Laboratory Reference Document No. 80-23

Larval herring (*Clupea harengus* L.) gut content and morphological condition data from three spawning seasons (1974, 1975, and 1976) in the Georges Bank - Gulf of Maine area.

by

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Corrections to Laboratory Reference Document No. 80-23

1.	Tables 46-60	Std length column should read >40.
2.	p. 73	CL for the Body Height/Std Length ratio of the 25-29 mm length class should read ± 0.001.
3.	p. 75	Body Height/Std Length ratio of the Total row should read 0.045.
4.		The Body Height/Std Length ratios of the 20-24, 25-29, and 30-39 mm length classes should read 0.0398, 0.0416, and 0.0482, respectively. The total mean value should read 0.0443 ± 0.001.

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INTRODUCTION

Larval herring surveys have been conducted by the Northeast Fisheries Center in the Georges Bank - Gulf of Maine area since 1971 in order to investigate the physical and biological factors influencing larval survival and, ultimately, recruitment into the fishery. The major program objectives and field sampling techniques have been developed through ICNAF (International Commission for the Northwest Atlantic Fisheries), and are more fully described in Lough and Bolz (1980).

Starvation and predation are generally acknowledged as major causes of larval fish mortality (Hunter, 1976). There is some evidence that the size of the recruited year class of fall spawned larval herring is dependent upon overwinter survival when food organisms are scarce in this area (Sherman, 1971; Dubé et al., 1977; Lough, 1976; Graham and Davis, 1971; and Chenoweth, 1970). There have been many investigations into larval fish feeding which have provided evidence for a linkage between larval survival and the production cycle of their prey organisms. The major objective of our study is to examine the interrelations among larval herring survival, feeding, and morphological condition during the first six months of life. In this report the basic larval herring gut content and morphological condition data are presented on an individual cruise basis, for the 1974, 1975, and 1976 spawning seasons. These data are still undergoing extensive analyses which will be interpreted more fully, along with the corresponding information on the distribution and abundance of larval herring prey and predators in the environment, in future reports by Cohen et al. (1980a), and Cohen and Lough (1980a).

METHODS

1. Field Sampling

Cruise tracks and dates for each survey conducted in the 1968-1978 ICNAF time series are presented along with details of the sampling methods in Lough and Bolz (1980). Our efforts have been focused on the following 15 cruises:

Vessel Cruise No.	Survey Dates
1. Cryos 74-04	9/07 - 9/24/74
2. Prognoz 74-01	10/18 -10/30/74
3. A. Dohrn 74-01	11/16 -11/23/74
4. Albatross IV 74-13	12/04 -12/19/74
5. Albatross IV 75-02	2/12 - 2/28/75
6. Belogorsk 75-02	9/25 -10/08/75
7. Belogorsk 75-03	10/17 -10/30/75
8. A. Dohrn 75-187	11/01 -11/18/75
9. Albatross IV 75-14	12/05 -12/17/75
10. Albatross IV 76-01	2/10 - 2/25/76
11. Wieczno 76-01	4/09 - 5/04/76
12. Wieczno 76-03	10/14 -11/03/76
13. A. Dohrn 76-02	11/15 -11/29/76
14. Researcher 76-01	11/27 -12/11/76
15. Mt. Mitchell 77-01	2/13 - 2/24/77

Beginning in 1971, the ICNAF surveys were conducted on a standard grid of stations 15-20 miles apart, attempting to cover the entire region approximately once a month from September/October through December. February surveys were added in 1974, and since the 1975 season sampling effort has been concentrated on the Georges Bank - Nantucket Shoals spawning areas. A double oblique bongo haul (61-cm diameter frame with .333 and .505-mm mesh nets, and starting in fall 1974, also a 20-cm diameter frame with .053 or .253, and .165-mm mesh nets) was made at each station. A 10-minute neuston haul (1x2, or .5x1 m rectangular frame with a .505-mm mesh net) also was made at most standard stations during the 1974-1977 seasons. During a standard bongo haul the sampling array was lowered at 50 m/min to a depth of 100 m or within 5 m of the bottom and retrieved at 10 m/min at a ship speed of 3.5 knots.

2. Laboratory and Data Processing Methods

A complete description of the laboratory and data processing methods has been outlined in Cohen and Lough (1979). Over 7,000 larval herring have been processed from the 15 survey cruises covering three spawning seasons (September/October through February, and through April in 1976). A series of measurements (standard length, head height, eye height, body height, maxillary length, pectoral angle, and skull width) were taken on a subsample of larvae in order to estimate the approximate age, various condition factors, and mouthgape. Larvae were staged according to Doyle (1977) and then processed for gut content and noted for incidence of parasites. Prey items were identified as specifically as possible based on the available literature (Murphy

and Cohen, 1978) and measured for a length-weight conversion for eventual use in biomass estimates of prey consumed (Cohen and Lough, 1980b). An attempt was made to correct the environmental abundance estimates of prey items collected by .053, .165, .333, and .505-mm mesh bongo nets for losses due to extrusion and avoidance (Cohen, 1980; Davis, 1980), so that these data and the larval gut content information could be used in the calculation of selectivity indices (Cohen et al., 1980b). This information will also be used to investigate the relationship between prey density and larval growth and survival examined in a recent paper by Werner and Blaxter (1980).

All the data were processed using statistical and organizational routines from "Statistical Package for the Social Sciences" (Nie et al., 1975) in use on the Sigma-7 computer of the Woods Hole Oceanographic Institution.

3. Presentation of Data

The larval herring gut content and morphological condition data for the three spawning seasons are presented in this report for each individual survey cruise in the following breakdown of tables and figures:

A. Tables

1. Mean length and width of larval herring prey items by 5-mm length class.

2. Abundance of larval herring prey items by 5-mm length class.

3. Diel distribution (2-hourly) of feeding larval herring by 5-mm length class.

4. Mean values of larval herring condition factor measurements by 5-mm length class.

B. Figures (individual cruise plots)

1. Percentage of larval herring feeding per station.

2. Mean number of prey items per larval herring per station.

3. Mean value of larval herring eye height/head height ratios per station.

4. Mean value of larval herring body height/standard length ratios per station.

SUMMARY OF RESULTS

The dominant prey items of herring larvae over the three seasons studied were adults and developmental stages of the following copepods ranked by the approximate frequency with which they were selected as prey:

1. *Pseudocalanus* sp.
2. *Paracalanus parvus*
3. *Centropages typicus*
4. *Centropages hamatus*
5. *Oithona* spp.
6. *Calanus finmarchicus*

The larvae feed more intensively on copepod nauplii early in the season when they are small, and gradually shift to a higher proportion of copepodites and adults in their diet later on in the season. Larvae commonly contained 1 to 5 organisms in their hind guts; on several occasions large numbers of copepod eggs (up to 60 per larva) were found throughout the length of the gut. In December 1974, both species of *Centropages* were common as prey, but in December of 1975 and 1976 their occurrence in the larval guts decreased markedly and *Pseudocalanus* sp. and *Paracalanus parvus* became dominant. There is some evidence that this change in diet may reflect a change in composition of the zooplankton available, according to Sherman et al. (1978), who found a decrease in the percentage of *Centropages typicus* adults and an increase in *Pseudocalanus* sp. adults on Georges Bank in autumn of 1975 compared to autumn of 1974.

