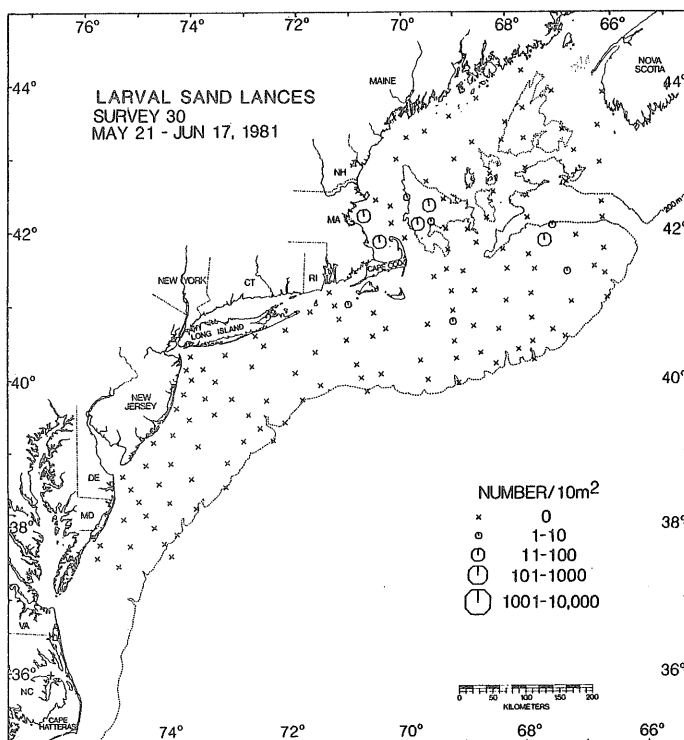


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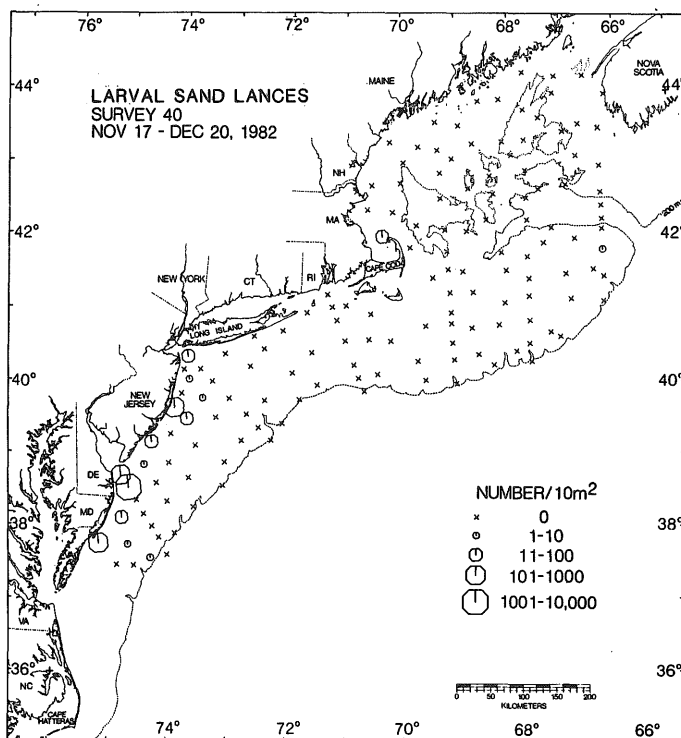
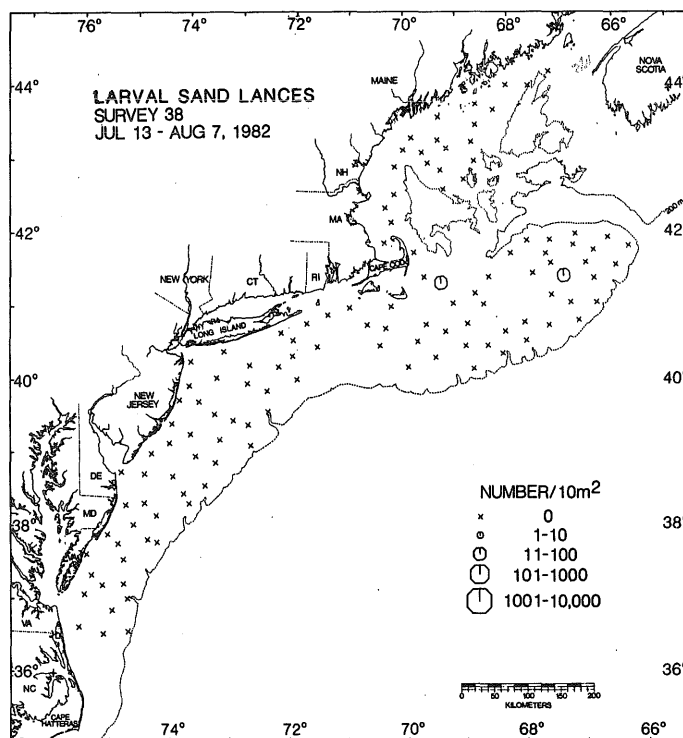
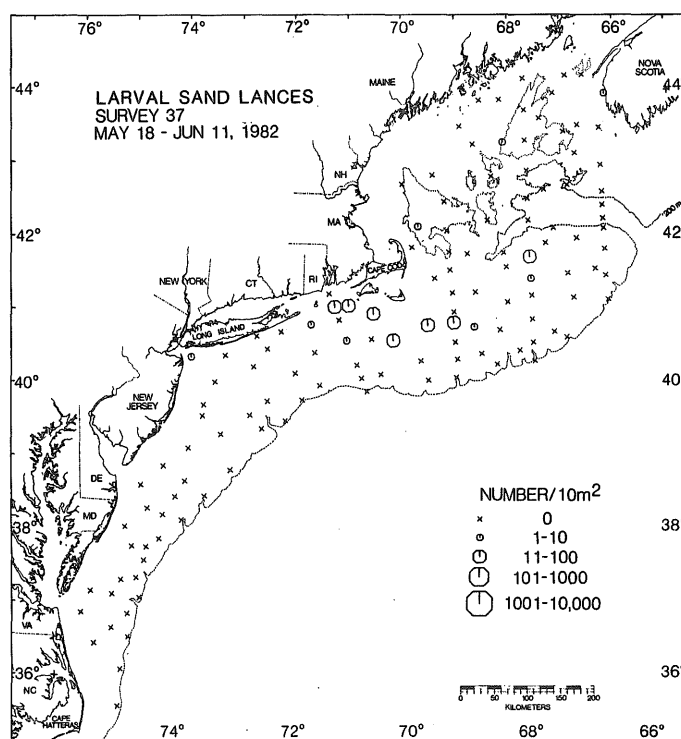
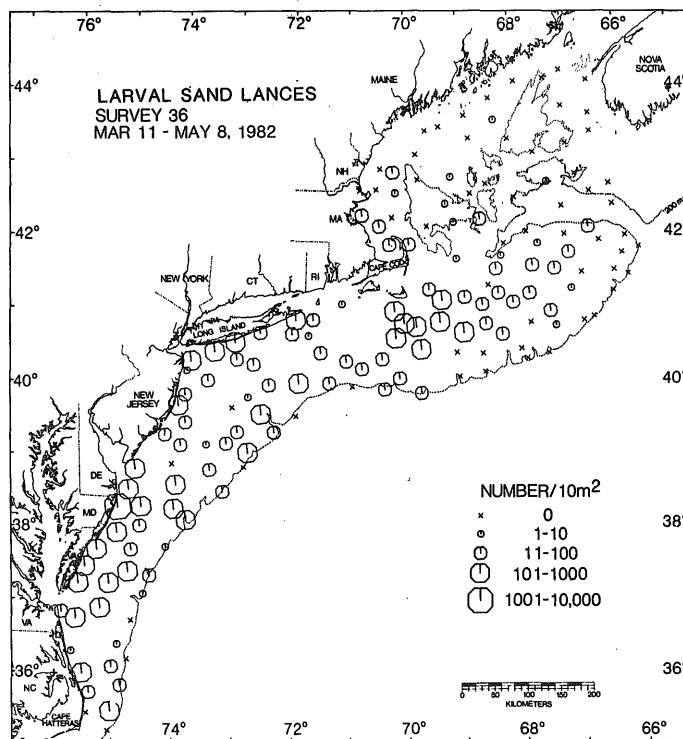


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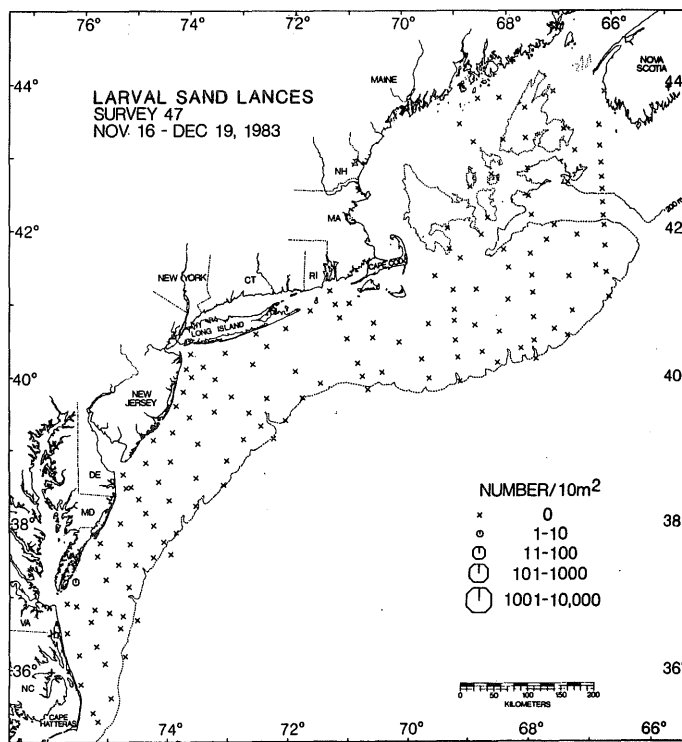
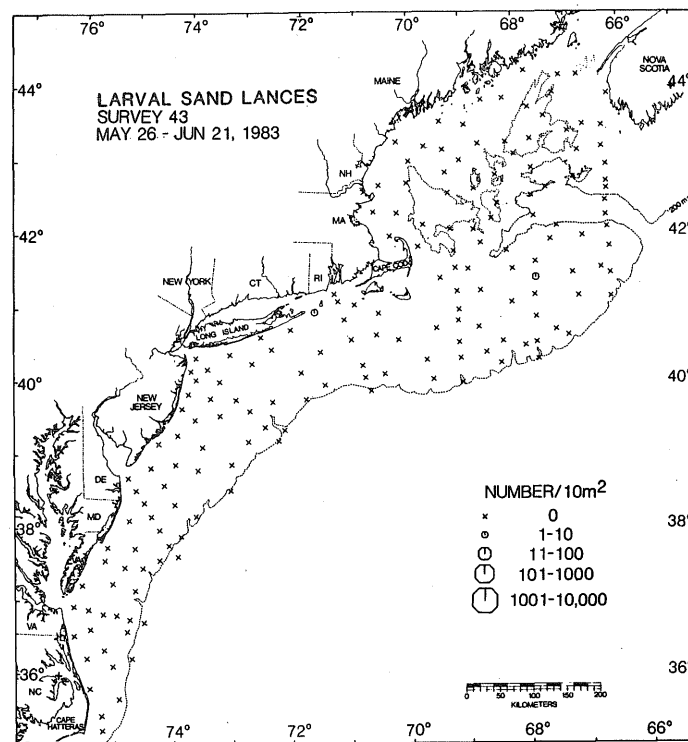
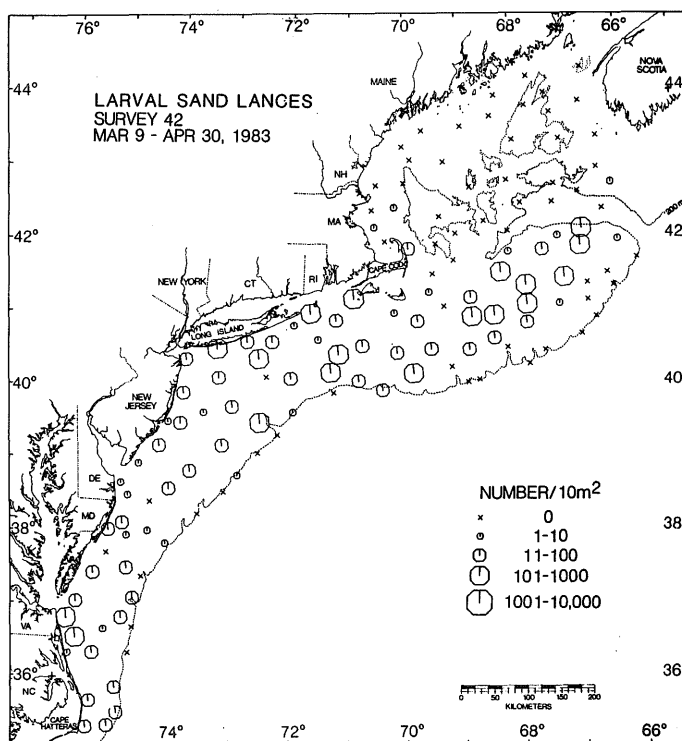
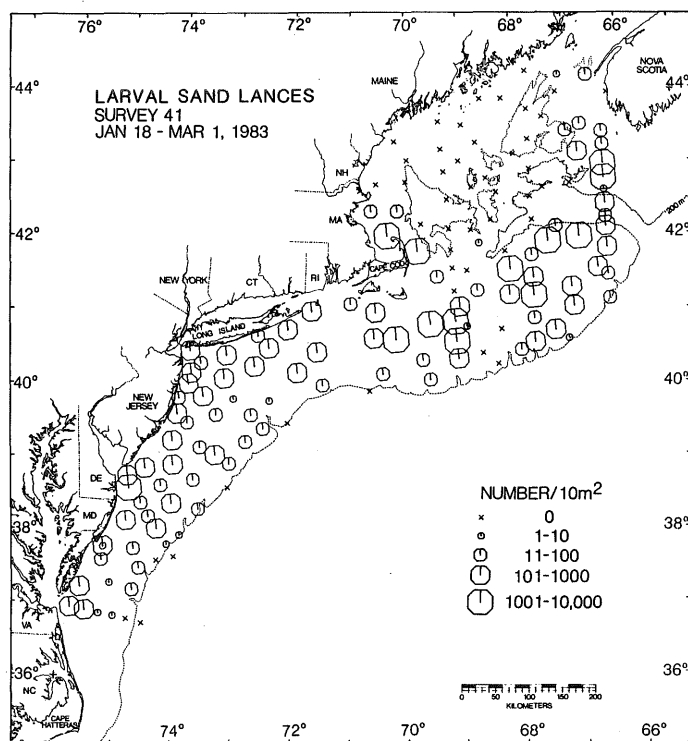


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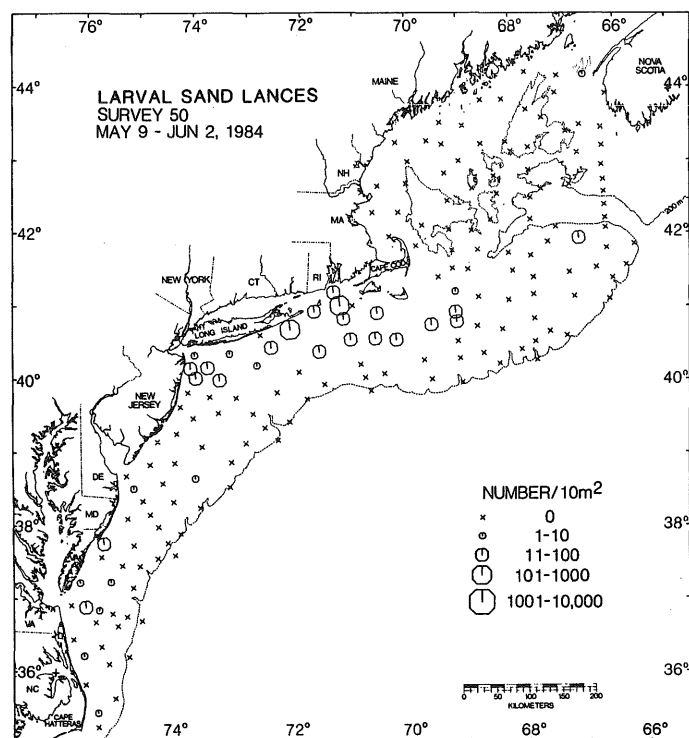
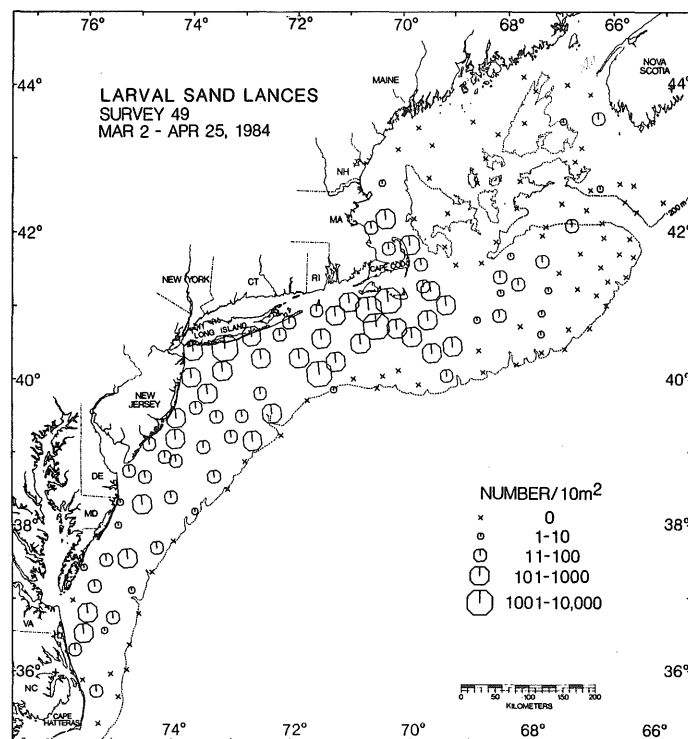
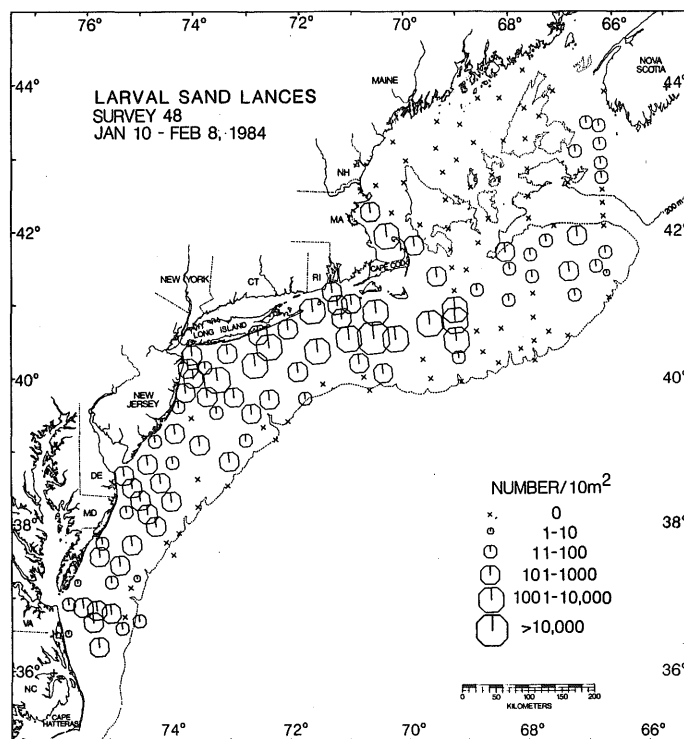


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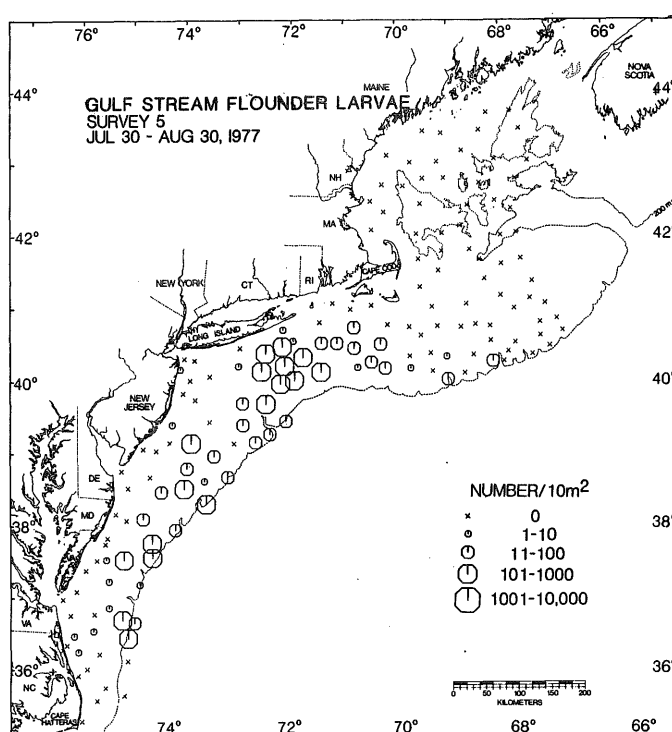
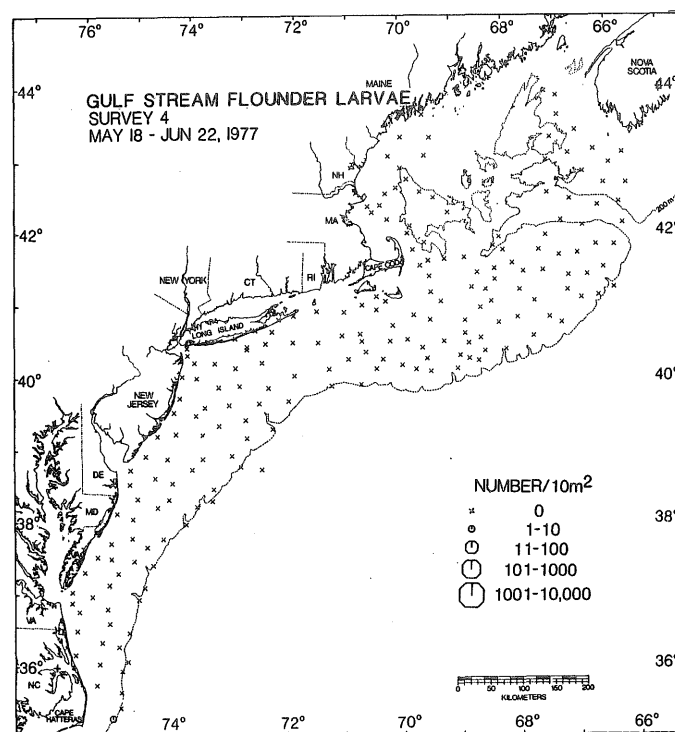
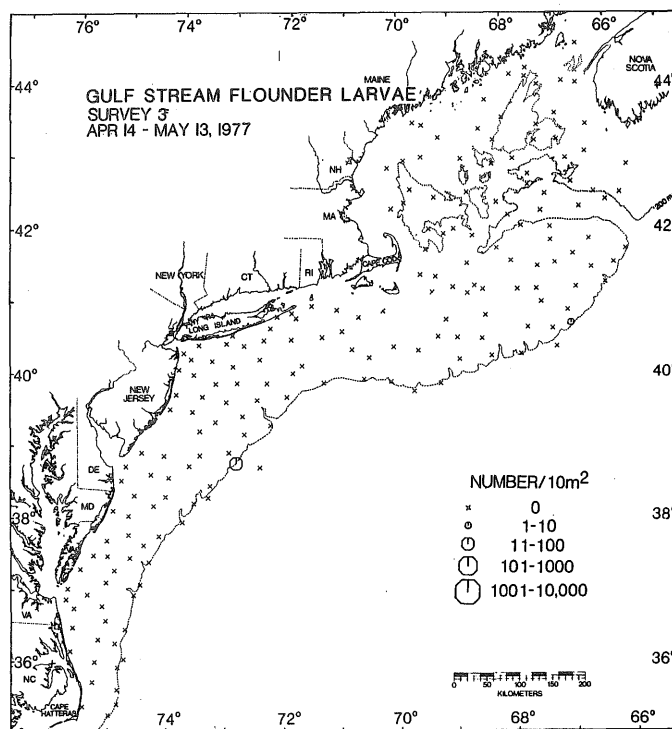
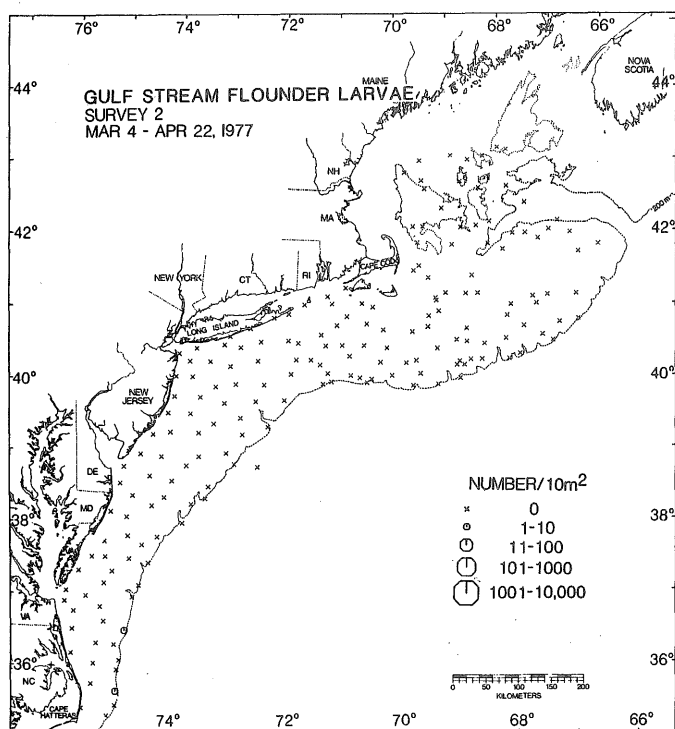


Figure 21. Distribution and abundance of Gulf Stream flounder, *Citharichthys arctifrons*, larvae off northeastern United States, winter 1977 through spring 1984.

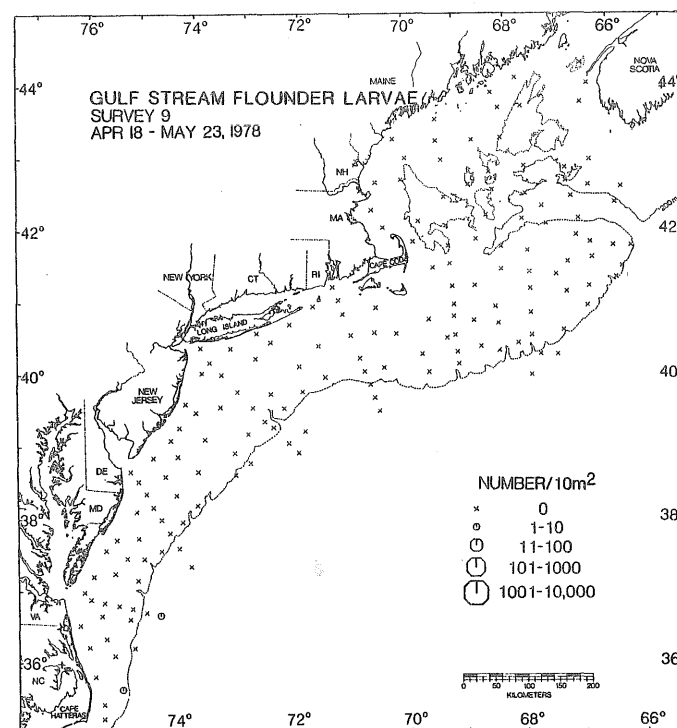
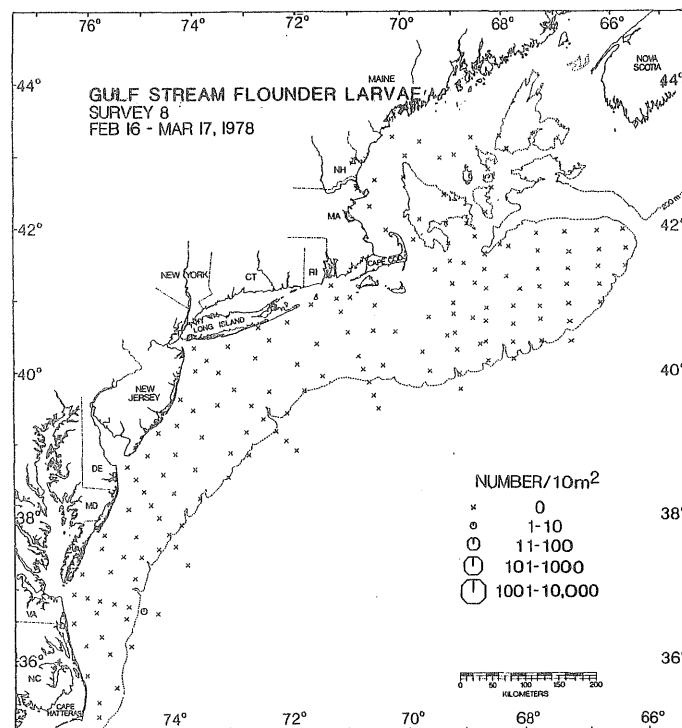
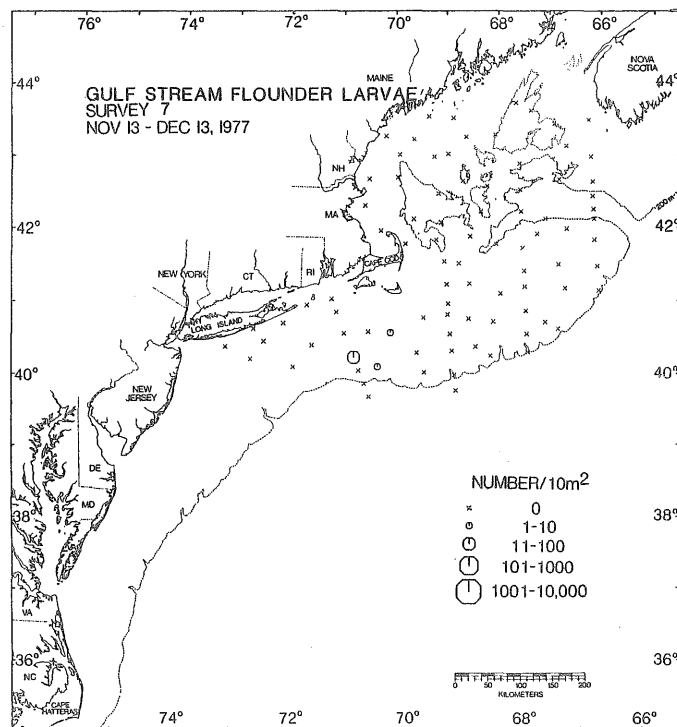
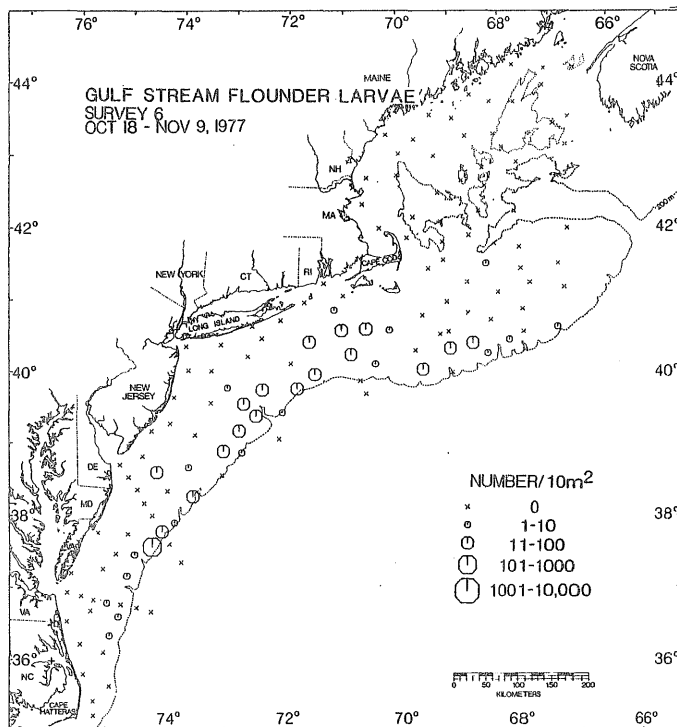


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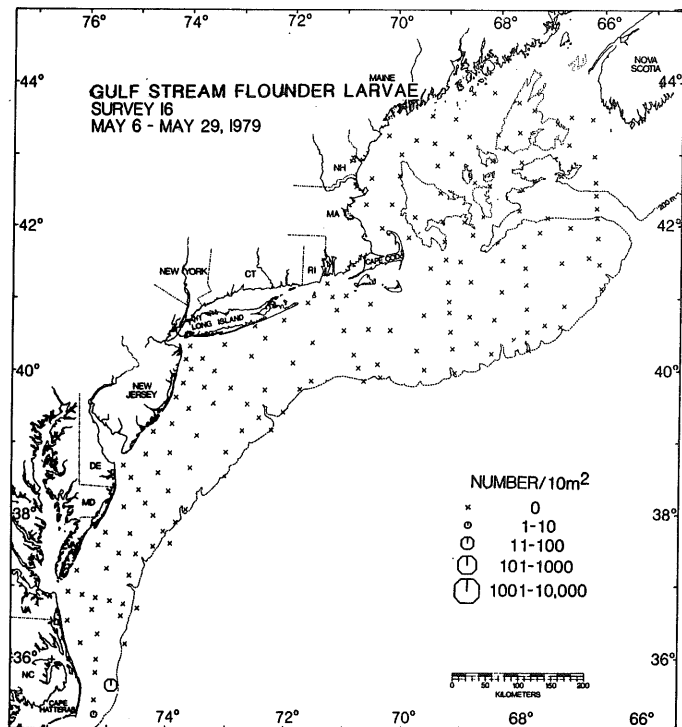
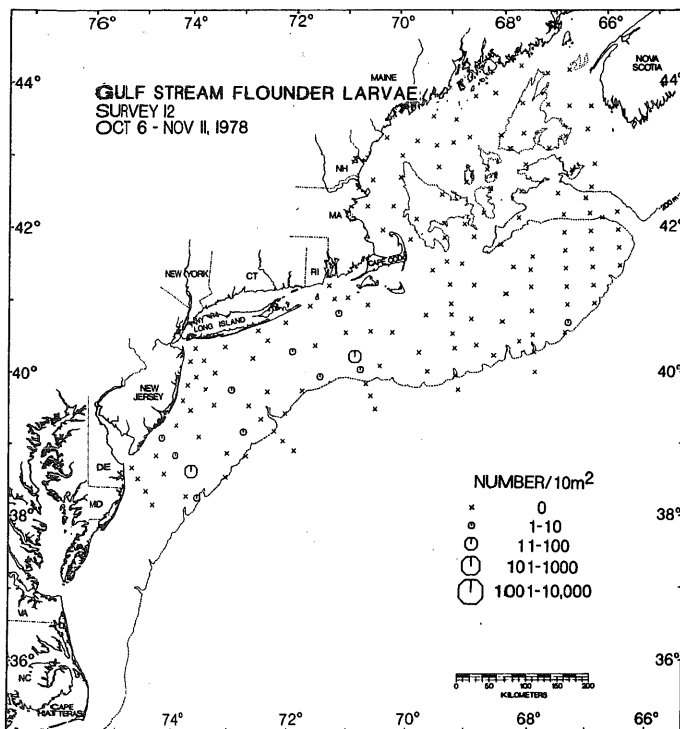
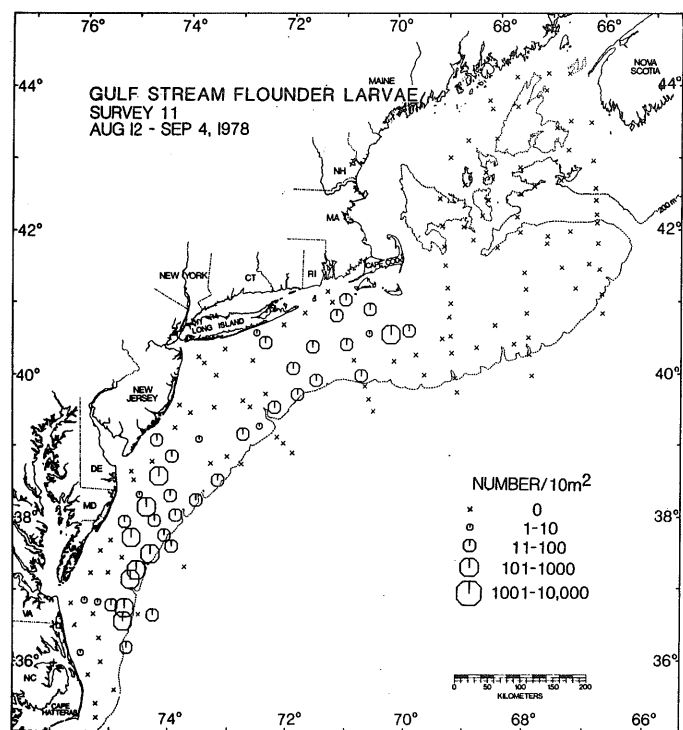
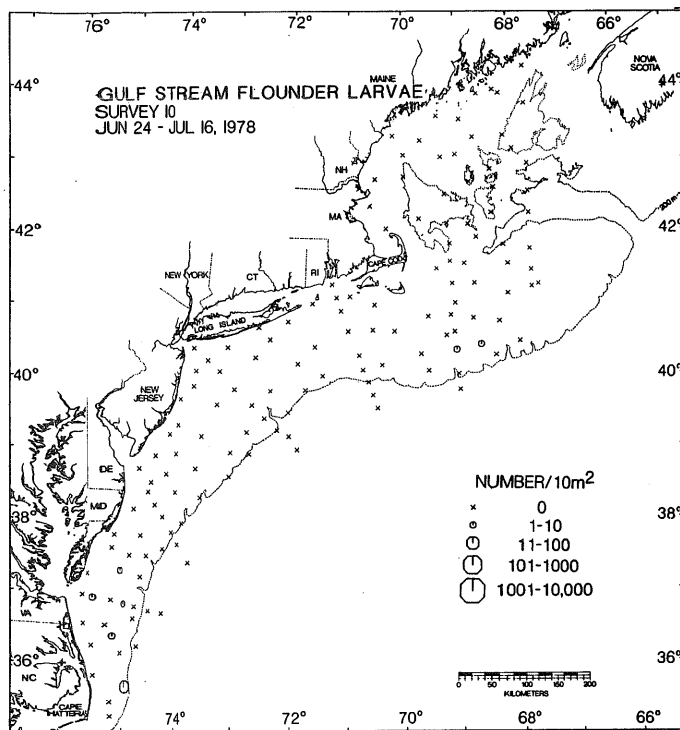


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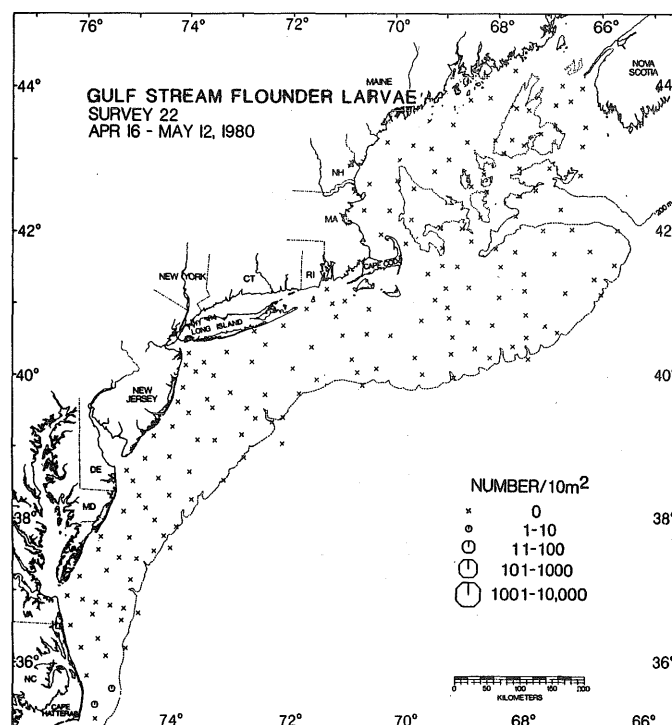
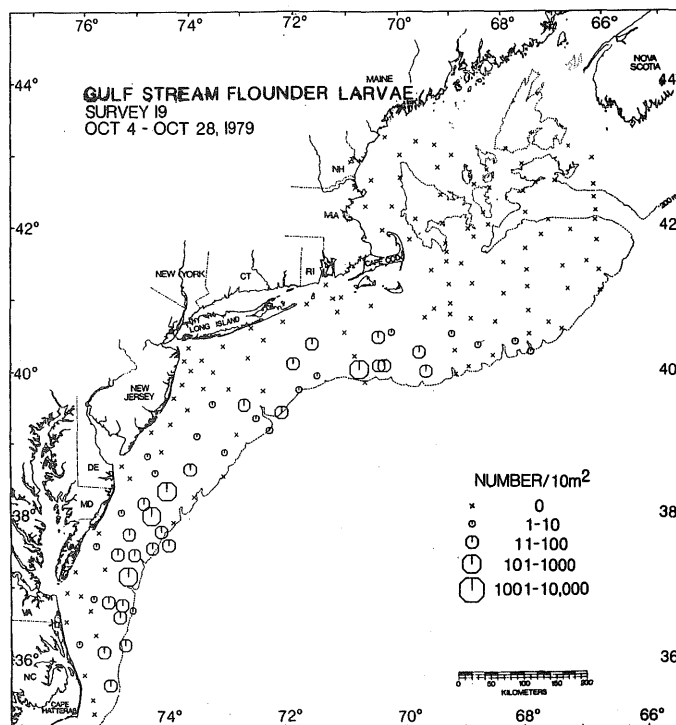
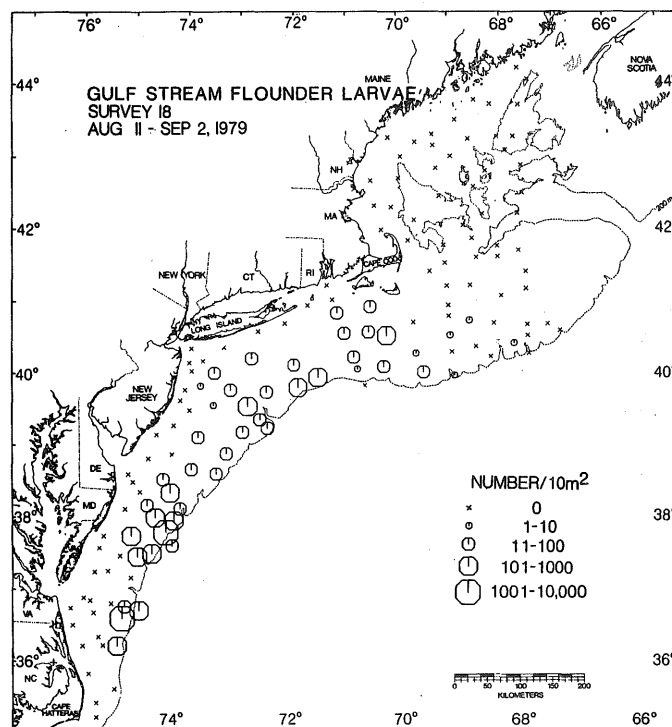
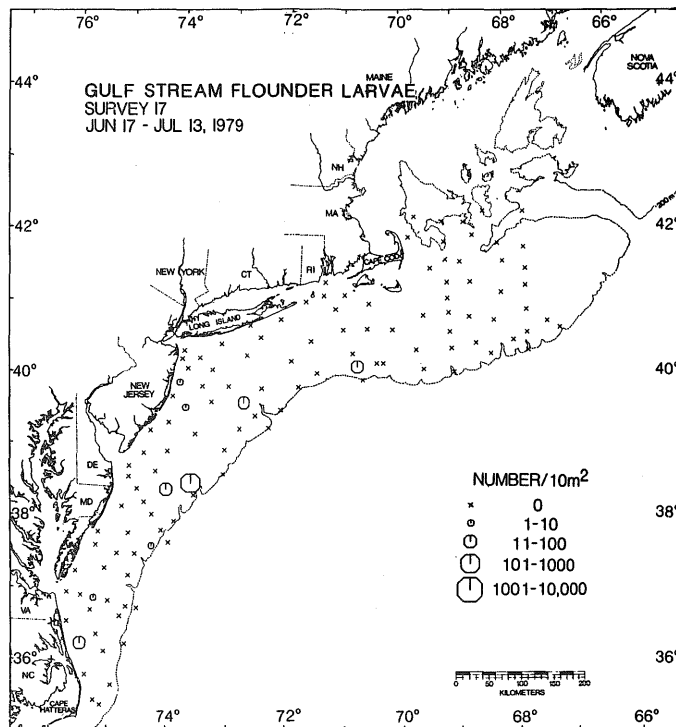