In our study the highest incidences of feeding occurred during December 1975 (28.04%), April 1976 (37.97%), and February 1977(29.01%). In all the other surveys percentage of larvae feeding ranged between 5-18%, except in September 1975 when no larvae were examined with food in their guts. These percentages are somewhat low compared to other studies of larval herring feeding reported:

Author	Feeding incidence
Sherman and Honey (1970):	57%
Rudakova (1971):	1961-morning maximum=38.6% 1967-day maximum=40.8% evening maximum=55%
Bainbridge and Forsythe (1971):	sunset maximum=70%
Bjorke (1971):	51%
Bowers and Williamson (1951):	Yolksac larvae=28% Post larvae=60-70%
Schnack (1972): North Sea	50%
Baltic Sea Firth of Schlei	= ∿ 100%
Bhattacharyya (1957):	35.2%

Percentages varied with the time of day, age of larvae, depth of of sampling, geographic area, and season. Most other studies have observed a diurnal feeding pattern. In our study, feeding incidence usually appeared to increase around sunset for all three seasons. We were not able to estimate the degree of digestion of the gut contents as other authors have done (Schnack, 1972,

and Bhattacharyya, 1957) in order to calculate the length of time food was in the gut, and obtain a better estimate of the time when feeding occurred.

The morphological measurements were used to calculate several measures of larval condition based on the indices described in Ehrlich et al. (1976). Cruise plots of the eye height/head height and body height/standard length ratios show some indication that larvae retained on the shoal spawning grounds located in the highest larval density centers were more robust than larvae outside these areas. The multivariate techniques of factor and discriminant analyses were used to try to separate robust from starving larvae based on their morphological measurements and feeding incidence, however, neither technique was successful because of various problems encountered in analyzing this data set which are discussed in Cohen and Lough (1979).

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Table 1. Cryos 74-04, 9/7-9/24/74, mean length and width of larval herring prey items by 5-mm larval length class.

CRUISE Cryos 74-04 GEAR 61 cm Bongo MESH .333 mm

PREY SIZE DISTRIBUTION · LARVAL GUT CONTENTS · SPECIES *Clupea harengus*

LARVAL LENGTH (MM)	NUMBER LARVAE EXAMINED	NUMBER LARVAE FEEDING	TOTAL NUMBER PREY	MEAN NO. PREY/ LARVA	NUMBER OF PREY AT SIZE RANGES (MM) Length						
					≤0.19	0.2 - 0.49	0.5 - 1.09	1.1 - 1.59	1.6 - 2.59	2.6 - 4.59	5.0
<10	262	14	28	2.0	16	10					
10-14	35	1	1	1.0	1						
15-19	7	0									
20-24											
25-29											
30-39											
>40											
LENGTH MISSING	8	1	1	1.0							
TOTAL	312	16	29	1.81	17	10					

Table 1. Continued.

CRUISE Cryos 74-04 GEAR 61 cm Bongo MESH .333 mm

PREY SIZE DISTRIBUTION · LARVAL GUT CONTENTS · SPECIES *Clupea harengus*

LARVAL LENGTH (MM)	NUMBER LARVAE EXAMINED	NUMBER LARVAE FEEDING	TOTAL NUMBER PREY	MEAN NO. PREY/ LARVA	NUMBER OF PREY AT SIZE RANGES (MM) Width						
					≤0.19	0.2 - 0.49	0.5 - 1.09	1.1 - 1.59	1.6 - 2.59	2.6 - 4.59	5.0
< 10	262	14	28	2.0	23						
10 - 14	35	1	1	1.0	1						
15 - 19	7	0									
20-24											
25-29											
30-39											
>40											
LENGTH MISSING	8	1	1	1.0							
TOTAL	312	16	29	1.81	24						

Table 2. Prognoz 74-01, 10/18-10/30/74, mean length and width of larval herring prey items by 5-mm larval length class.

CRUISE Prognoz 74-01 GEAR 61 cm Bongo MESH .333 mm

PREY SIZE DISTRIBUTION · LARVAL GUT CONTENTS · SPECIES *Clupea harengus*

LARVAL LENGTH (MM)	NUMBER LARVAE EXAMINED	NUMBER LARVAE FEEDING	TOTAL NUMBER PREY	MEAN NO. PREY/ LARVA	NUMBER OF PREY AT SIZE RANGES (MM) Length						
					≤0.19	0.2 - 0.49	0.5 - 1.09	1.1 - 1.59	1.6 - 2.59	2.6 - 4.59	5.0
<10	89	4	5	1.25	2	3					
10-14	61	13	28	2.15	1	15	6				
15-19											
20-24											
25-29											
30-39											
>40											
LENGTH MISSING											
TOTAL	150	17	33	1.94	3	18	6				

Table 2. Continued.

CRUISE Prognoz 74-01 GEAR 61 cm Bongo MESH .333 mm

PREY SIZE DISTRIBUTION · LARVAL GUT CONTENTS · SPECIES *Clupea harengus*

LARVAL LENGTH (MM)	NUMBER LARVAE EXAMINED	NUMBER LARVAE FEEDING	TOTAL NUMBER PREY	MEAN NO. PREY/ LARVA	NUMBER OF PREY AT SIZE RANGES (MM) Width						
					≤0.19	0.2 - 0.49	0.5 - 1.09	1.1 - 1.59	1.6 - 2.59	2.6 - 4.59	5.0
< 10	89	4	5	1.25	4						
10 - 14	61	13	28	2.15	14	5					
15 - 19											
20 - 24											
25 - 29											
30 - 39											
> 40											
LENGTH MISSING											
TOTAL	150	17	33	1.94	18	5					

Table 3. A. Dorhn 74-01, 11/16-11/23/74, mean length and width of larval herring prey items by 5-mm larval length class.

CRUISE A. Dorhn 74-1 GEAR 61 cm Bongo MESH .333 mm

PREY SIZE DISTRIBUTION · LARVAL GUT CONTENTS · SPECIES *Clupea harengus*

LARVAL LENGTH (MM)	NUMBER LARVAE EXAMINED	NUMBER LARVAE FEEDING	TOTAL NUMBER PREY	MEAN NO. PREY/ LARVA	NUMBER OF PREY AT SIZE RANGES (MM) Length						
					≤0.19	0.2 - 0.49	0.5 - 1.09	1.1 - 1.59	1.6 - 2.59	2.6 - 4.59	5.0
< 10	35	5	8	1.6	2	5					
10 - 14	41	10	17	1.7		2	12				
15 - 19	72	12	17	1.42		2	13				
20-24	2	1	3	3.0			3				
25-29											
30-39											
> 40											
LENGTH MISSING											
TOTAL	150	28	45	1.61	2	9	28				

Table 3. Continued.