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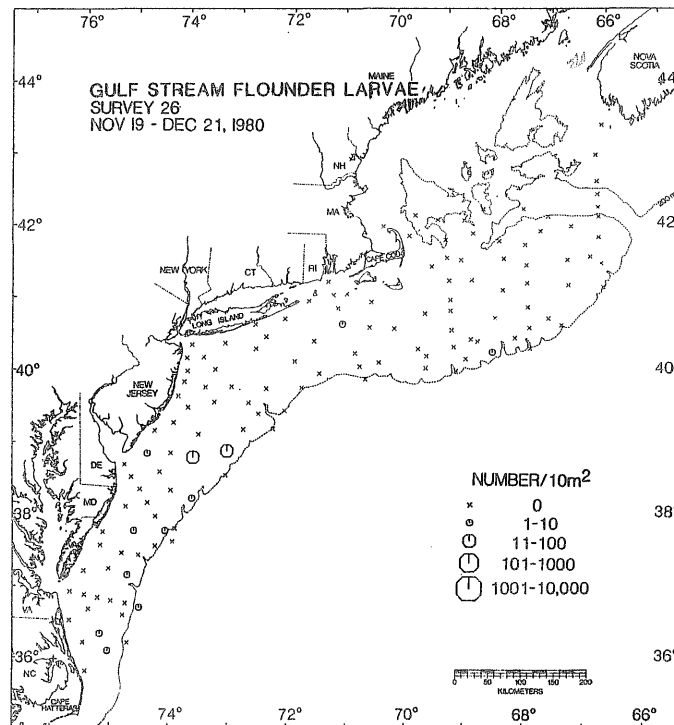
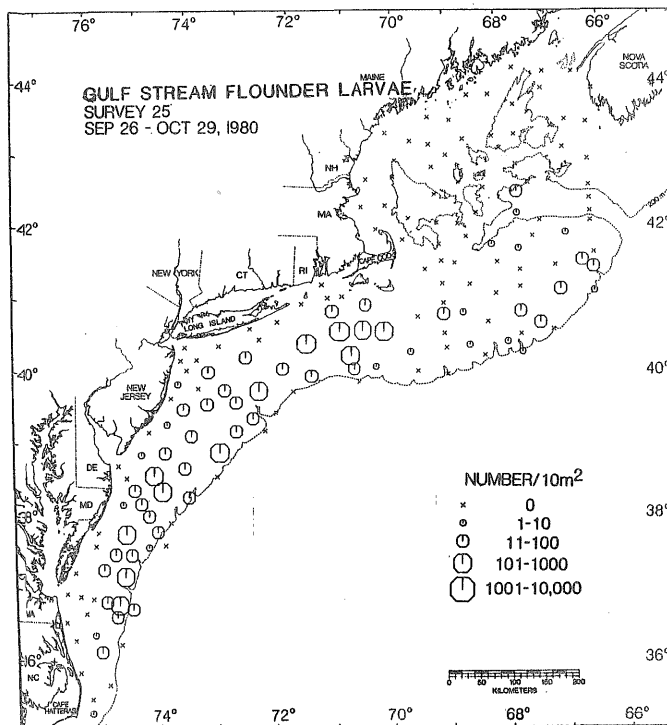
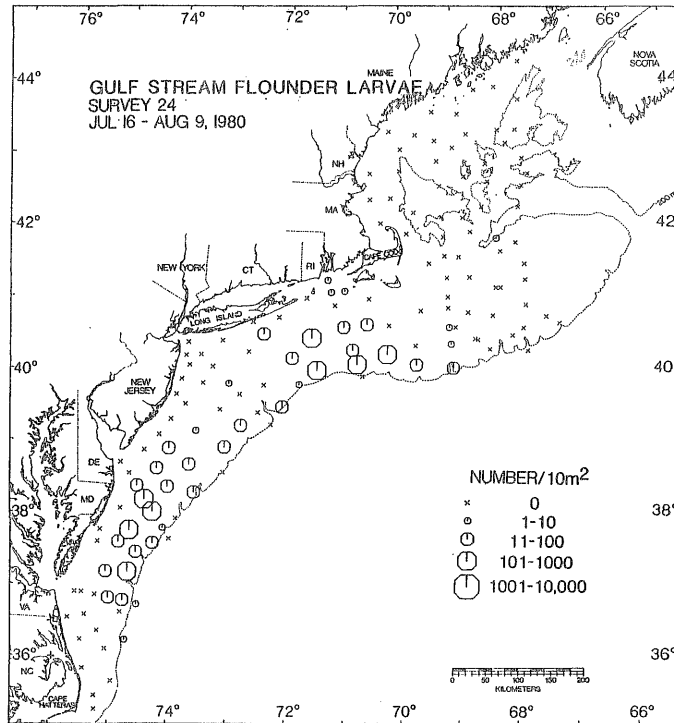
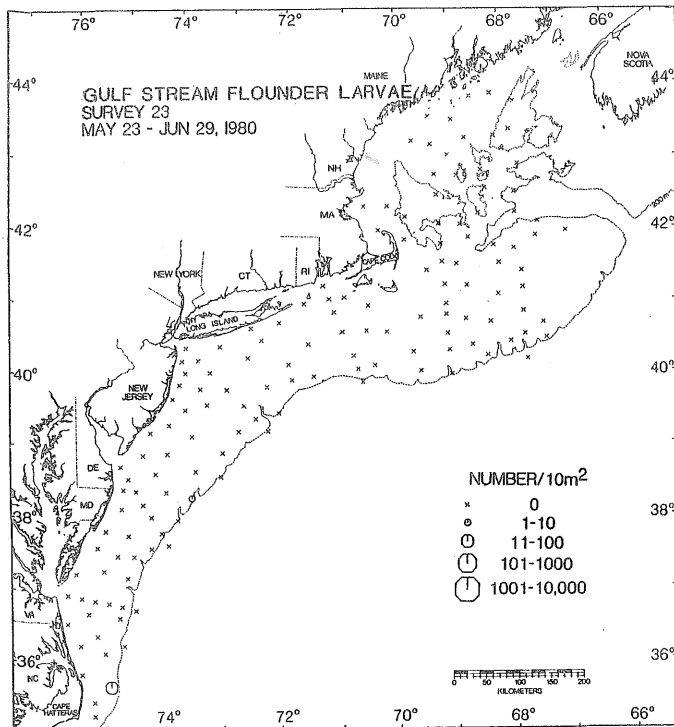


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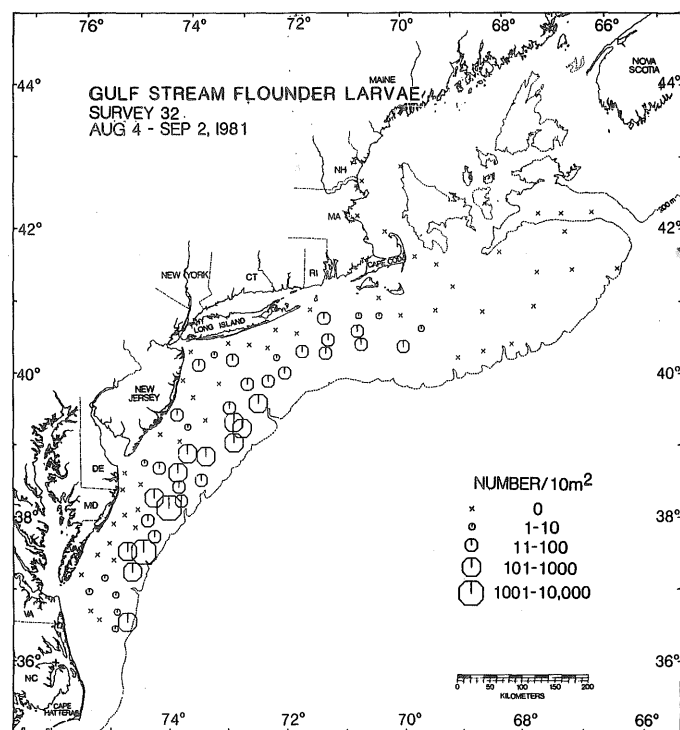
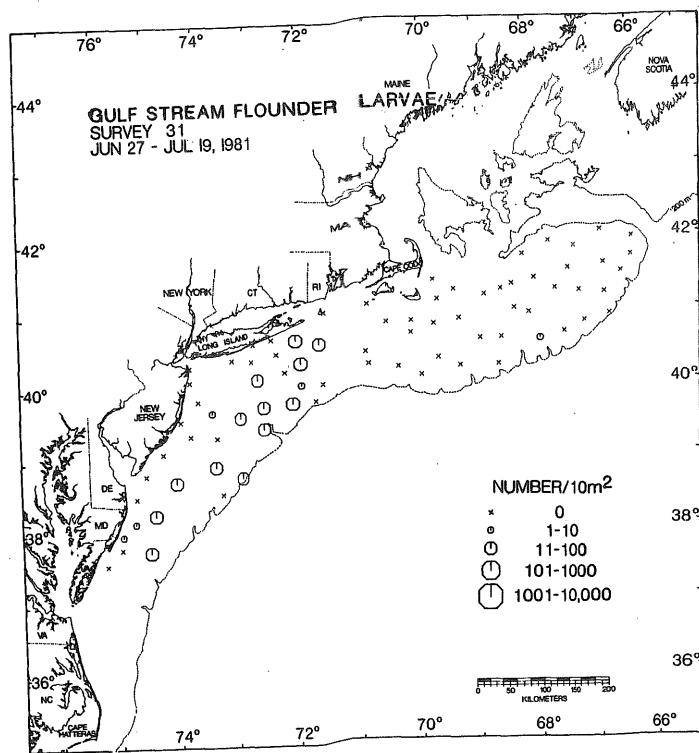
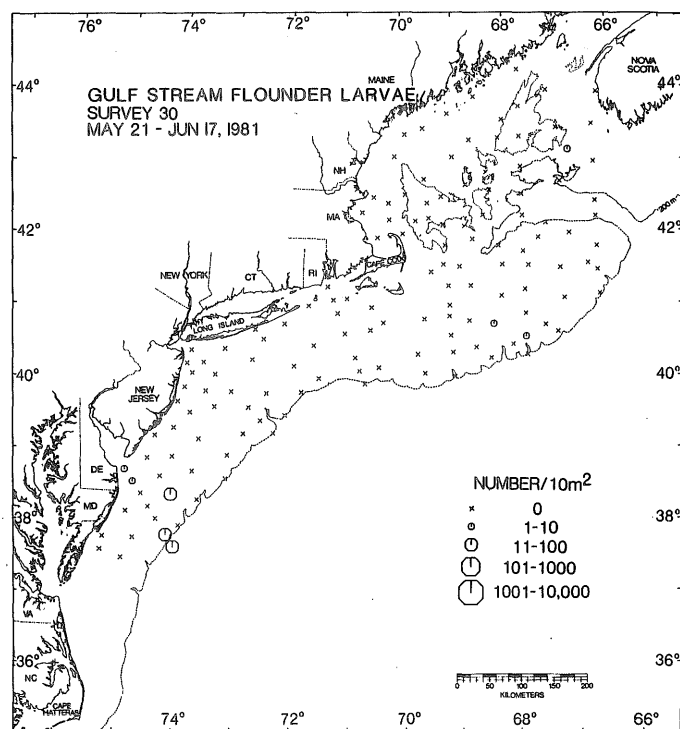
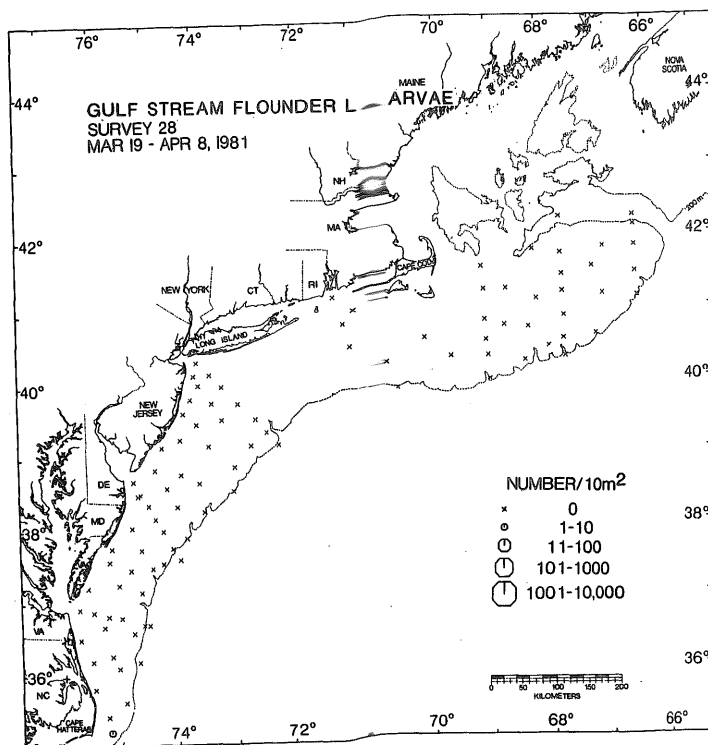


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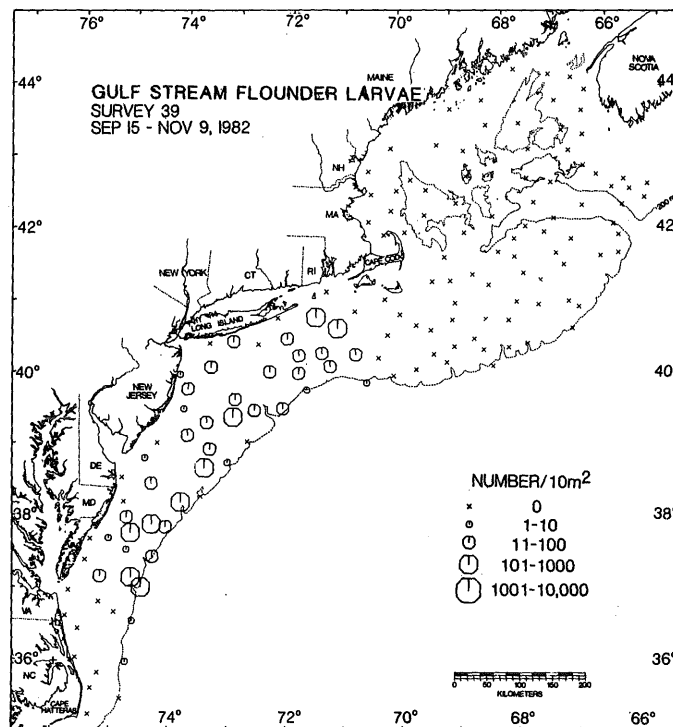
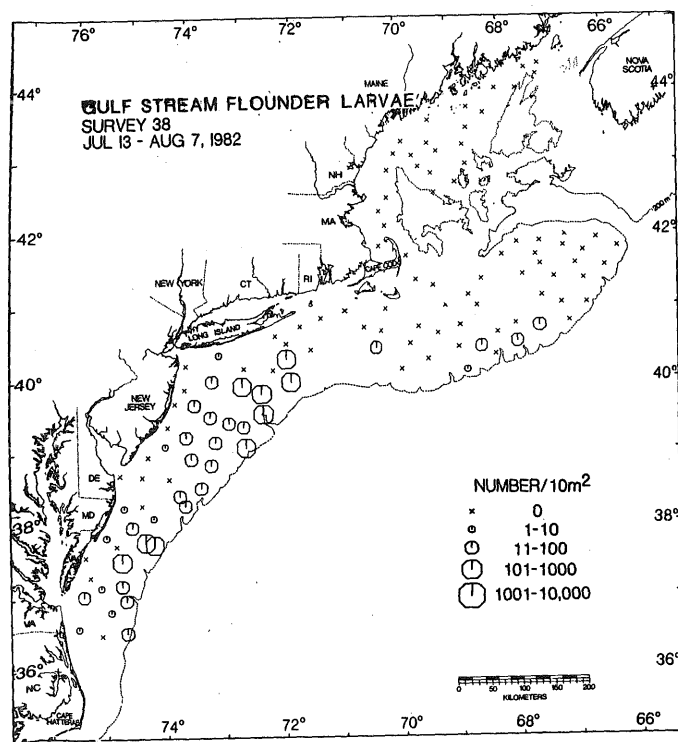
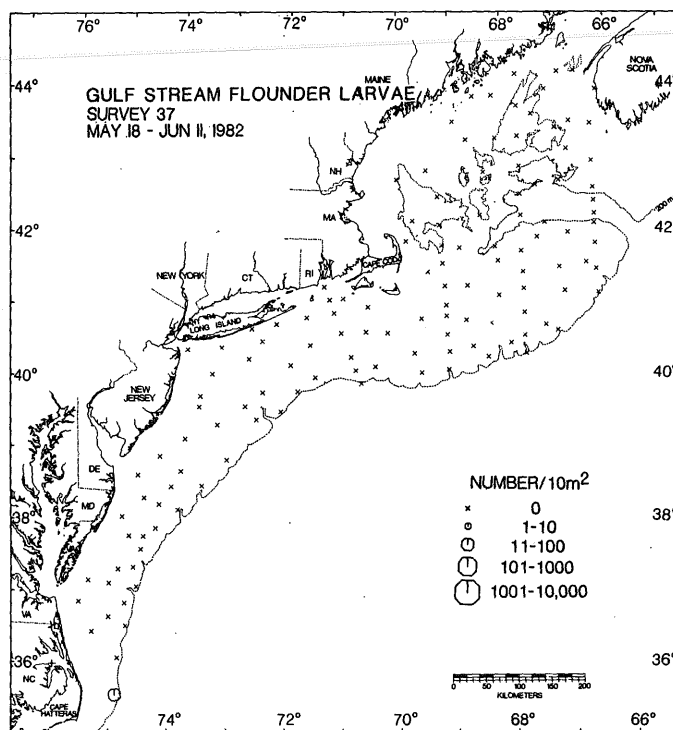
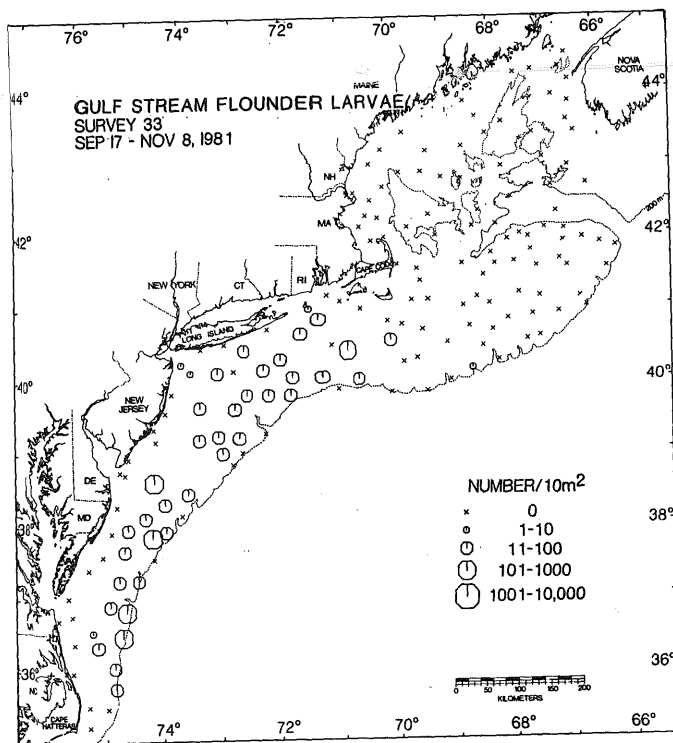


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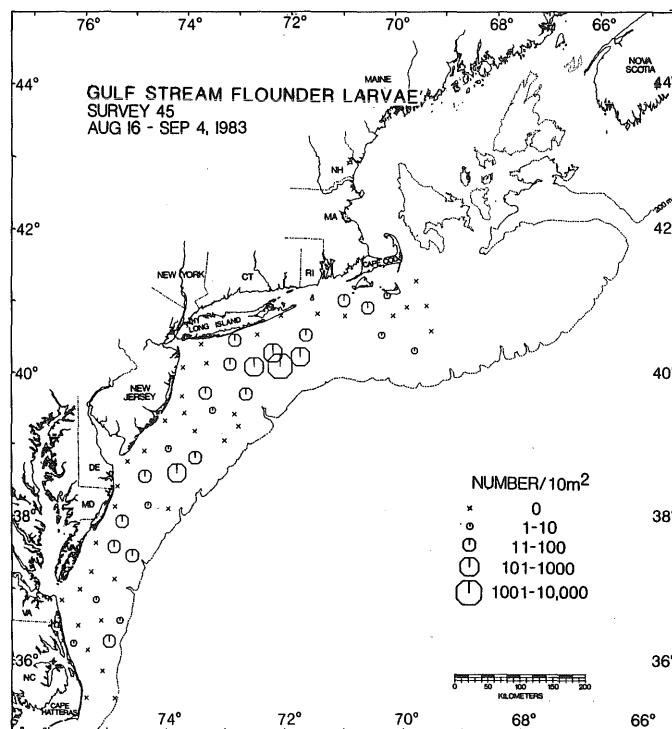
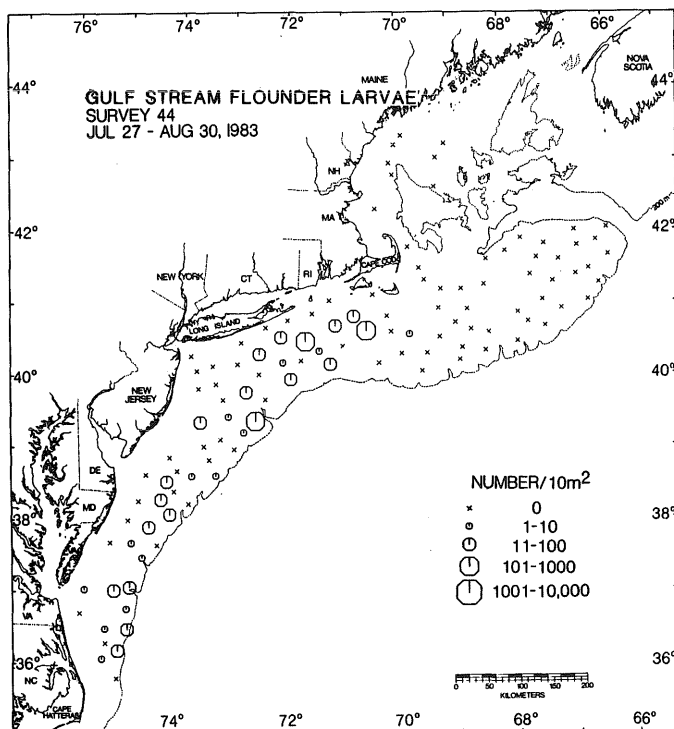
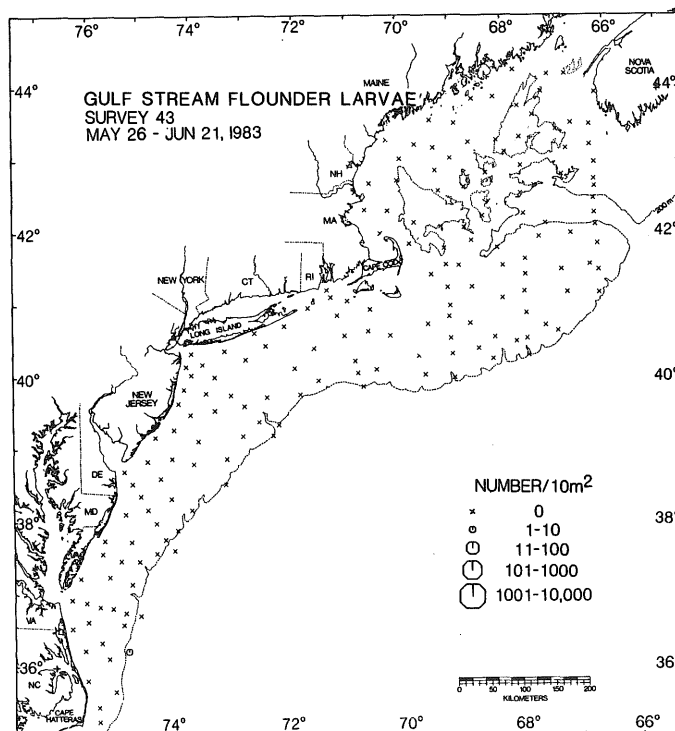
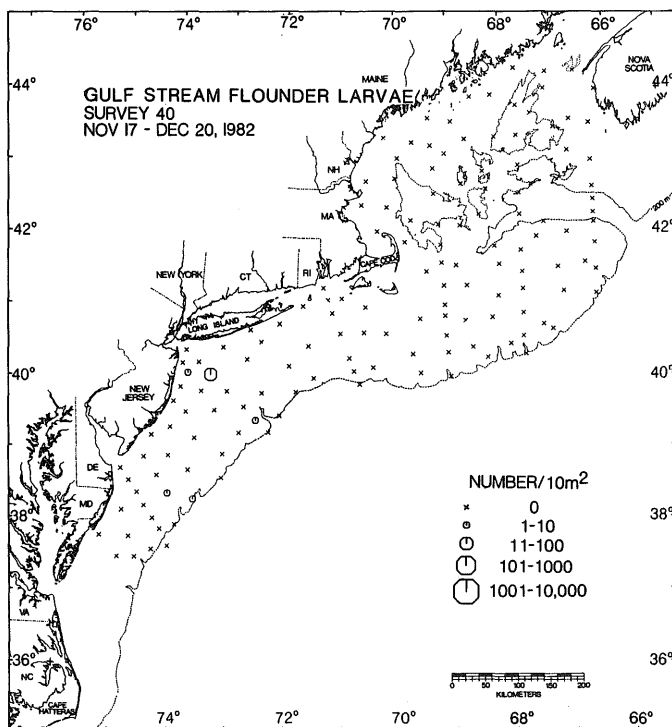


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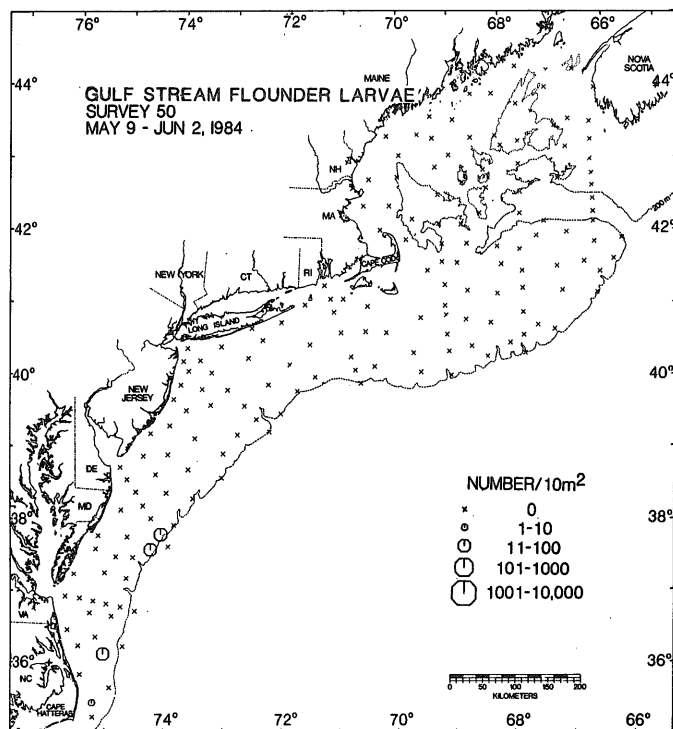
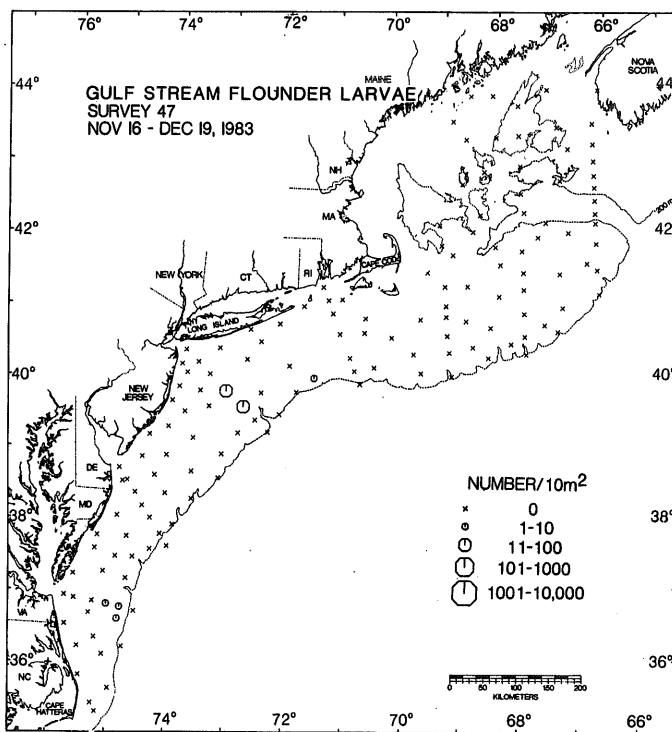
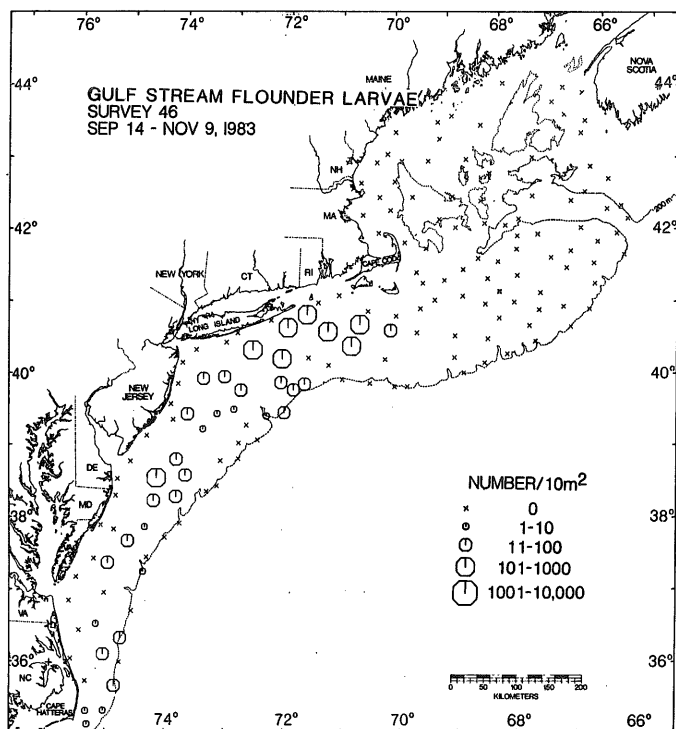


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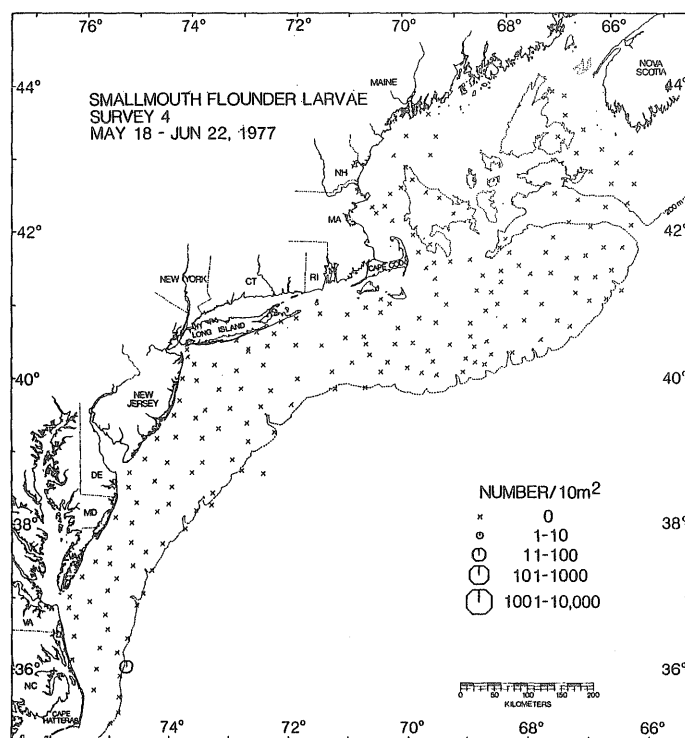
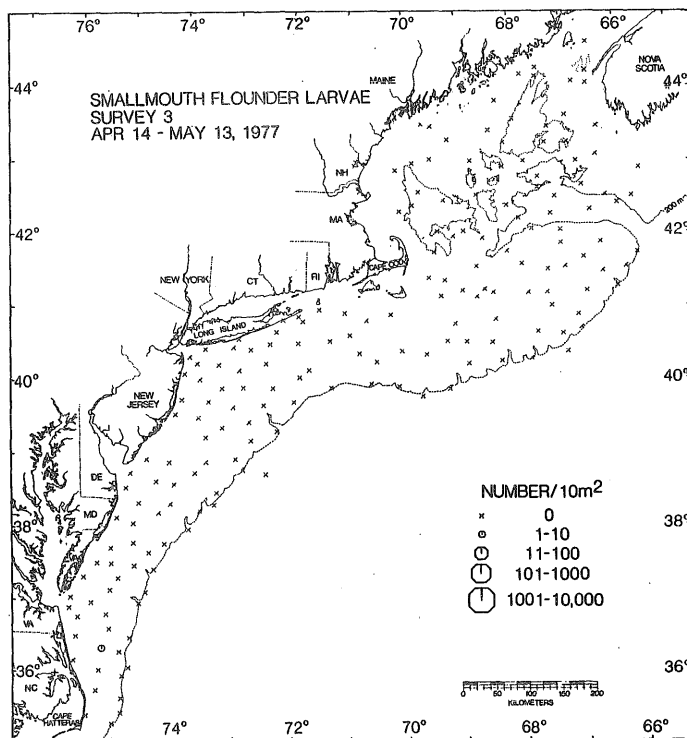
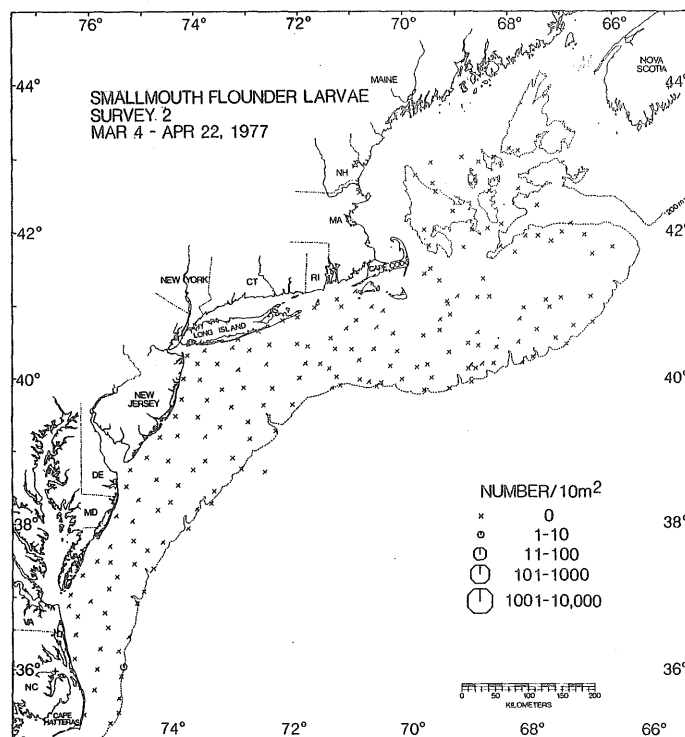
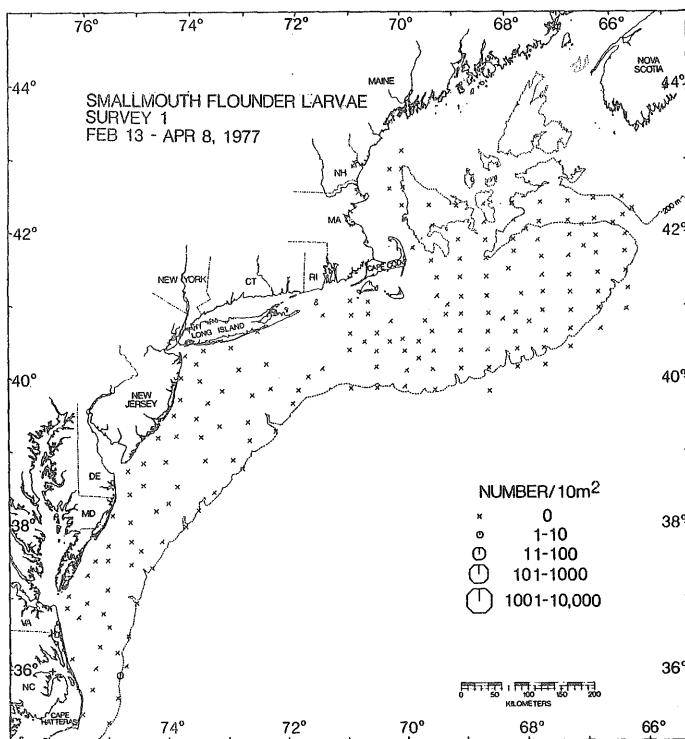


Figure 22. Distribution and abundance of smallmouth flounder, *Etropus microstomus*, larvae off northeastern United States, winter 1977 through spring 1984.

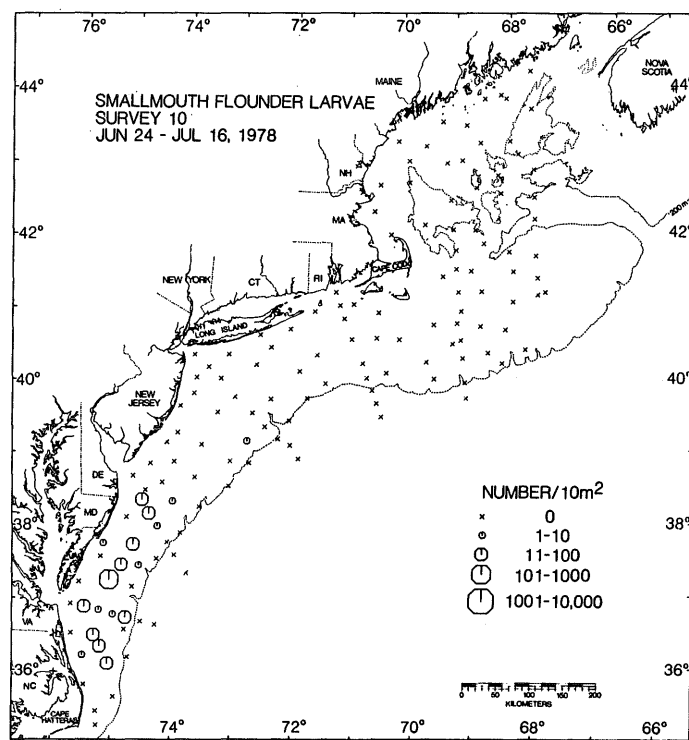
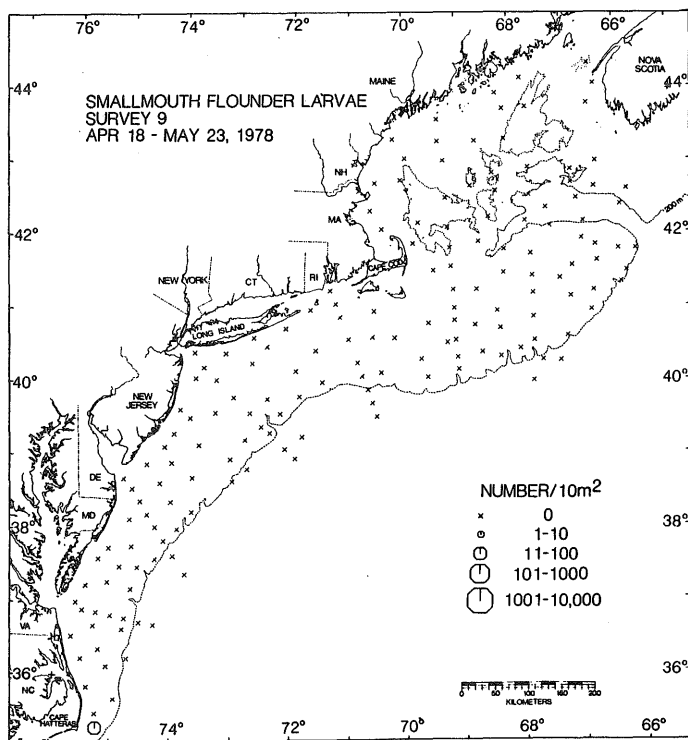
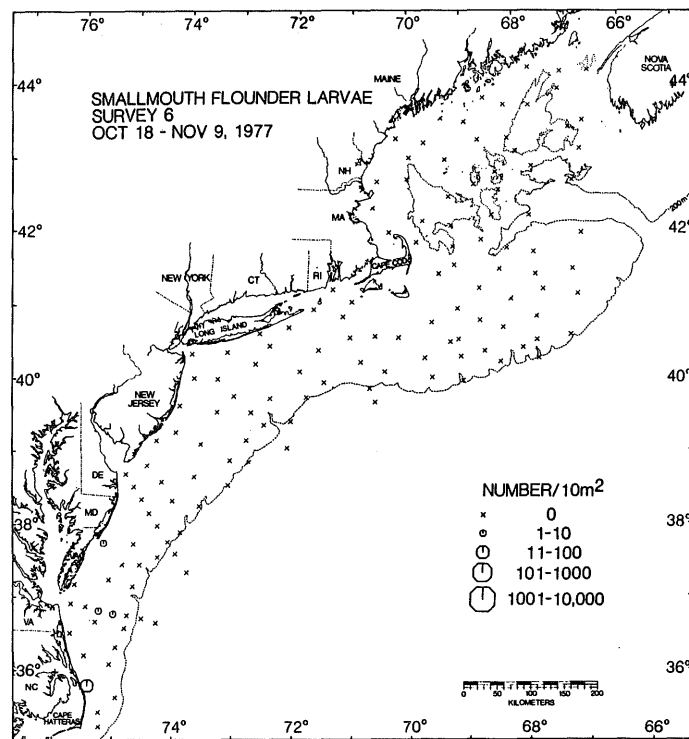
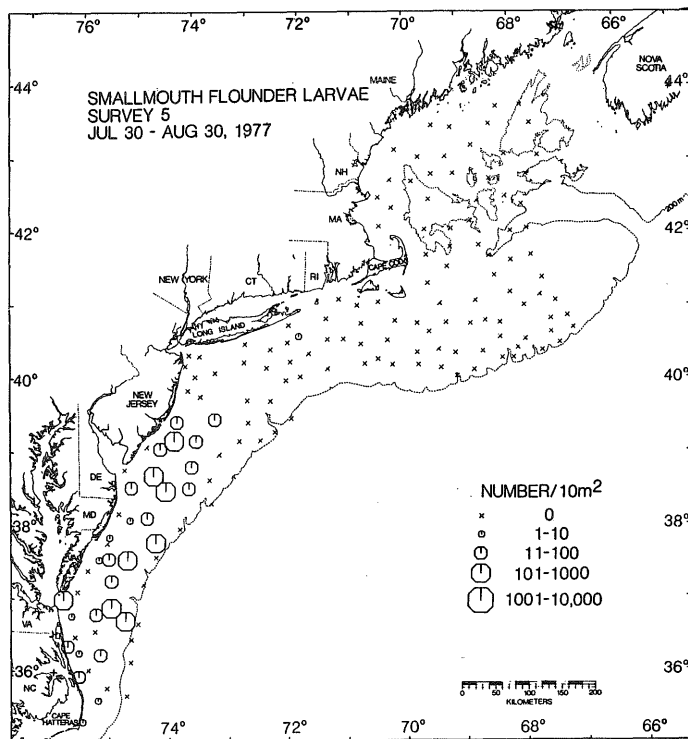


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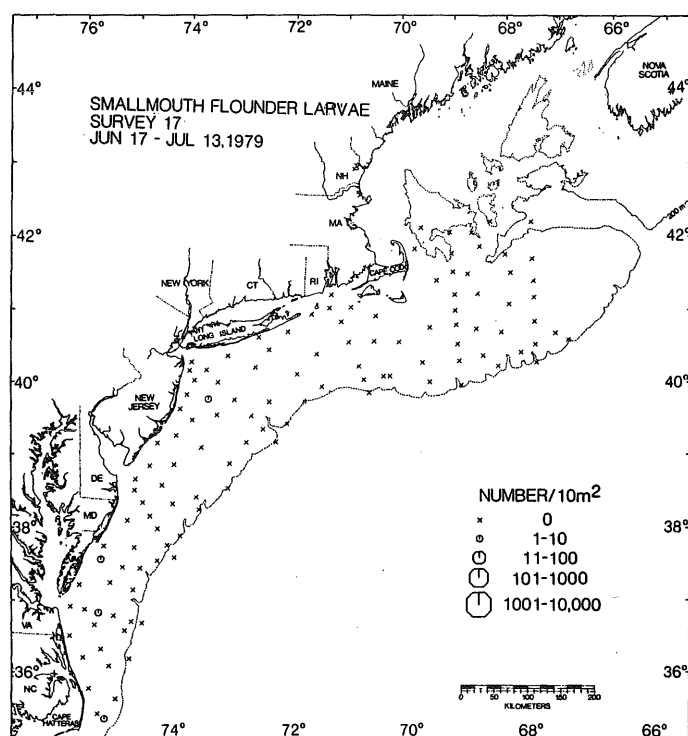
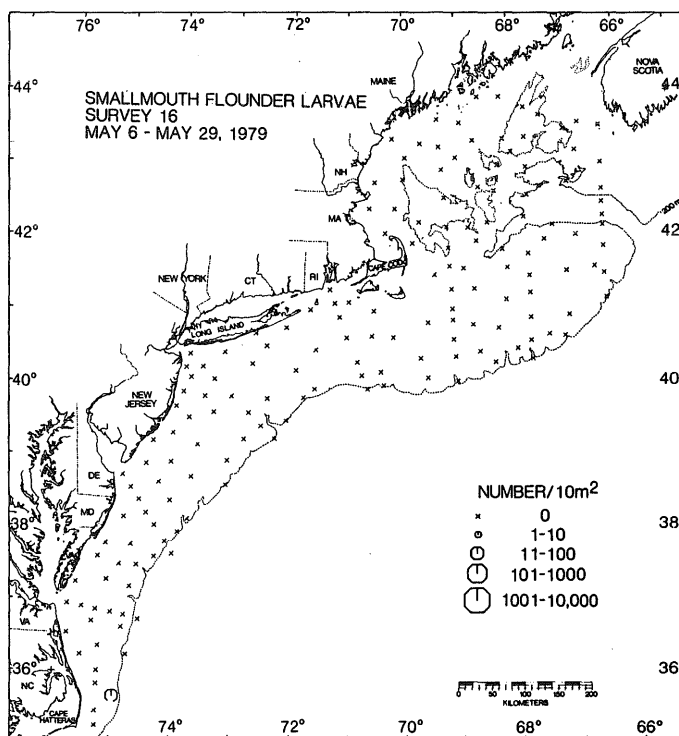
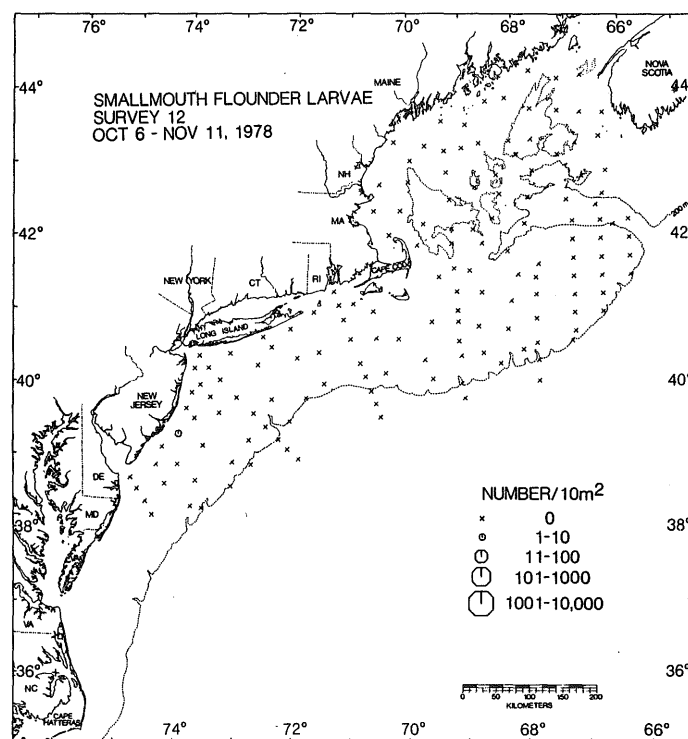
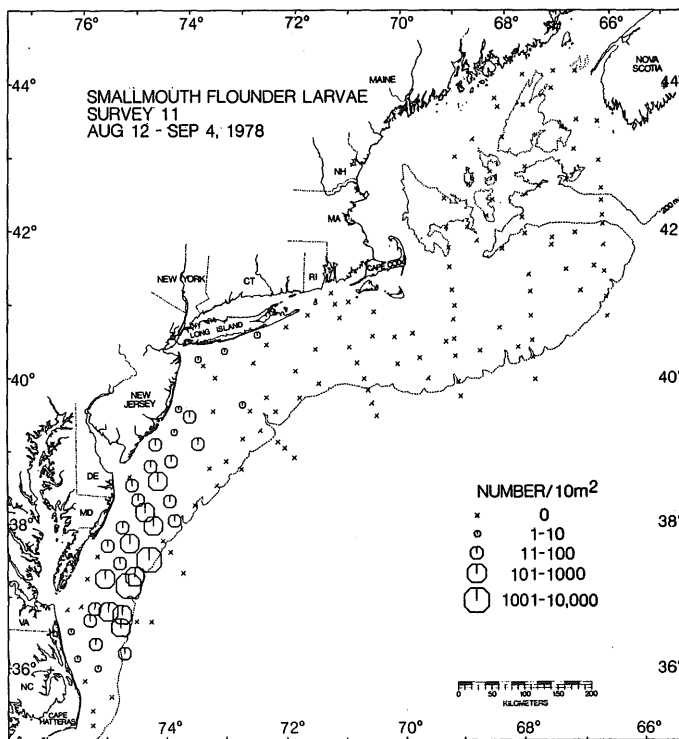


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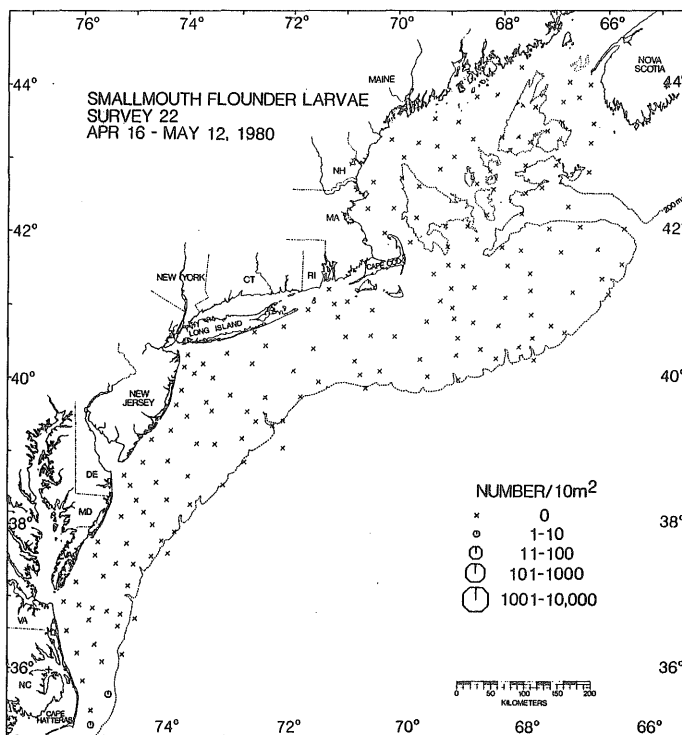
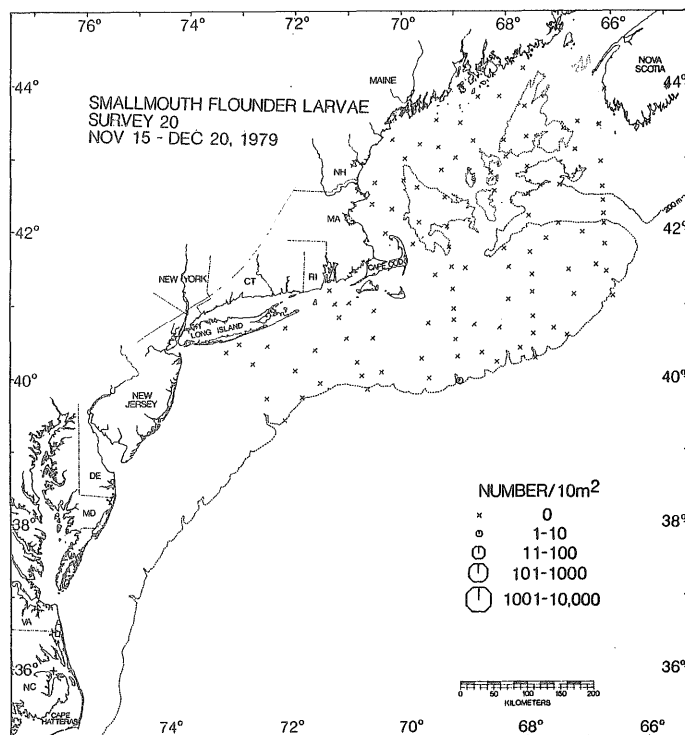
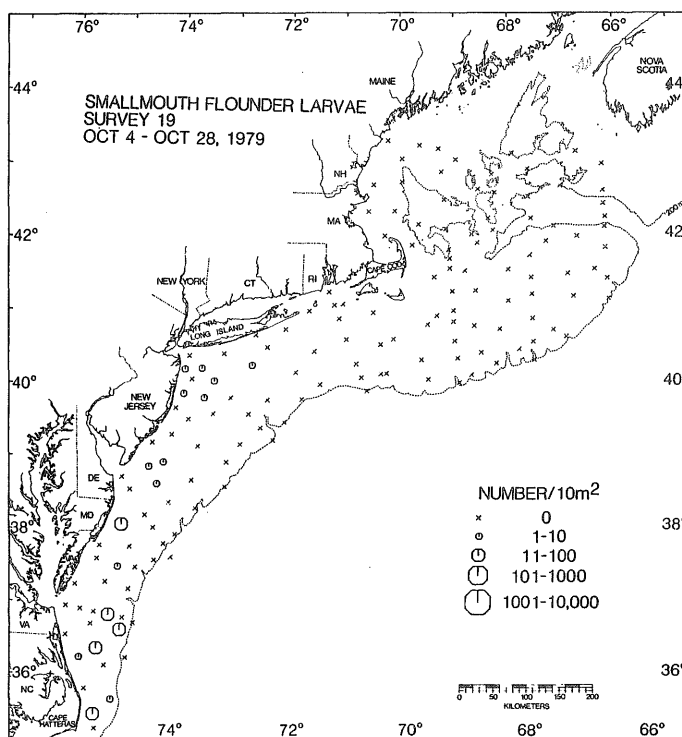
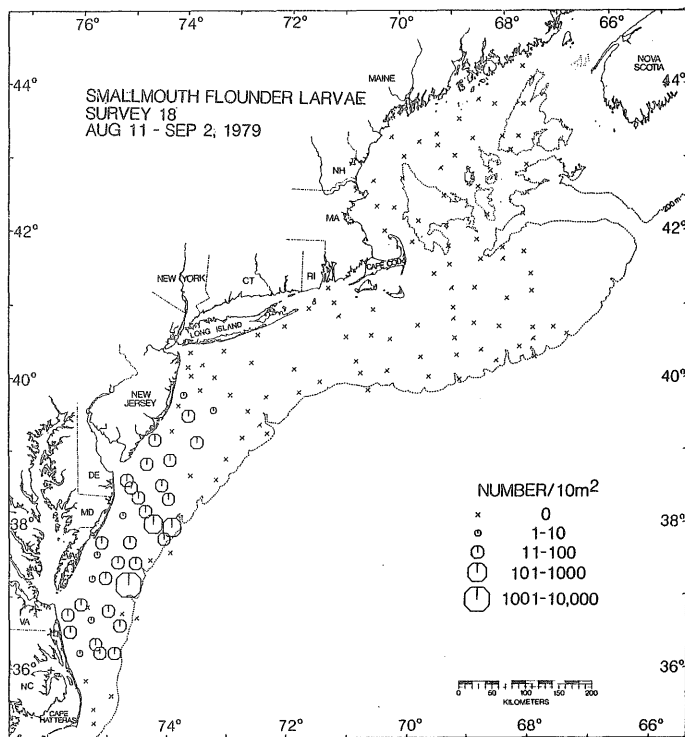


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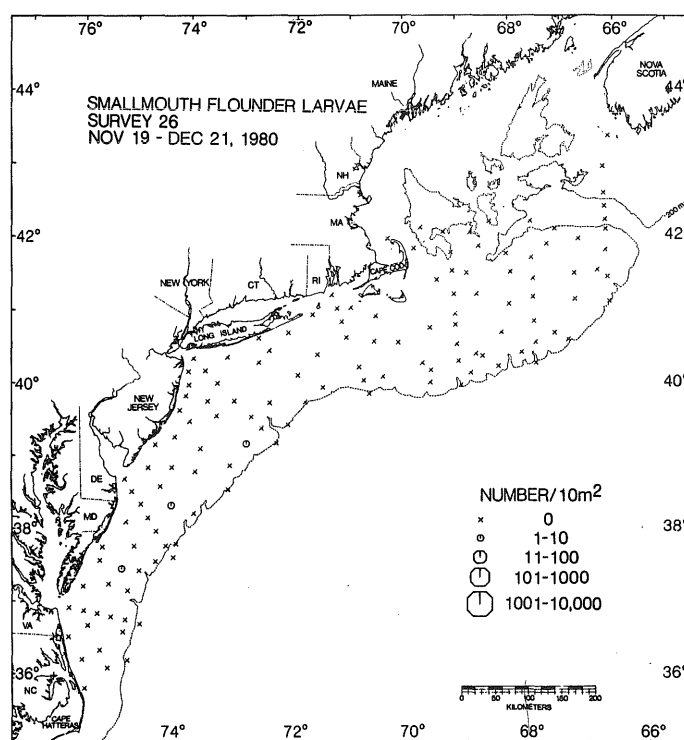
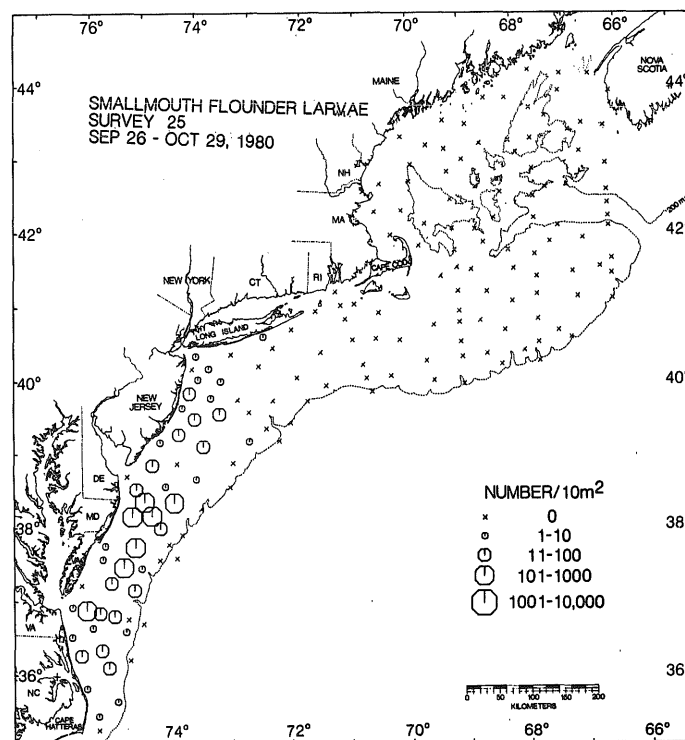
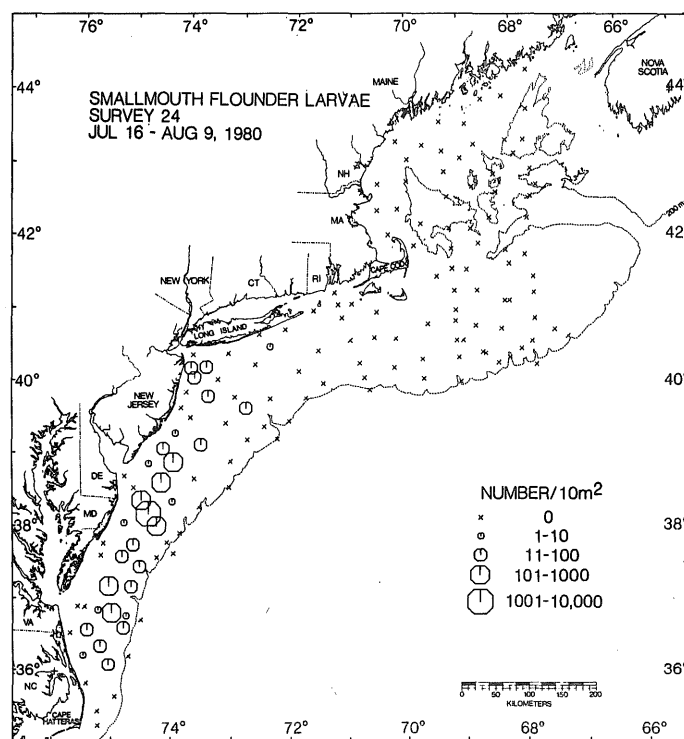
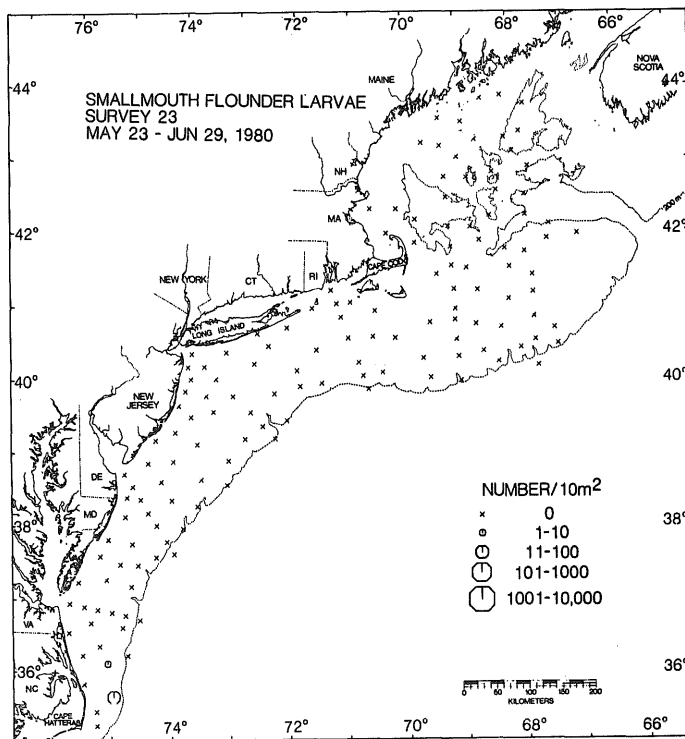


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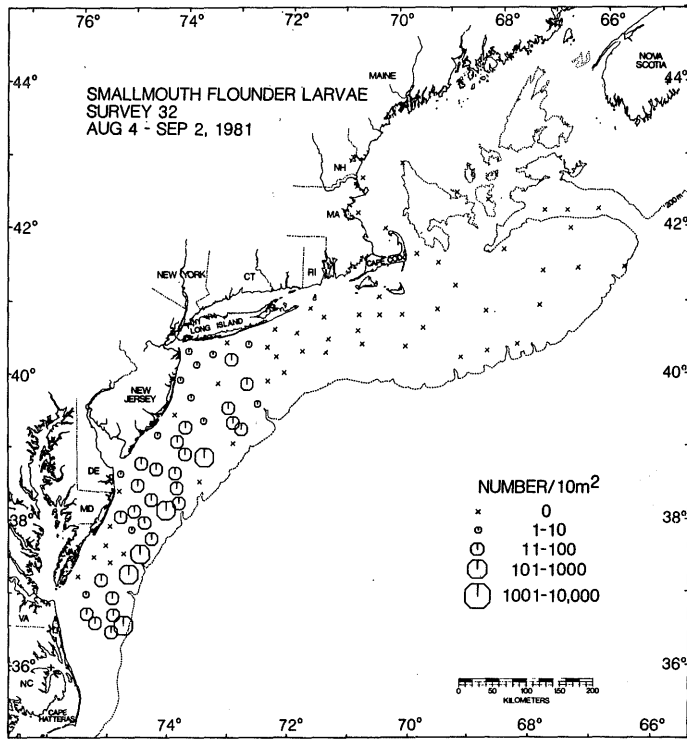
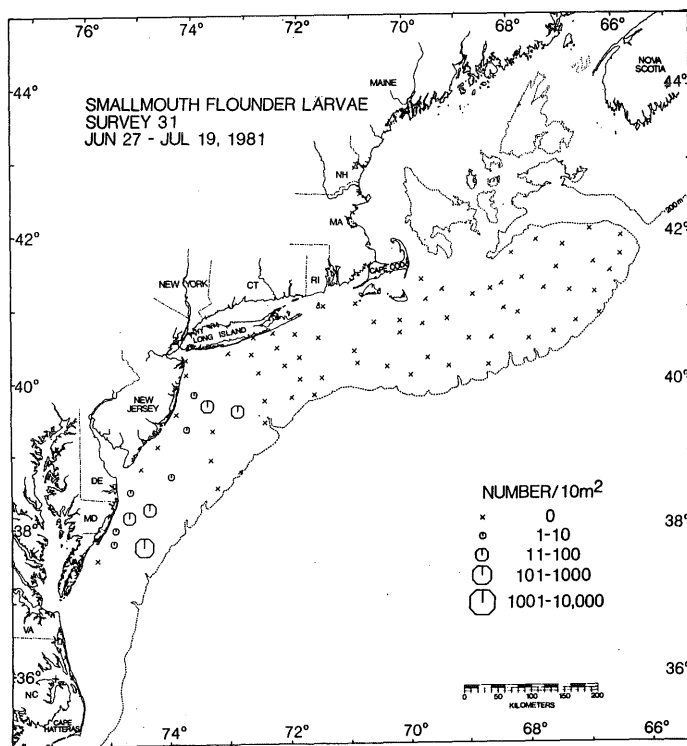
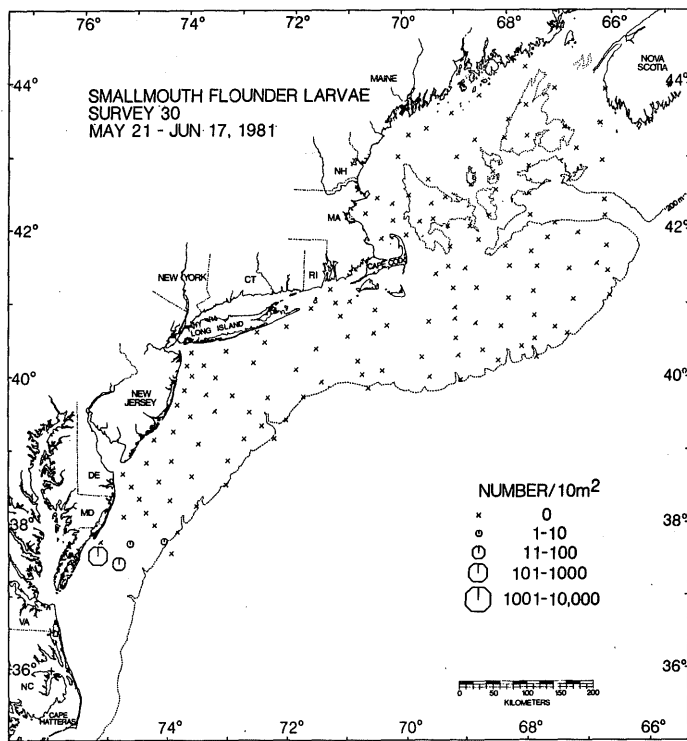
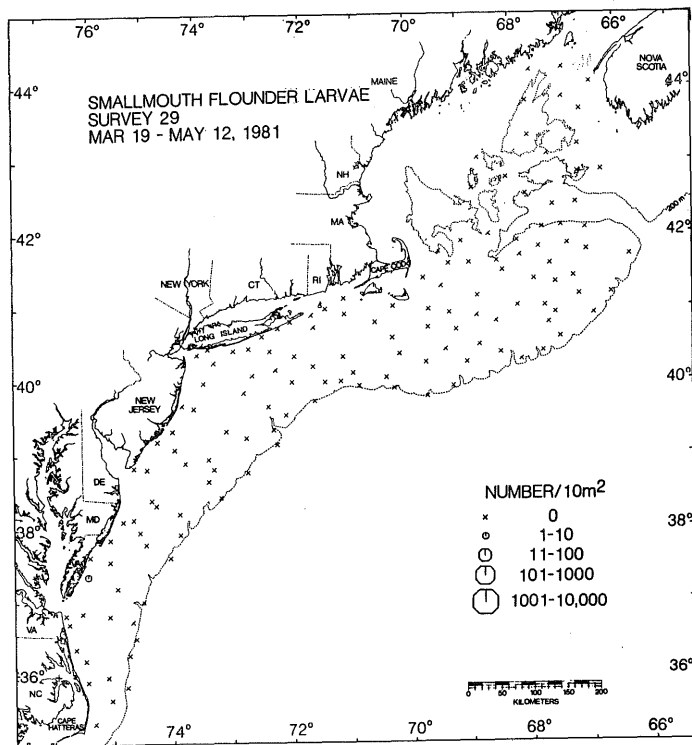


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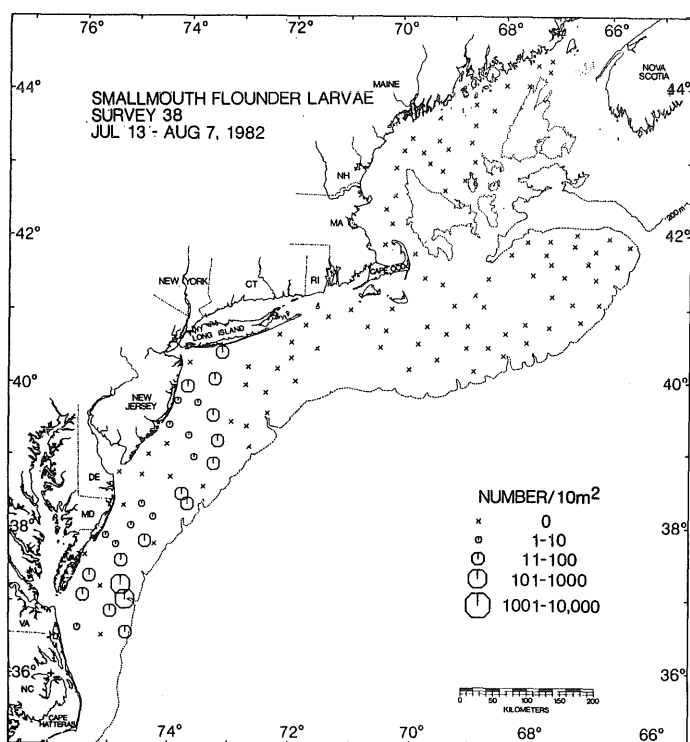
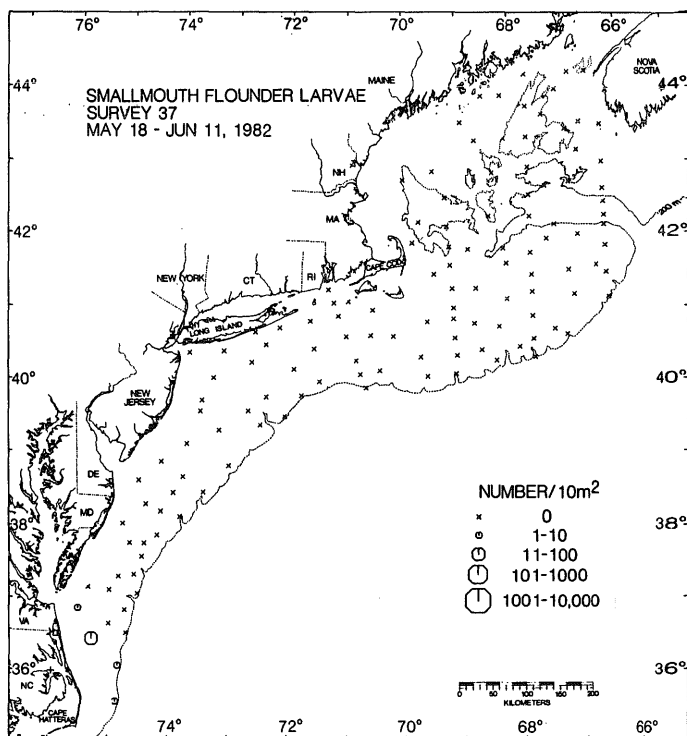
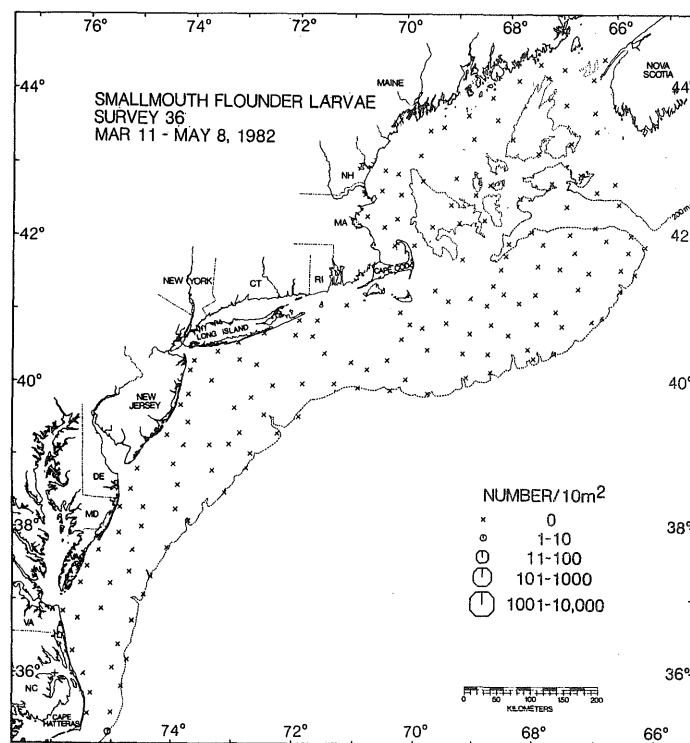
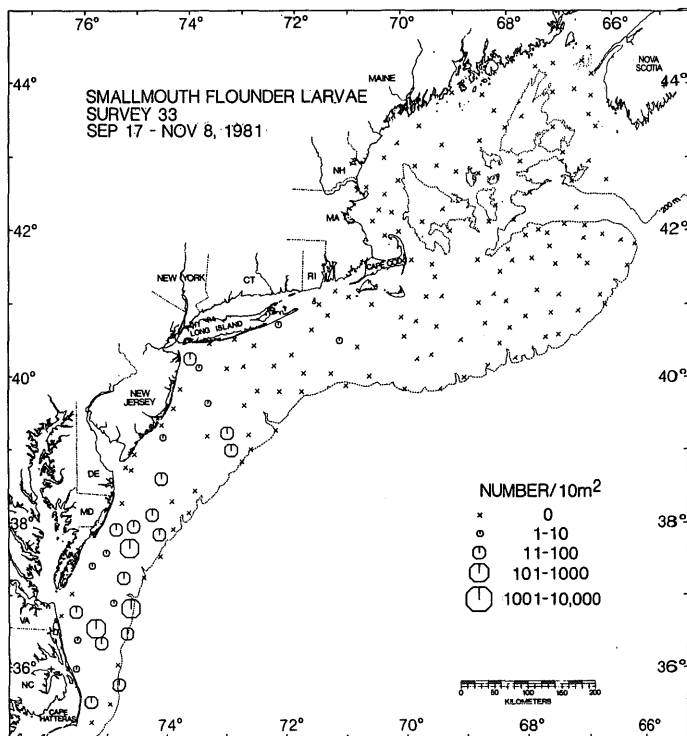


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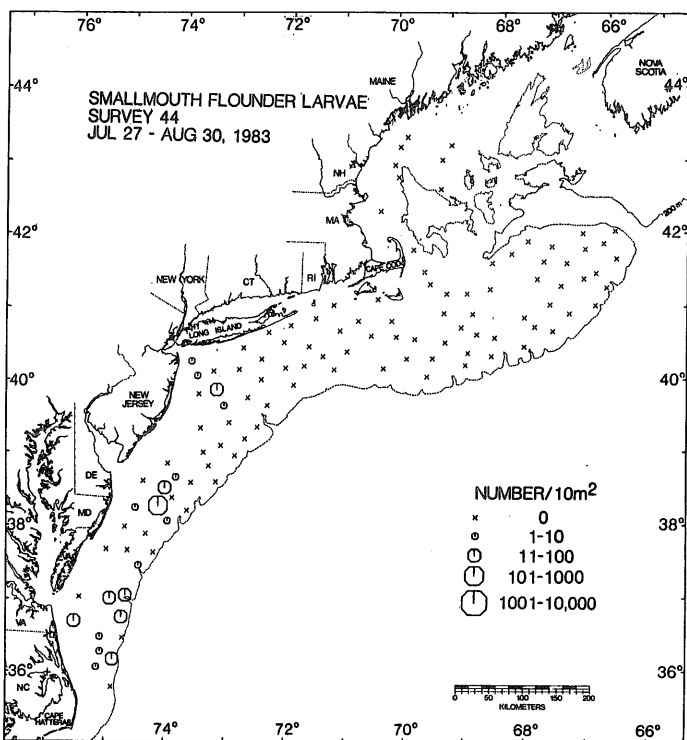
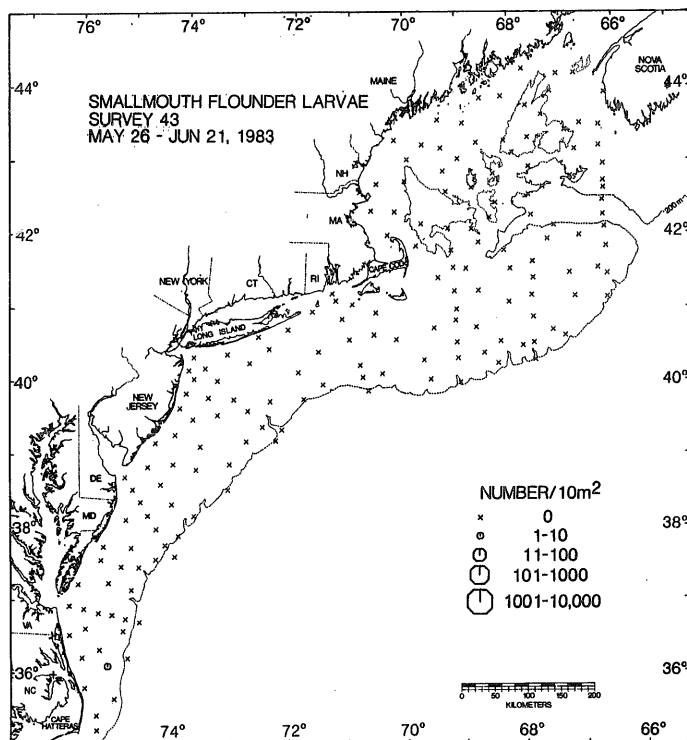
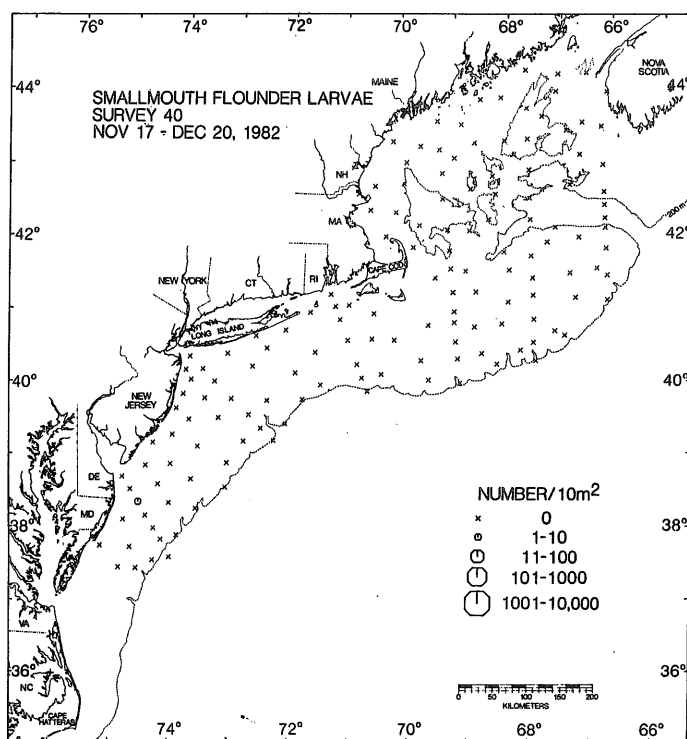
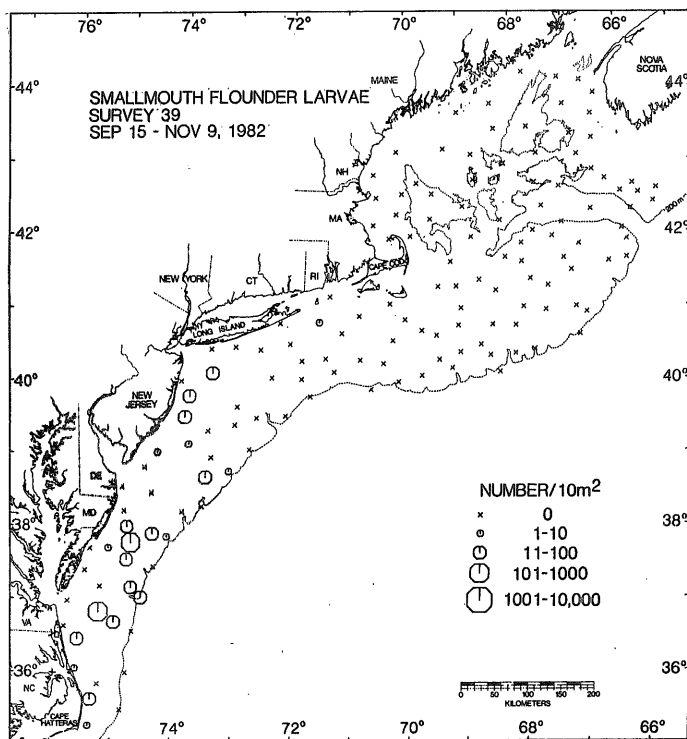


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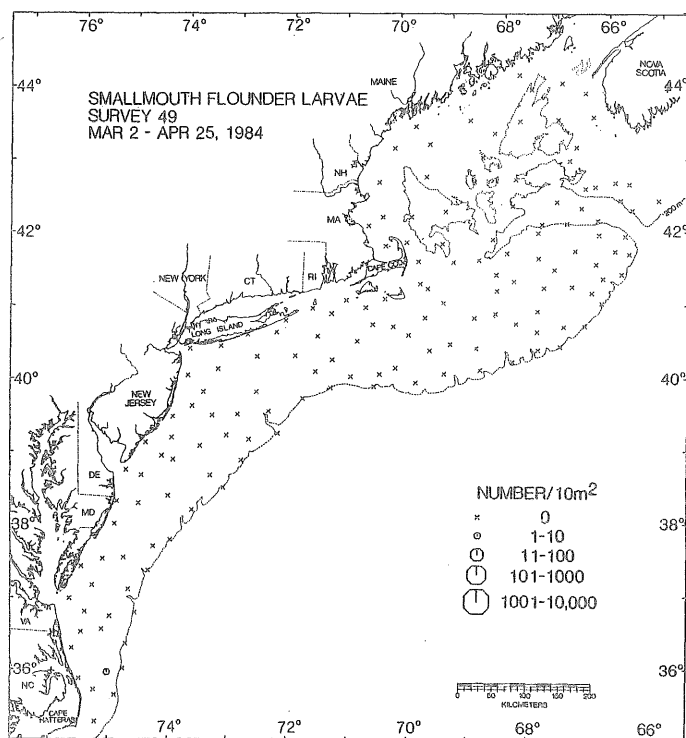
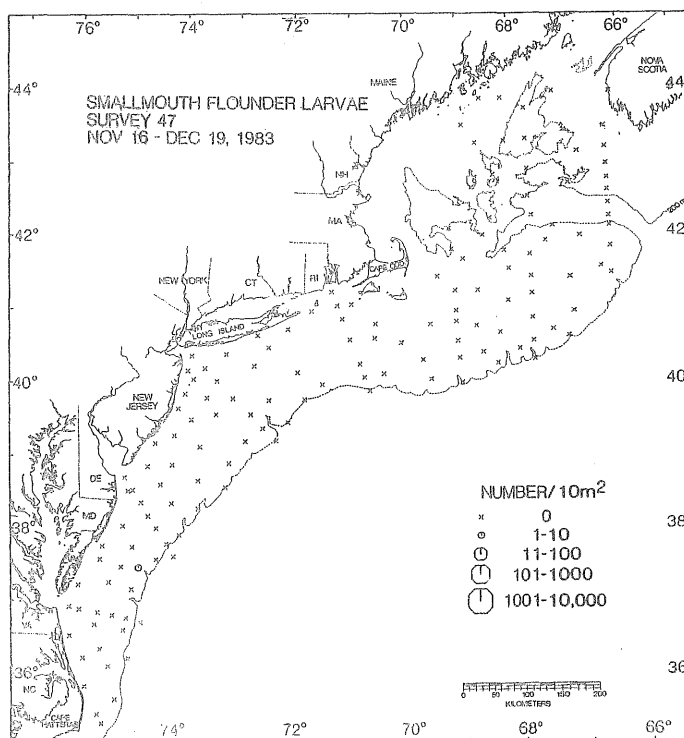
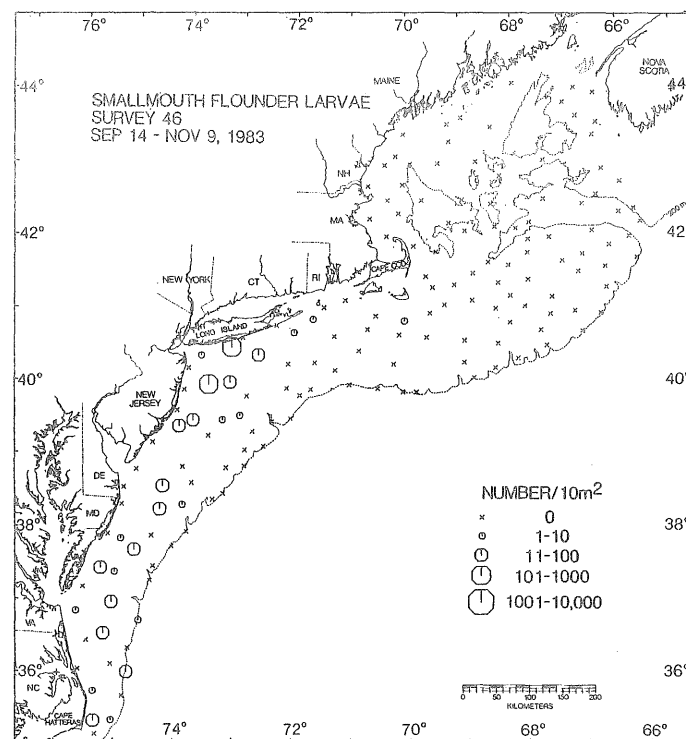
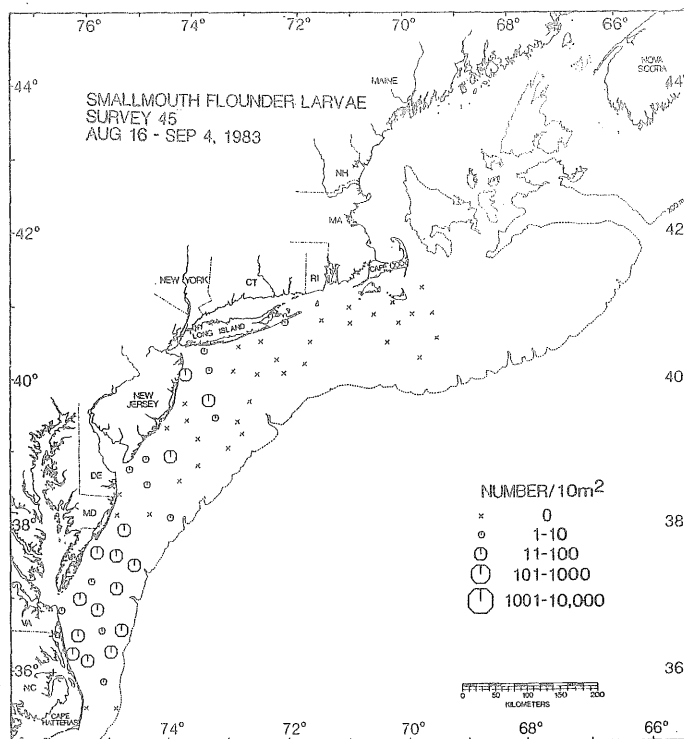


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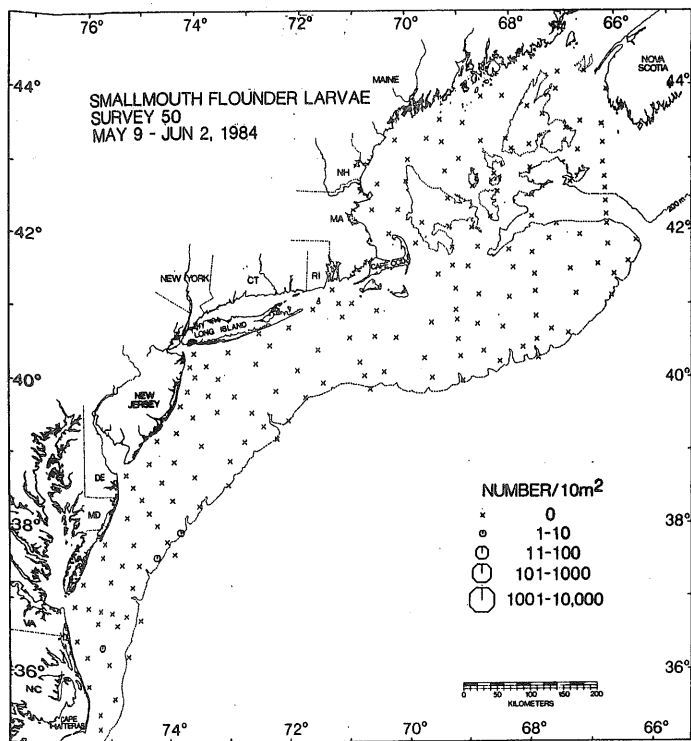


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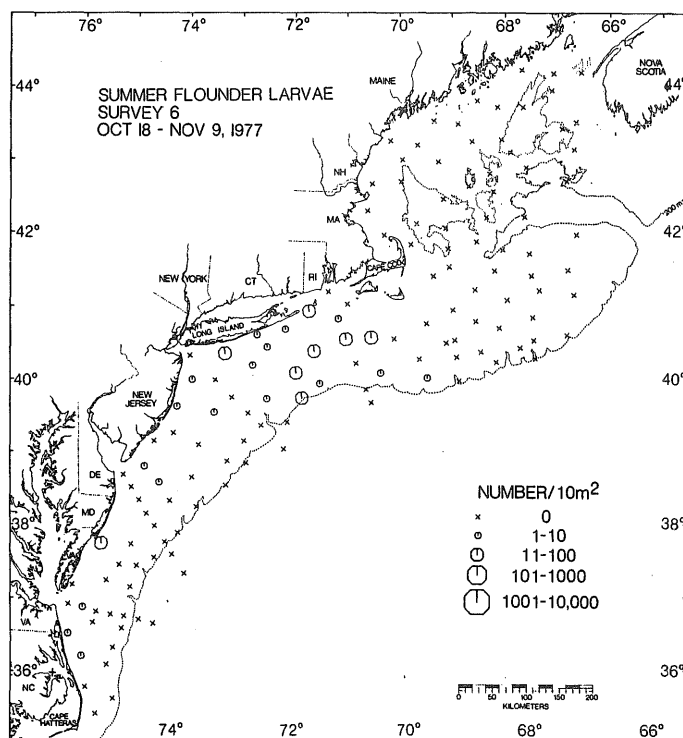
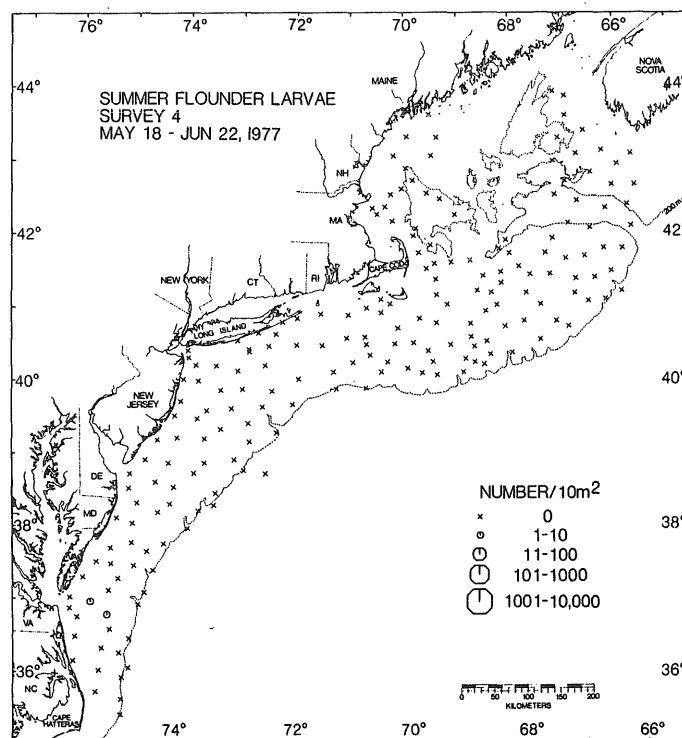
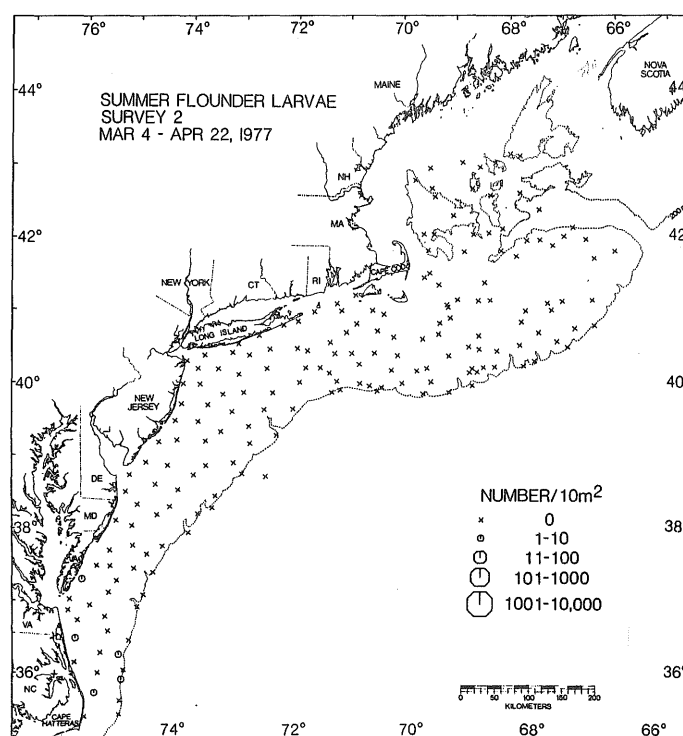
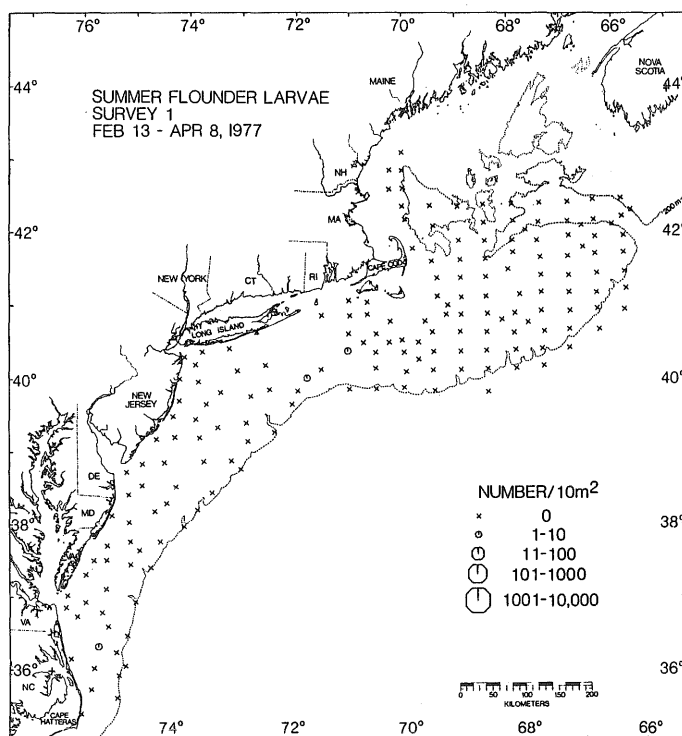


Figure 23. Distribution and abundance of summer flounder, Paralichthys dentatus, larvae off northeastern United States, winter 1977 through spring 1984.