CRUISE A. Dohrn 74-1 GEAR 61 cm Bongo MESH .333 mm

PREY SIZE DISTRIBUTION · LARVAL GUT CONTENTS · SPECIES *Clupea harengus*

LARVAL LENGTH (MM)	NUMBER LARVAE EXAMINED	NUMBER LARVAE FEEDING	TOTAL NUMBER PREY	MEAN NO. PREY/ LARVA	NUMBER OF PREY AT SIZE RANGES (MM) Width						
					≤0.19	0.2 - 0.49	0.5 - 1.09	1.1 - 1.59	1.6 - 2.59	2.6 - 4.59	5.0
< 10	35	5	8	1.6	5						
10 - 14	41	10	17	1.7	2	7					
15 - 19	72	12	17	1.42	1	8					
20-24	2	1	3	3.0		3					
25-29											
30-39											
>40											
LENGTH MISSING											
TOTAL	150	28	45	1.61	8	18					

Table 4. Albatross IV 74-13, 12/4-12/19/74, mean length and width of larval herring prey items by 5-mm larval length class.

CRUISE ALB IV 74-13 GEAR 61 cm Bongo MESH .505 mm

PREY SIZE DISTRIBUTION · LARVAL GUT CONTENTS · SPECIES *Clupea harengus*

LARVAL LENGTH (MM)	NUMBER LARVAE EXAMINED	NUMBER LARVAE FEEDING	TOTAL NUMBER PREY	MEAN NO. PREY/ LARVA	NUMBER OF PREY AT SIZE RANGES (MM) Length						
					≤0.19	0.2 - 0.49	0.5 - 1.09	1.1 - 1.59	1.6 - 2.59	2.6 - 4.59	5.0
< 10	119	2	2	1.0		1					
10 - 14	1589	140	332	2.37	2	142	83				
15 - 19	1066	222	653	2.94	7	111	470				
20-24	286	99	381	3.85	74	19	265				
25-29	34	9	53	5.89		8	40				
30-39	2	1	6	6.0			5				
>40											
LENGTH MISSING	32	2	3	1.5			2				
TOTAL	3128	475	1430	3.01	83	281	865				

Table 4. Continued.

CRUISE ALB IV 74-13 GEAR 61 cm Bongo MESH .505 mm

PREY SIZE DISTRIBUTION · LARVAL GUT CONTENTS · SPECIES *Clupea harengus*

LARVAL LENGTH (MM)	NUMBER LARVAE EXAMINED	NUMBER LARVAE FEEDING	TOTAL NUMBER PREY	MEAN NO. PREY/ LARVA	NUMBER OF PREY AT SIZE RANGES (MM) Width						
					≤0.19	0.2 - 0.49	0.5 - 1.09	1.1 - 1.59	1.6 - 2.59	2.6 - 4.59	5.0
<10	119	2	2	1.0	1						
10-14	1589	140	332	2.37	120	76					
15-19	1066	222	653	2.94	109	447					
20-24	286	99	381	3.85	73	239					
25-29	34	9	53	5.89	6	25					
30-39	2	1	6	6.0		5					
>40											
LENGTH MISSING	32	2	3	1.5		2					
TOTAL	3128	475	1430	3.01	309	794					

Table 5. Albatross IV 75-02, 2/12-2/28/75, mean length and width of larval herring prey items by 5-mm larval length class.

CRUISE ALB IV 75-02 GEAR 61 cm Bongo 0.5x1m Neuston MESH .505 mm

PREY SIZE DISTRIBUTION · LARVAL GUT CONTENTS · SPECIES *Clupea harengus*

LARVAL LENGTH (MM)	NUMBER LARVAE EXAMINED	NUMBER LARVAE FEEDING	TOTAL NUMBER PREY	MEAN NO. PREY/ LARVA	NUMBER OF PREY AT SIZE RANGES (MM) Length						
					≤0.19	0.2 - 0.49	0.5 - 1.09	1.1 - 1.59	1.6 - 2.59	2.6 - 4.59	5.0
< 10											
10 - 14	2	0									
15 - 19	7	0									
20-24	231	42	95	2.26			64				
25-29	658	120	367	3.06	10		228	2			
30-39	327	36	122	3.39			54	13			
>40											
LENGTH MISSING	5	0									
TOTAL	1230	198	584	2.95	10		346	15			

Table 5. Continued.

CRUISE ALB IV 75-02 GEAR 61 cm Bongo 0.5x1m Neuston MESH .505 mm

PREY SIZE DISTRIBUTION · LARVAL GUT CONTENTS · SPECIES *Clupea harengus*

LARVAL LENGTH (MM)	NUMBER LARVAE EXAMINED	NUMBER LARVAE FEEDING	TOTAL NUMBER PREY	MEAN NO. PREY/ LARVA	NUMBER OF PREY AT SIZE RANGES (MM) Width						
					≤0.19	0.2 - 0.49	0.5 - 1.09	1.1 - 1.59	1.6 - 2.59	2.6 - 4.59	5.0
< 10											
10 - 14	2	0									
15 - 19	7	0									
20-24	231	42	95	2.26		55					
25-29	658	120	367	3.06	10	207	2				
30-39	327	36	122	3.39		63					
> 40											
LENGTH MISSING	5	0									
TOTAL	1230	198	584	2.95	10	325	2				

Table 6. Belogorsk 75-02, 9/25-10/8/75, mean length and width of larval herring prey items by 5-mm larval length class.

CRUISE Belogorsk 75-02 GEAR 61 cm Bongo MESH .333 mm

PREY SIZE DISTRIBUTION · LARVAL GUT CONTENTS · SPECIES *Clupea harengus*

LARVAL LENGTH (MM)	NUMBER LARVAE EXAMINED	NUMBER LARVAE FEEDING	TOTAL NUMBER PREY	MEAN NO. PREY/ LARVA	NUMBER OF PREY AT SIZE RANGES (MM) Length						
					≤0.19	0.2 - 0.49	0.5 - 1.09	1.1 - 1.59	1.6 - 2.59	2.6 - 4.59	5.0
<10	15	0									
10-14	1	0									
15-19											
20-24											
25-29											
30-39											
>40											
LENGTH MISSING	1	0									
TOTAL	17	0									

Table 6. Continued.

CRUISE Belogorsk 75-02 GEAR 61 cm Bongo MESH .333 mm

PREY SIZE DISTRIBUTION · LARVAL GUT CONTENTS · SPECIES *Clupea harengus*

LARVAL LENGTH (MM)	NUMBER LARVAE EXAMINED	NUMBER LARVAE FEEDING	TOTAL NUMBER PREY	MEAN NO. PREY/ LARVA	NUMBER OF PREY AT SIZE RANGES (MM) Width						
					≤ 0.19	0.2 - 0.49	0.5 - 1.09	1.1 - 1.59	1.6 - 2.59	2.6 - 4.59	5.0
< 10	15	0									
10 - 14	1	0									
15 - 19											
20 - 24											
25 - 29											
30 - 39											
> 40											
LENGTH MISSING	1	0									
TOTAL	17	0									

Table 7. Belogorsk 75-03, 10/17-10/30/75, mean length and width of larval herring prey items by 5-mm larval length class.

CRUISE Belogorsk 75-3 GEAR 61 cm Bongo MESH .333 mm

PREY SIZE DISTRIBUTION · LARVAL GUT CONTENTS · SPECIES *Clupea harengus*

LARVAL LENGTH (MM)	NUMBER LARVAE EXAMINED	NUMBER LARVAE FEEDING	TOTAL NUMBER PREY	MEAN NO. PREY/ LARVA	NUMBER OF PREY AT SIZE RANGES (MM) Length						
					≤0.19	0.2 - 0.49	0.5 - 1.09	1.1 - 1.59	1.6 - 2.59	2.6 - 4.59	5.0
<10	97	12	37	3.08	22	7					
10-14	52	2	8	4.0	1	6					
15-19											
20-24											
25-29											
30-39											
>40											
LENGTH MISSING	1	0									
TOTAL	150	14	45	3.21	23	13					

Table 7. Continued.