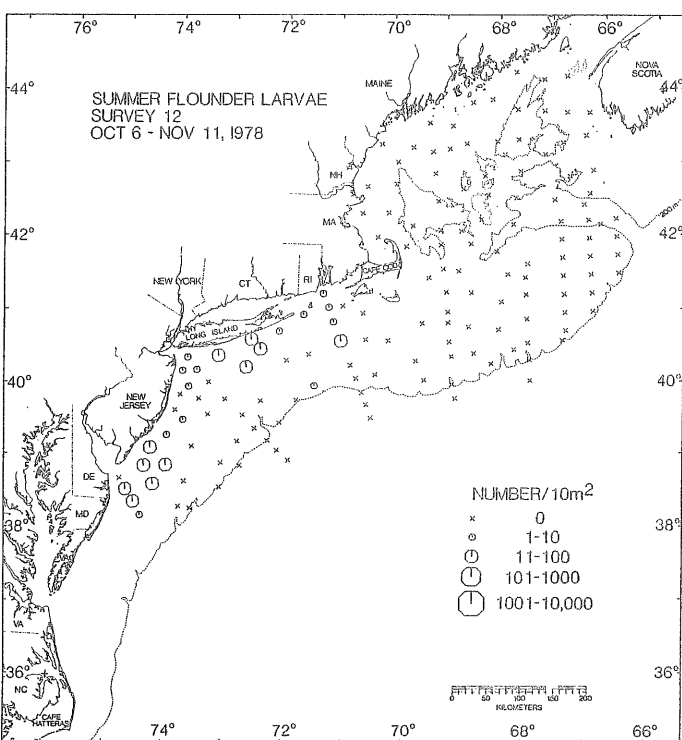
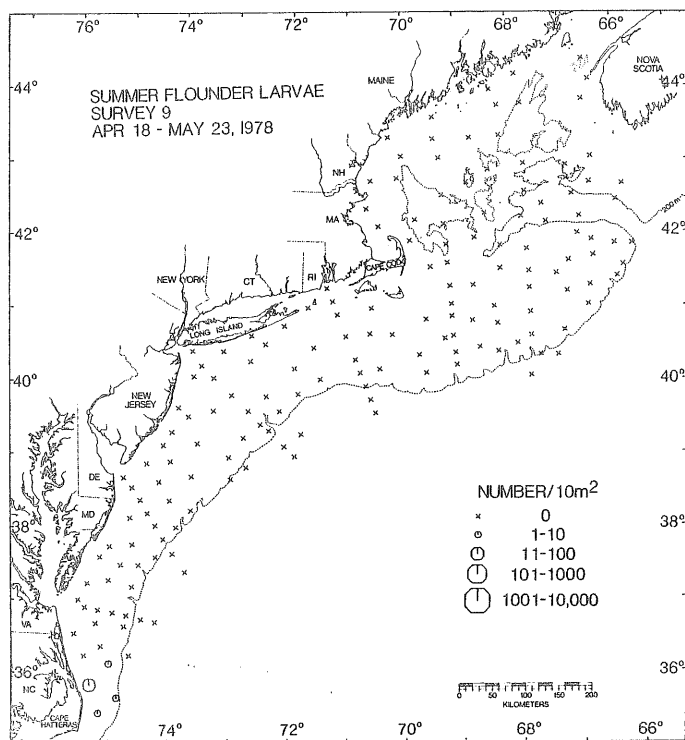
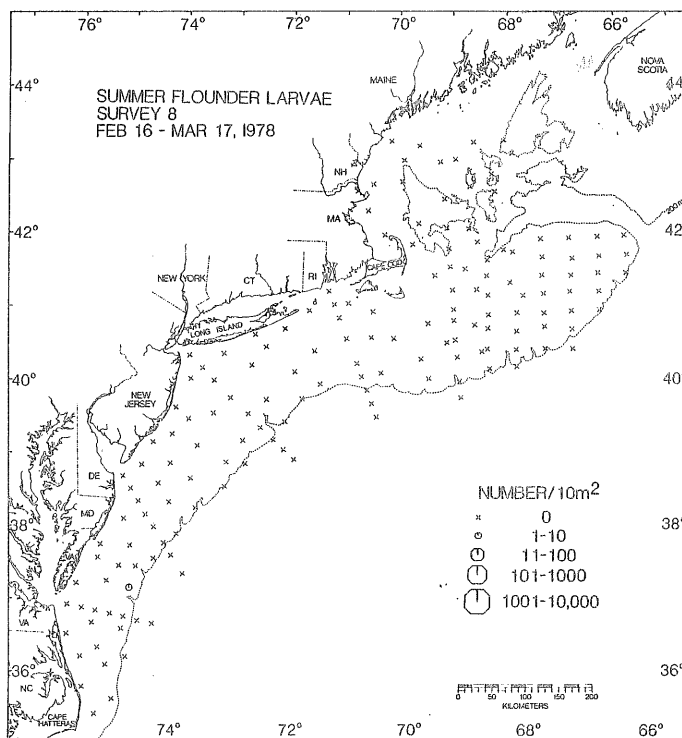
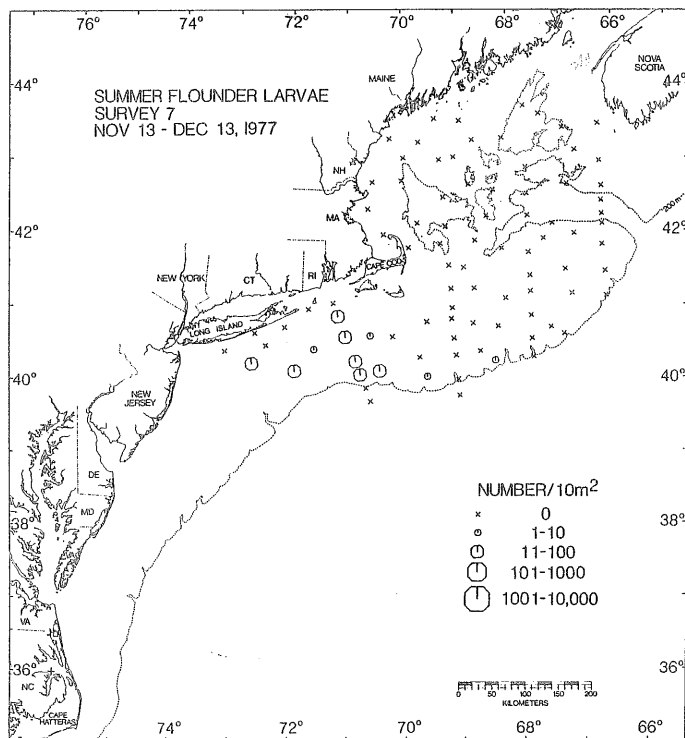


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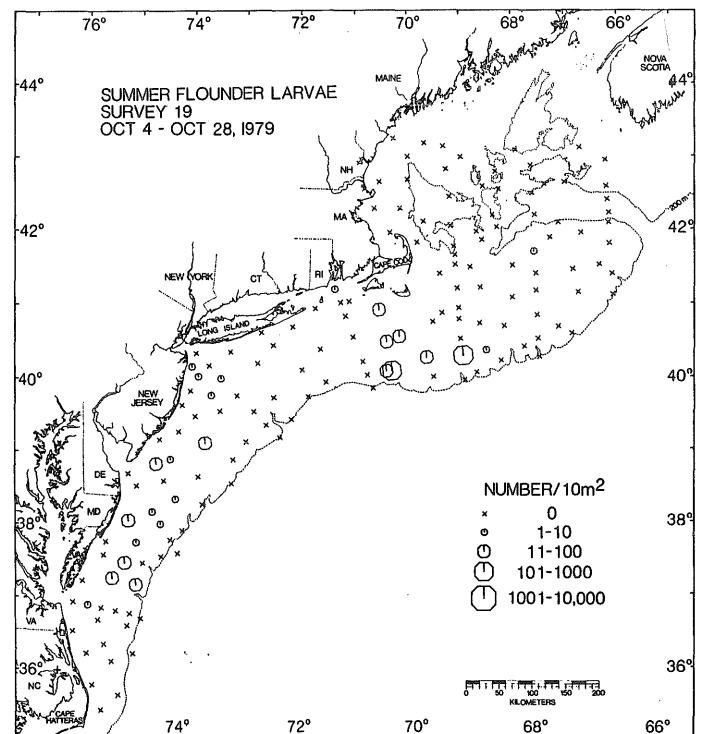
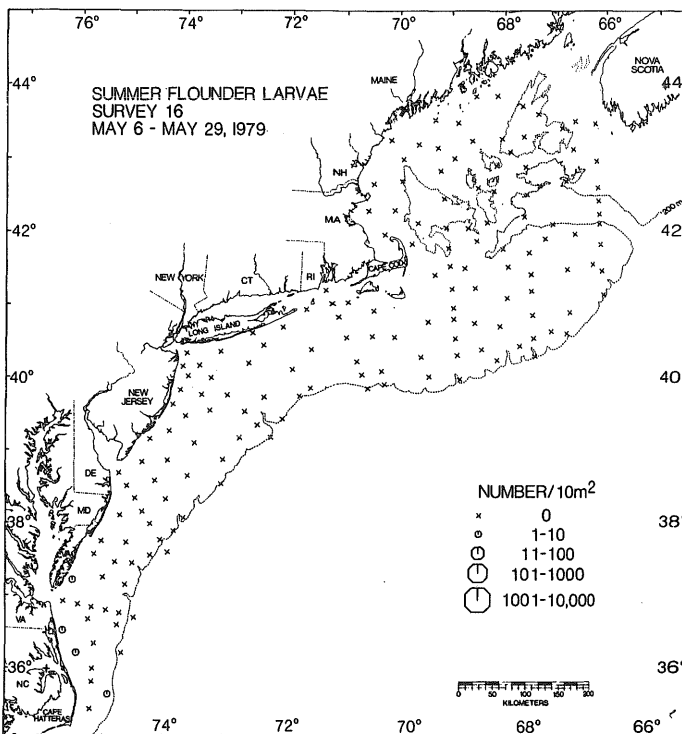
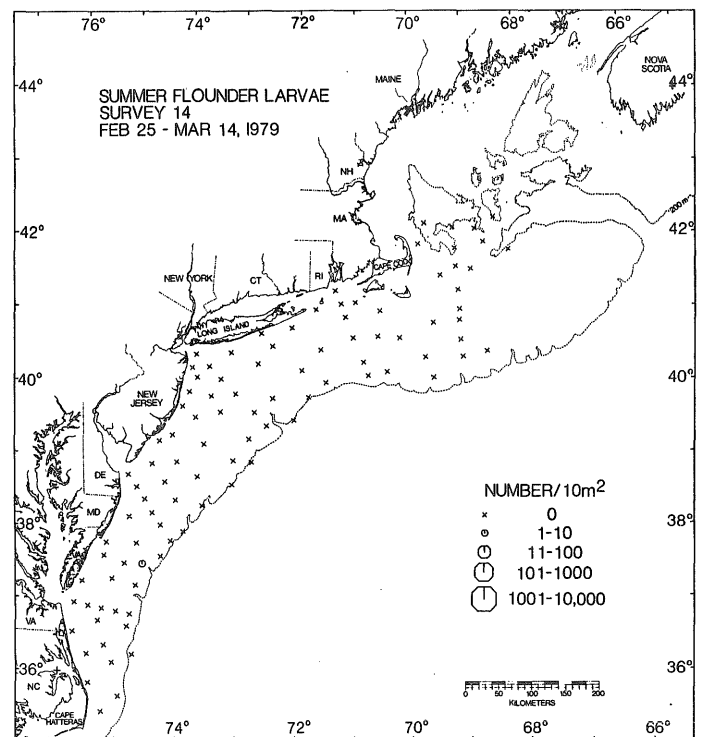
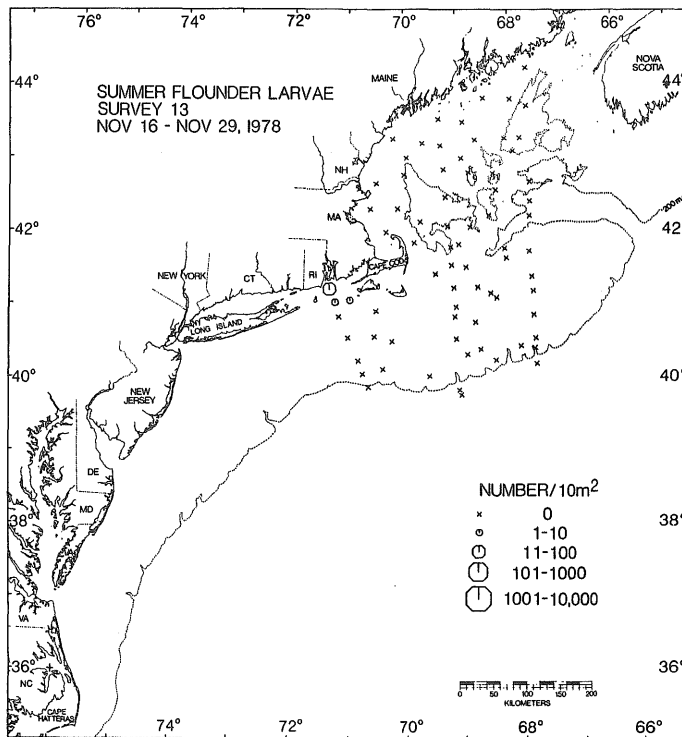


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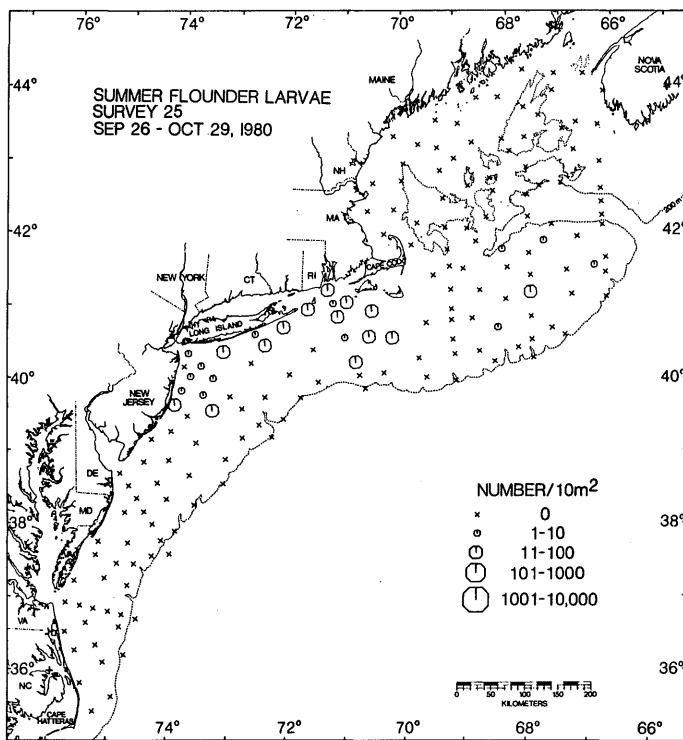
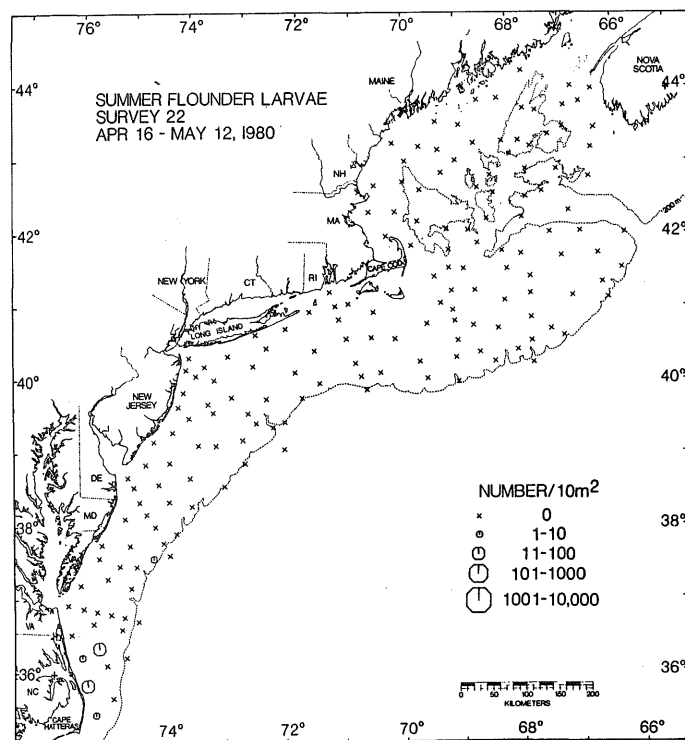
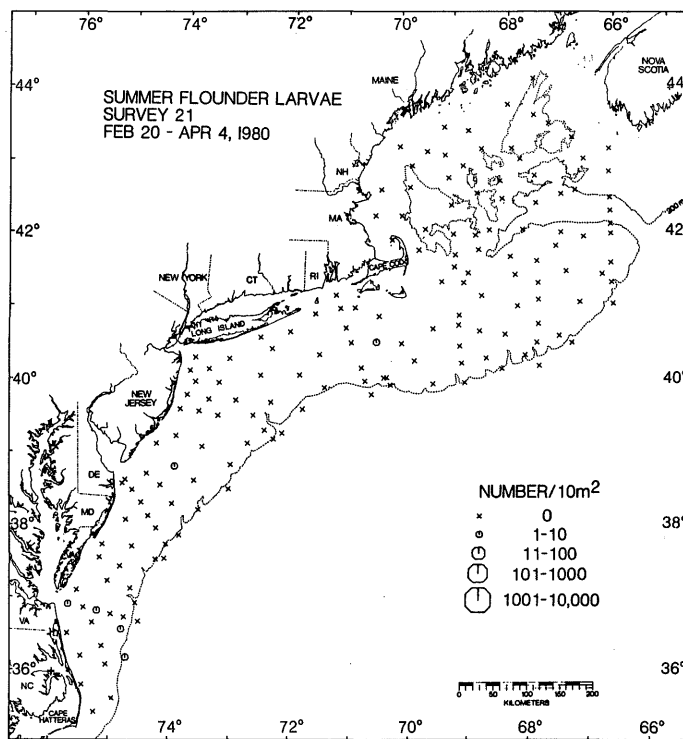
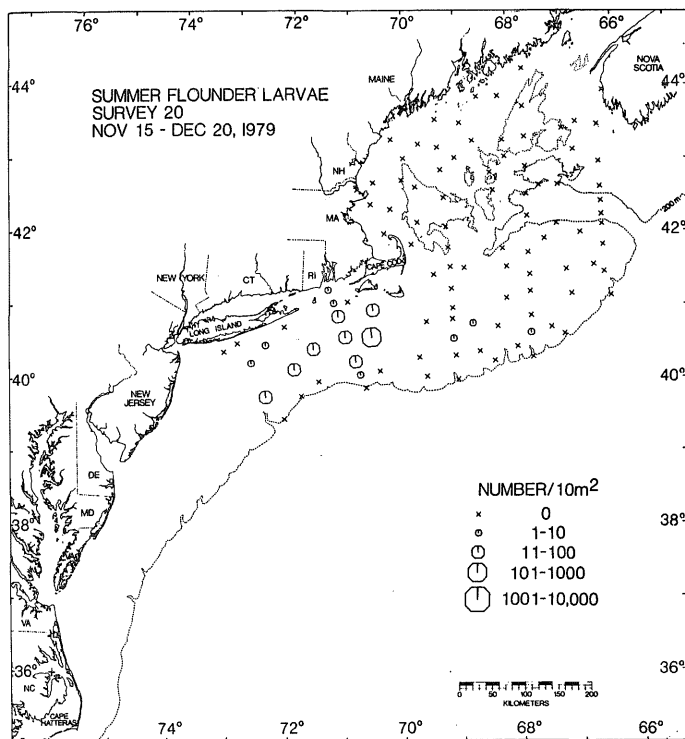


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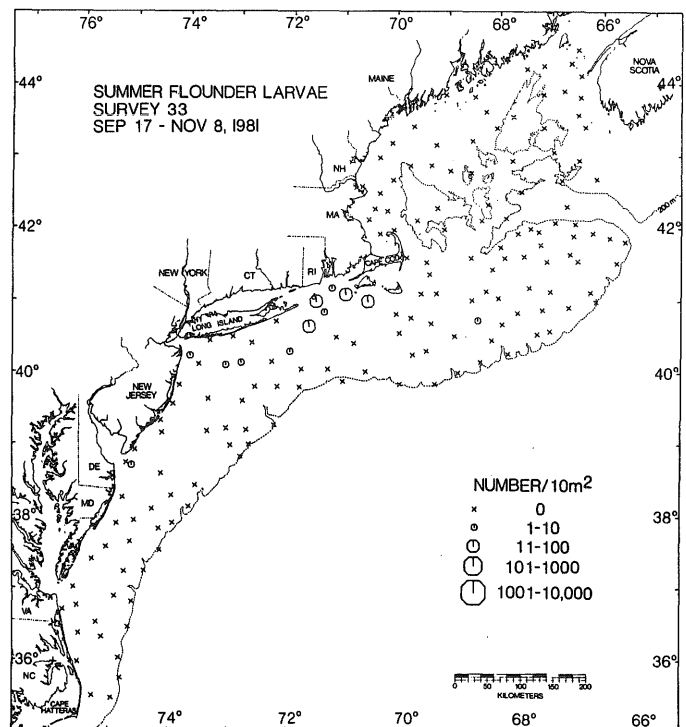
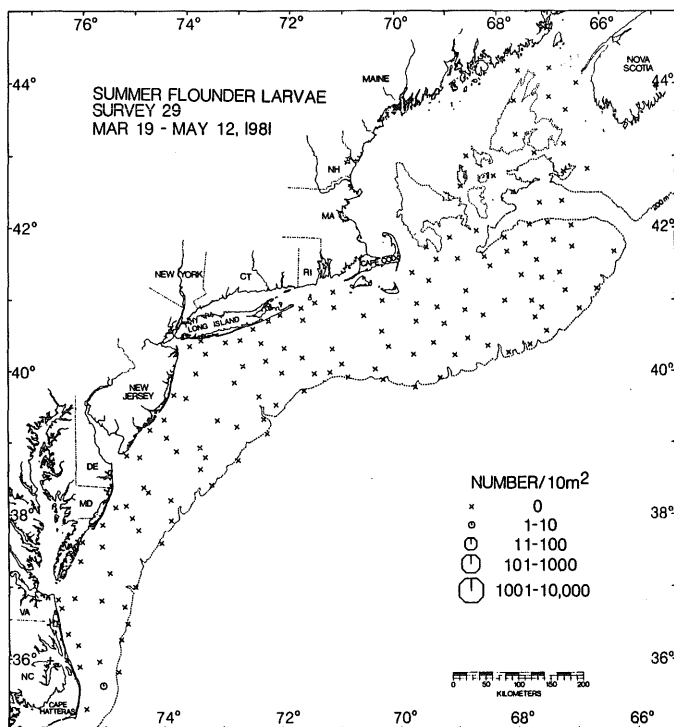
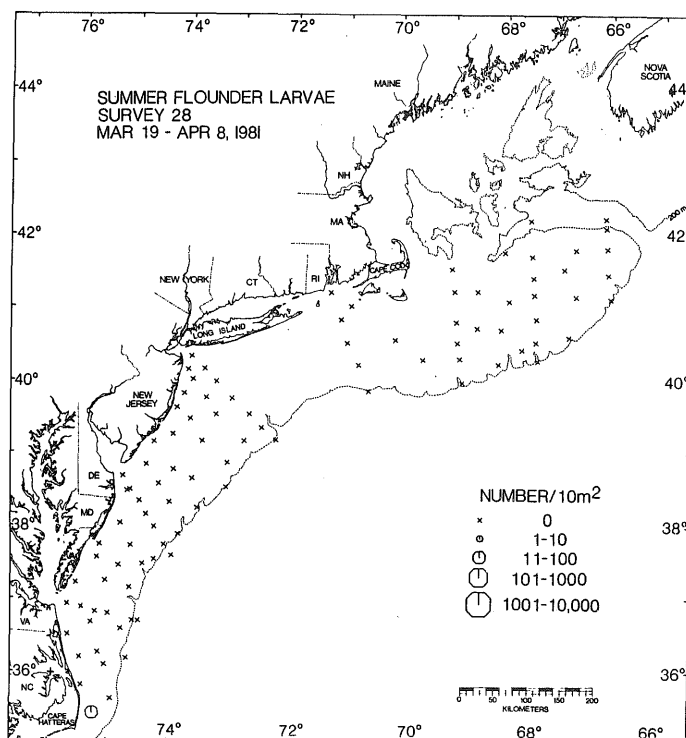
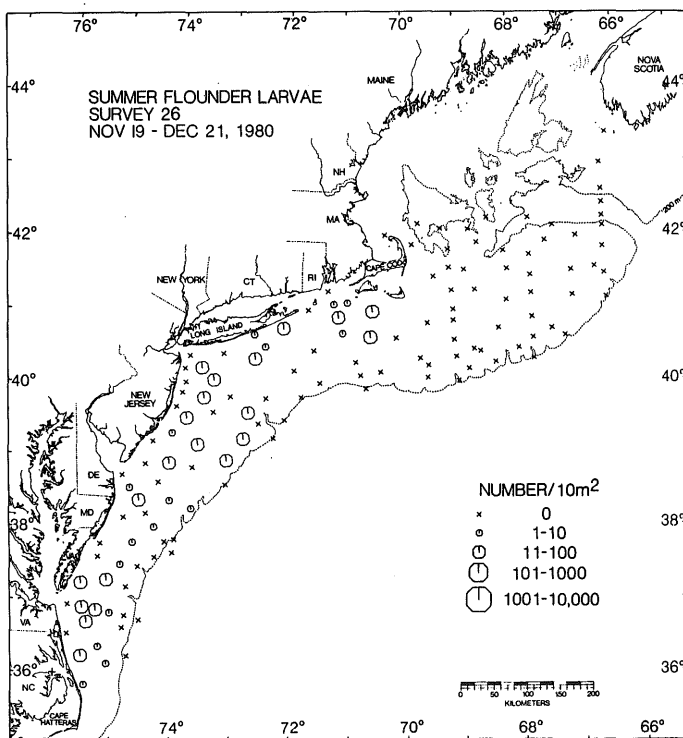


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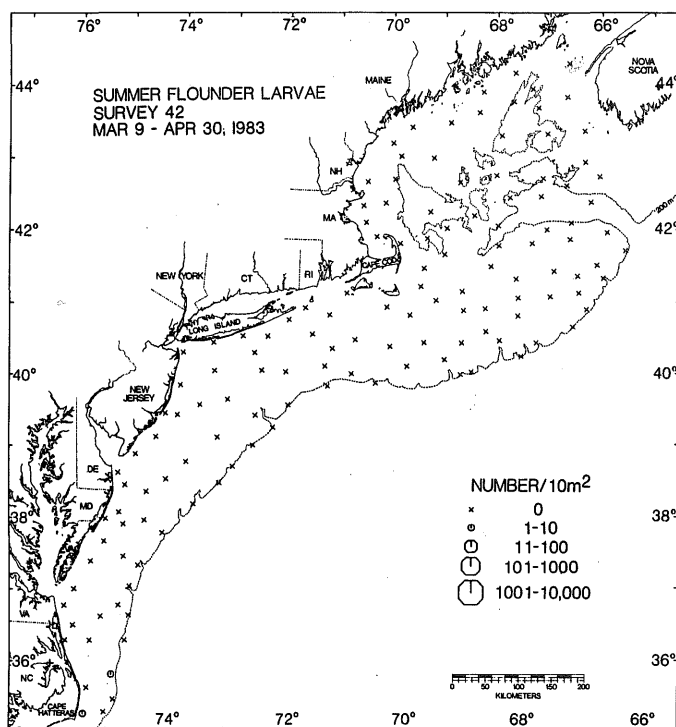
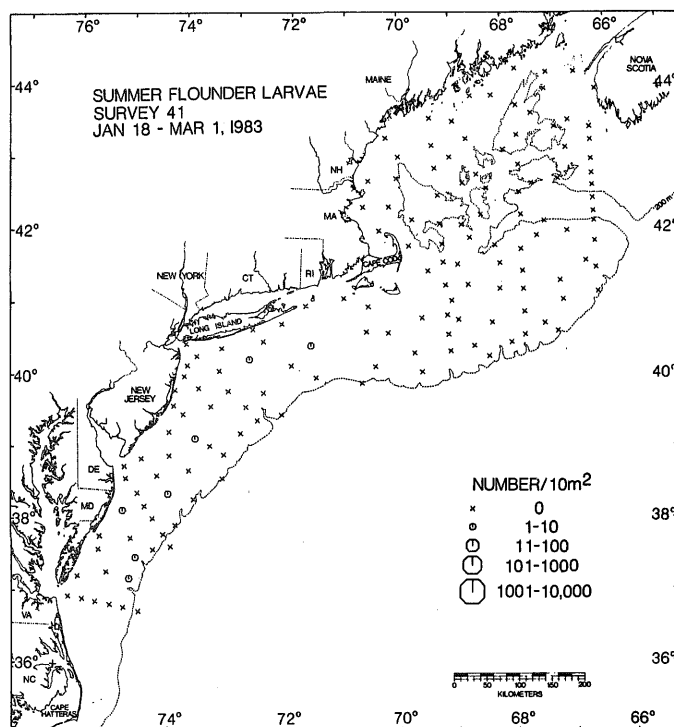
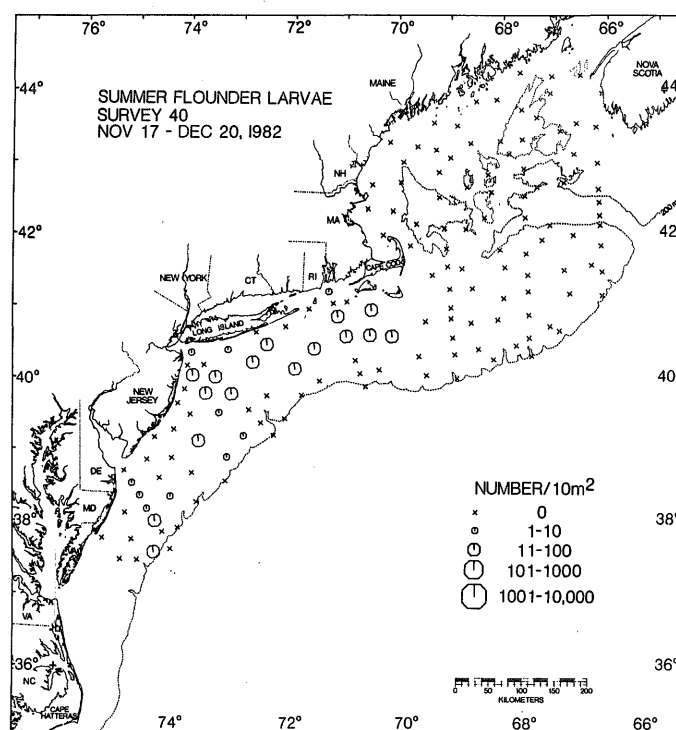
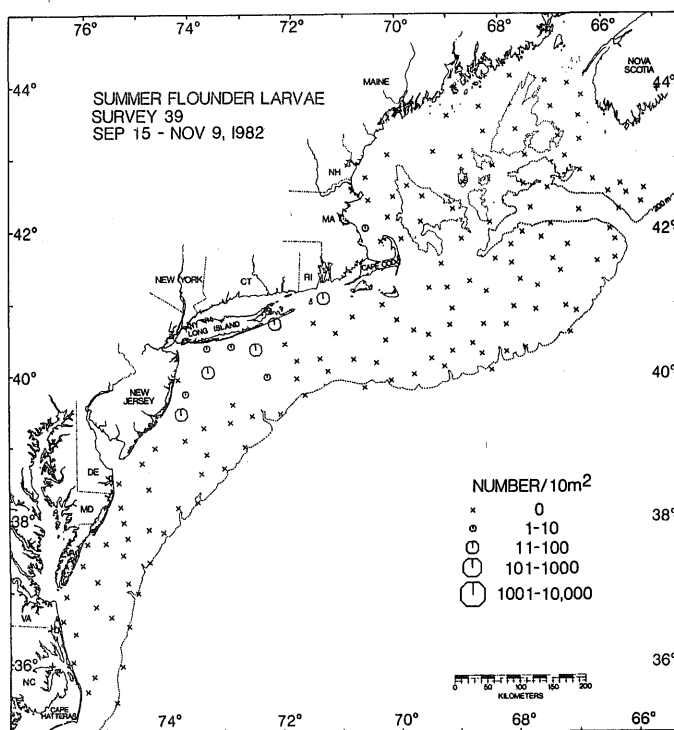


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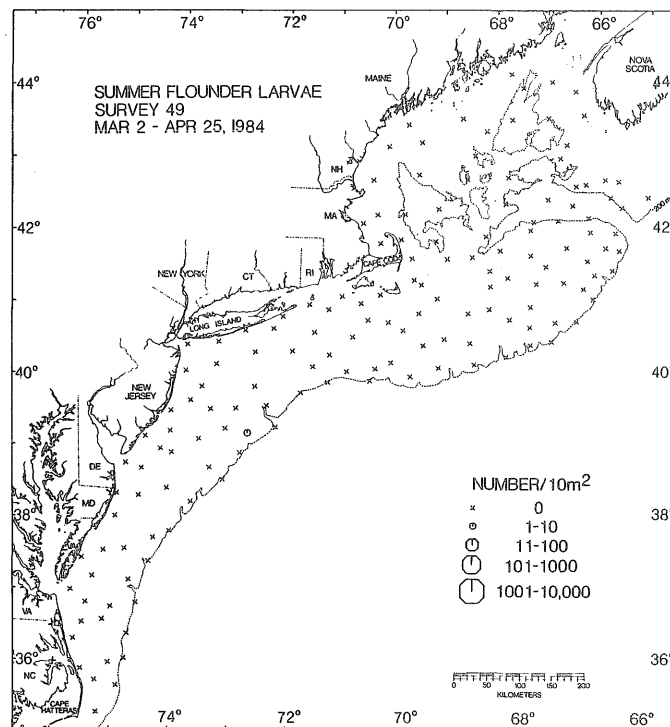
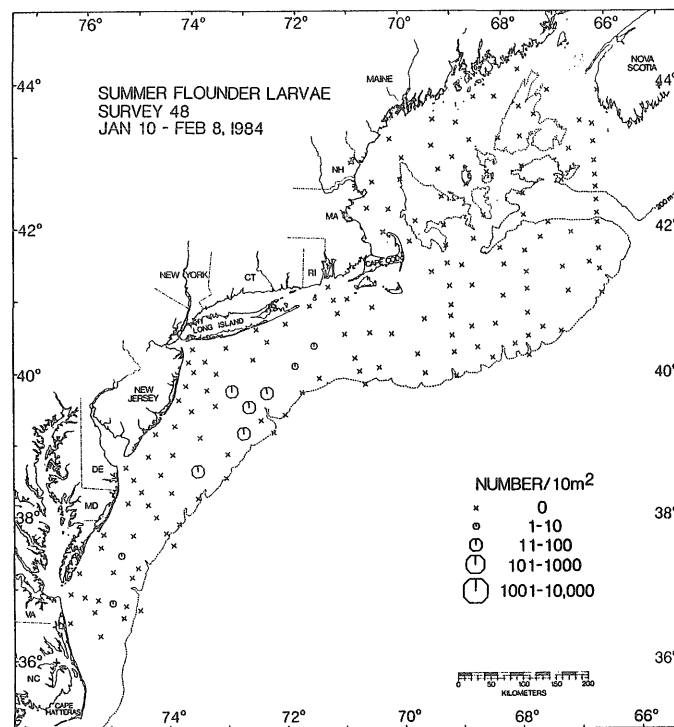
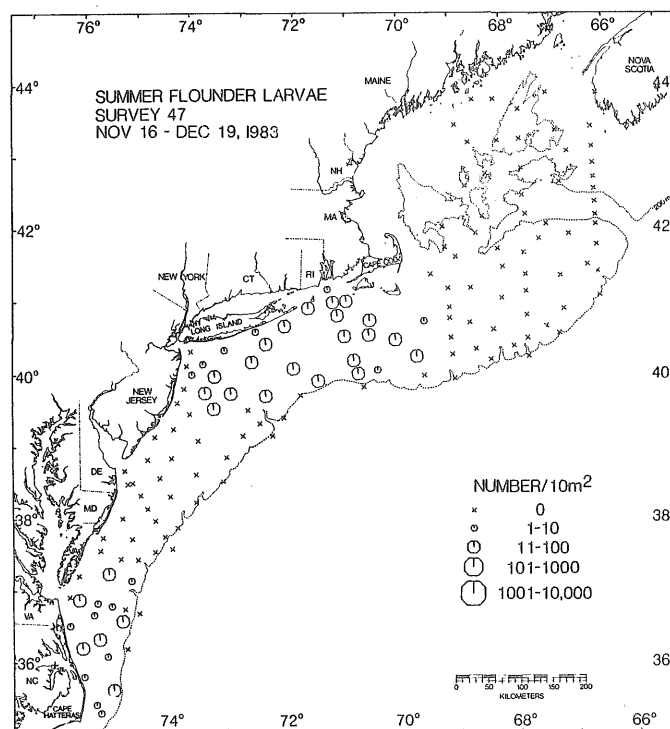
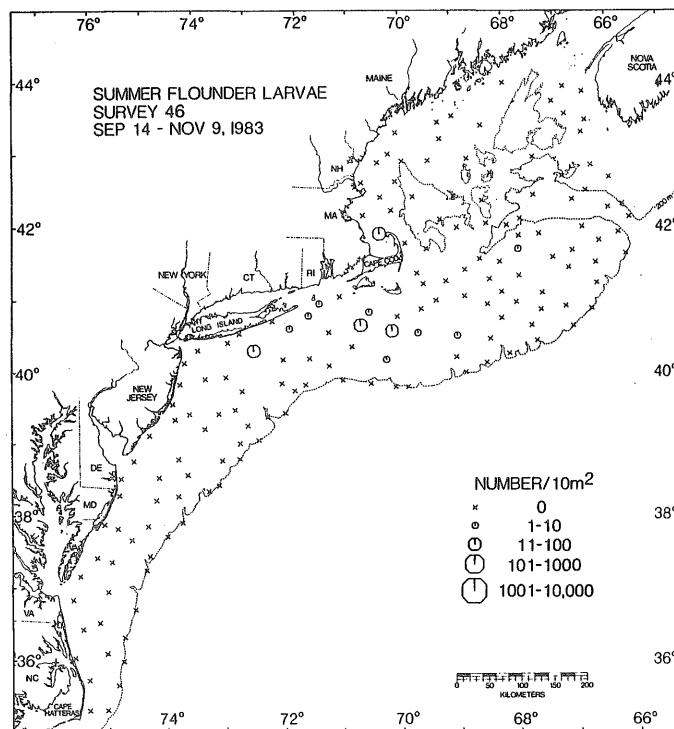


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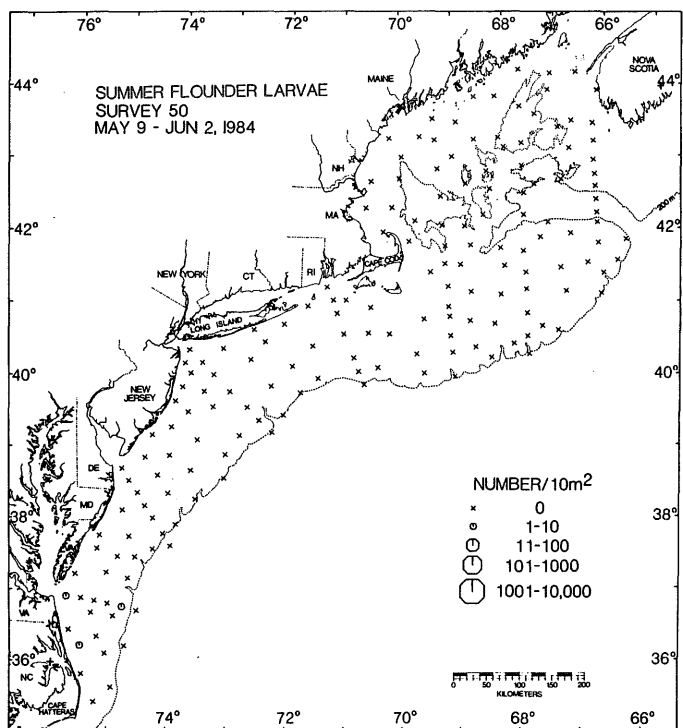


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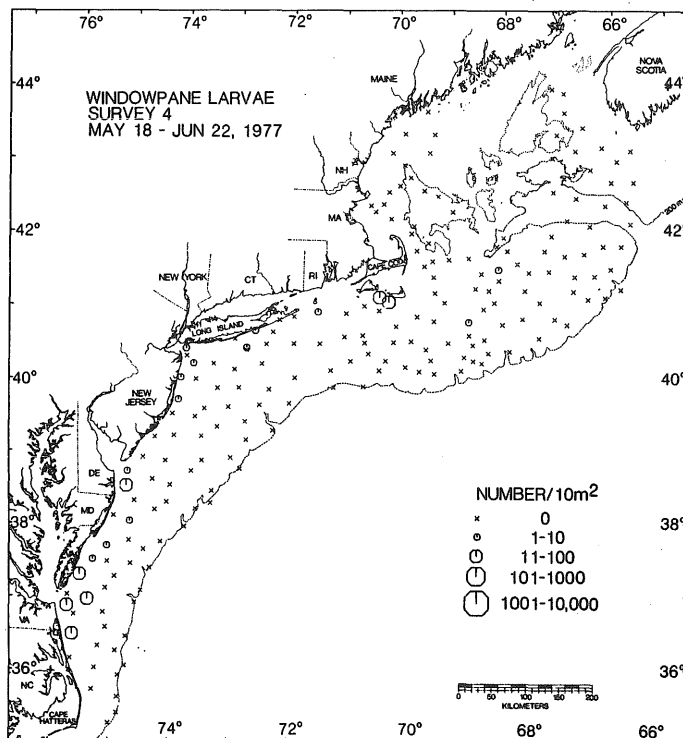
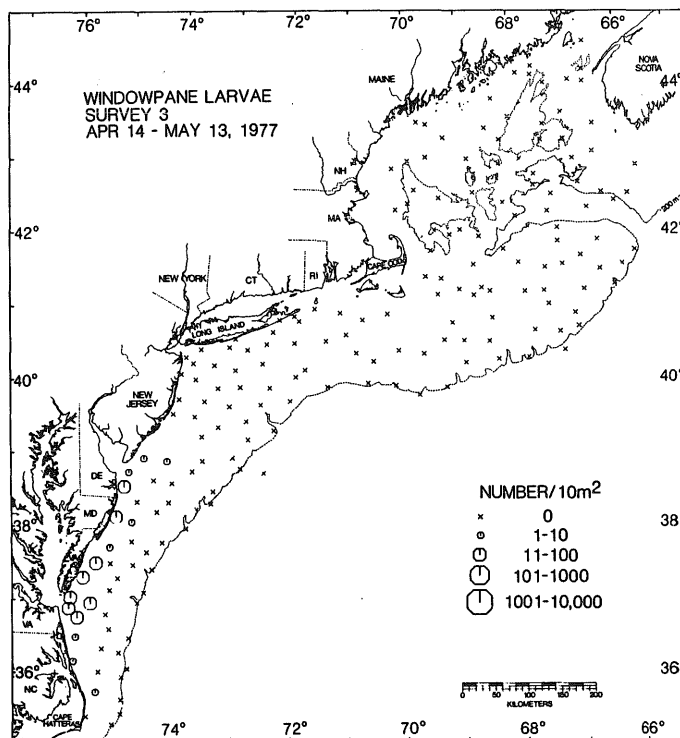
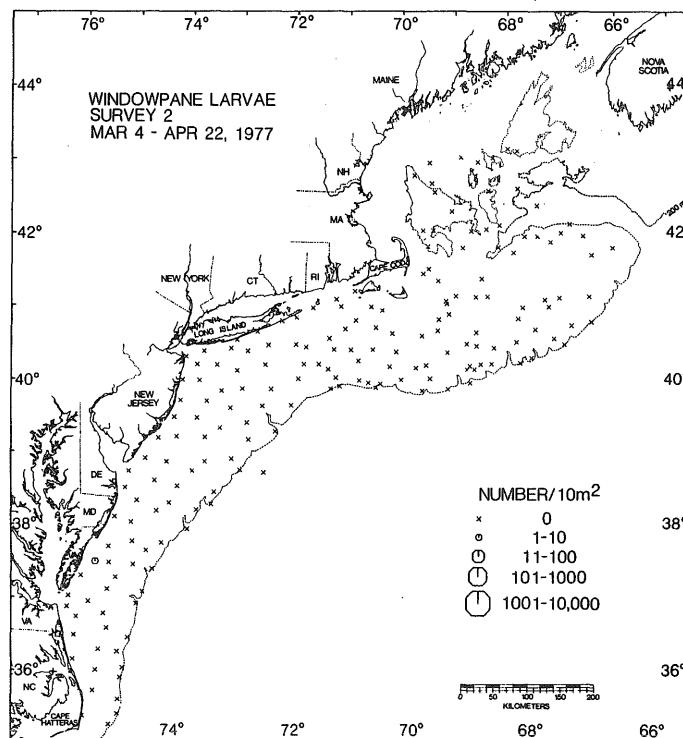
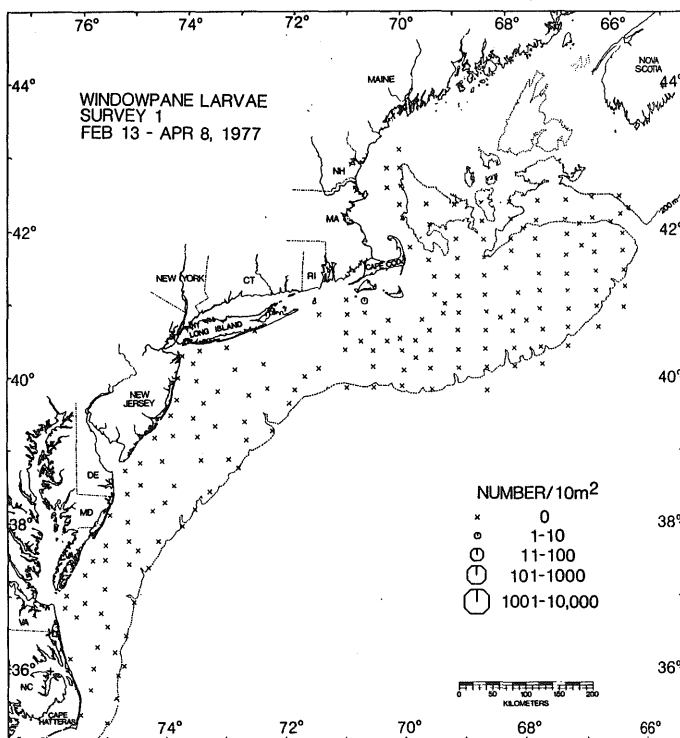


Figure 24. Distribution and abundance of windowpane, Scopthalmus aquosus, larvae off northeastern United States, winter 1977 through spring 1984.

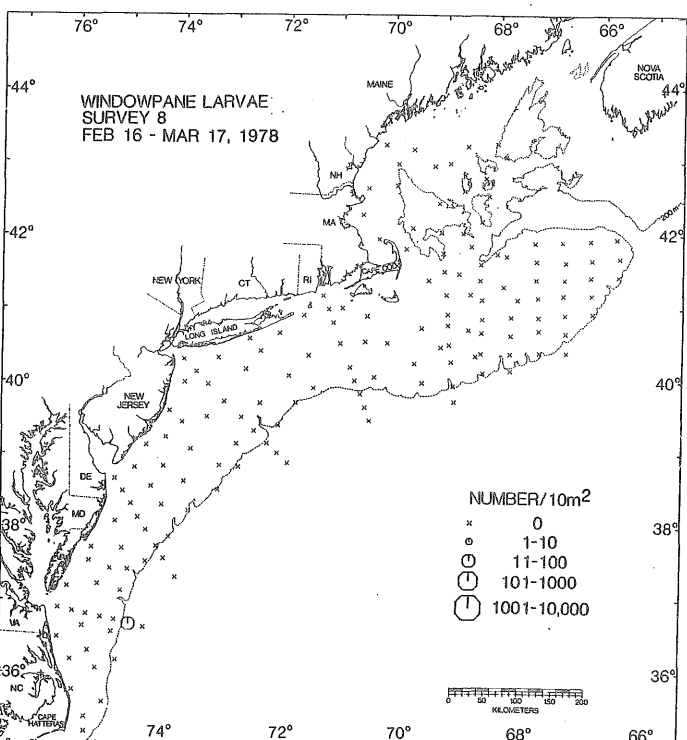
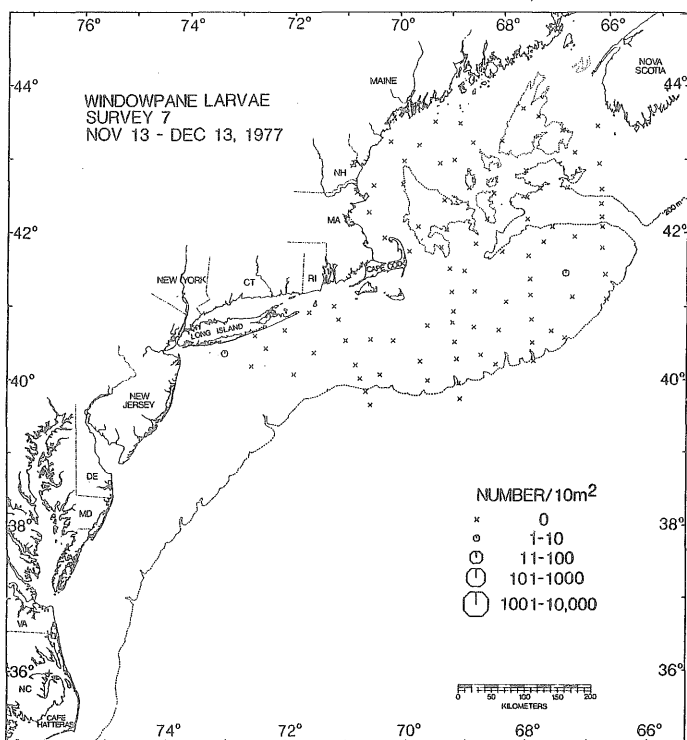
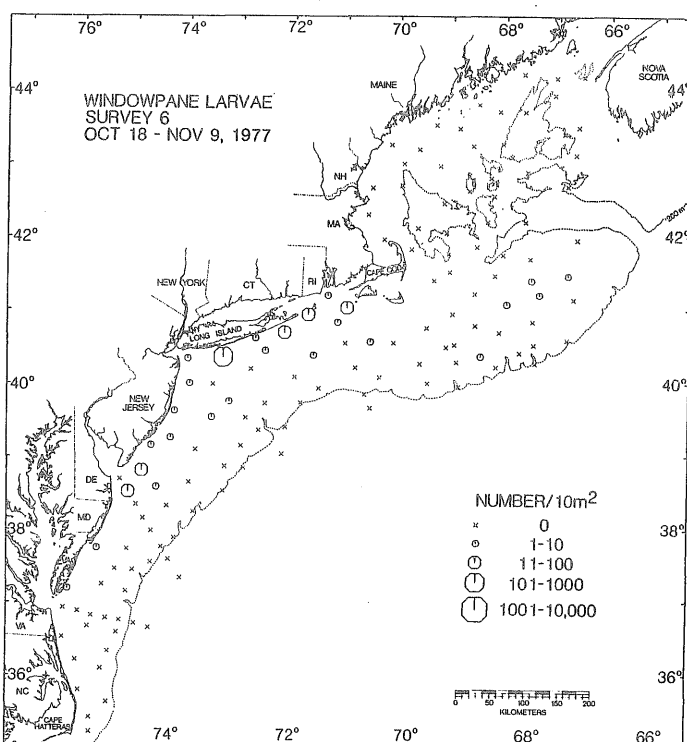
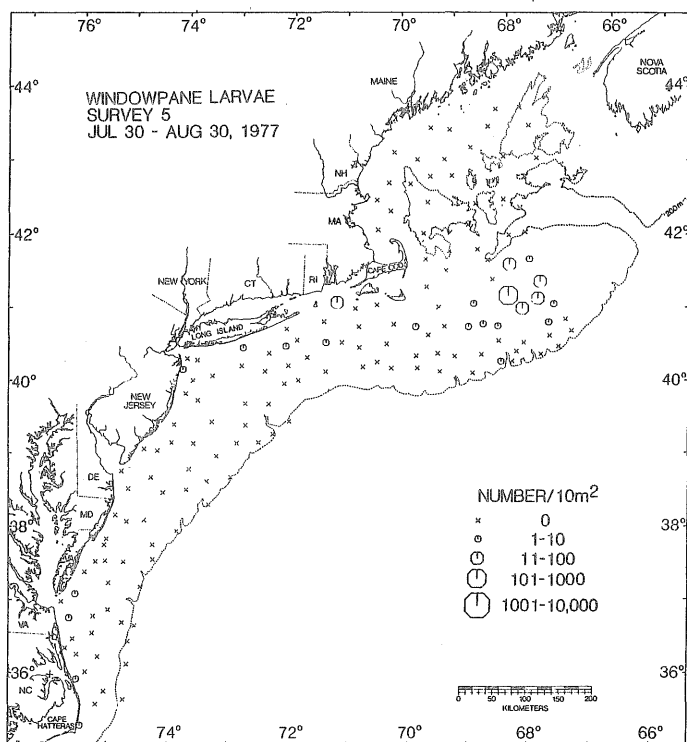


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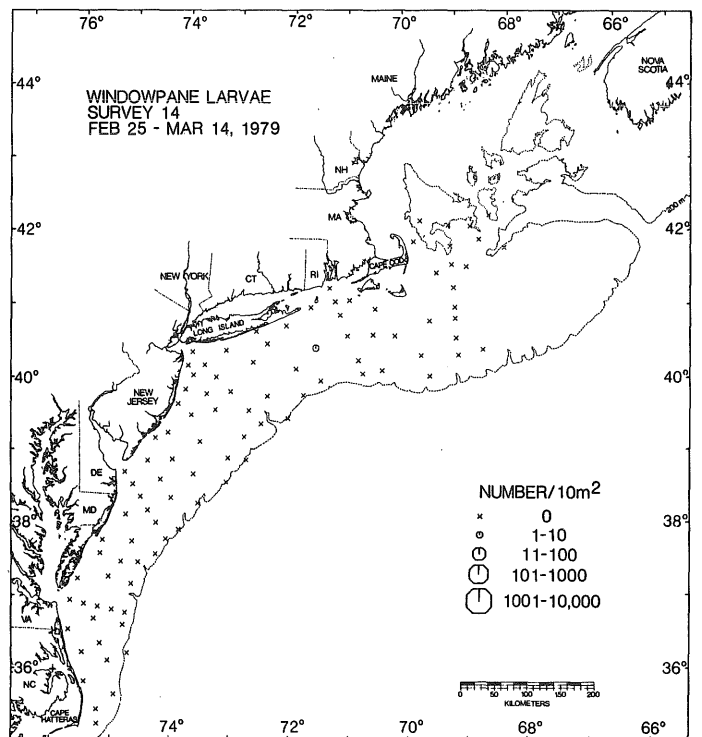
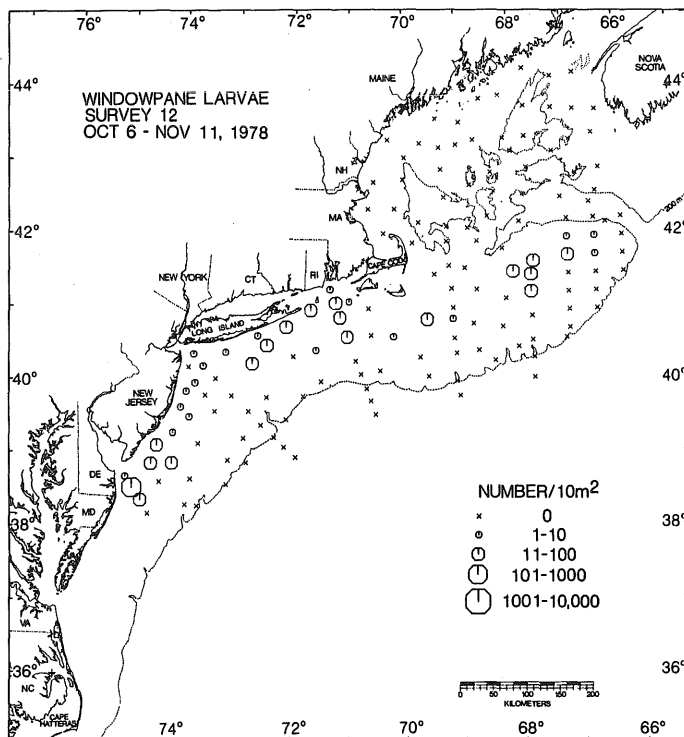
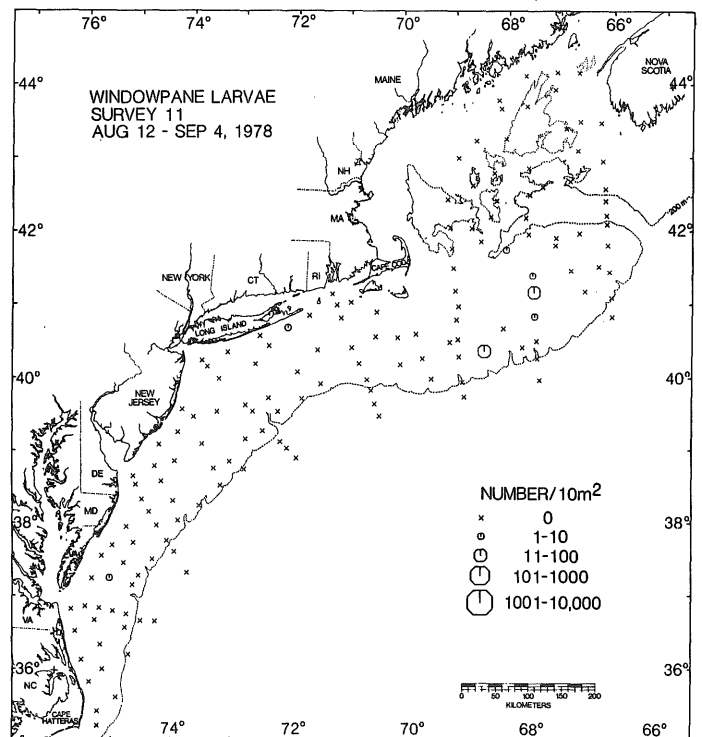
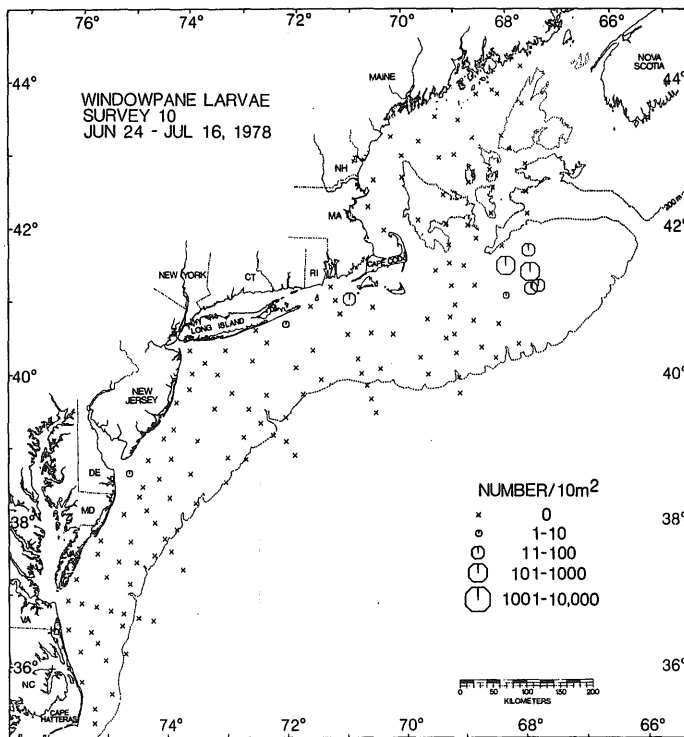


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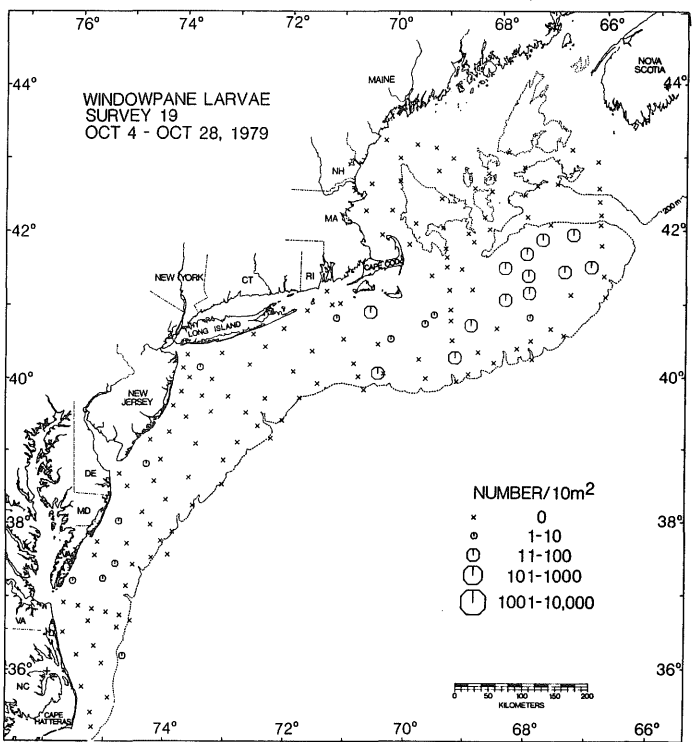
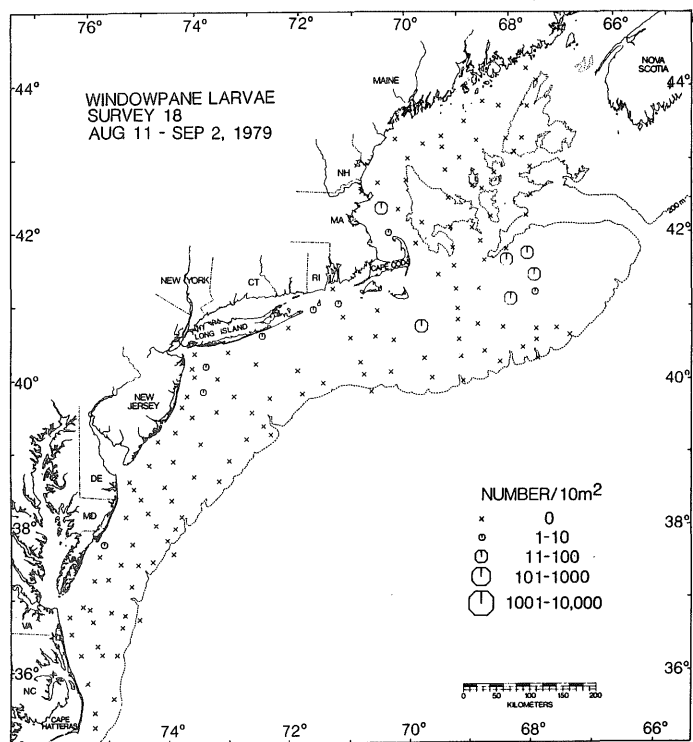
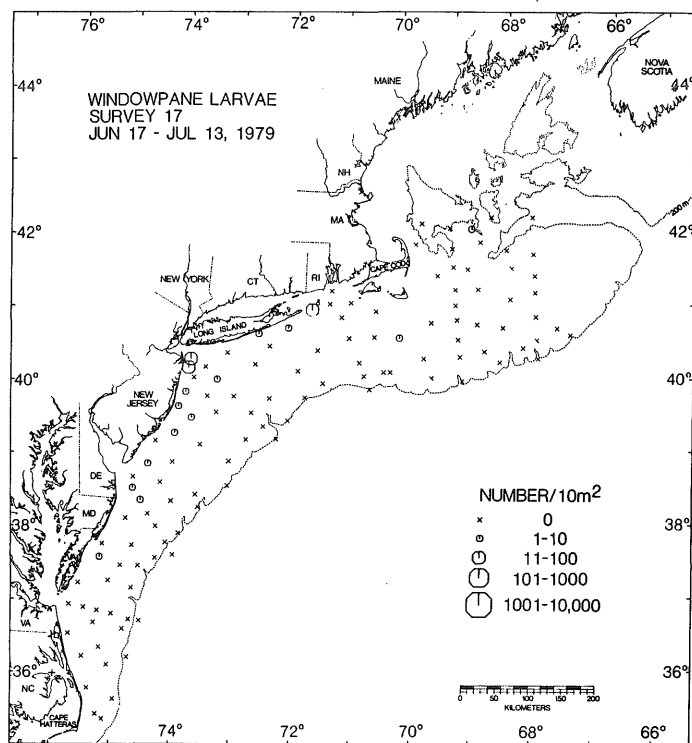
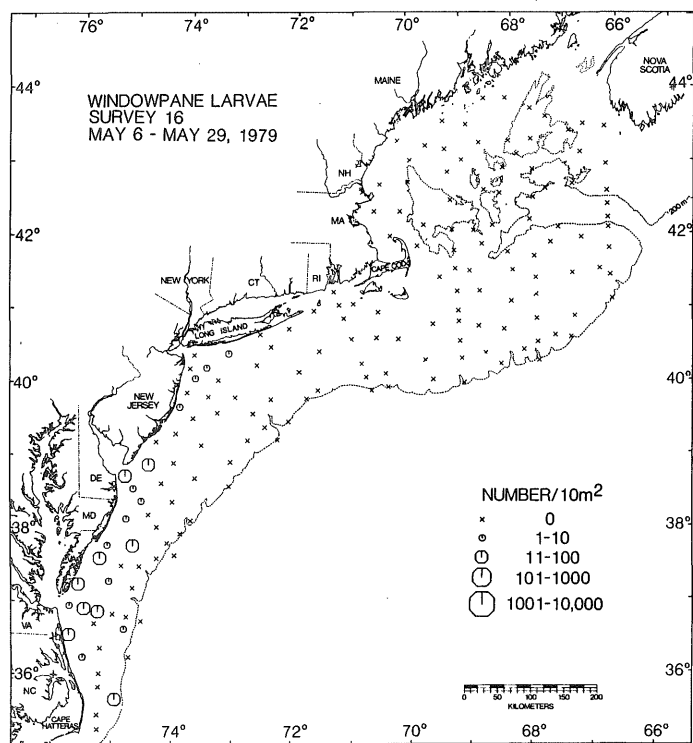


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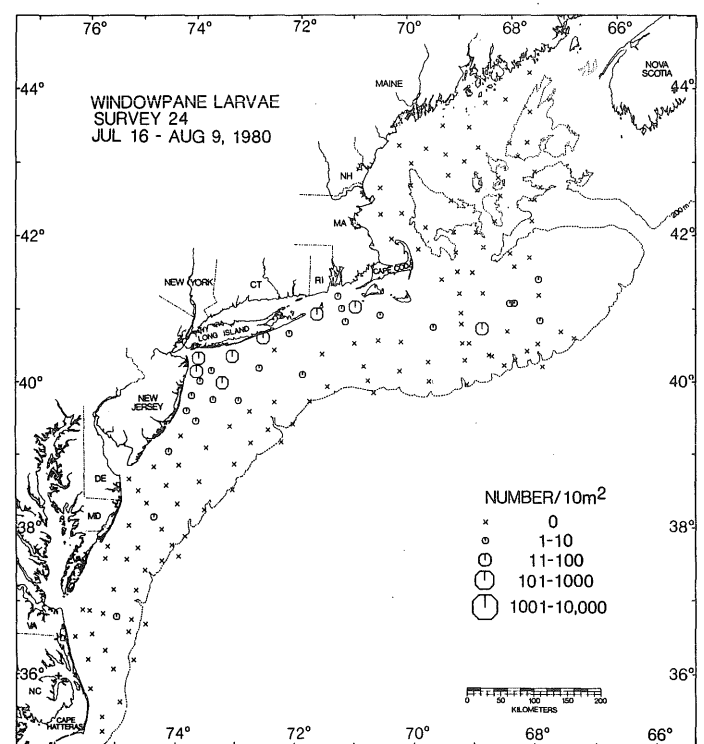
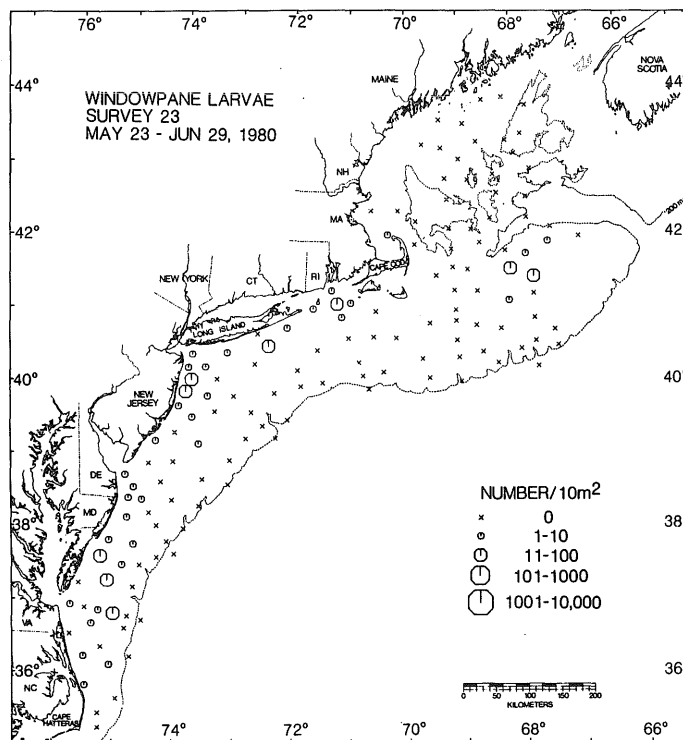
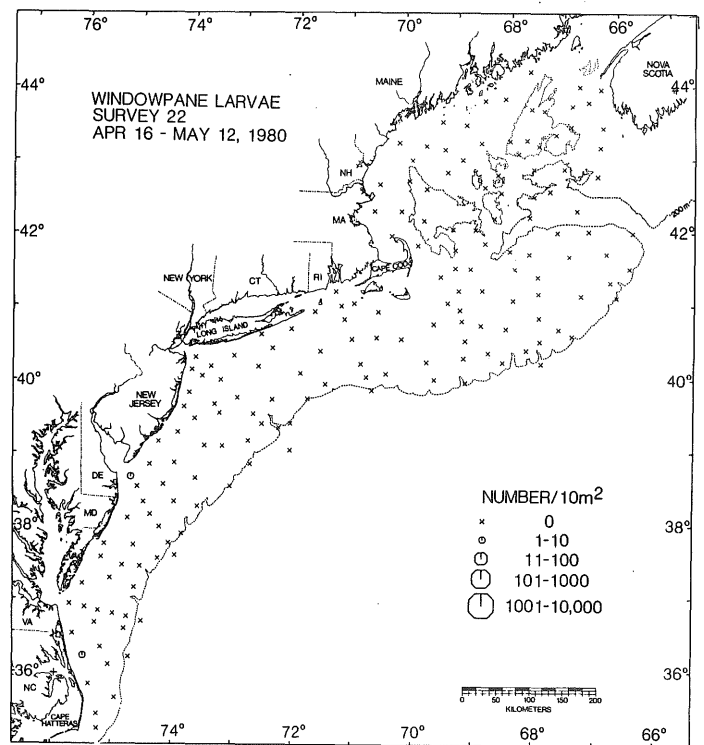
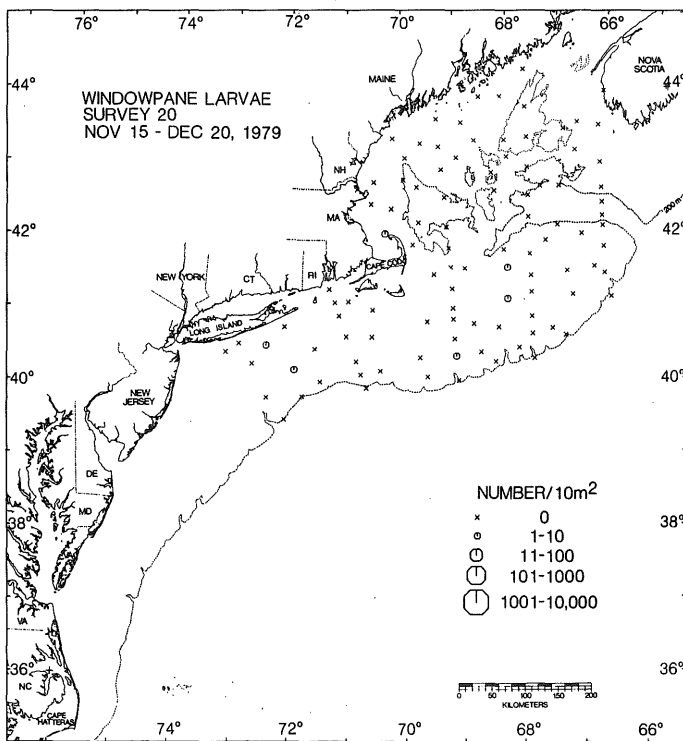


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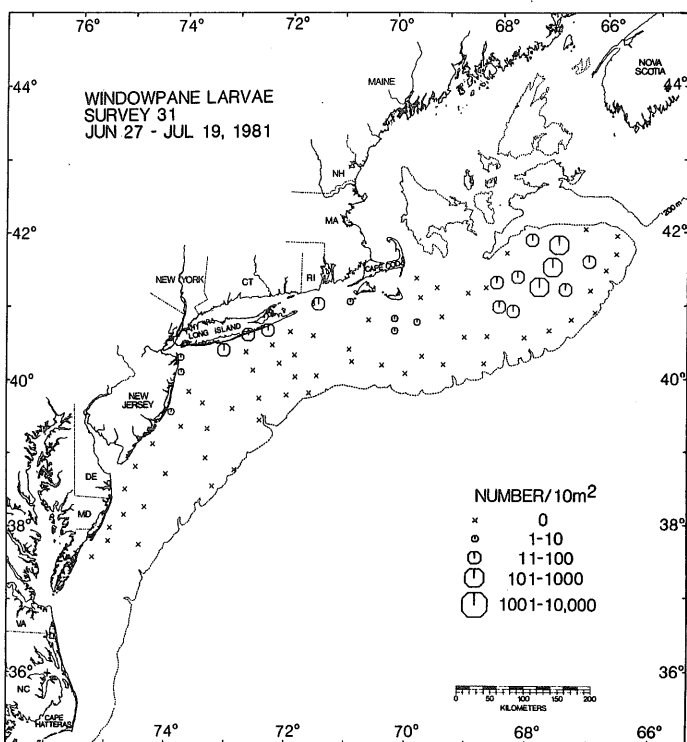
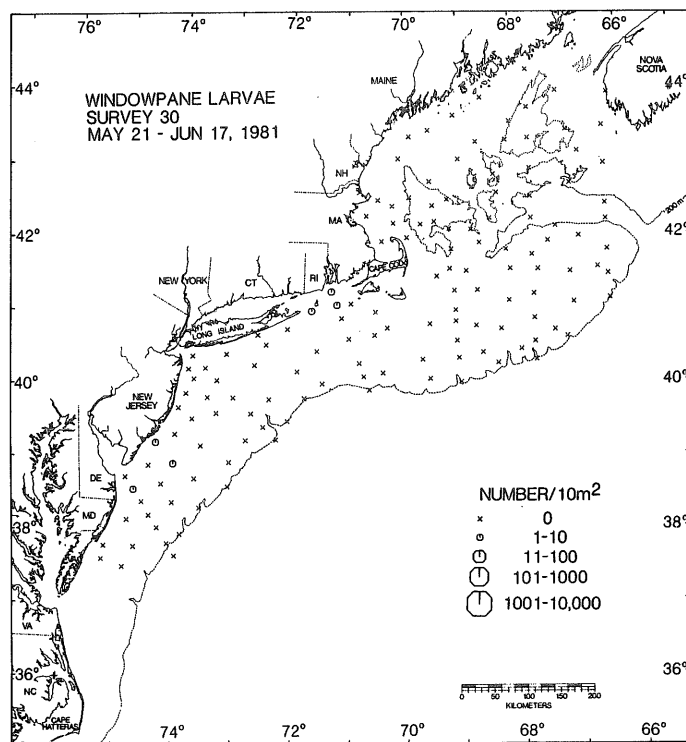
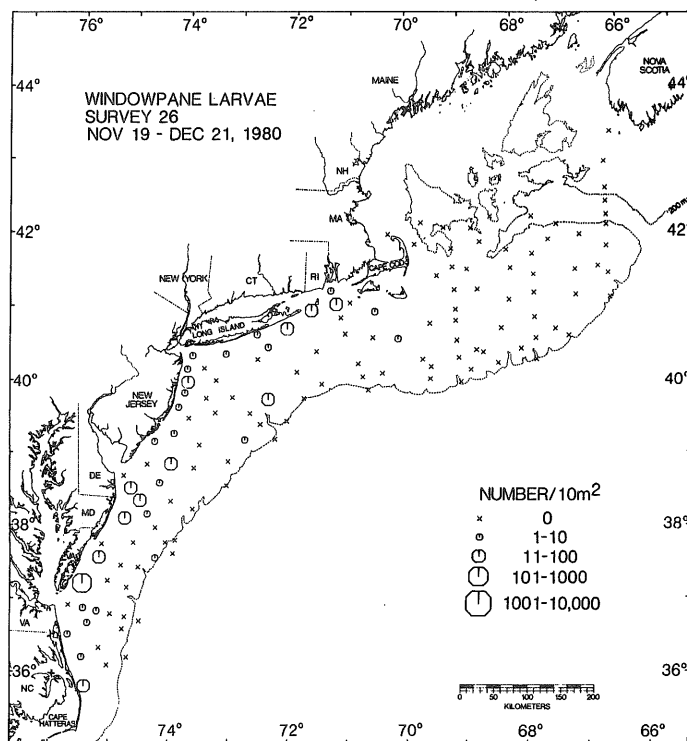
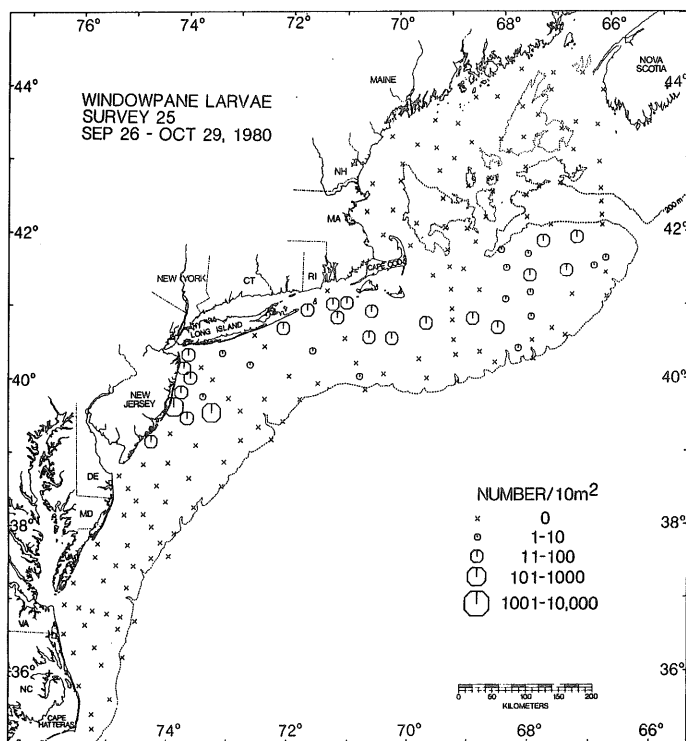


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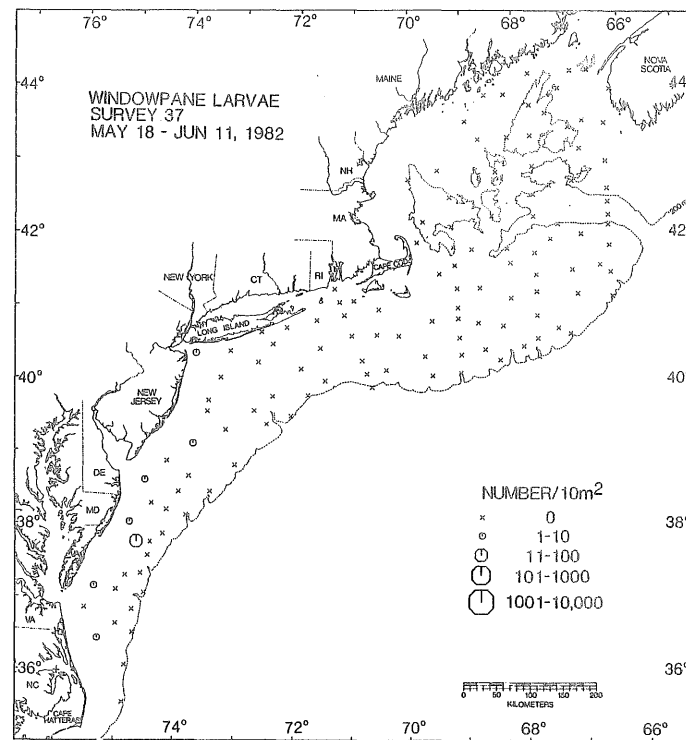
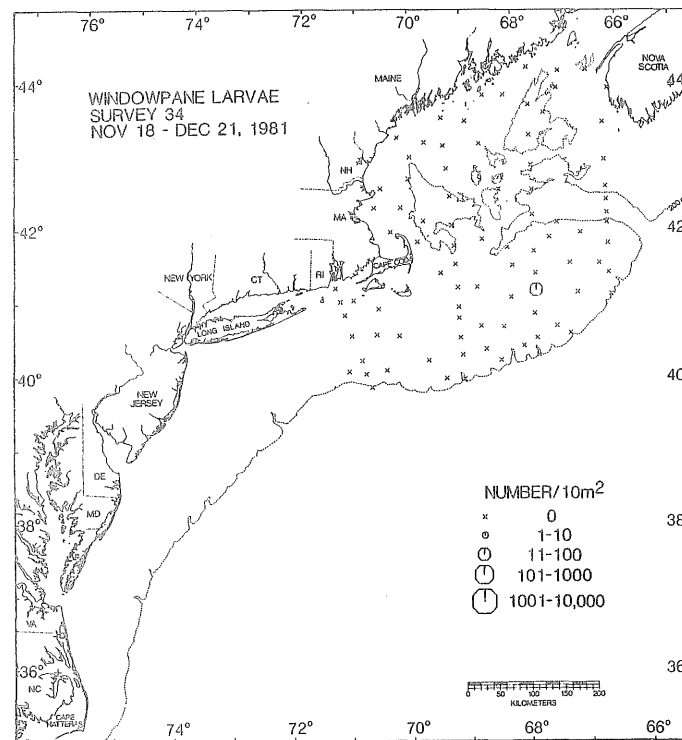
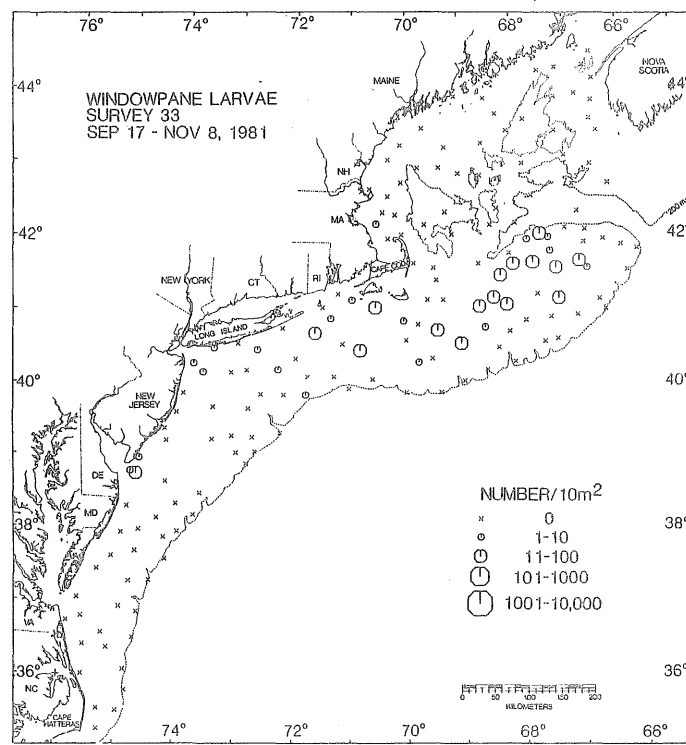
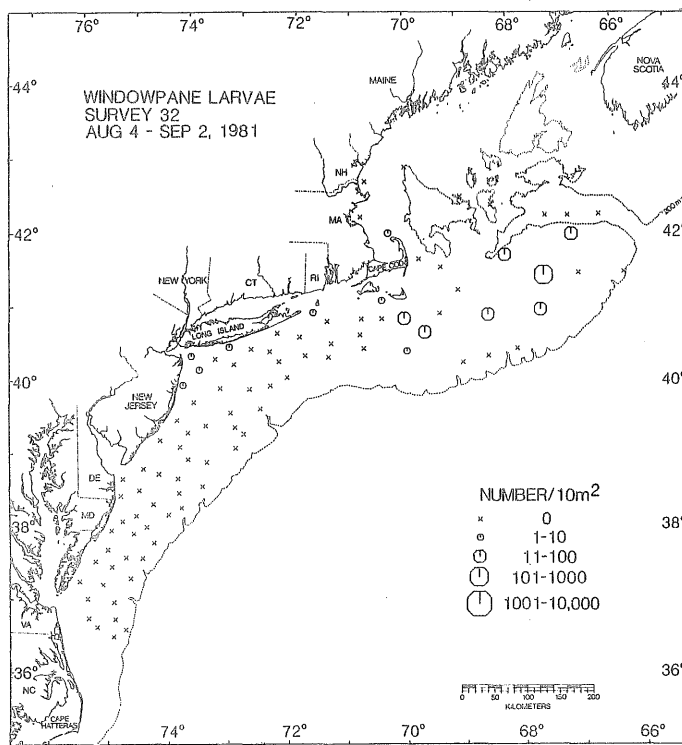


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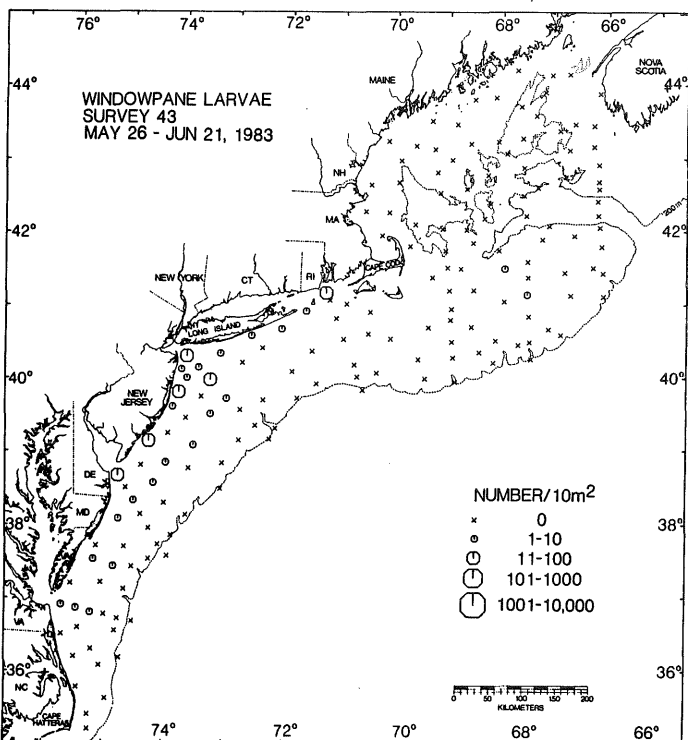
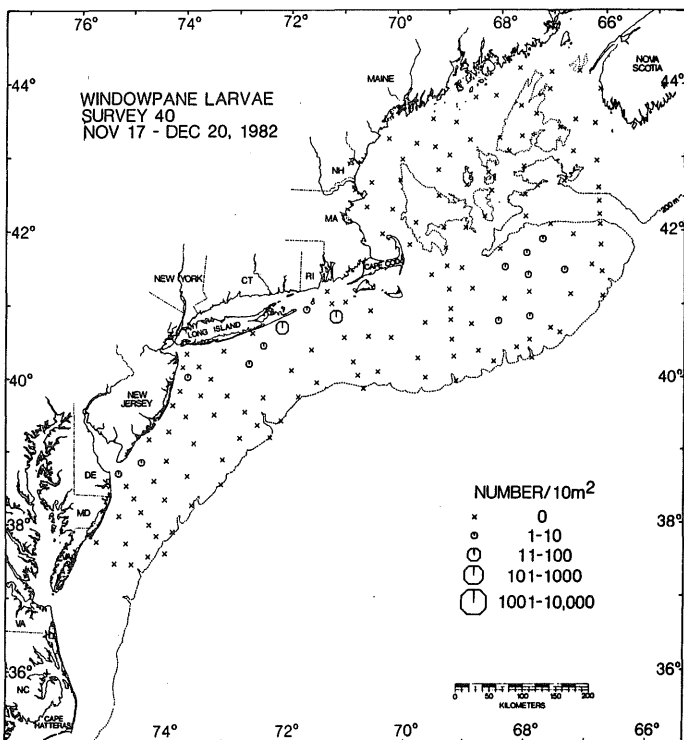
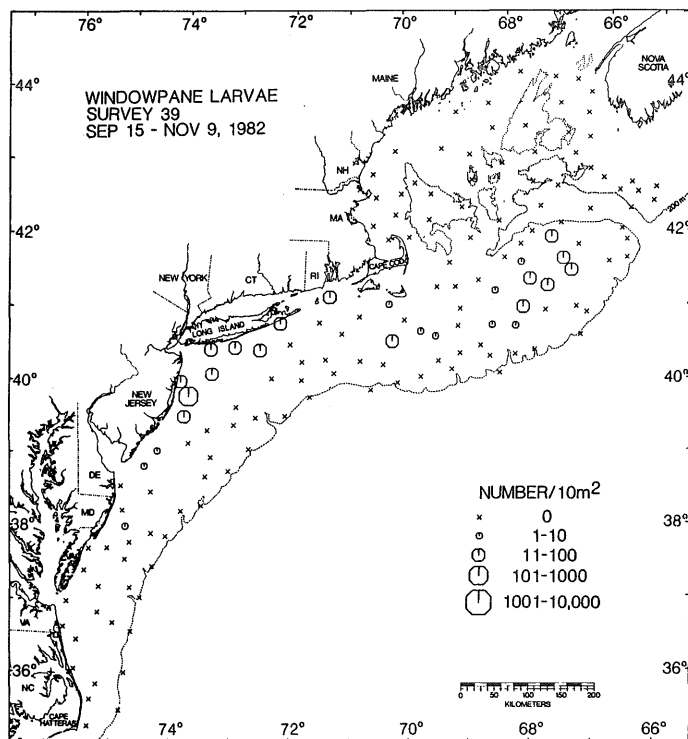
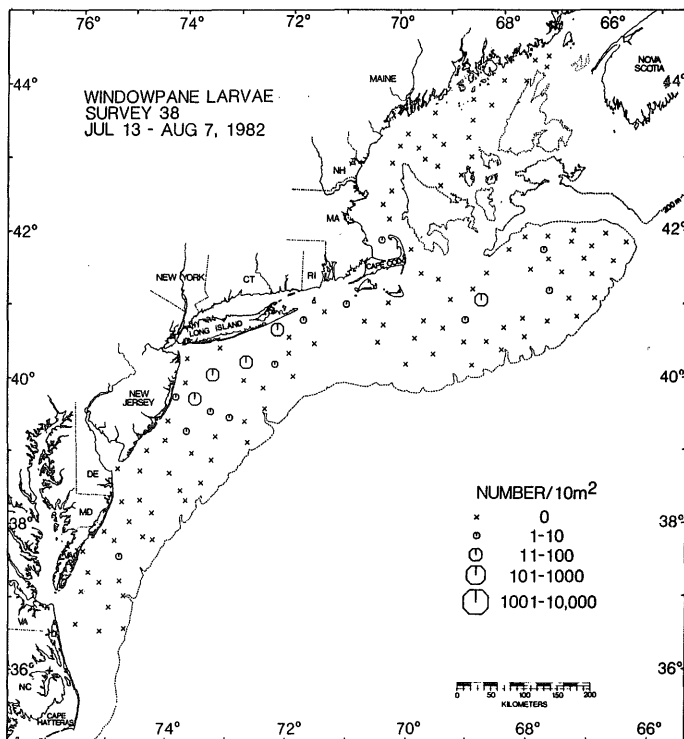