CRUISE Belogorsk 75-03 GEAR 61 cm Bongo MESH .333 mm

PREY SIZE DISTRIBUTION · LARVAL GUT CONTENTS · SPECIES *Clupea harengus*

LARVAL LENGTH (MM)	NUMBER LARVAE EXAMINED	NUMBER LARVAE FEEDING	TOTAL NUMBER PREY	MEAN NO. PREY/ LARVA	NUMBER OF PREY AT SIZE RANGES (MM) Width						
					≤ 0.19	0.2 - 0.49	0.5 - 1.09	1.1 - 1.59	1.6 - 2.59	2.6 - 4.59	5.0
< 10	97	12	37	3.08	27						
10 - 14	52	2	8	4.0	7						
15 - 19											
20-24											
25-29											
30-39											
> 40											
LENGTH MISSING	1	0									
TOTAL	150	14	45	3.21	34						

Table 8. A. Dohrn 75-187, 11/1-11/18/75, mean length and width of larval herring prey items by 5-mm larval length class.

CRUISE A. Dohrn 75-187 GEAR 61 cm Bongo MESH .333 mm

PREY SIZE DISTRIBUTION · LARVAL GUT CONTENTS · SPECIES *Clupea harengus*

LARVAL LENGTH (MM)	NUMBER LARVAE EXAMINED	NUMBER LARVAE FEEDING	TOTAL NUMBER PREY	MEAN NO. PREY/ LARVA	NUMBER OF PREY AT SIZE RANGES (MM) Length						
					≤0.19	0.2 - 0.49	0.5 - 1.09	1.1 - 1.59	1.6 - 2.59	2.6 - 4.59	5.0
< 10	133	15	36	2.4	4	9					
10 - 14	439	32	57	1.78	2	14	6				
15 - 19	174	16	28	1.75		5	18				
20-24	12	1	2	2.0			2				
25-29											
30-39											
>40											
LENGTH MISSING	23	0									
TOTAL	781	64	123	1.92	6	28	26				

Table 8. Continued.

CRUISE A. Dohrn 75-187 GEAR 61 cm Bongo MESH .333 mm

PREY SIZE DISTRIBUTION · LARVAL GUT CONTENTS · SPECIES *Clupea harengus*

LARVAL LENGTH (MM)	NUMBER LARVAE EXAMINED	NUMBER LARVAE FEEDING	TOTAL NUMBER PREY	MEAN NO. PREY/ LARVA	NUMBER OF PREY AT SIZE RANGES (MM) Width						
					≤ 0.19	0.2 - 0.49	0.5 - 1.09	1.1 - 1.59	1.6 - 2.59	2.6 - 4.59	5.0
< 10	133	15	36	2.4	7	2					
10 - 14	439	32	57	1.78	13	8					
15 - 19	174	16	28	1.75	1	18					
20-24	12	1	2	2.0	2						
25-29											
30-39											
> 40											
LENGTH MISSING	23	0									
TOTAL	781	64	123	1.92	23	28					

Table 9. Albatross IV 75-14, 12/5-12/17/75, mean length and width of larval herring prey items by 5-mm larval length class.

CRUISE ALB IV 75-14 GEAR 61 cm Bongo MESH .505 mm

PREY SIZE DISTRIBUTION · LARVAL GUT CONTENTS · SPECIES *Clupea harengus*

LARVAL LENGTH (MM)	NUMBER LARVAE EXAMINED	NUMBER LARVAE FEEDING	TOTAL NUMBER PREY	MEAN NO. PREY/ LARVA	NUMBER OF PREY AT SIZE RANGES (MM) Length						
					≤ 0.19	0.2 - 0.49	0.5 - 1.09	1.1 - 1.59	1.6 - 2.59	2.6 - 4.59	5.0
< 10	41	0									
10 - 14	277	51	94	1.84	1	36	23				
15 - 19	742	235	493	2.1	8	25	287				
20-24	149	58	204	3.5		9	154				
25-29	15	4	19	4.75			15				
30-39											
> 40											
LENGTH MISSING	42	7	8	1.14			4				
TOTAL	1266	355	818	2.3	9	70	483				

Table 9. Continued.

CRUISE ALB IV 75-14 GEAR 61 cm Bongo MESH .505 mm

PREY SIZE DISTRIBUTION · LARVAL GUT CONTENTS · SPECIES *Clupea harengus*

LARVAL LENGTH (MM)	NUMBER LARVAE EXAMINED	NUMBER LARVAE FEEDING	TOTAL NUMBER PREY	MEAN NO. PREY/ LARVA	NUMBER OF PREY AT SIZE RANGES (MM) Width						
					≤0.19	0.2 - 0.49	0.5 - 1.09	1.1 - 1.59	1.6 - 2.59	2.6 - 4.59	5.0
< 10	41	0									
10 - 14	277	51	94	1.84	37	23					
15 - 19	742	235	493	2.1	108	212					
20-24	149	58	204	3.5	31	132					
25-29	15	4	19	4.75	9	5					
30-39											
> 40											
LENGTH MISSING	42	7	8	1.14		4					
TOTAL	1266	355	818	2.3	185	376					

Table 10. Albatross IV 76-01, 2/10-2/25/76, mean length and width of larval herring prey items by 5-mm larval length class.

CRUISE ALB IV 76-01 GEAR 61 cm Bongo 0.5x1m Neuston MESH .505 mm

PREY SIZE DISTRIBUTION · LARVAL GUT CONTENTS · SPECIES *Clupea harengus*

LARVAL LENGTH (MM)	NUMBER LARVAE EXAMINED	NUMBER LARVAE FEEDING	TOTAL NUMBER PREY	MEAN NO. PREY/ LARVA	NUMBER OF PREY AT SIZE RANGES (MM) Length						
					≤0.19	0.2 - 0.49	0.5 - 1.09	1.1 - 1.59	1.6 - 2.59	2.6 - 4.59	5.0
< 10											
10 - 14											
15 - 19											
20-24	39	7	12	1.71		3	1	2			
25-29	410	43	177	4.12	66	6	71	1	1		
30-39	320	32	205	6.4	95	13	62	2			
>40											
LENGTH MISSING	17	3	12	4.0		3	5				
TOTAL	786	85	406	4.78	161	25	139	5	1		

Table 10. Continued.

CRUISE ALB IV 76-01 GEAR 61 cm Bongo 0.5x1m Neuston MESH .505 mm

PREY SIZE DISTRIBUTION · LARVAL GUT CONTENTS · SPECIES *Clupea harengus*

LARVAL LENGTH (MM)	NUMBER LARVAE EXAMINED	NUMBER LARVAE FEEDING	TOTAL NUMBER PREY	MEAN NO. PREY/ LARVA	NUMBER OF PREY AT SIZE RANGES (MM) Width						
					≤0.19	0.2 - 0.49	0.5 - 1.09	1.1 - 1.59	1.6 - 2.59	2.6 - 4.59	5.0
< 10											
10 - 14											
15 - 19											
20-24	39	7	12	1.71		6					
25-29	410	43	177	4.12	71	73	1				
30-39	320	32	205	6.4	106	62	4				
>40											
LENGTH MISSING	17	3	12	4.0	3	5					
TOTAL	786	85	406	4.78	180	146	5				

Table 11. Wieczno 76-01, 4/9-5/4/76, mean length and width of larval herring prey items by 5-mm larval length class.