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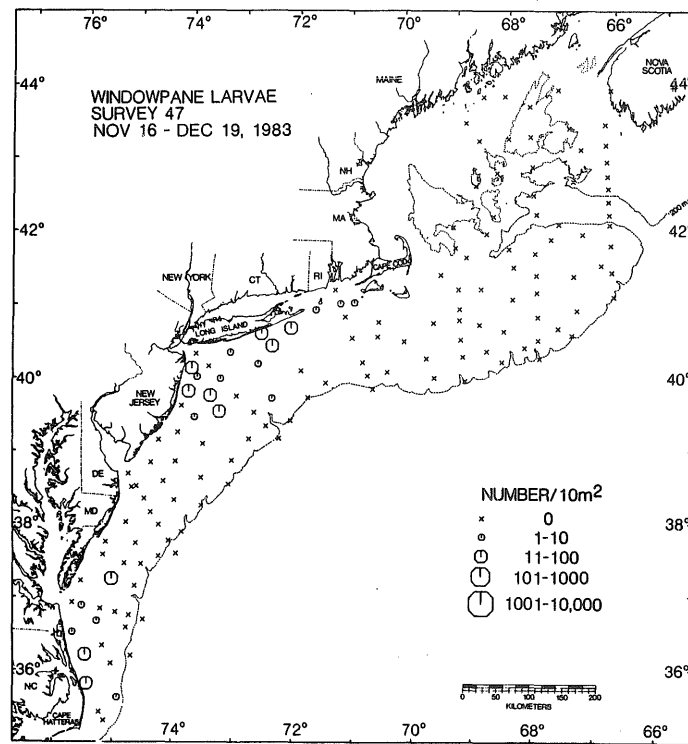
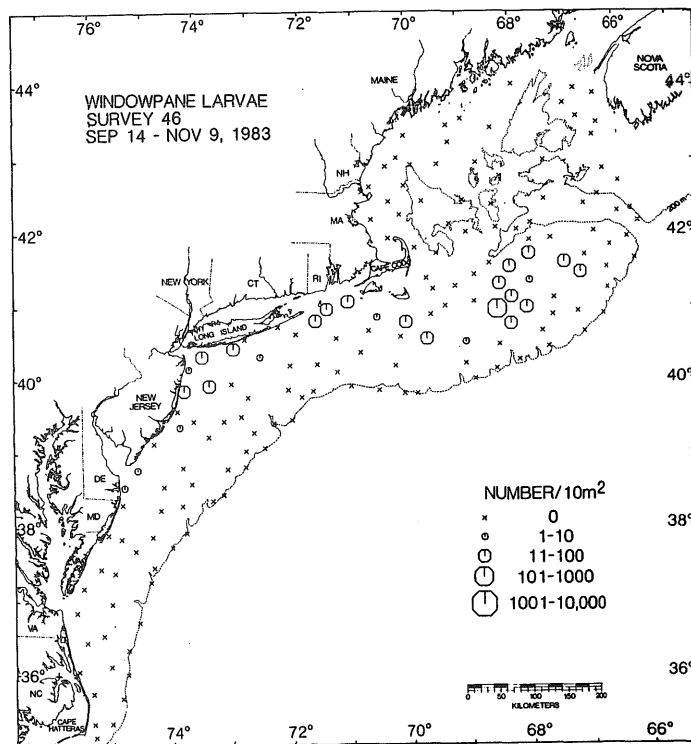
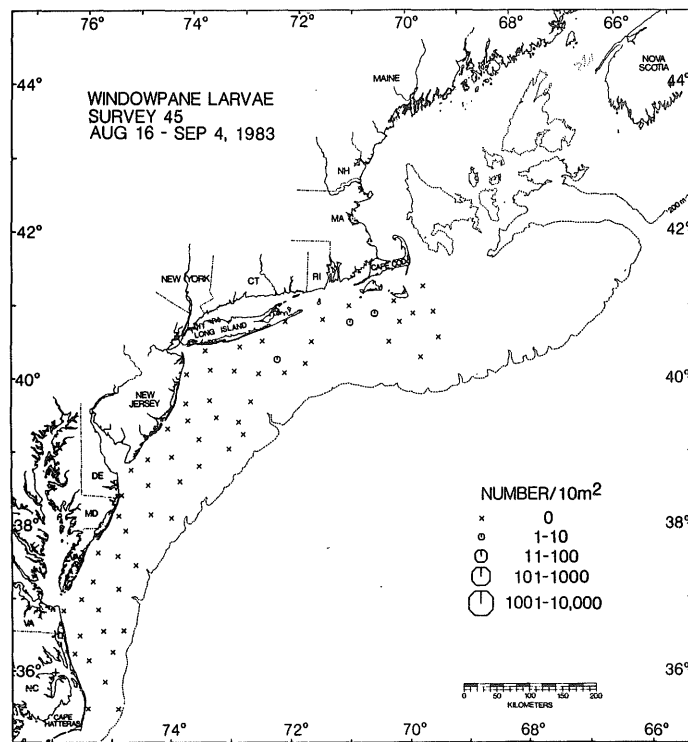
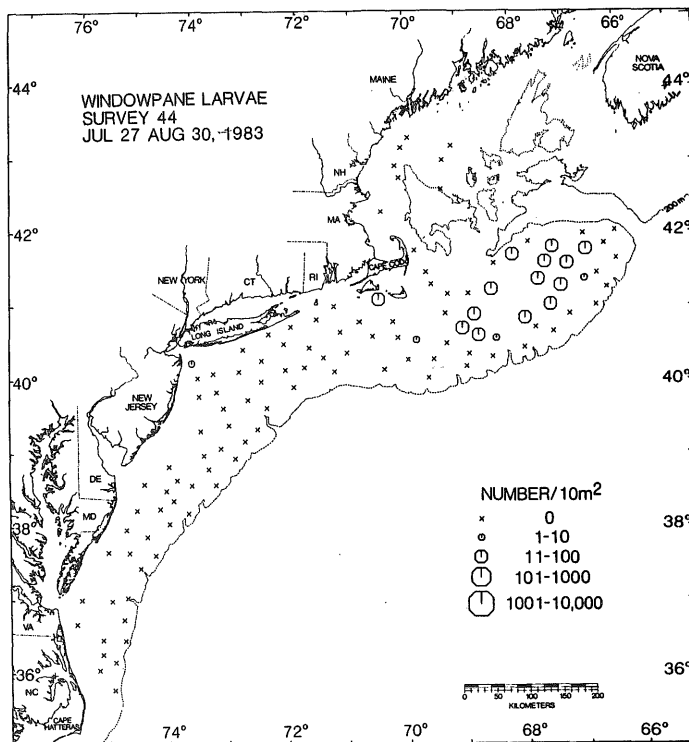


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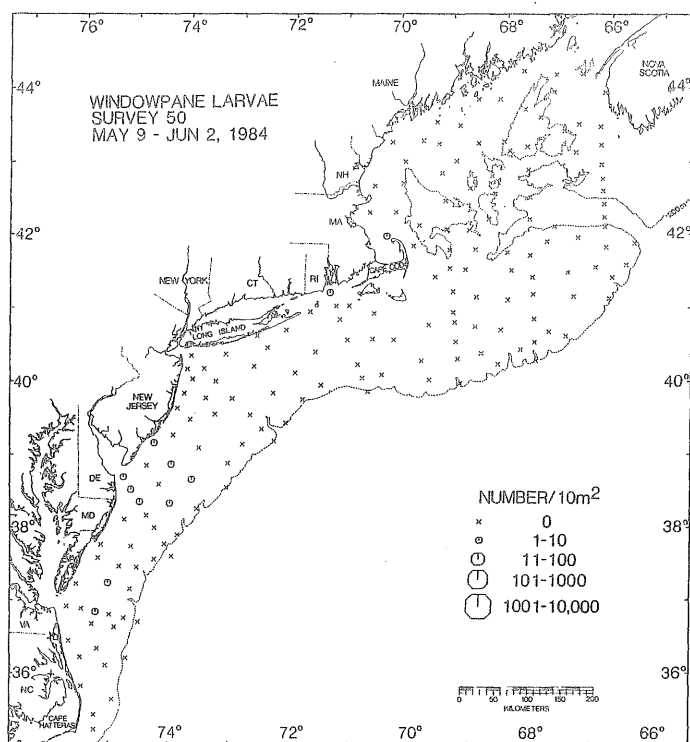
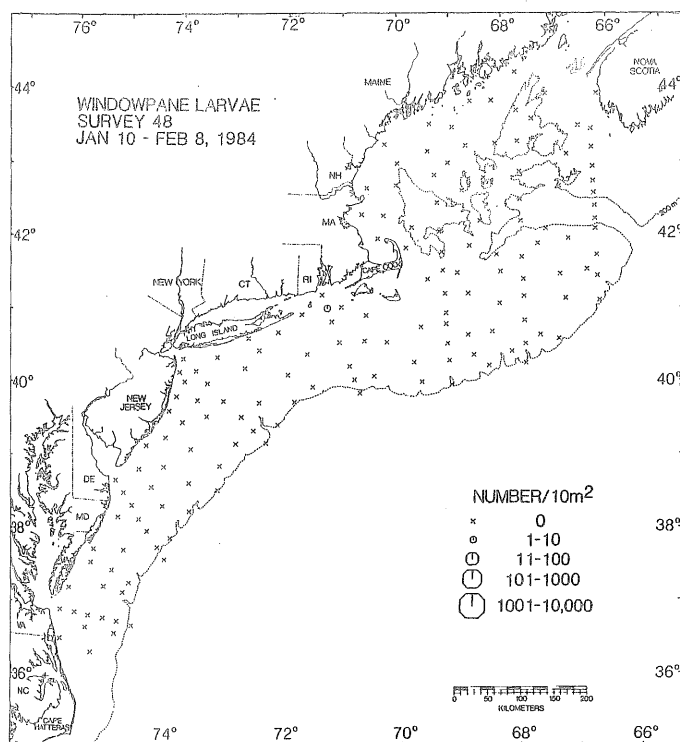


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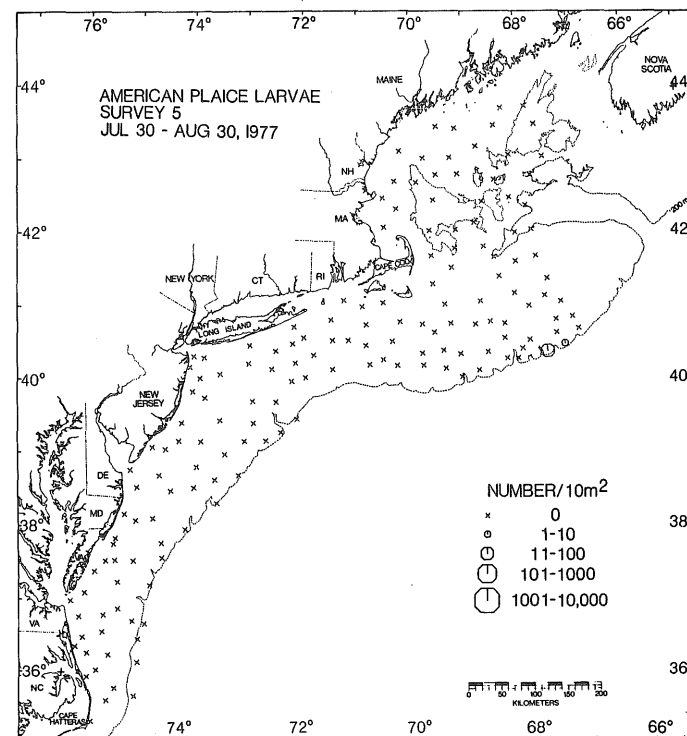
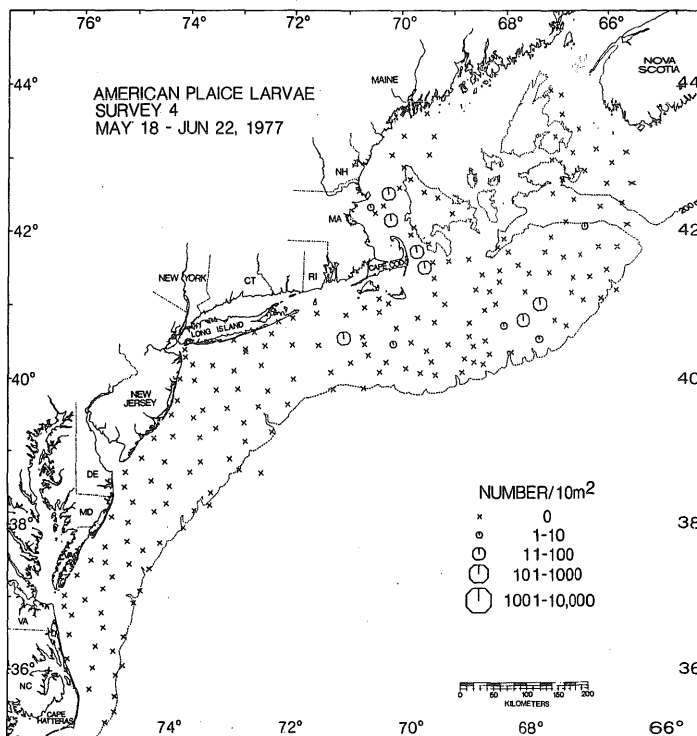
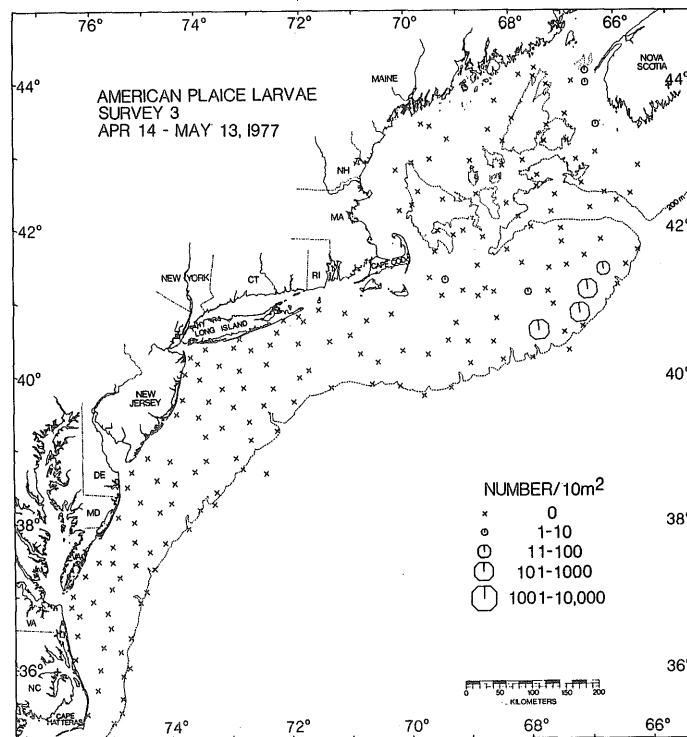
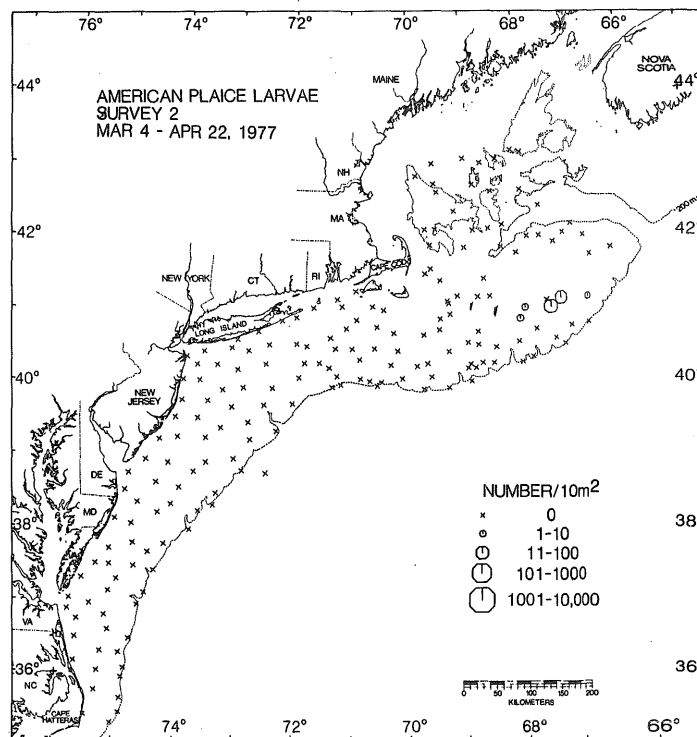


Figure 25. Distribution and abundance of American plaice, *Hippoglossoides platessoides*, larvae off northeastern United States, winter 1977 through spring 1984.

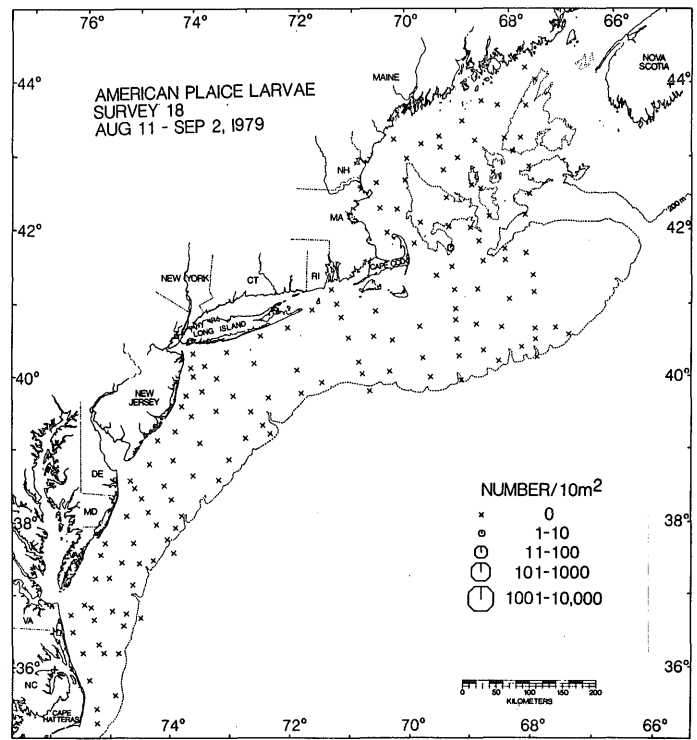
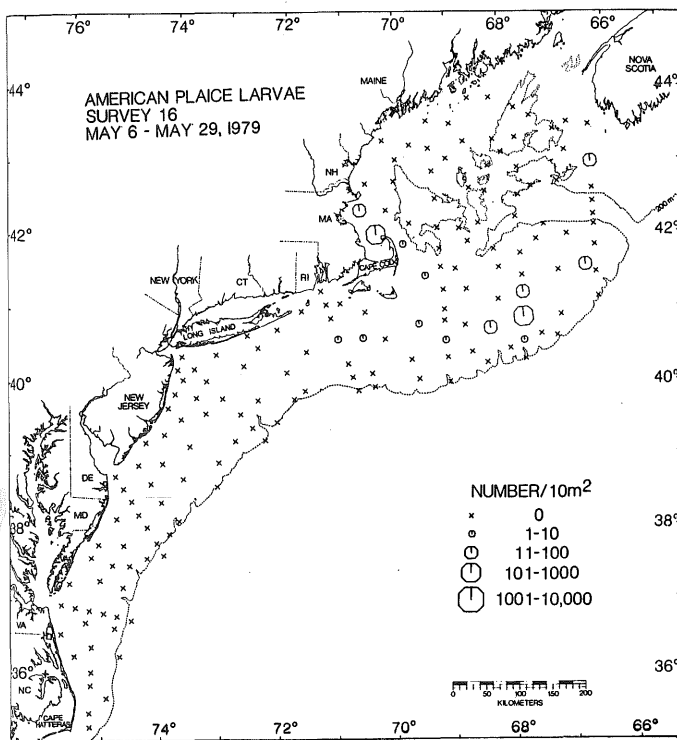
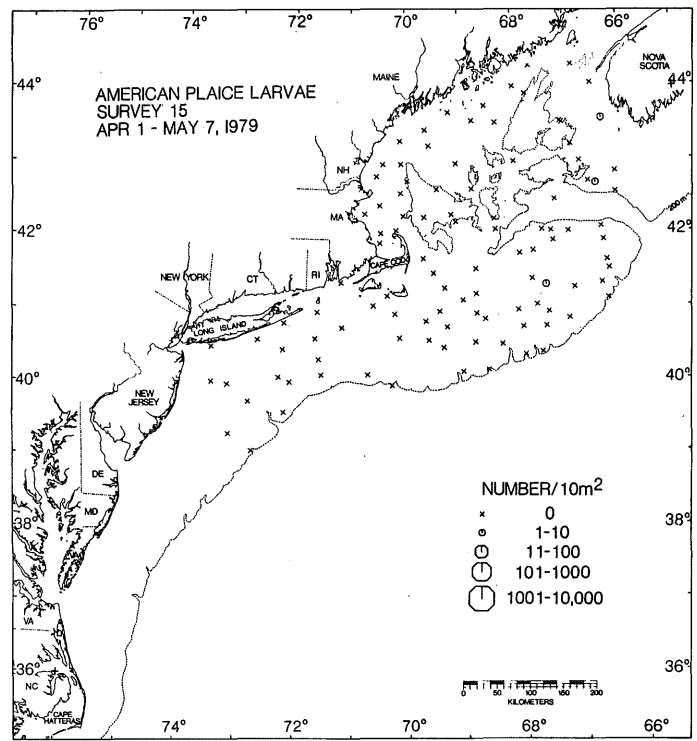
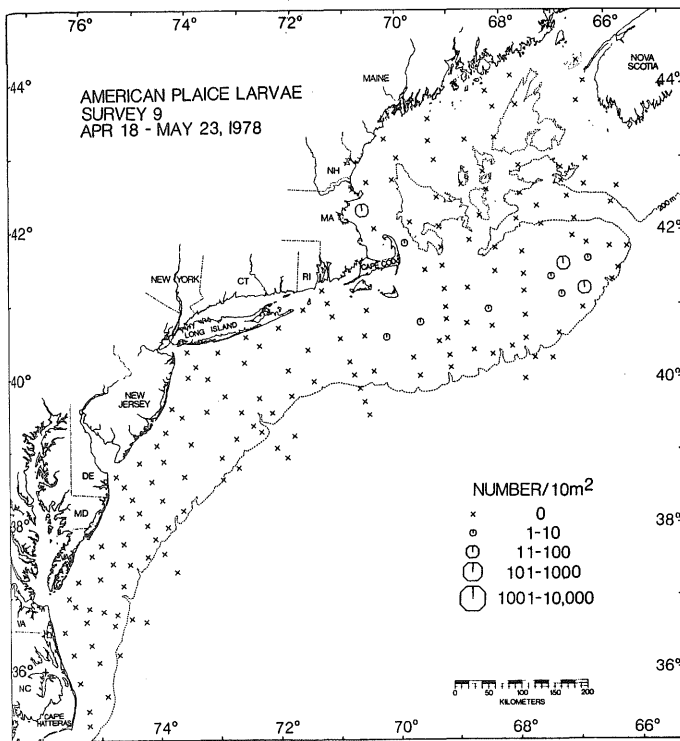


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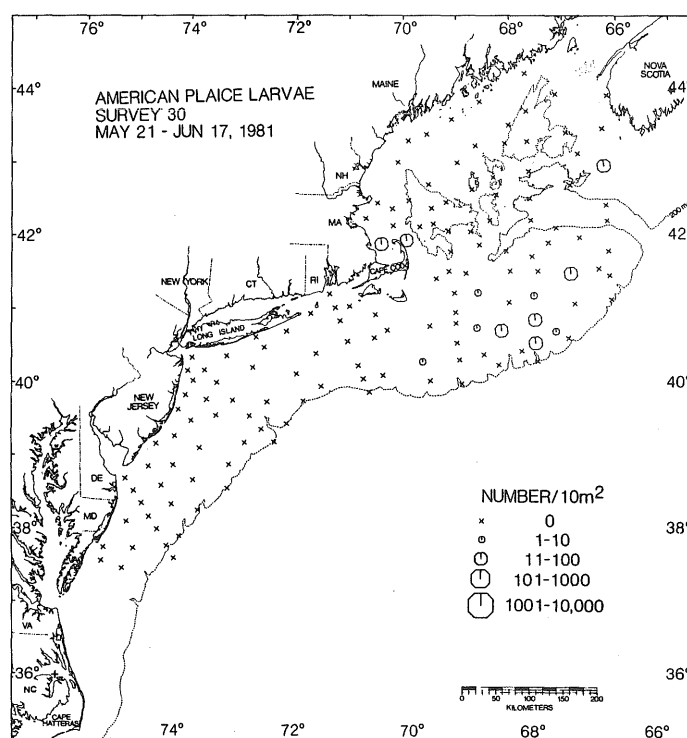
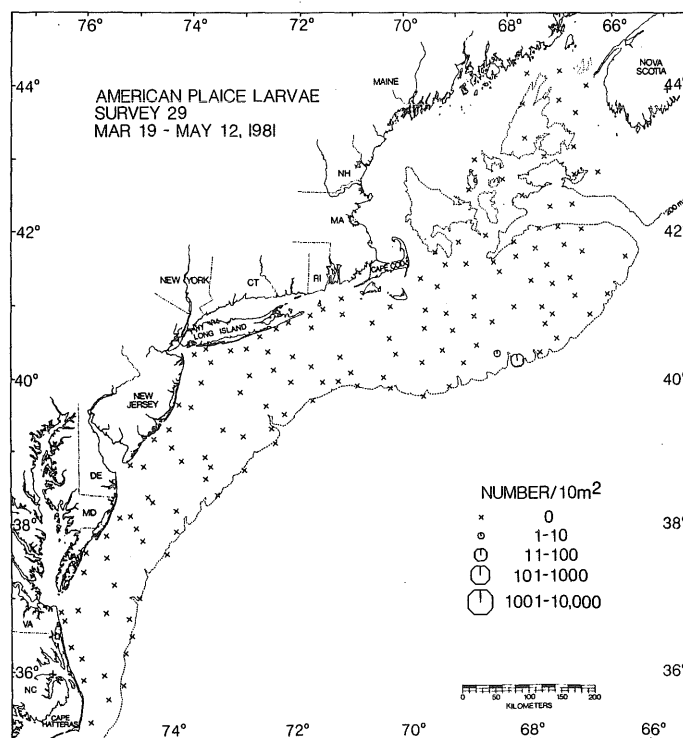
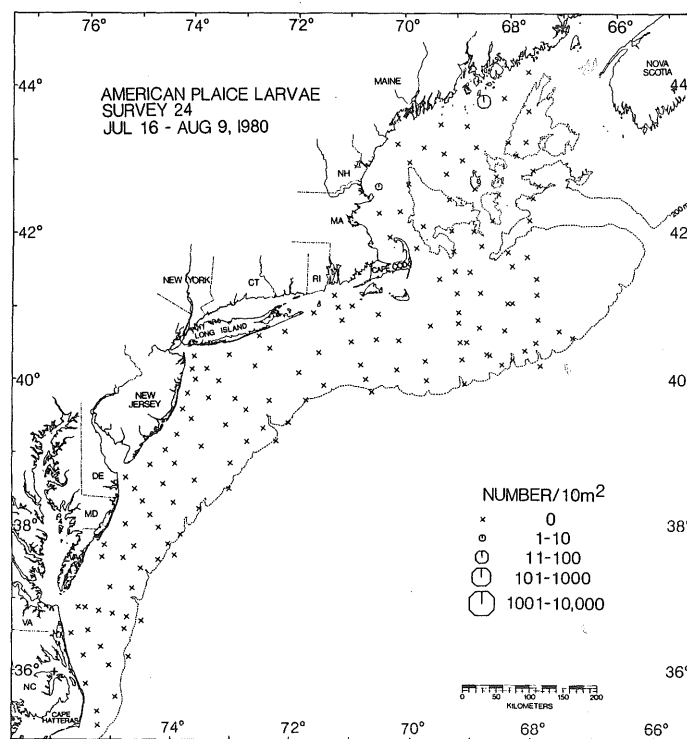
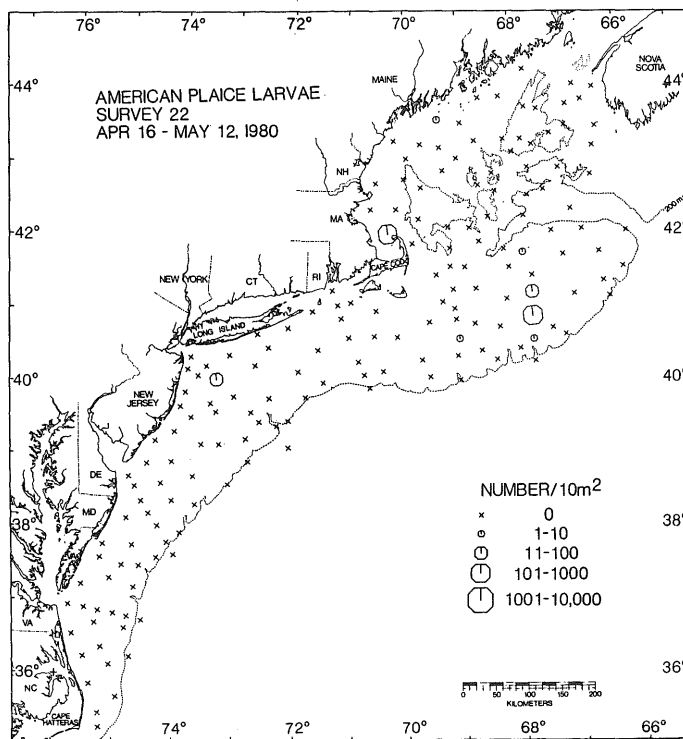


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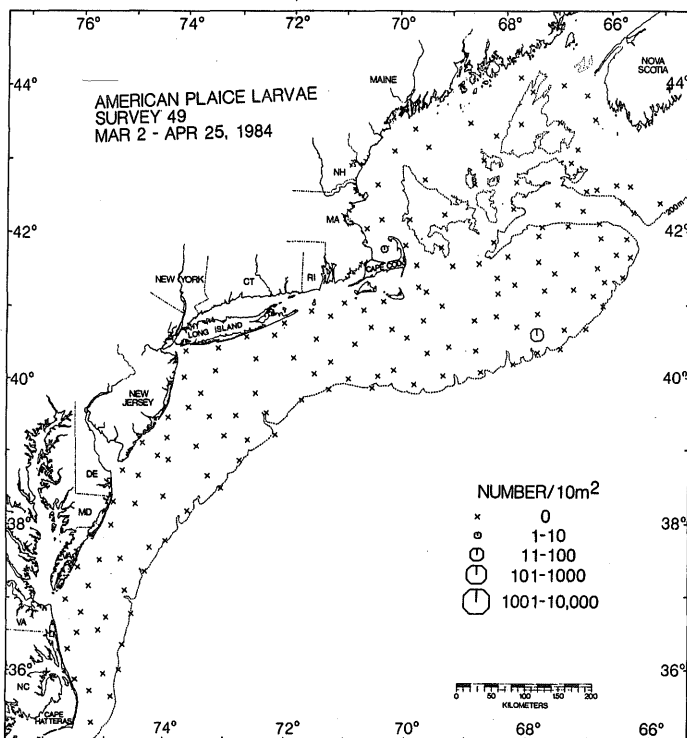
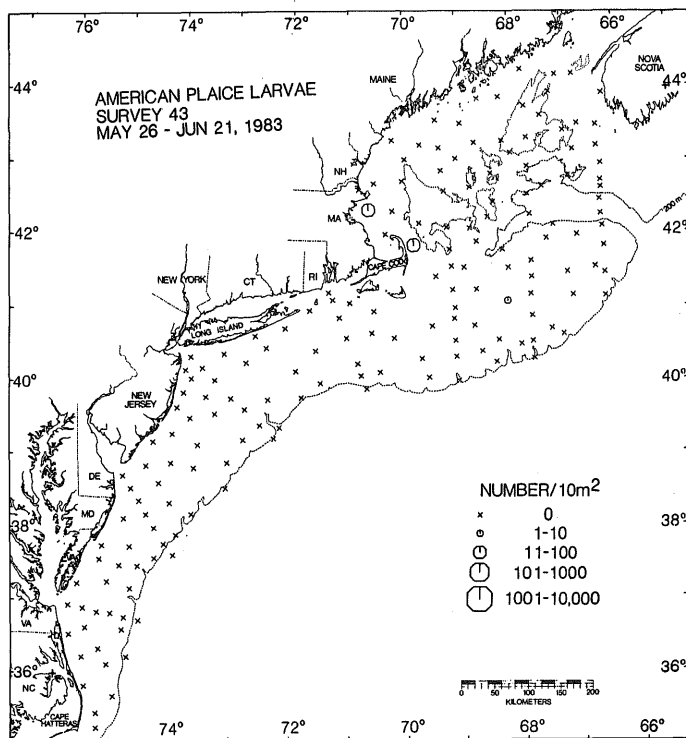
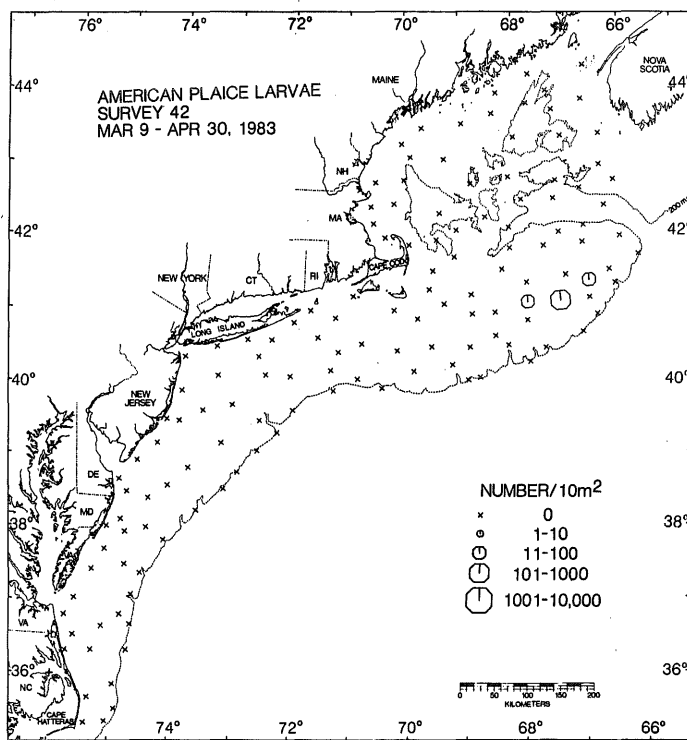
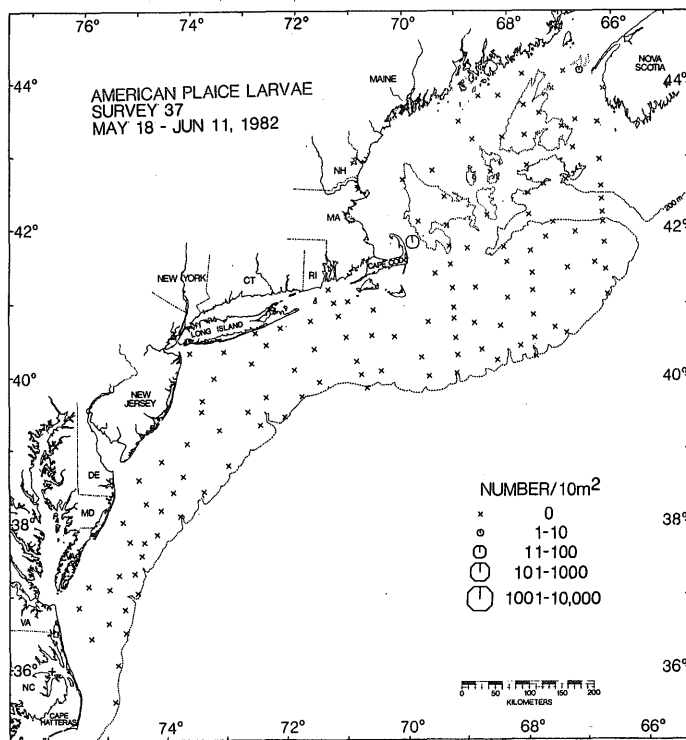


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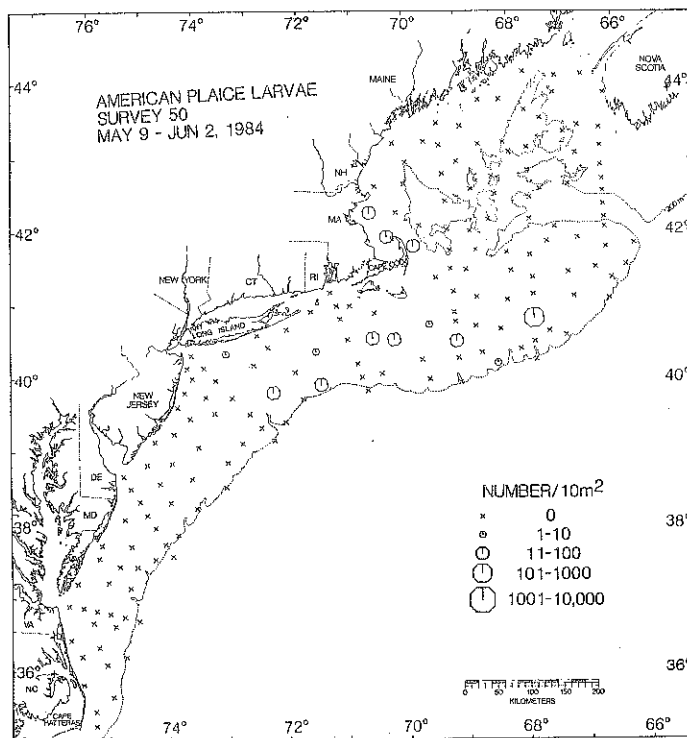


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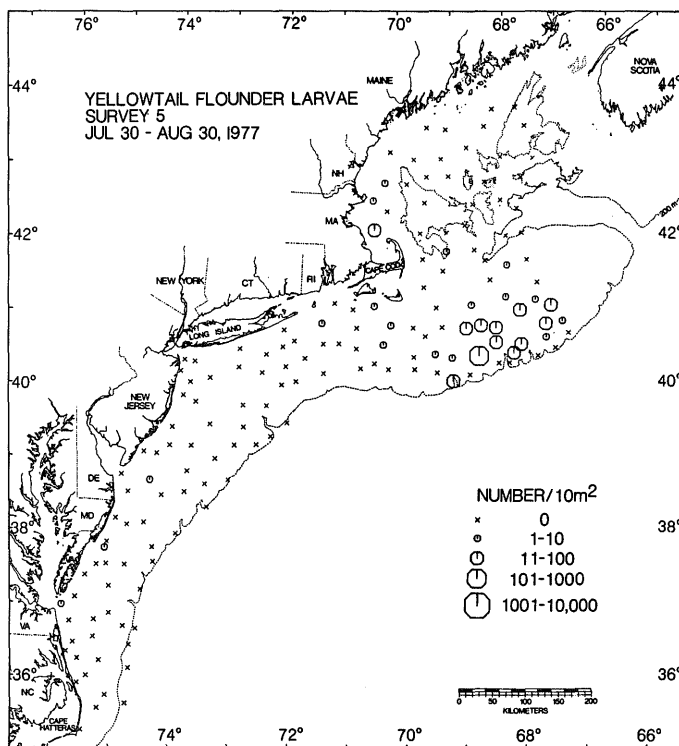
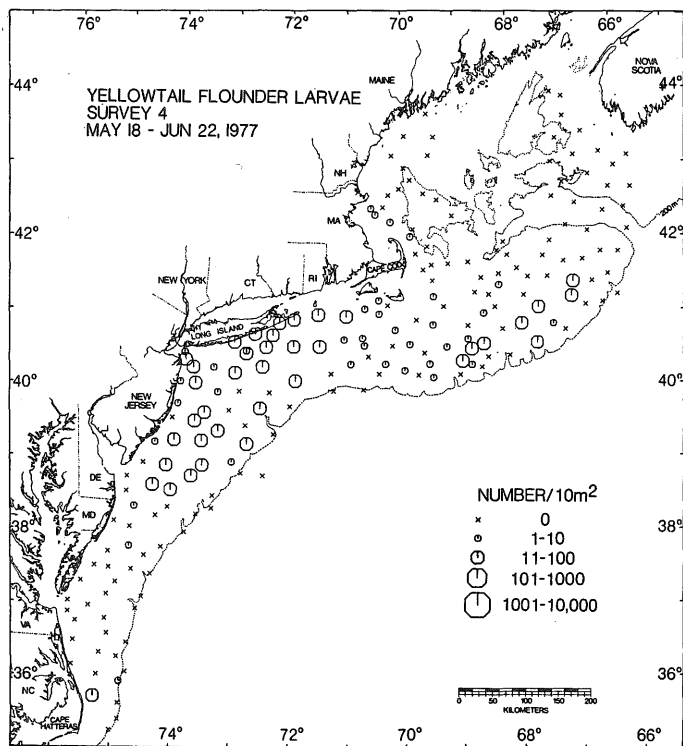
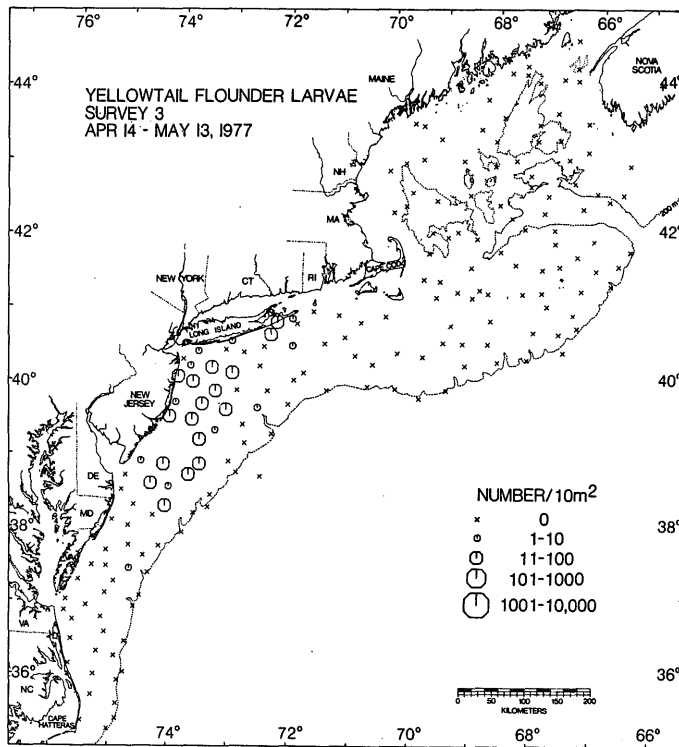
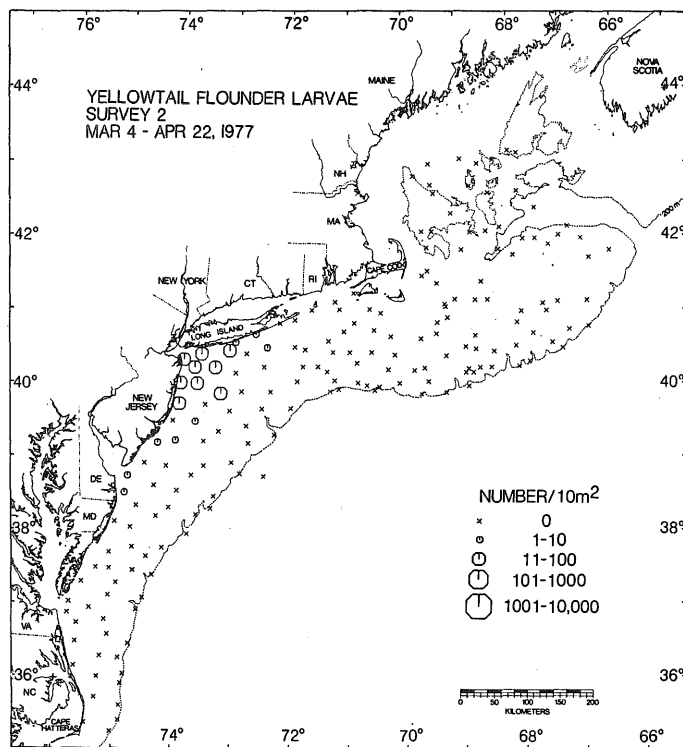


Figure 26. Distribution and abundance of yellowtail flounder, *Limanda ferruginea*, larvae off northeastern United States, winter 1977 through spring 1984.

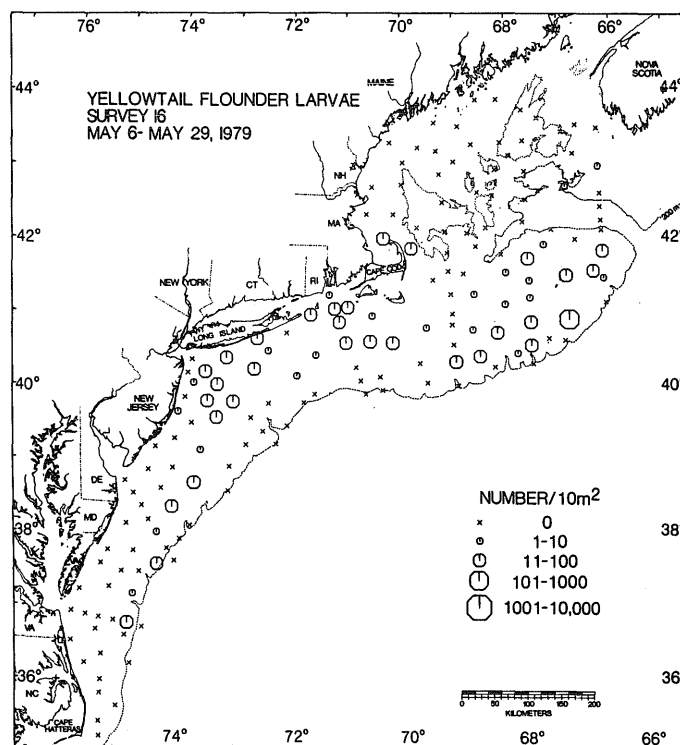
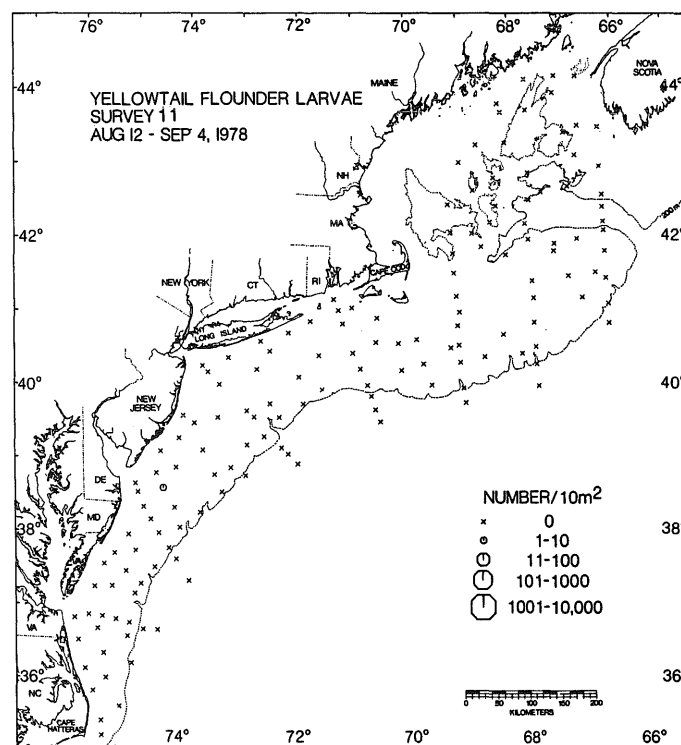
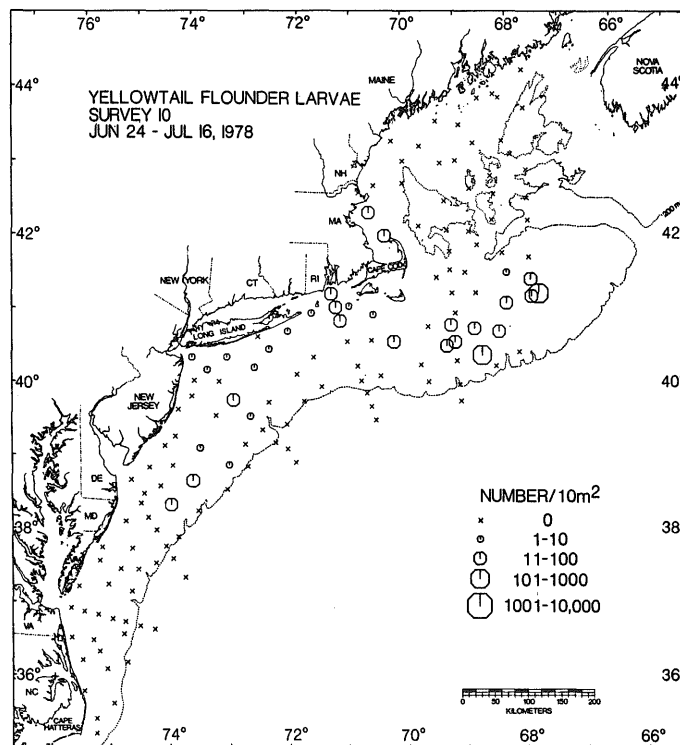
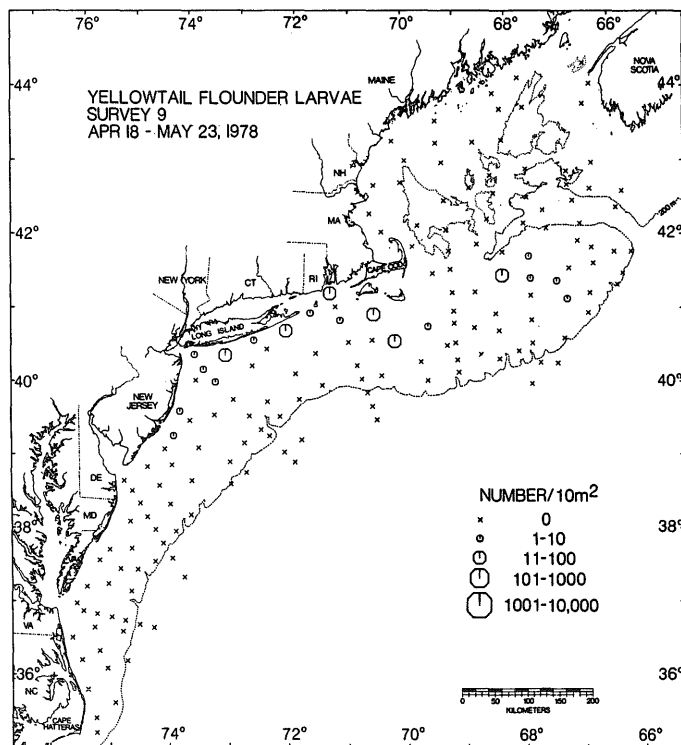


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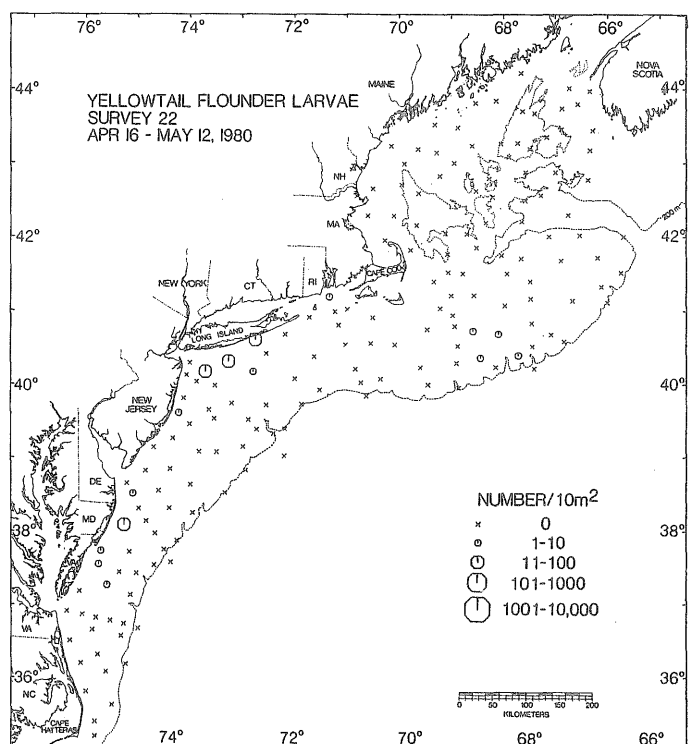
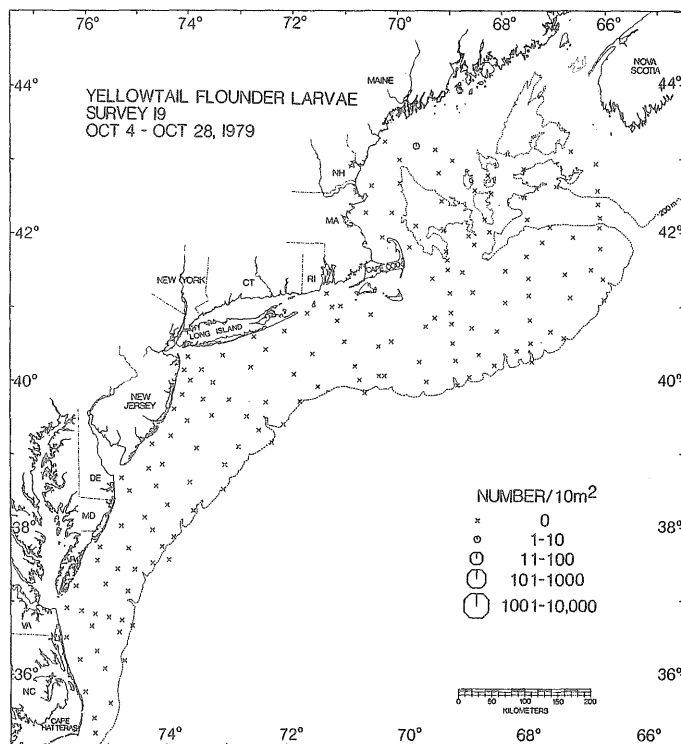
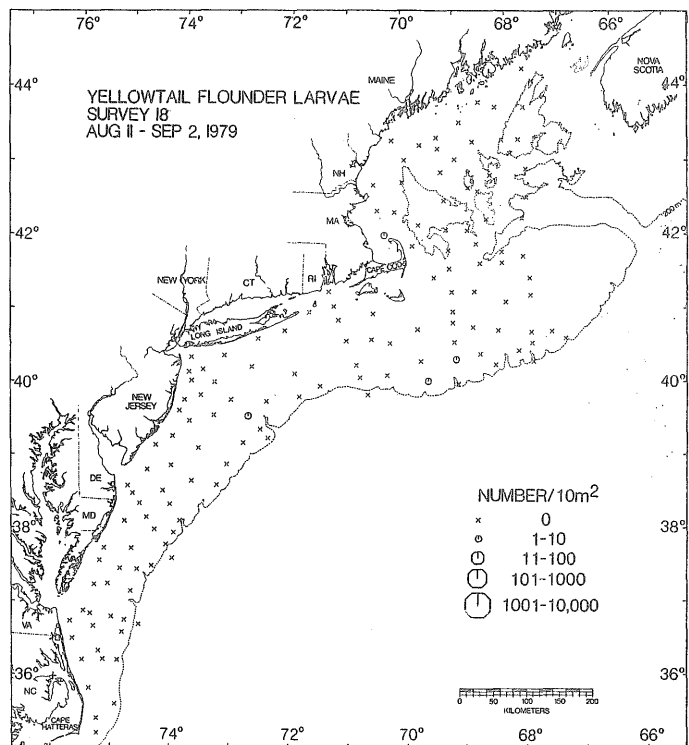
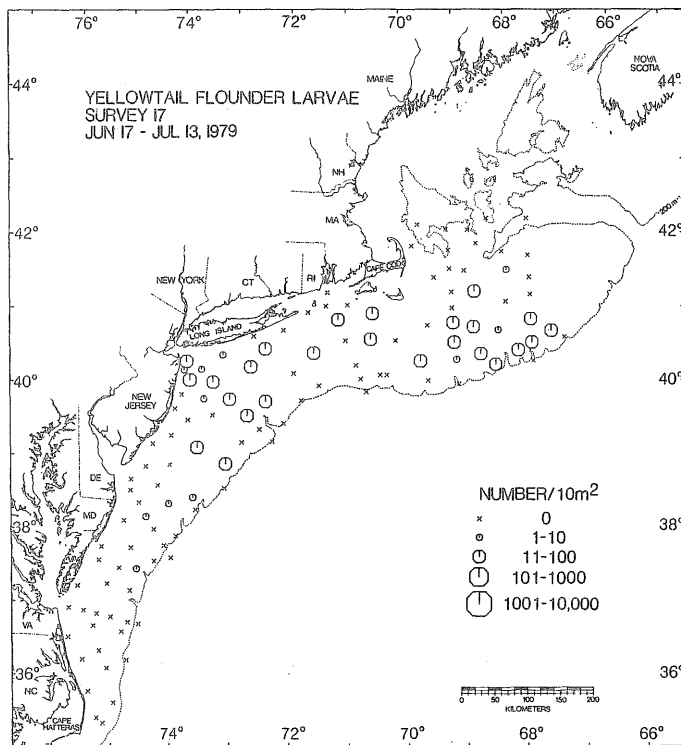


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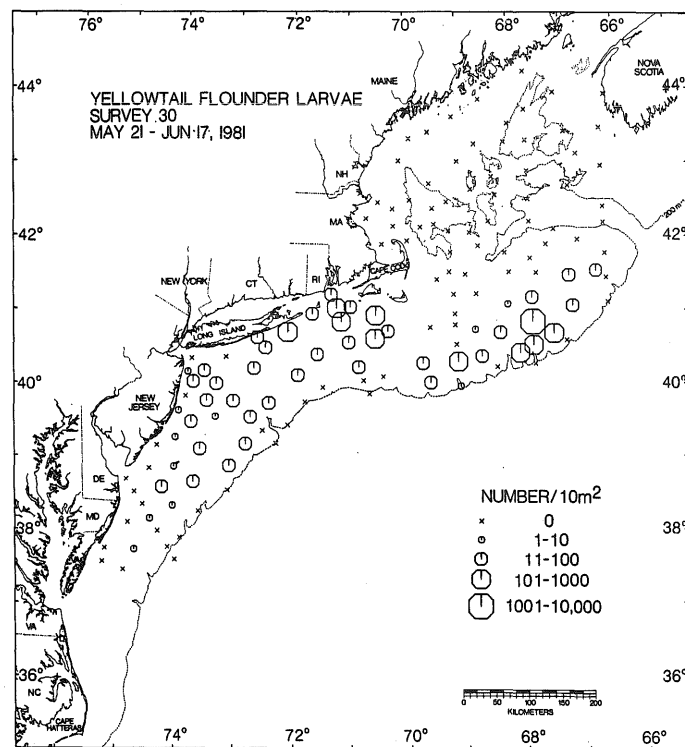
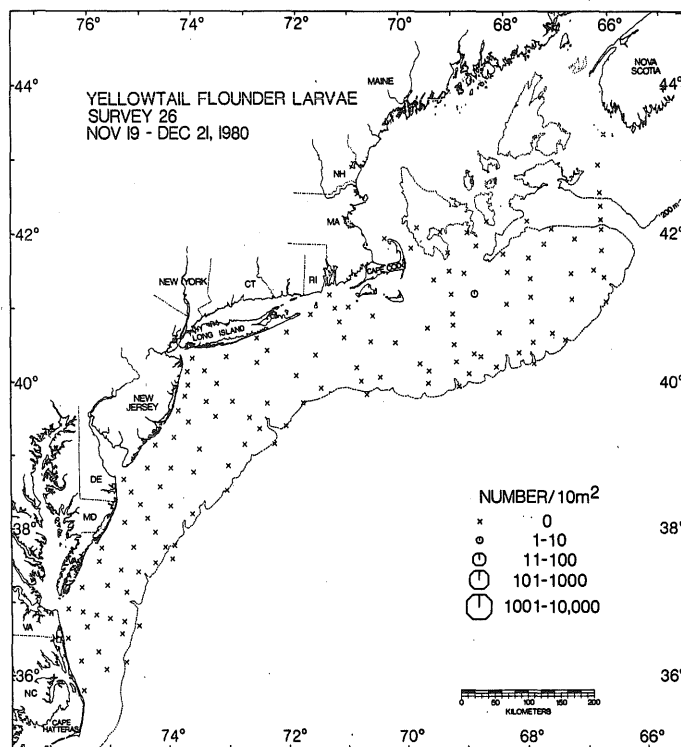
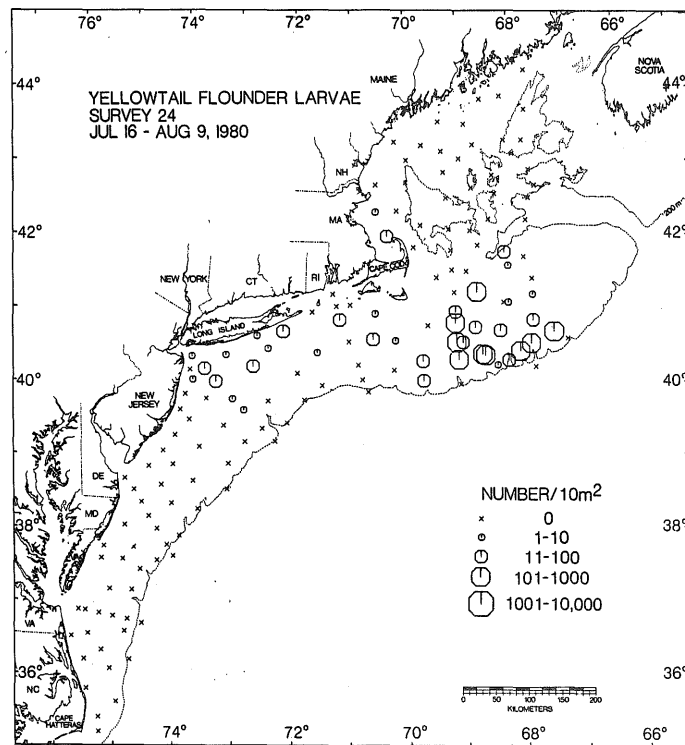
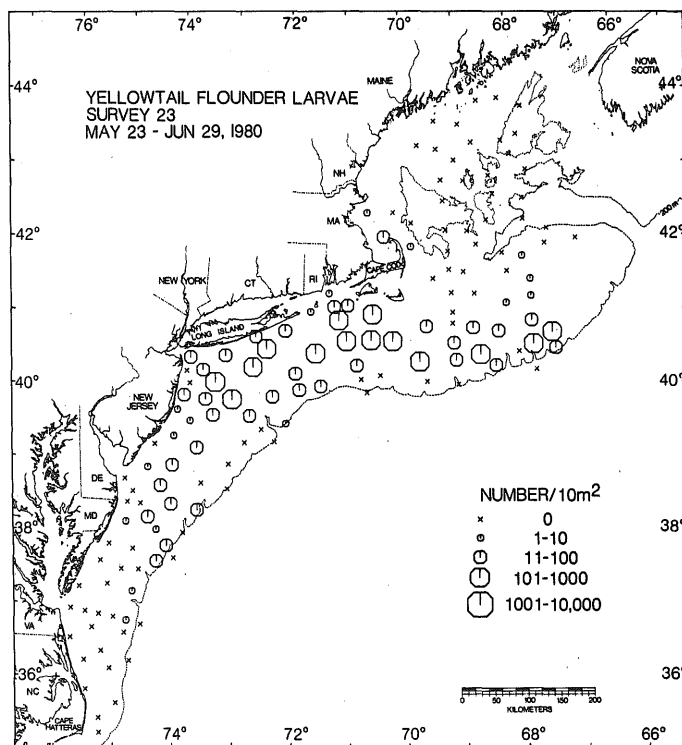


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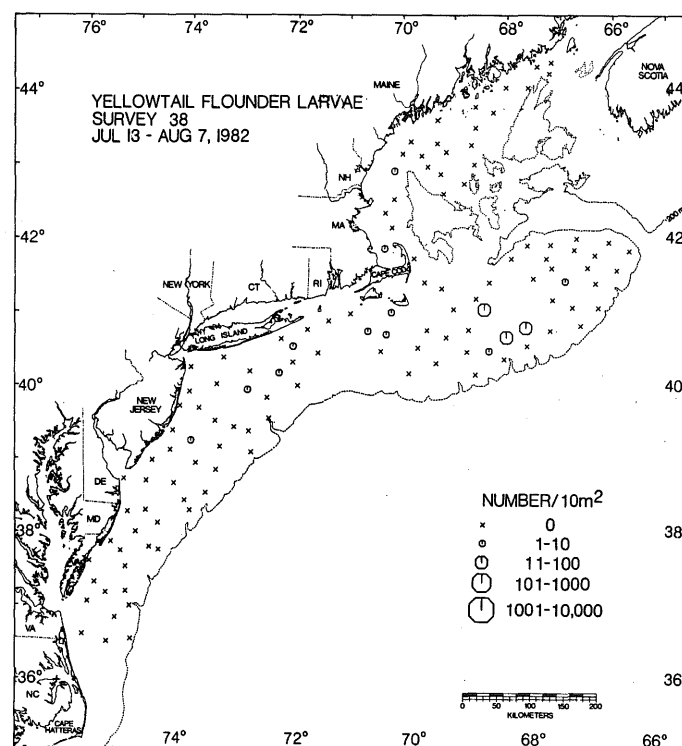
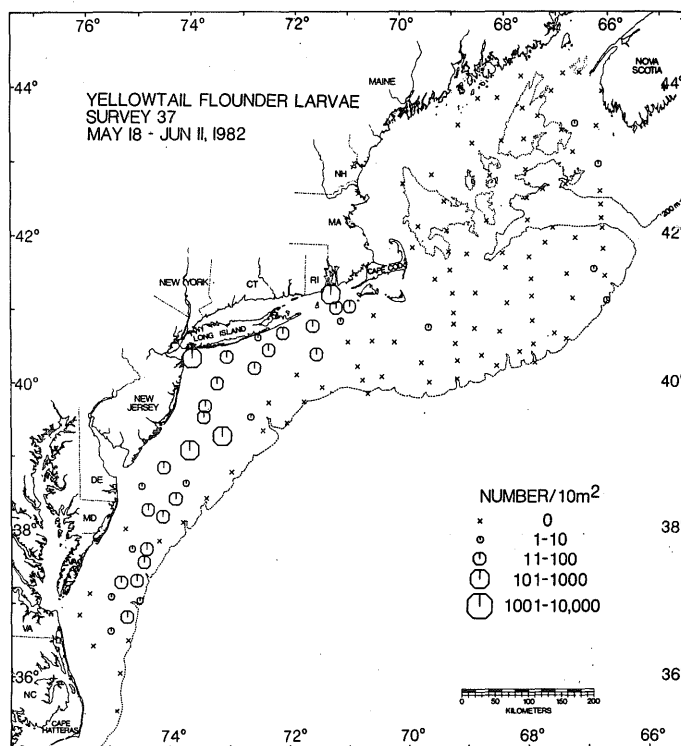
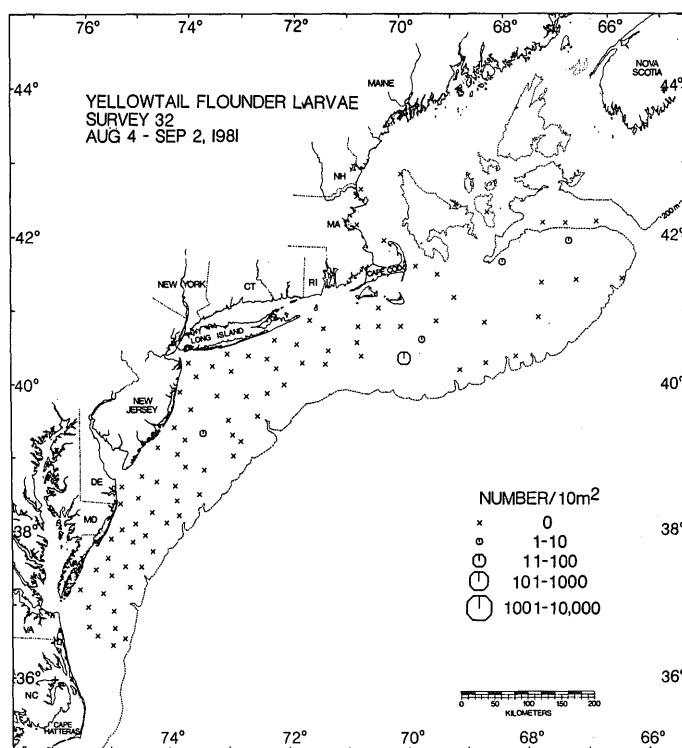
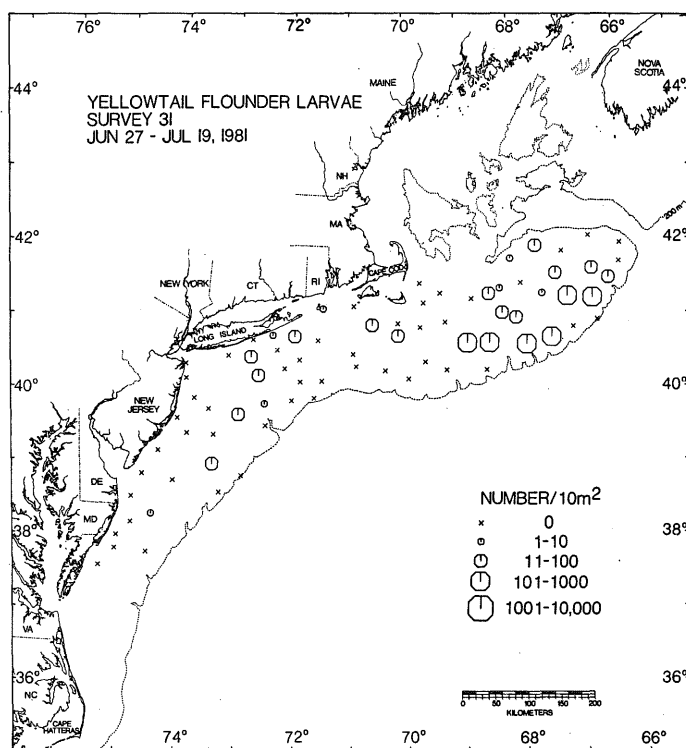


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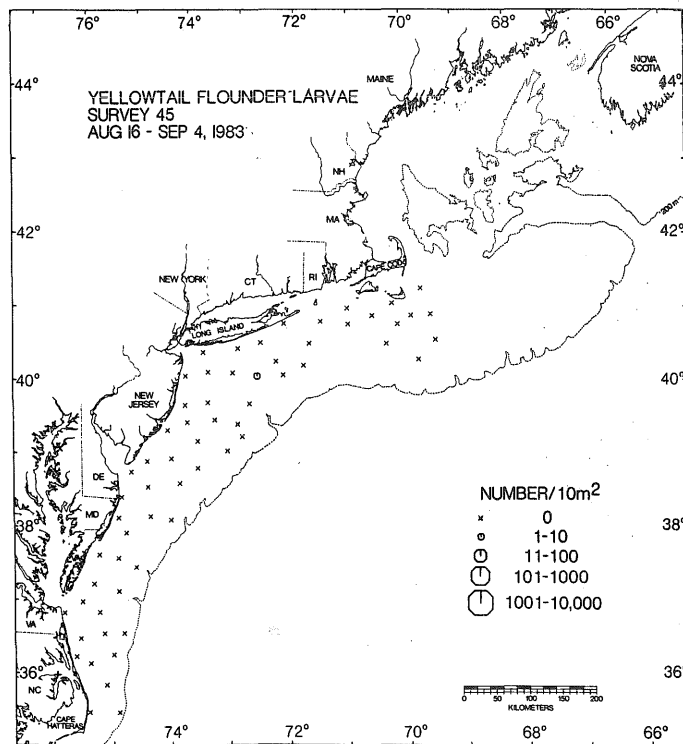
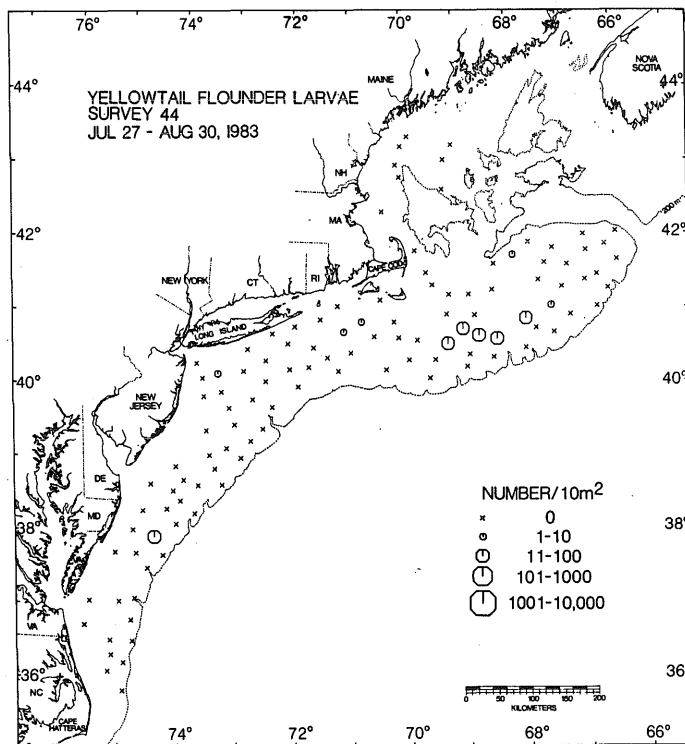
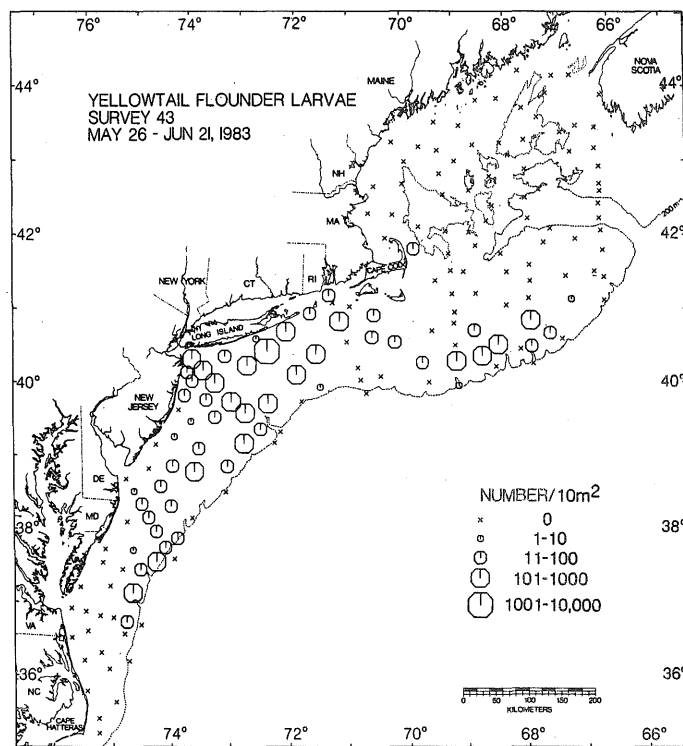
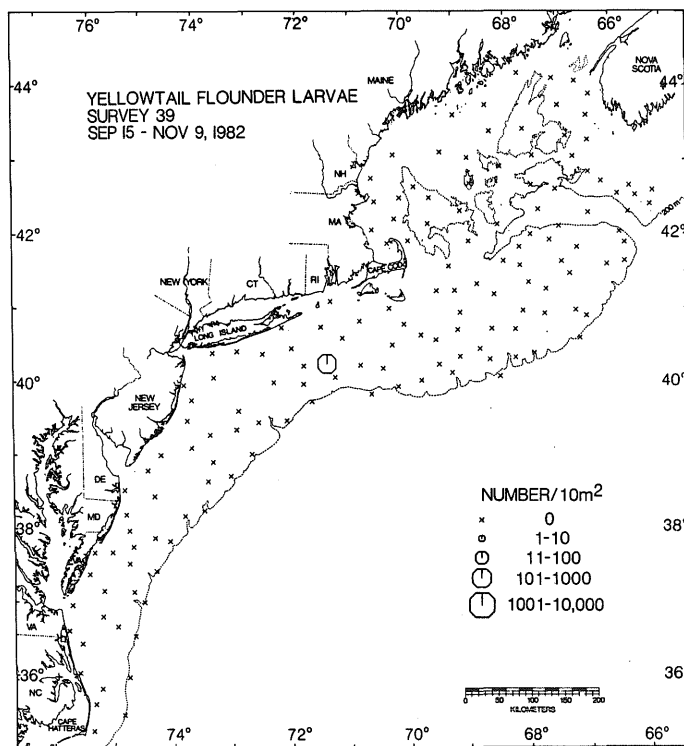


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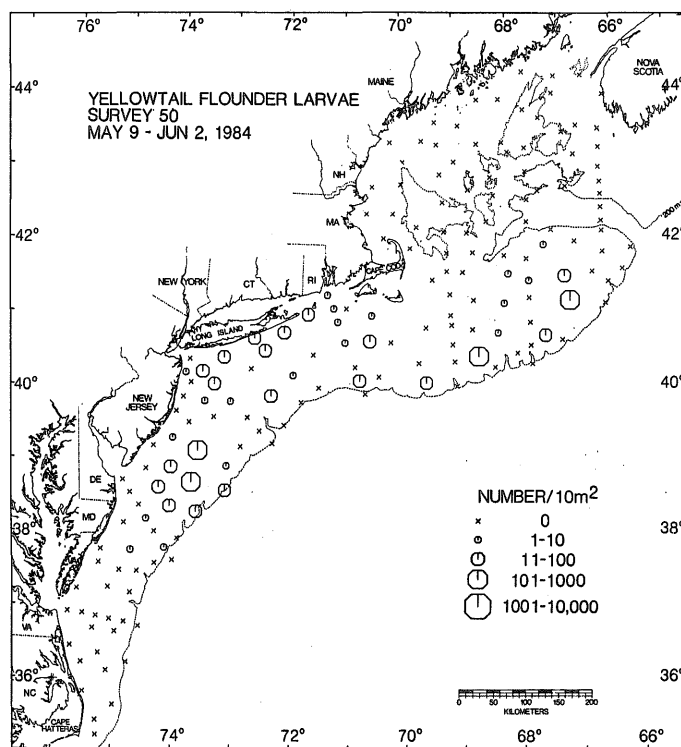
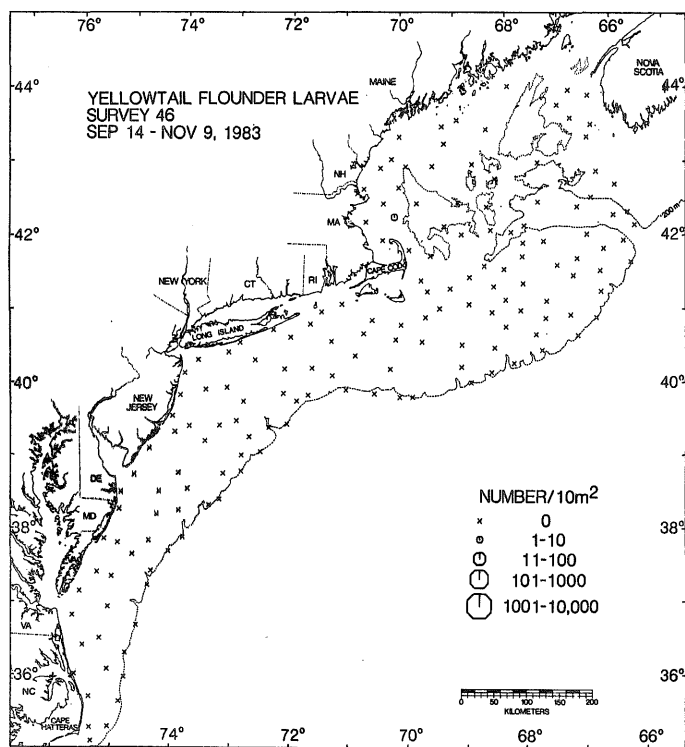


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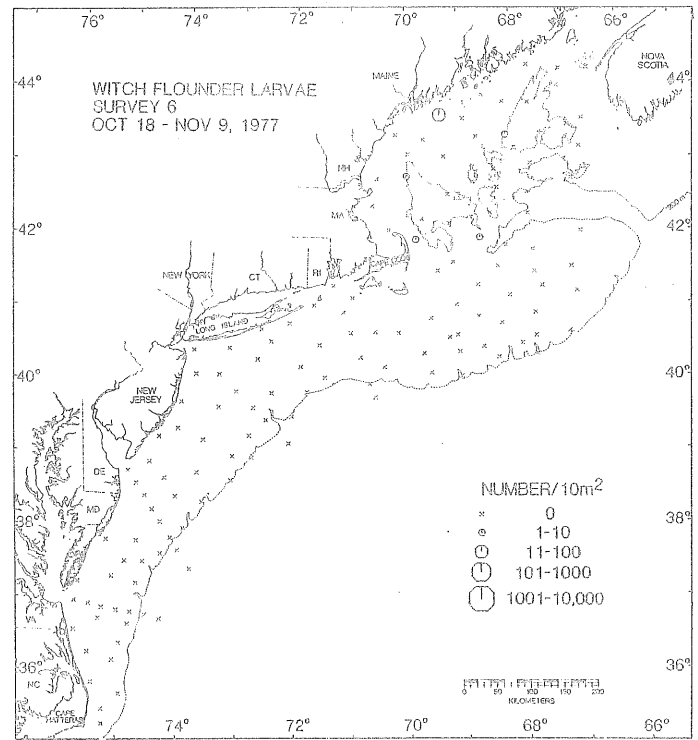
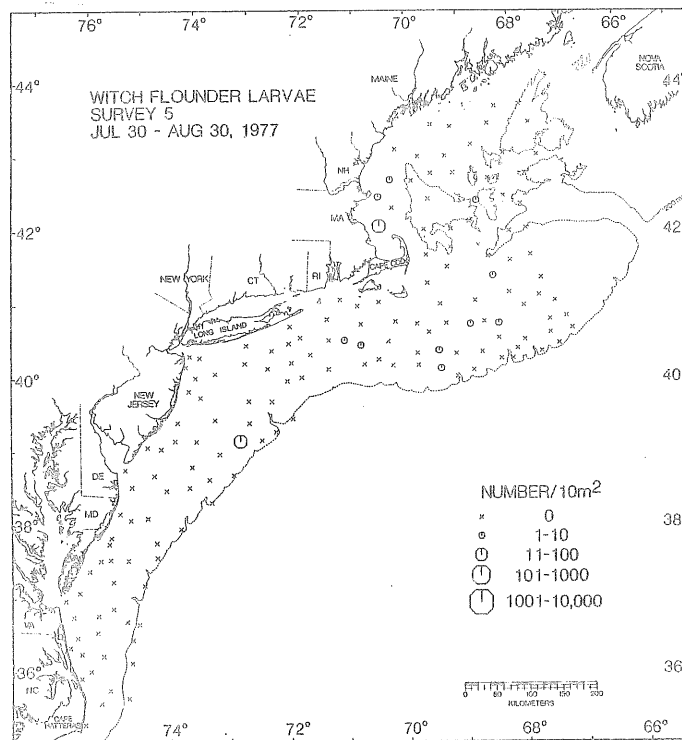
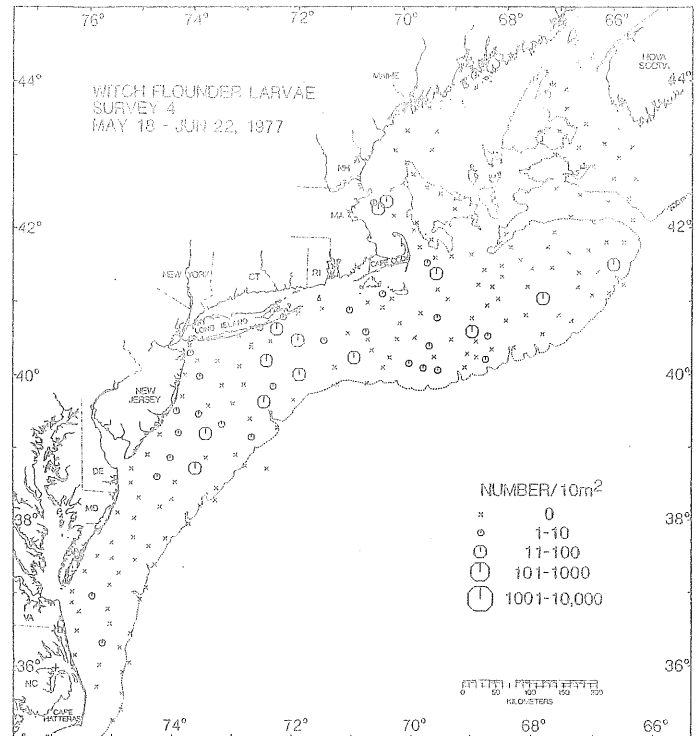
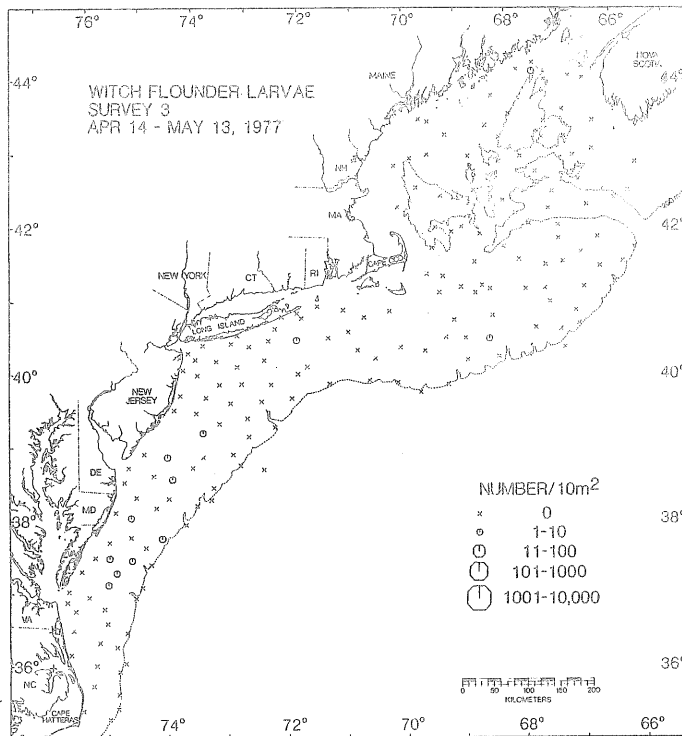


Figure 27. Distribution and abundance of witch flounder, *Glyptocephalus cynoglossus*, larvae off northeastern United States, winter 1977 through spring 1984.