CRUISE Wieczno 76-01 GEAR 61 cm Bongo MESH .505 mm

PREY SIZE DISTRIBUTION · LARVAL GUT CONTENTS · SPECIES *Clupea harengus*

LARVAL LENGTH (MM)	NUMBER LARVAE EXAMINED	NUMBER LARVAE FEEDING	TOTAL NUMBER PREY	MEAN NO. PREY/ LARVA	NUMBER OF PREY AT SIZE RANGES (MM) Length						
					≤0.19	0.2 - 0.49	0.5 - 1.09	1.1 - 1.59	1.6 - 2.59	2.6 - 4.59	5.0
< 10											
10 - 14											
15 - 19											
20-24											
25-29	4	2	6	3.0			2				
30-39	128	43	380	8.84		1	4				
>40	22	13	69	5.31							
LENGTH MISSING	4	2	49	24.5							
TOTAL	158	60	504	8.4		1	6				

Table 11. Continued.

CRUISE Wieczno 76-01 GEAR 61 cm Bongo MESH .505 mm

PREY SIZE DISTRIBUTION · LARVAL GUT CONTENTS · SPECIES *Clupea harengus*

LARVAL LENGTH (MM)	NUMBER LARVAE EXAMINED	NUMBER LARVAE FEEDING	TOTAL NUMBER PREY	MEAN NO. PREY/ LARVA	NUMBER OF PREY AT SIZE RANGES (MM) Width						
					≤0.19	0.2 - 0.49	0.5 - 1.09	1.1 - 1.59	1.6 - 2.59	2.6 - 4.59	5.0
< 10											
10 - 14											
15 - 19											
20 - 24											
25-29	4	2	6	3.0		1					
30-39	128	43	380	8.84	1	1					
>40	22	13	69	5.31							
LENGTH MISSING	4	2	49	24.5							
TOTAL	158	60	504	8.4	1	2					

Table 12. Wieczno 76-03, 10/14-11/3/76, mean length and width of larval herring prey items by 5-mm larval length class.

CRUISE Wieczno 76-03 GEAR 61 cm Bongo MESH .505 mm

PREY SIZE DISTRIBUTION · LARVAL GUT CONTENTS · SPECIES *Clupea harengus*

LARVAL LENGTH (MM)	NUMBER LARVAE EXAMINED	NUMBER LARVAE FEEDING	TOTAL NUMBER PREY	MEAN NO. PREY/ LARVA	NUMBER OF PREY AT SIZE RANGES (MM) Length						
					≤0.19	0.2 - 0.49	0.5 - 1.09	1.1 - 1.59	1.6 - 2.59	2.6 - 4.59	5.0
< 10	25	3	8	2.67	2	3	1				
10 - 14	174	13	21	1.61		3	8				
15 - 19	28	3	5	1.67		2	3				
20-24	1	0									
25-29											
30-39											
>40											
LENGTH MISSING	10	1	1	1.0							
TOTAL	238	20	34	1.7							

Table 12. Continued.

CRUISE Wieczno 76-03 GEAR 61 cm Bongo MESH .505 mm

PREY SIZE DISTRIBUTION · LARVAL GUT CONTENTS · SPECIES *Clupea harengus*

LARVAL LENGTH (MM)	NUMBER LARVAE EXAMINED	NUMBER LARVAE FEEDING	TOTAL NUMBER PREY	MEAN NO. PREY/ LARVA	NUMBER OF PREY AT SIZE RANGES (MM) Width						
					≤0.19	0.2 - 0.49	0.5 - 1.09	1.1 - 1.59	1.6 - 2.59	2.6 - 4.59	5.0
< 10	25	3	8	2.67							
10 - 14	174	13	21	1.61	4	3					
15 - 19	28	3	5	1.67	1	2					
20-24	1	0									
25-29											
30-39											
>40											
LENGTH MISSING	10	1	1	1.0							
TOTAL	238	20	34	1.7	5	5					

Table 13. A. Dohrn 76-02, 11/15-11/29/76, mean length and width of larval herring prey items by 5-mm larval length class.

CRUISE Anton Dohrn 76-02 GEAR 61 cm Bongo MESH .505 mm

PREY SIZE DISTRIBUTION · LARVAL GUT CONTENTS · SPECIES *Clupea harengus*

LARVAL LENGTH (MM)	NUMBER LARVAE EXAMINED	NUMBER LARVAE FEEDING	TOTAL NUMBER PREY	MEAN NO. PREY/ LARVA	NUMBER OF PREY AT SIZE RANGES (MM) Length						
					≤0.19	0.2 - 0.49	0.5 - 1.09	1.1 - 1.59	1.6 - 2.59	2.6 - 4.59	5.0
< 10											
10 - 14	3	0									
15 - 19	21	1	1	1.0			1				
20-24	17	2	2	1.0			2				
25-29	1	1	4	4.0			4				
30-39											
>40											
LENGTH MISSING	2	0									
TOTAL	44	4	7	1.75			7				

Table 13. Continued.

CRUISE Anton Dohrn 76-02 GEAR 61 cm Bongo MESH .505 mm

PREY SIZE DISTRIBUTION · LARVAL GUT CONTENTS · SPECIES *Clupea harengus*

LARVAL LENGTH (MM)	NUMBER LARVAE EXAMINED	NUMBER LARVAE FEEDING	TOTAL NUMBER PREY	MEAN NO. PREY/ LARVA	NUMBER OF PREY AT SIZE RANGES (MM) Width						
					≤0.19	0.2 - 0.49	0.5 - 1.09	1.1 - 1.59	1.6 - 2.59	2.6 - 4.59	5.0
<10											
10-14	3	0									
15-19	21	1	1	1.0							
20-24	17	2	2	1.0		2					
25-29	1	1	4	4.0		4					
30-39											
>40											
LENGTH MISSING	2	0									
TOTAL	44	4	7	1.75		6					

Table 14. Researcher 76-01, 11/27-12/11/76, mean length and width of larval herring prey items by 5-mm larval length class.

CRUISE Researcher 76-01 GEAR 61 cm Bongo MESH .505 mm

PREY SIZE DISTRIBUTION · LARVAL GUT CONTENTS · SPECIES *Clupea harengus*

LARVAL LENGTH (MM)	NUMBER LARVAE EXAMINED	NUMBER LARVAE FEEDING	TOTAL NUMBER PREY	MEAN NO. PREY/ LARVA	NUMBER OF PREY AT SIZE RANGES (MM) Length						
					≤0.19	0.2 - 0.49	0.5 - 1.09	1.1 - 1.59	1.6 - 2.59	2.6 - 4.59	5.0
< 10											
10 - 14											
15 - 19	14	3	5	1.67			5				
20-24	35	2	3	1.5			3				
25-29	7	0									
30-39											
> 40											
LENGTH MISSING											
TOTAL	56	5	8	1.6			8				

Table 14. Continued.