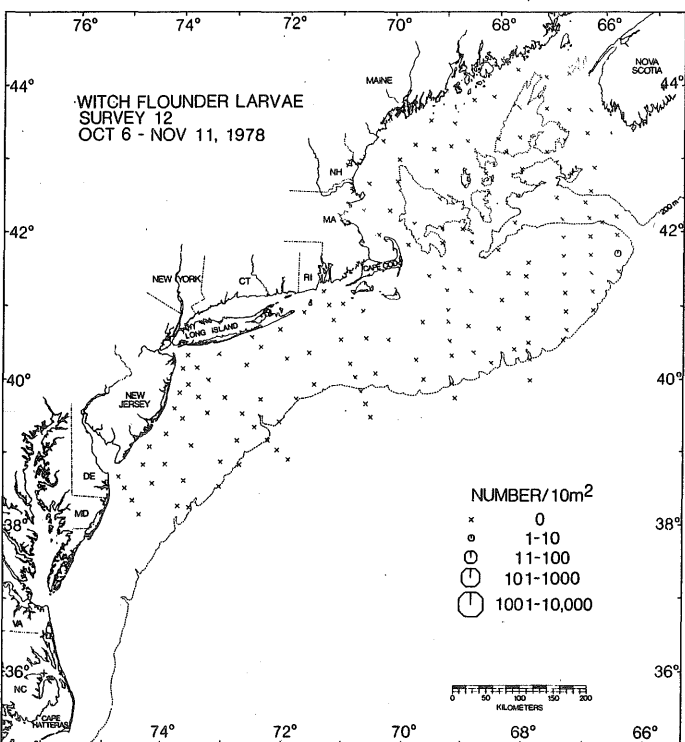
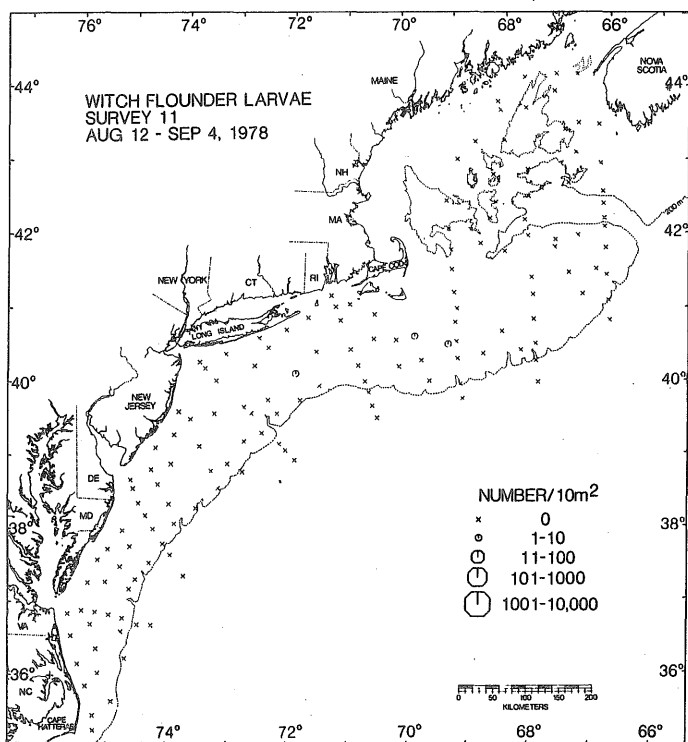
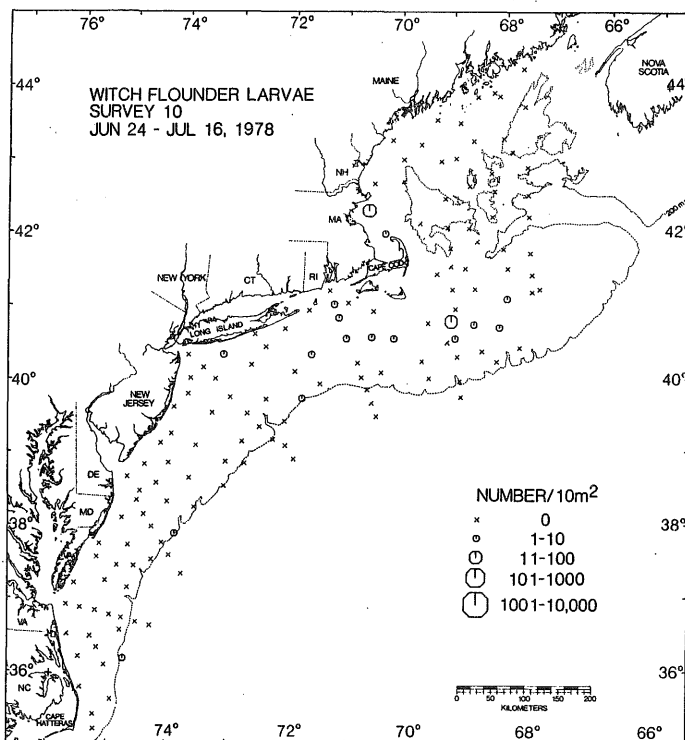
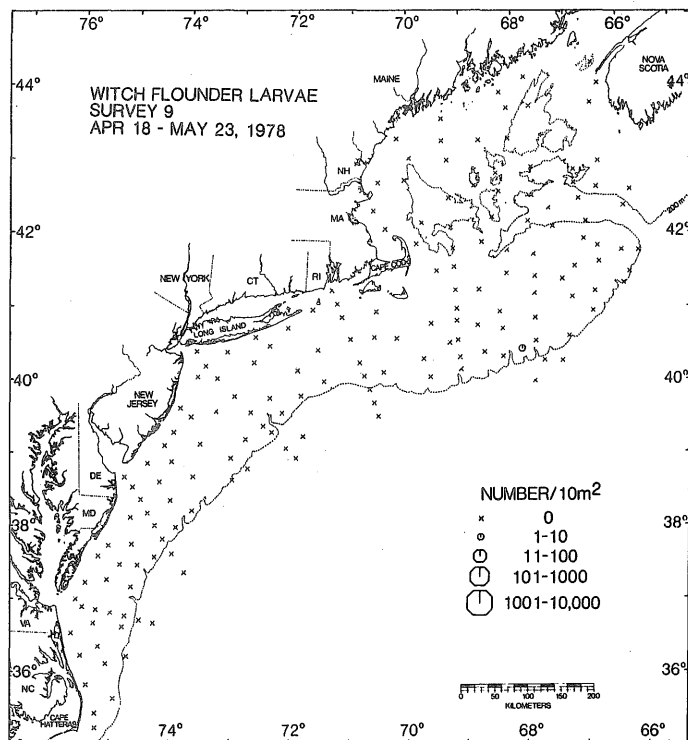


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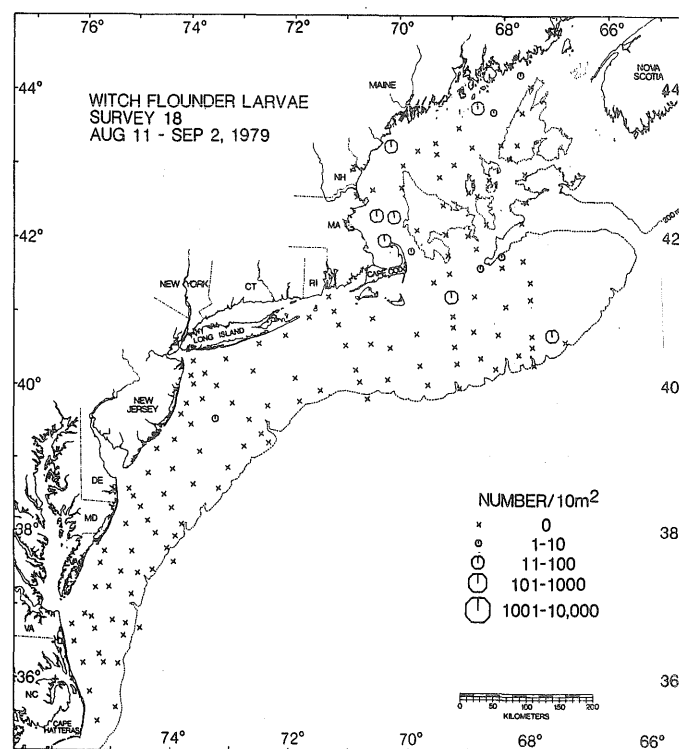
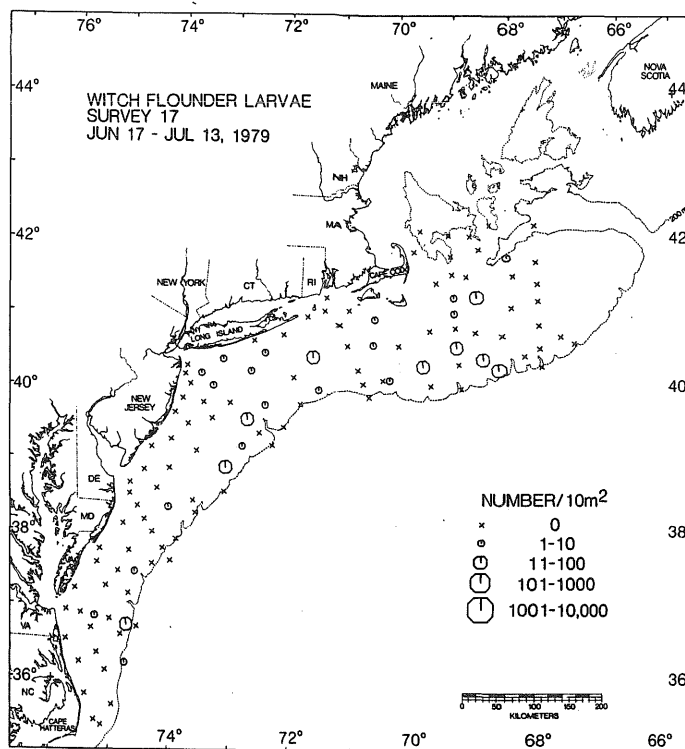
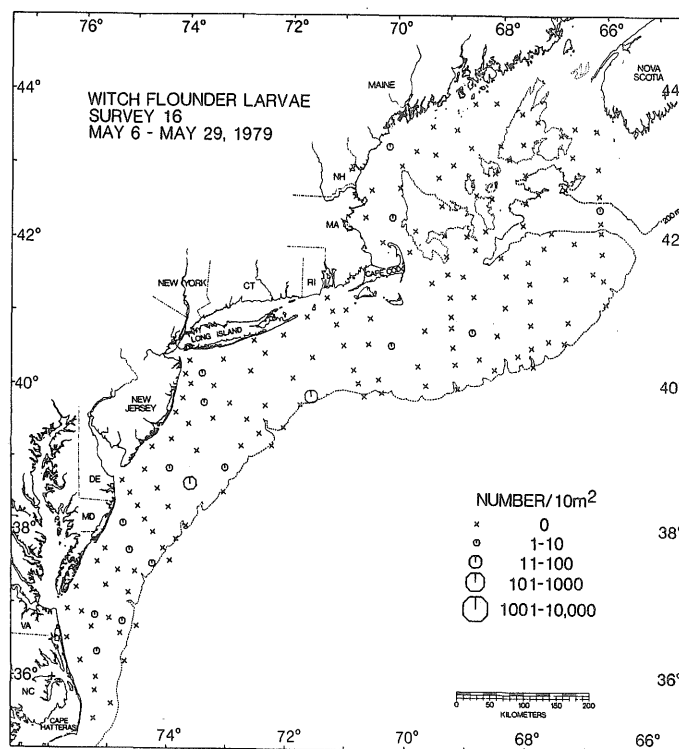
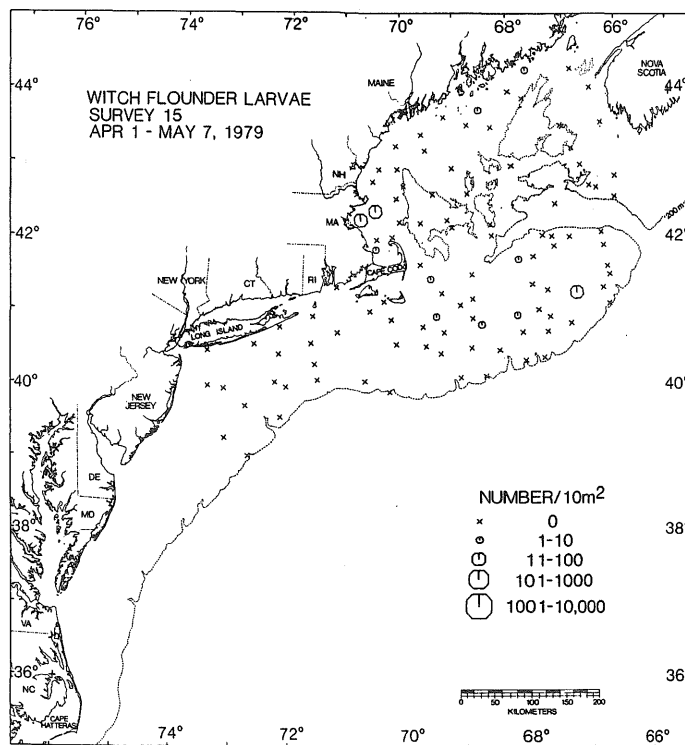


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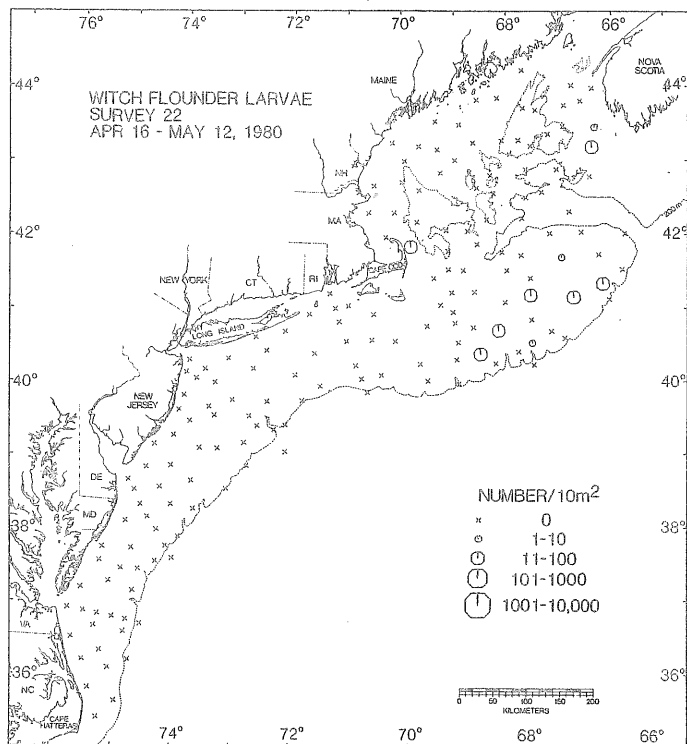
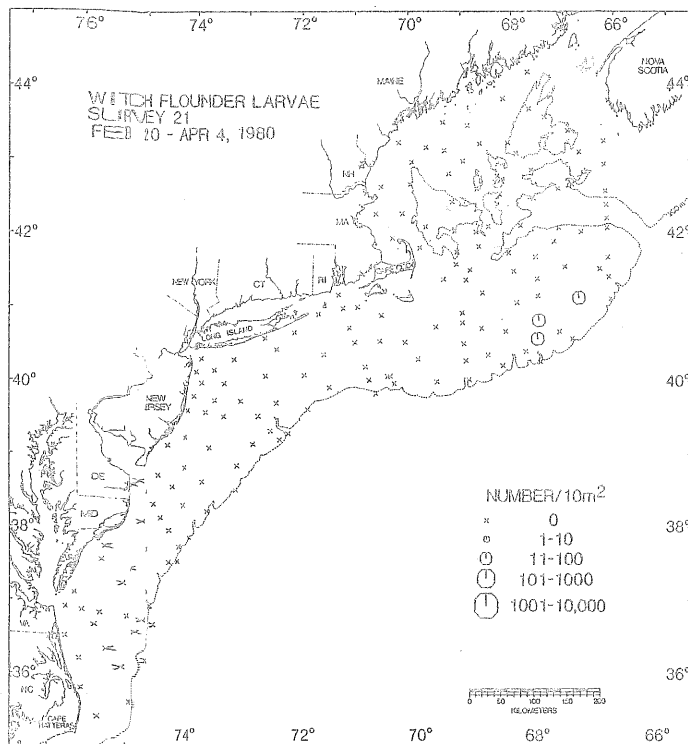
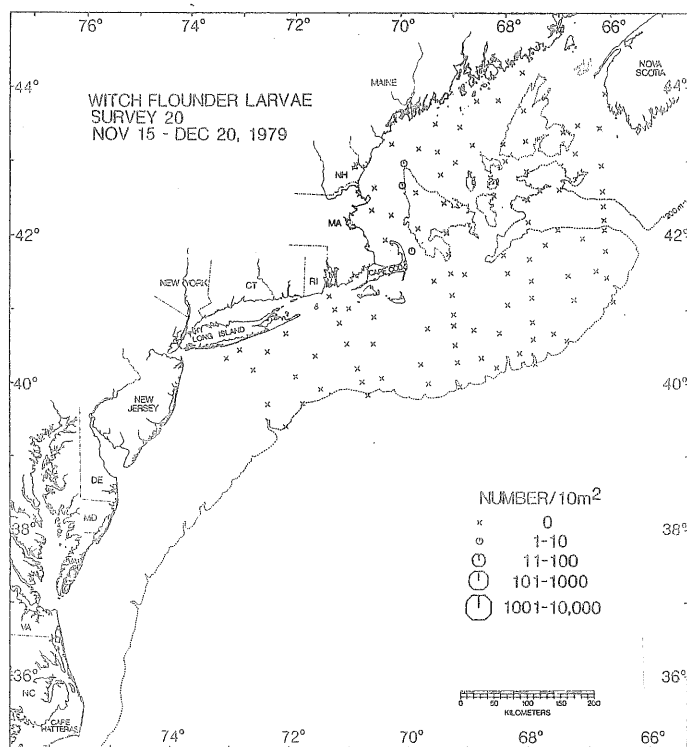
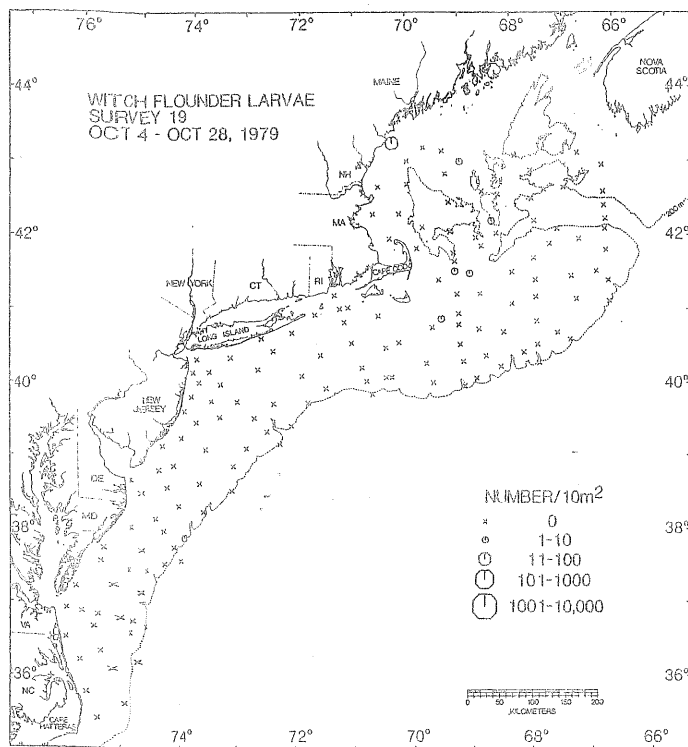


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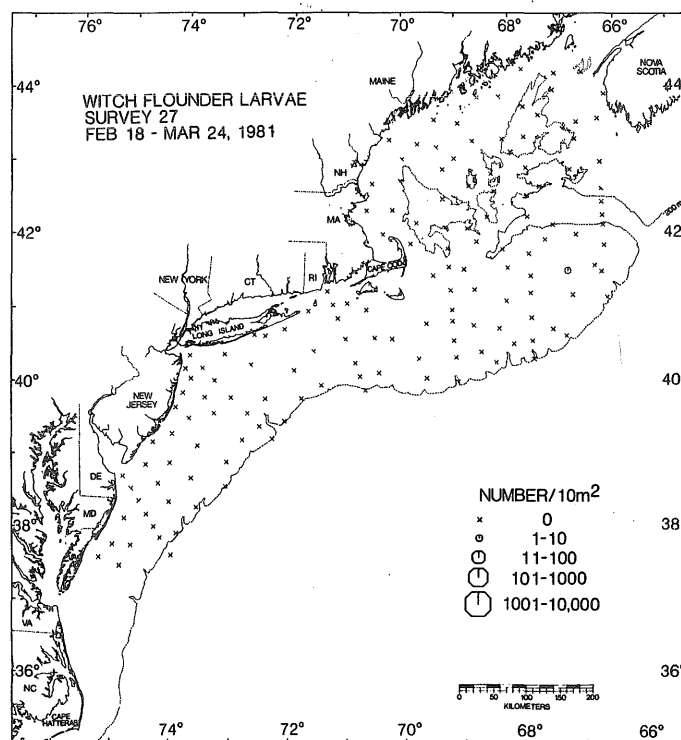
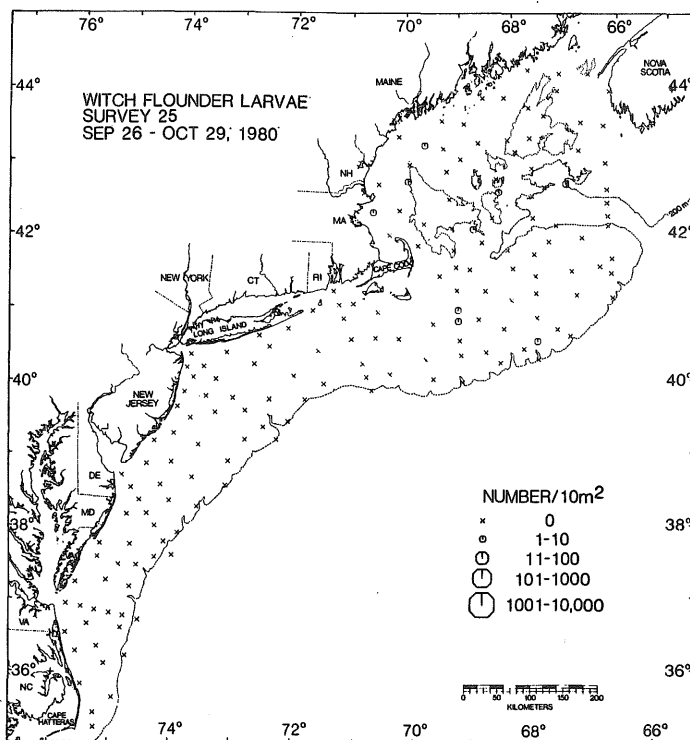
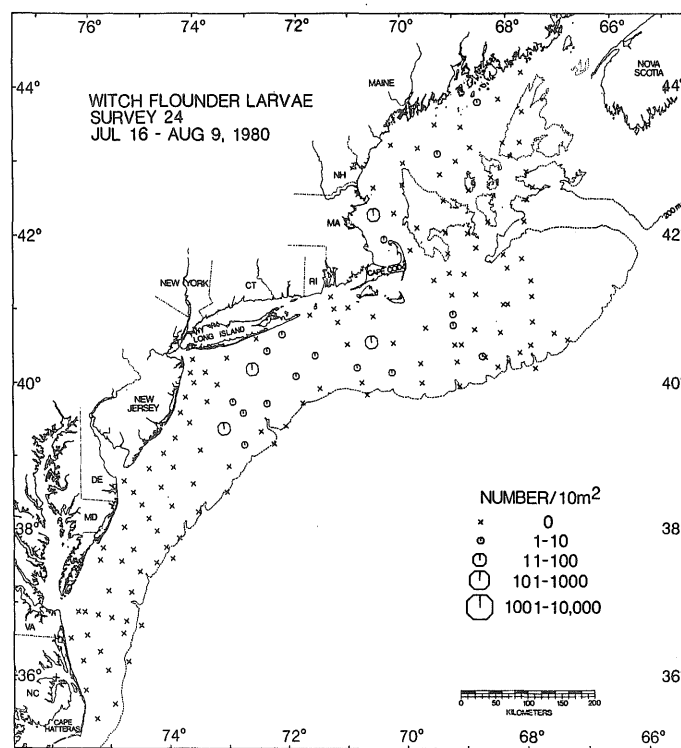
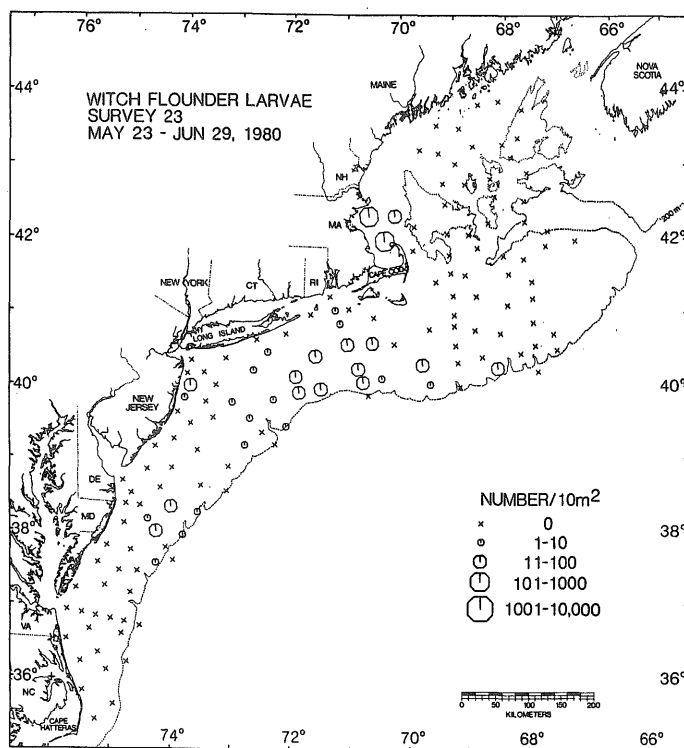


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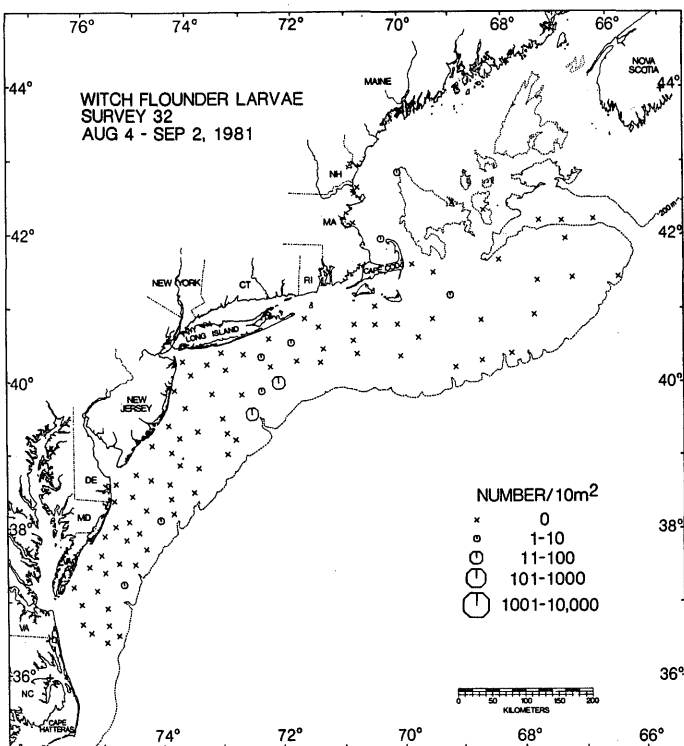
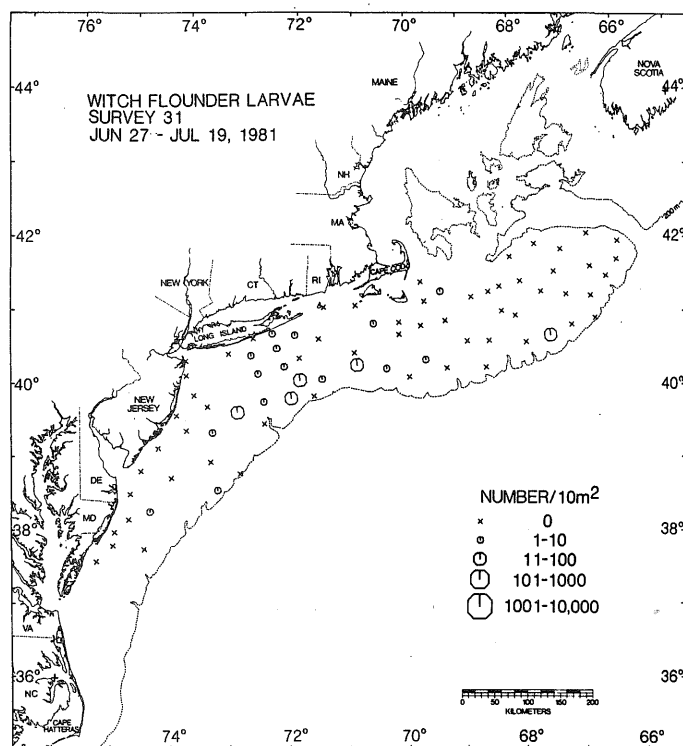
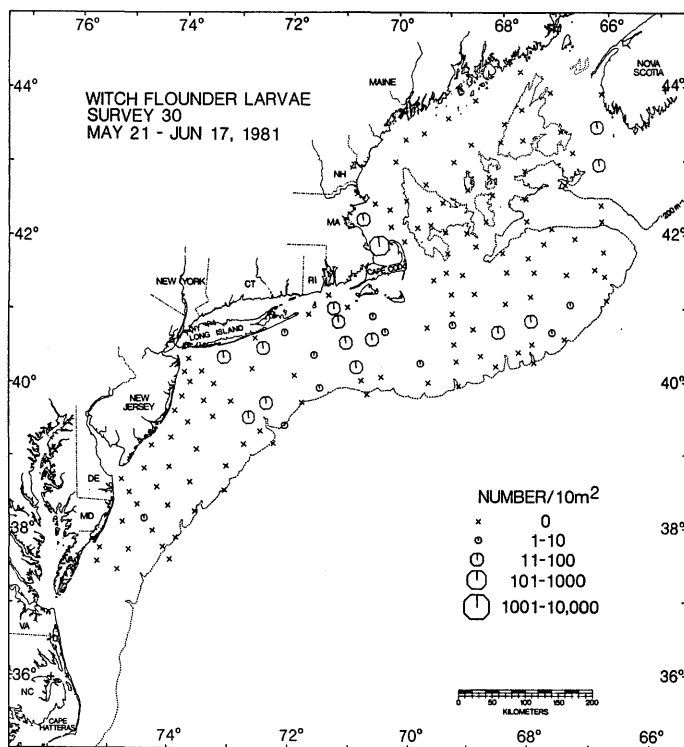
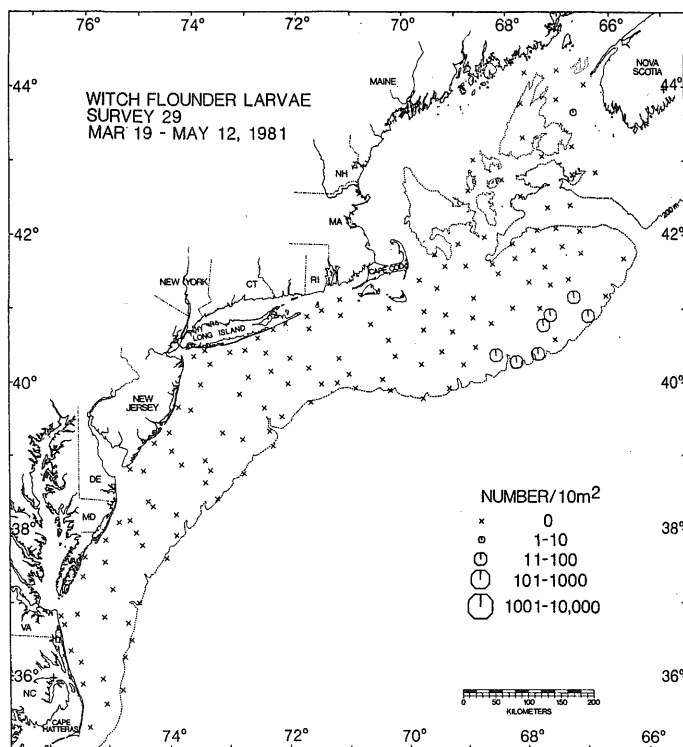


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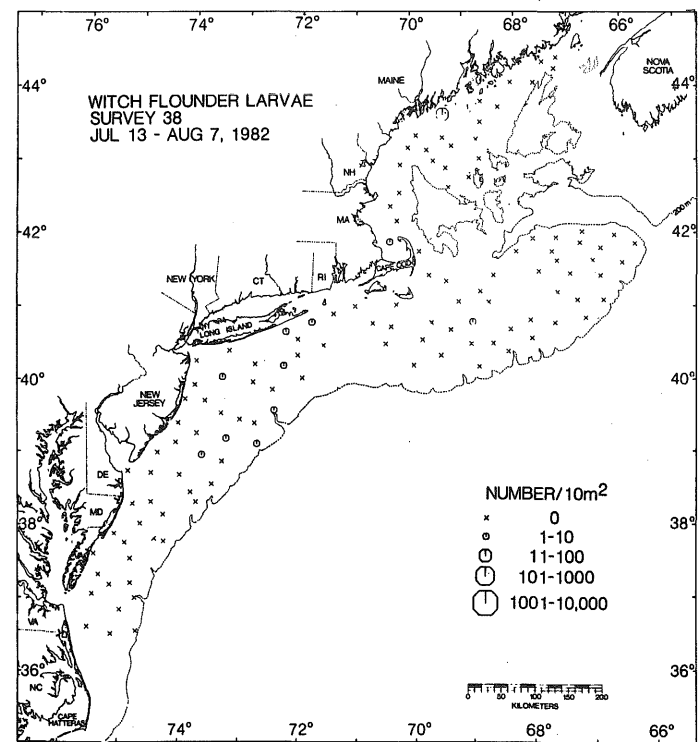
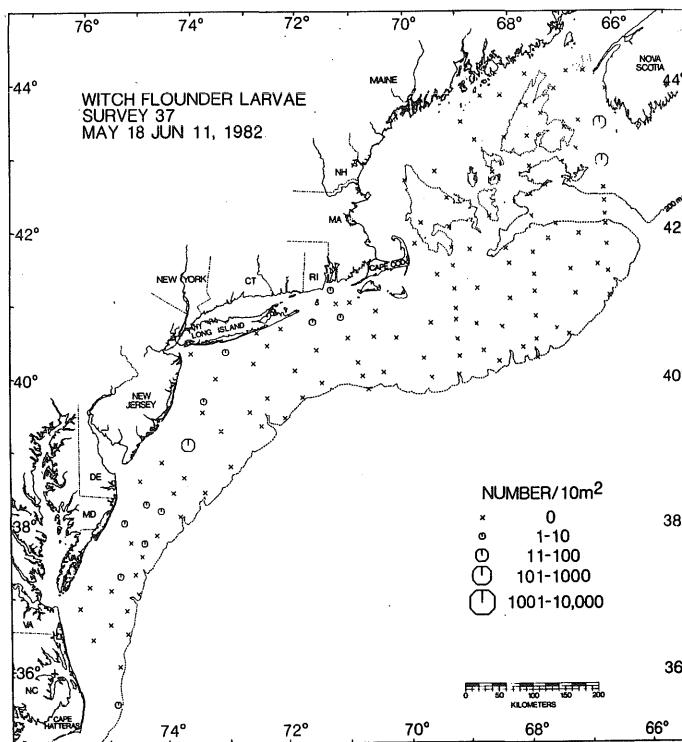
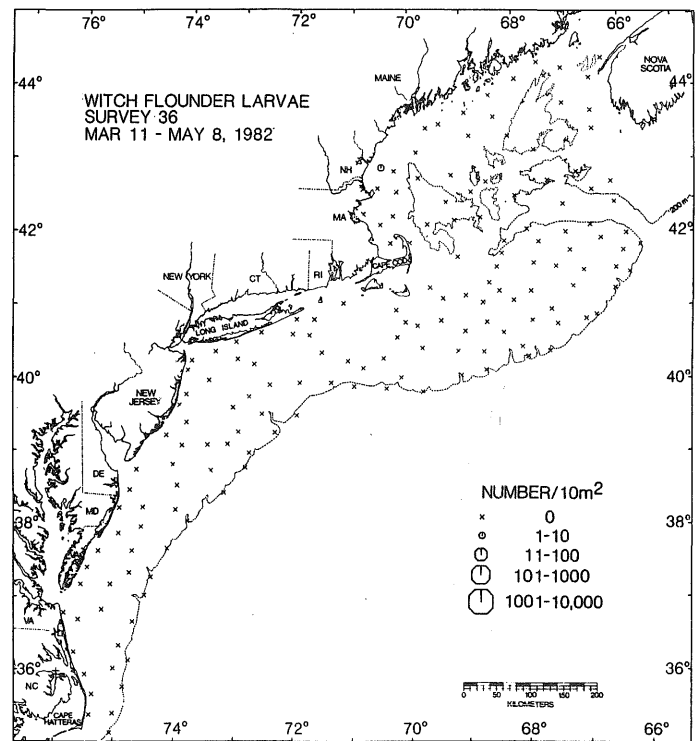
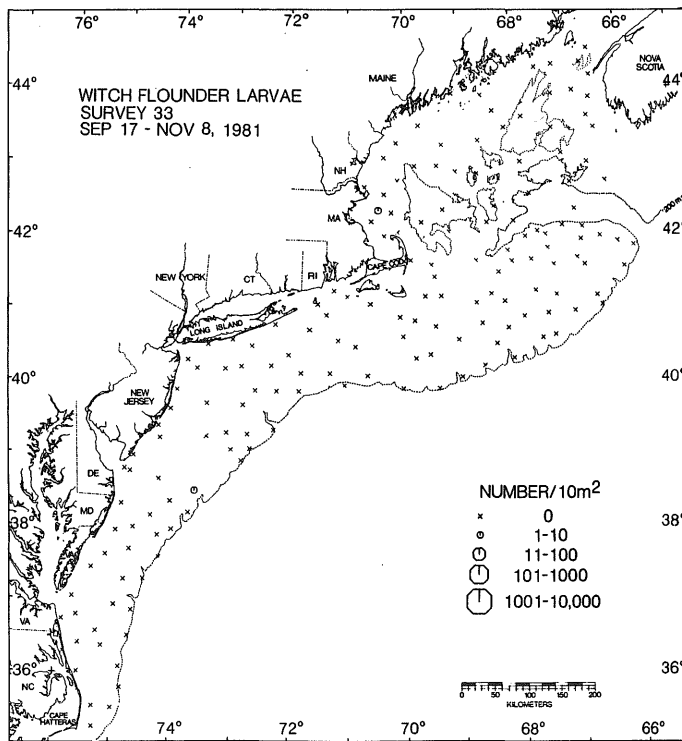


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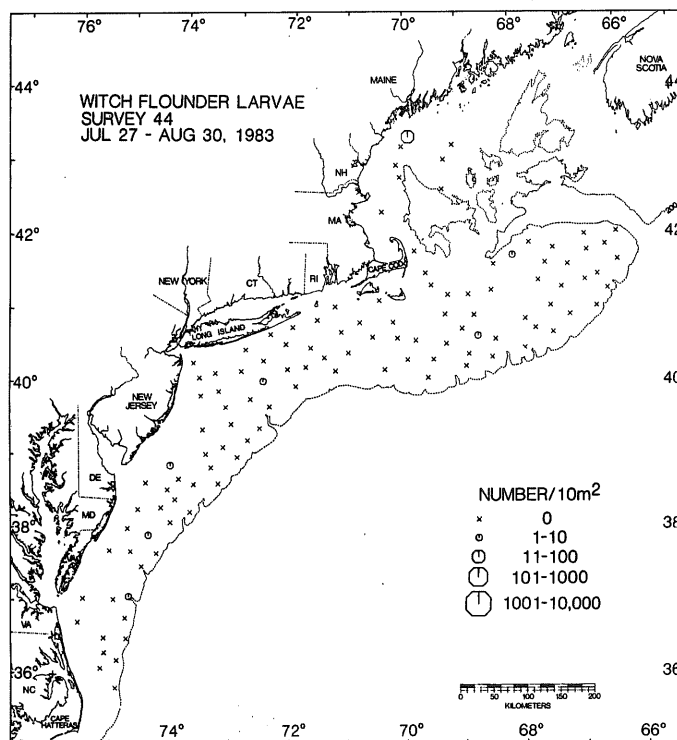
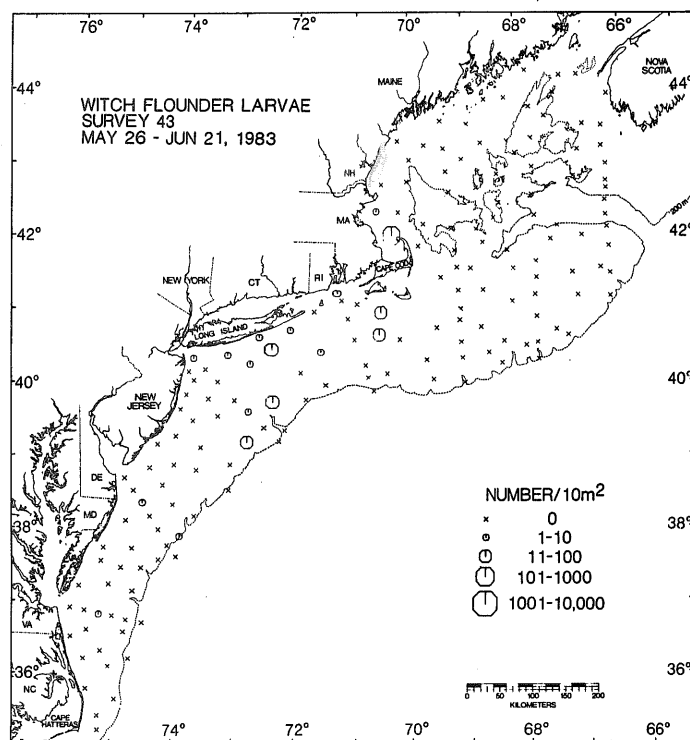
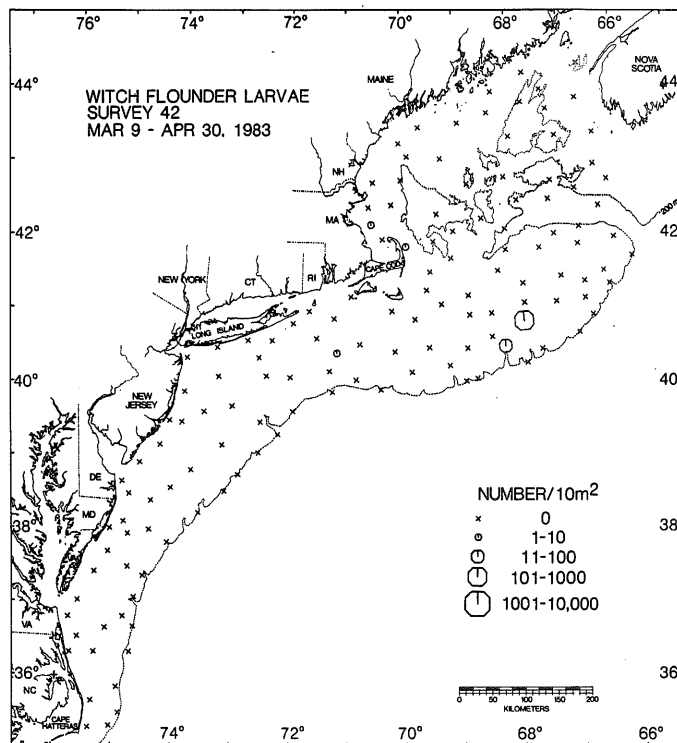
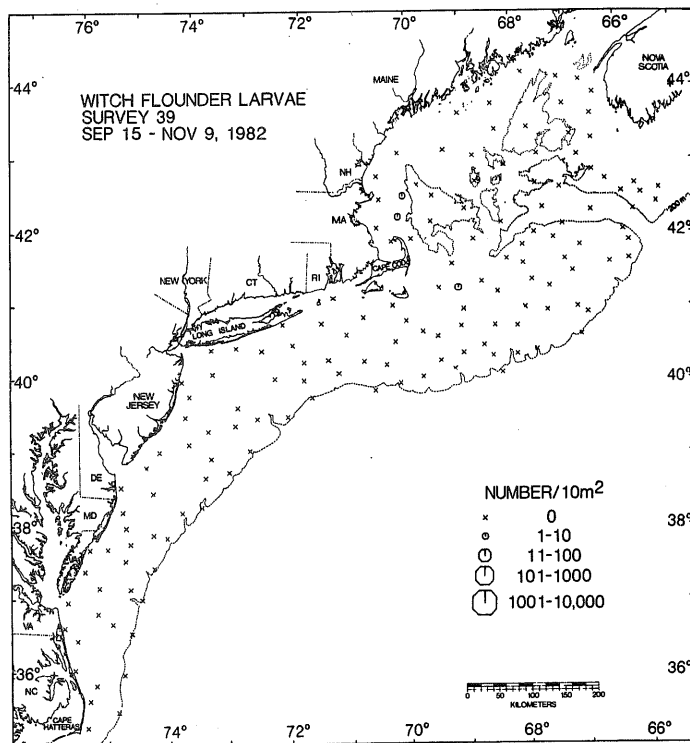
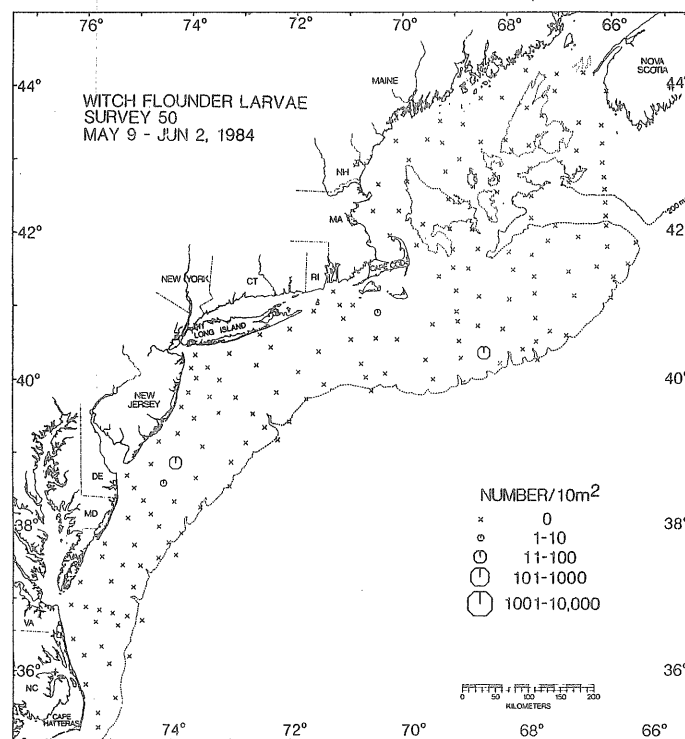
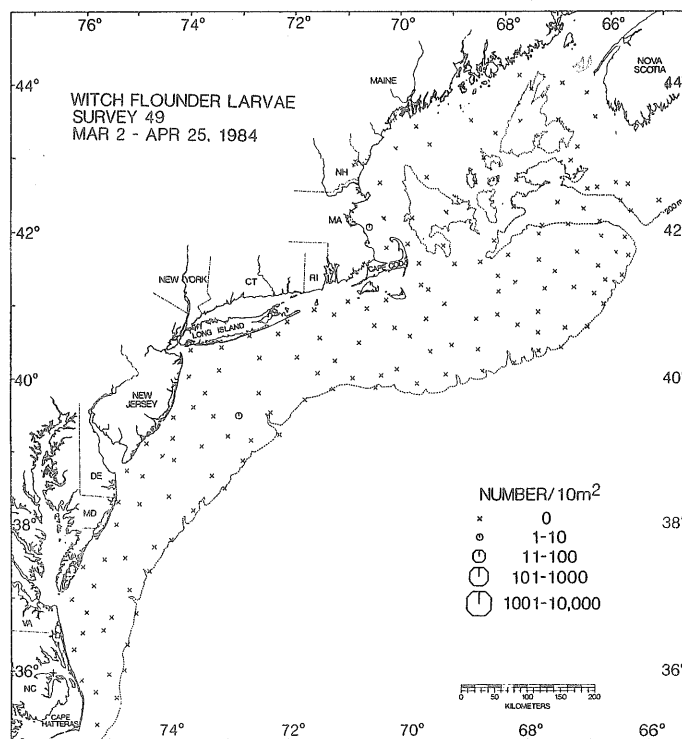


Figure 27. continued.



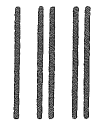
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Figure 27. continued.

(continued from inside front cover.)

37. *Regional Action Plan: Northeast Regional Office and Northeast Fisheries Center.* By Bruce E. Higgins, Ruth Rehfus, John B. Pearce, Robert J. Pawlowski, Robert L. Lippson, Timothy Goodger, Susan Mello ~~one~~, and Douglas W. Beach. April 1985. ix + 84 p., 4 figs., 6 tables, 9 app. NTIS Access. No. PB85-219962/AS.
38. *The Shelf/Slope Front South of Nantucket Shoals and Georges Bank as Delineated by Satellite Infrared Imagery and Shipboard Hydrographic and Plankton Observations.* By J. B. Colton, Jr., J. L. Anderson, J. E. O'Reilly, C. A. Evans-Zetlin, and H. G. Marshall. May 1985. vi + 22 p., 14 figs. NTIS Access. No. PB85-221083/AS.
39. *USA Historical Catch Data, 1904-82, for Major Georges Bank Fisheries.* By Anne M. T. Lange and Joan E. Palmer. May 1985. iii + 21 p., 12 figs., 2 tables. NTIS Access. No. PB85-233948/AS.
40. *Indexing the Economic Health of the U.S. Fishing Industry's Harvesting Sector.* By Virgil J. Norton, Morton M. Miller, and Elizabeth Kenney. May 1985. v + 42 p., 44 figs., 25 tables, 1 app. NTIS Access. No. PB85-217958/AS.
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42. *Status of the Fishery Resources Off the Northeastern United States for 1985.* By Conservation & Utilization Division, Northeast Fisheries Center. August 1985. iii + 137 p., 46 figs., 49 tables. NTIS Access. No. PB86-125473/AS.
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44. *NOAA's Northeast Monitoring Program (NEMP): A Report on Progress of the First Five Years (1979-84) and a Plan for the Future.* By Robert N. Reid, Merton C. Ingham, and John B. Pearce, eds., and Catherine E. Warsh (water quality), Robert N. Reid (sediments & bottom organisms), Adriana Y. Cantillo (trace contaminants in tissues), and Edith Gould (biological effects), topic coords. May 1987. xi + 138 p., 13 figs., 1 table, 9 app.
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