CRUISE Researcher 76-01 GEAR 61 cm Bongo MESH .505 mm

PREY SIZE DISTRIBUTION · LARVAL GUT CONTENTS · SPECIES *Clupea harengus*

LARVAL LENGTH (MM)	NUMBER LARVAE EXAMINED	NUMBER LARVAE FEEDING	TOTAL NUMBER PREY	MEAN NO. PREY/ LARVA	NUMBER OF PREY AT SIZE RANGES (MM) Width						
					≤0.19	0.2 - 0.49	0.5 - 1.09	1.1 - 1.59	1.6 - 2.59	2.6 - 4.59	5.0
< 10											
10 - 14											
15 - 19	14	3	5	1.67	1	4					
20-24	35	2	3	1.5		3					
25-29	7	0									
30-39											
>40											
LENGTH MISSING											
TOTAL	56	5	8	1.6	1	7					

Table 15. Mt. Mitchell, 77-01, 2/13-2/24/77, mean length and width of larval herring prey items by 5-mm larval length class.

CRUISE Mt.Mitchell 77-01 GEAR 61 cm Bongo MESH .505 mm

PREY SIZE DISTRIBUTION · LARVAL GUT CONTENTS · SPECIES *Clupea harengus*

LARVAL LENGTH (MM)	NUMBER LARVAE EXAMINED	NUMBER LARVAE FEEDING	TOTAL NUMBER PREY	MEAN NO. PREY/ LARVA	NUMBER OF PREY AT SIZE RANGES (MM) Length						
					≤ 0.19	0.2 - 0.49	0.5 - 1.09	1.1 - 1.59	1.6 - 2.59	2.6 - 4.59	5.0
< 10											
10 - 14											
15 - 19											
20-24	18	6	7	1.17							
25-29	31	12	20	1.67			3	1			
30-39	27	4	9	2.25			2	4			
>40											
LENGTH MISSING	10	3	10	3.33							
TOTAL	86	25	46	1.84			5	5			

Table 15. Continued.

CRUISE Mt.Mitchell 77-01 GEAR 61 cm Bongo MESH .505 mm

PREY SIZE DISTRIBUTION · LARVAL GUT CONTENTS · SPECIES *Clupea harengus*

LARVAL LENGTH (MM)	NUMBER LARVAE EXAMINED	NUMBER LARVAE FEEDING	TOTAL NUMBER PREY	MEAN NO. PREY/ LARVA	NUMBER OF PREY AT SIZE RANGES (MM) Width						
					≤0.19	0.2 - 0.49	0.5 - 1.09	1.1 - 1.59	1.6 - 2.59	2.6 - 4.59	5.0
< 10											
10 - 14											
15 - 19											
20-24	18	6	7	1.17							
25-29	31	12	20	1.67		4					
30-39	27	4	9	2.25		5					
>40											
LENGTH MISSING	10	3	10	3.33							
TOTAL	86	25	46	1.84		9					

Species Names for Tables 16-30

Pseudo m = *Pseudocalanus* sp.

Para p = *Paracalanus parvus*

Cent typ = *Centropages typicus*

Cent ham = *Centropages hamatus*

Oithona spp = *Oithona* spp.

Cal fin = *Calanus finmarchicus*

Invert egg = Invertebrate egg

Unident Cal adult = Unidentified Calanoid adult

Unident Cal juv = Unidentified Calanoid juvenile

Unident = Unidentified and miscellaneous other groups

Table 16. Cryos 74-04, 9/7-9/24/74, abundance of larval herring prey items by 5-mm larval length class.

N = copepod nauplius C = copepodite A = adult copepod

CRUISE Cryos 74-04 GEAR 61 cm Bongo MESH .333 mm

TAXA SELECTION — LARVAL GUT CONTENTS · SPECIES *Clupea harengus*

LARVAL LENGTH (MM)	NUMBER LARVAE EXAMINED	NUMBER LARVAE FEEDING	*Pseudo m*	*Para p*	*Pseud-para*	*Cent typ*	*Cent ham*	*Cent spp*	*Oithona spp*	*Cal fin*	*Invert egg*	*Unident Cal adult*	*Unident Cal juv*	*Unident*
< 10	262	14	11-N		1-N	8-N							8-N	
10-14	35	1											1-N	
15-19	7	0												
20-24														
25-29														
30-39														
>40														
LENGTH MISSING	8	1											1-N	
TOTAL	312	16	11-N		1-N	8-N							10-N	

Table 17. Prognoz 74-01, 10/18-10/30/74, abundance of larval herring prey items by 5-mm larval length class.

N = copepod nauplius C = copepodite A = adult copepod

CRUISE Prognoz 74-01 GEAR 61 cm Bongo MESH .333 mm

TAXA SELECTION — LARVAL GUT CONTENTS · SPECIES *Clupea harengus*

LARVAL LENGTH (MM)	NUMBER LARVAE EXAMINED	NUMBER LARVAE FEEDING	*Pseudo m*	*Para p*	*Pseud- para*	*Cent typ*	*Cent ham*	*Cent spp*	*Oithona spp*	*Cal fin*	*Invert egg*	*Unident Cal adult*	*Unident Cal juv*	*Unident*
<10	89	4	1-N					1-N					3-N	
10-14	61	13	2-C	1-C 2-A	1-C	1-C			1-N 1-C 3-A			3	13-C	
15-19														
20-24														
25-29														
30-39														
>40														
LENGTH MISSING														
TOTAL	150	17	1-N 2-C	1-C 2-A	1-C	1-C		1-N	1-N 1-C 3-A			3	3-N 13-C	

Table 18. A. Dohrn 74-01, 11/16-11/23/74, abundance of larval herring prey items by 5-mm larval length class.

N = copepod nauplius C = copepodite A = adult copepod

CRUISE Anton Dohrn 74-01 GEAR 61 cm Bongo MESH .333 mm

TAXA SELECTION — LARVAL GUT CONTENTS · SPECIES *Clupea harengus*

LARVAL LENGTH (MM)	NUMBER LARVAE EXAMINED	NUMBER LARVAE FEEDING	*Pseudo m*	*Para p*	*Pseud- para*	*Cent typ*	*Cent ham*	*Cent spp*	*Oithona spp*	*Cal fin*	*Invert egg*	*Unident Cal adult*	*Unident Cal juv*	*Unident*
< 10	35	5				1-C						1	5-N 1-C	
10-14	41	10		2-A		9-C			1-A			2	3-C	
15-19	72	12	1-A	1-C 3-A		5-C 2-A						3	2-C	
20-24	2	1		2-A		1-A								
25-29														
30-39														
>40														
LENGTH MISSING														
TOTAL	150	28	1-A	1-C 7-A		15-C 3-A			1-A			6	5-N 6-C	

Table 19. Albatross IV 74-13, 12/4-12/19/74, abundance of larval herring prey items by 5-mm larval length class.

N = Copepod nauplius C = Copepodite A = Adult copepod

CRUISE Albatross IV 74-13 GEAR 61 cm Bongo MESH .505 mm

TAXA SELECTION — LARVAL GUT CONTENTS · SPECIES *Clupea harengus*

LARVAL LENGTH (MM)	NUMBER LARVAE EXAMINED	NUMBER LARVAE FEEDING	*Pseudo m*	*Para p*	*Pseud-para*	*Cent typ*	*Cent ham*	*Cent spp*	*Oithona spp*	*Cal fin*	*Invert egg*	*Unident Cal adult*	*Unident Cal juv*	*Unident*
<10	119	2						1-C				-	1-C	
10-14	1589	140	15-N 1-C 2-A	6-N 5-C 37-A	14-N 4-C 4-A	45-C 47-A		1-N 31-C 4-A	9-C 24-A		1	43	22-N 14-C	1-fish egg 2-Pteropods
15-19	1066	222	13-N 2-C 20-A	33-C 44-A	12-N 7-C 5-A	234-C 7-A	120-C 21-A	33-C 3-A	7-C 25-A		7	24	4-N 31-C	1-fish egg
20-24	286	99	2-N 4-C 44-A	8-C 29-A	4-C 2-A	73-C 11-A	47-C 39-A	6-C	7-C 11-A		74	15	3-N 1-C	1-fish egg
25-29	34	9	1-A	2-C 15-A	1-C 2-A	7-C	2-C 7-A	1-C 2-A	7-A			5	1-N	
30-39	2	1				1-C 2-A	2-A					1		
>40														
LENGTH MISSING	32	2		1-A			1-C	1-C						
TOTAL	3128	475	30-N 7-C 67-A	6-N 48-C 126-A	26-N 16-C 13-A	360-C 67-A	170-C 69-A	1-N 73-C 9-A	23-C 67-A	4	82	88	26-N 47-C	3-fish eggs 2-Pteropods

Table 20. Albatross IV 75-02, 2/12-2/28/75, abundance of larval herring prey items by 5-mm larval length class.

N = copepod nauplius C = copepodite A = adult copepod

CRUISE Albatross IV 75-02 GEAR 61 cm Bongo 0.5 x 1m Neuston MESH .505 mm

TAXA SELECTION — LARVAL GUT CONTENTS · SPECIES *Clupea harengus*

LARVAL LENGTH (MM)	NUMBER LARVAE EXAMINED	NUMBER LARVAE FEEDING	*Pseudo m*	*Para p*	*Pseud-para*	*Cent typ*	*Cent ham*	*Cent spp*	*Oithona spp*	*Cal fin*	*Invert egg*	*Unident Cal adult*	*Unident Cal juv*	*Unident*
< 10														
10-14	2	0												
15-19	7	0												
20-24	231	42	2-C 47-A		3-A	1-C 6-A	11-C 6-A	3-C				16		
25-29	658	120	15-C 203-A	3-A		4-C 19-A	18-C 33-A	8-A	2-A		10	52		
30-39	327	36	1-C 61-A	4-A		3-C 10-A	23-A	1-A	2-A			17		
>40														
LENGTH MISSING	5	0												
TOTAL	1230	198	18-C 311-A	7-A	3-A	8-C 35-A	29-C 62-A	3-C 9-A	4-A		10	85		

Table 21. Belogorsk 75-02, 9/25-10/8/75, abundance of larval herring prey items by 5-mm larval length class.

N = copepod nauplius C = copepodite A = adult copepod

CRUISE Belogorsk 75-02 GEAR 61 cm Bongo MESH .333 mm

TAXA SELECTION — LARVAL GUT CONTENTS · SPECIES *Clupea harengus*

LARVAL LENGTH (MM)	NUMBER LARVAE EXAMINED	NUMBER LARVAE FEEDING	*Pseudo m*	*Para p*	*Pseud-para*	*Cent typ*	*Cent ham*	*Cent spp*	*Oithona spp*	*Cal fin*	*Invert egg*	*Unident Cal adult*	*Unident Cal juv*	*Unident*
<10	15	0												
10-14	1	0												
15-19														
20-24														
25-29														
30-39														
>40														
LENGTH MISSING	1	0												
TOTAL	17	0												

Table 22. Belogorsk 75-03, 10/17-10/30/75, abundance of larval herring prey items by 5-mm larval length class.

N = copepod nauplius C = copepodite A = adult copepod

CRUISE Belogorsk 75-03 GEAR 61 cm Bongo MESH .333 mm

TAXA SELECTION — LARVAL GUT CONTENTS · SPECIES *Clupea harengus*

LARVAL LENGTH (MM)	NUMBER LARVAE EXAMINED	NUMBER LARVAE FEEDING	*Pseudo m*	*Para p*	*Pseud- para*	*Cent typ*	*Cent ham*	*Cent spp*	*Oithona spp*	*Cal fin*	*Invert egg*	*Unident Cal adult*	*Unident Cal juv*	*Unident*
<10	97	12	3-N		4-N 1-C						9	3	16-N	Pelecypod larvae-1
10-14	52	2			2-N	1-N			2-C			1	2-C	
15-19														
20-24														
25-29														
30-39														
>40														
LENGTH MISSING	1	0												
TOTAL	150	14	3-N		6-N 1-C	1-N			2-C		9	4	16-N 2-C	

Table 23. A. Dohrn 75-187, 11/1-11/18/75, abundance of larval herring prey items by 5-mm larval length class.

N = Copepod nauplius C = Copepodite A = Adult copepod

CRUISE Anton Dohrn 75-187 GEAR 61 cm Bongo MESH .333 mm

TAXA SELECTION — LARVAL GUT CONTENTS · SPECIES *Clupea harengus*

LARVAL LENGTH (MM)	NUMBER LARVAE EXAMINED	NUMBER LARVAE FEEDING	*Pseudo m*	*Para p*	*Pseud- para*	*Cent typ*	*Cent ham*	*Cent spp*	*Oithona spp*	*Cal fin*	*Invert egg*	*Unident Cal adult*	*Unident Cal juv*	*Unident*
< 10	133	15		5-C	1-C					5-N 1-A		9	9-N 6-C	
10-14	439	32	2-N 1-A	6-C 6-A	1-C	2-C		1-C	4-A			18	12-N 4-C	
15-19	174	16	4-C 2-A	5-C 11-A	1-C			1-C	1-A			3		
20-24	12	1	2-C											
25-29														
30-39														
>40														
LENGTH MISSING	23	0												
TOTAL	781	64	2-N 6-C 3-A	16-C 17-A	3-C	2-C		2-C	5-A	5-N 1-A		30	21-N 10-C	

Table 24. Albatross IV 75-14, 12/5-12/17/75, abundance of larval herring prey items by 5-mm larval length class.

N = Copepod nauplius C = Copepodite A = Adult copepod

CRUISE Albatross IV 75-14 GEAR 61 cm Bongo MESH .505 mm

TAXA SELECTION — LARVAL GUT CONTENTS · SPECIES *Clupea harengus*

LARVAL LENGTH (MM)	NUMBER LARVAE EXAMINED	NUMBER LARVAE FEEDING	*Pseudo m*	*Para p*	*Pseud- para*	*Cent typ*	*Cent ham*	*Cent spp*	*Oithona spp*	*Cal fin*	*Invert egg*	*Unident Cal adult*	*Unident Cal juv*	*Unident*
< 10	41	0												
10-14	277	51	1-C 5-A	6-C 23-A	3-A	10-C			11-A		1	25	4-N 4-C	Candacia armata 1-C
15-19	742	235	8-C 46-A	35-C 180-A	7-C 10-A	38-C 2-A			1-C 18-A		8	122	17-C	Pelecypod larvae-1
20-24	149	58	2-C 23-A	12-C 101-A	2-C 7-A	3-C			5-A			44	5-C	
25-29	15	4		3-C 6-A	1-A				1-A			8		
30-39														
>40														
LENGTH MISSING	42	7		4-A								4		
TOTAL	1266	355	11-C 74-A	56-C 314-A	9-C 21-A	51-C 2-A			1-C 35-A		9	203	4-N 26-C	

Table 25. Albatross IV 76-01, 2/10-2/25/76, abundance of larval herring prey items by 5-mm larval length class.

N = copepod nauplius C = copepodite A = adult copepod

CRUISE Albatross IV 76-01 GEAR 61 cm Bongo 0.5 x 1m Neuston MESH .505 mm

TAXA SELECTION — LARVAL GUT CONTENTS · SPECIES *Clupea harengus*

LARVAL LENGTH (MM)	NUMBER LARVAE EXAMINED	NUMBER LARVAE FEEDING	*Pseudo m*	*Para p*	*Pseud- para*	*Cent typ*	*Cent ham*	*Cent spp*	*Oithona spp*	*Cal fin*	*Invert egg*	*Unident Cal adult*	*Unident Cal juv*	*Unident*
< 10														
10-14														
15-19														
20-24	39	7	3-A	1-A							3	5		
25-29	410	43	2-C 25-A	8-A	1-C 10-A	1-C 3-A			5-A		66	55	1-C	
30-39	320	32	1-C 37-A	3-A	3-C 5-A	3-C 2-A			9-A	5-N 1-C	102	32	2-C	
>40														
LENGTH MISSING	17	3			3-A	1-A			3-A			5		
TOTAL	786	85	3-C 65-A	12-A	4-C 18-A	4-C 6-A			17-A	5-N 1-C	171	97	3-C	

Table 26. Wieczno 76-01, 4/9-5/4/76, abundance of larval herring prey items by 5-mm larval length class.

N = copepod nauplius C = copepodite A = adult copepod

CRUISE Wieczno 76-01 GEAR 61 cm Bongo MESH .505 mm

TAXA SELECTION — LARVAL GUT CONTENTS · SPECIES *Clupea harengus*

LARVAL LENGTH (MM)	NUMBER LARVAE EXAMINED	NUMBER LARVAE FEEDING	*Pseudo m*	*Para p*	*Pseud- para*	*Cent typ*	*Cent ham*	*Cent spp*	*Oithona spp*	*Cal fin*	*Invert egg*	*Unident Cal adult*	*Unident Cal juv*	*Unident*
< 10														
10-14														
15-19														
20-24														
25-29	4	2	1-C 4-A							1-C				Euphausiid eggs-1 larvae-6 Mysid larvae-12 Acartia longiremis 1-A Hyperiid amphipod-1
30-39	128	43	2-C 31-A	6-A	1-A	2-C 2-A	1-A		4-C 3-A	8-C 18-A	30	214	37-C	
>40	22	13	11-A				2-A		1-C 2-A		8	37	1-N	Euphausiid larvae-7
LENGTH MISSING	4	2							1-C		5	1	42-C	
TOTAL	158	60	3-C 46-A	6-A	1-A	2-C 2-A	3-A		6-C 5-A	9-C 18-A	43	252	1-N 79-C	

Table 27. Wieczno 76-03, 10/14-11/3/76, abundance of larval herring prey items by 5-mm larval length class.

N = copepod nauplius C = copepodite A = adult copepod

CRUISE Wieczno 76-03 GEAR 61 cm Bongo MESH .505 mm

TAXA SELECTION — LARVAL GUT CONTENTS · SPECIES *Clupea harengus*

LARVAL LENGTH (MM)	NUMBER LARVAE EXAMINED	NUMBER LARVAE FEEDING	*Pseudo m*	*Para p*	*Pseud-para*	*Cent typ*	*Cent ham*	*Cent spp*	*Oithona spp*	*Cal fin*	*Invert egg*	*Unident Cal adult*	*Unident Cal juv*	*Unident*
<10	25	3	1-A	1-C				3-C				2	1-C	
10-14	174	13	2-A	1-A	2-C 1-A				3-C			10	2-C	
15-19	28	3	1-A	1-C		2-C		1-C						
20-24	1	0												
25-29														
30-39														
>40														
LENGTH MISSING	10	1										1		
TOTAL	238	20	4-A	2-C 1-A	2-C 1-A	2-C		3-C	4-C			13	3-C	

Table 28. A. Dohrn 76-02, 11/15-11/29/76, abundance of larval herring prey items by 5-mm larval length class.

N = copepod nauplius C = copepodite A = adult copepod

CRUISE Anton Dohrn 76-02 GEAR 61 cm Bongo MESH .505 mm

TAXA SELECTION — LARVAL GUT CONTENTS · SPECIES *Clupea harengus*

LARVAL LENGTH (MM)	NUMBER LARVAE EXAMINED	NUMBER LARVAE FEEDING	*Pseudo m*	*Para p*	*Pseud- para*	*Cent typ*	*Cent ham*	*Cent spp*	*Oithona spp*	*Cal fin*	*Invert egg*	*Unident Cal adult*	*Unident Cal juv*	*Unident*
< 10														
10-14	3	0												
15-19	21	1				1-C								
20-24	17	2	2-A											
25-29	1	1	1-A	3-A										
30-39														
>40														
LENGTH MISSING	2	0												
TOTAL	44	4	3-A	3-A		1-C								

Table 29. Researcher 76-01, 11/27-12/11/76, abundance of larval herring prey items by 5-mm larval length class.

N = Copepod nauplius C = Copepodite A = Adult copepod

CRUISE Researcher 76-01 GEAR 61 cm Bongo MESH .505 mm

TAXA SELECTION — LARVAL GUT CONTENTS · SPECIES *Clupea harengus*

LARVAL LENGTH (MM)	NUMBER LARVAE EXAMINED	NUMBER LARVAE FEEDING	*Pseudo m*	*Para p*	*Pseud- para*	*Cent typ*	*Cent ham*	*Cent spp*	*Oithona spp*	*Cal fin*	*Invert egg*	*Unident Cal adult*	*Unident Cal juv*	*Unident*
< 10														
10-14														
15-19	14	3	3-C 2-A											
20-24	35	2	1-A	2-A										
25-29	7	0												
30-39														
>40														
LENGTH MISSING														
TOTAL	56	5	3-C 3-A	2-A										

Table 30. Mt. Mitchell 77-01, 2/13-2/24/77, abundance of larval herring prey items by 5-mm larval length class.

N = copepod nauplius C = copepodite A = adult copepod

CRUISE Mt. Mitchell 77-01 GEAR 61 cm Bongo MESH .505 mm

TAXA SELECTION — LARVAL GUT CONTENTS · SPECIES *Clupea harengus*

LARVAL LENGTH (MM)	NUMBER LARVAE EXAMINED	NUMBER LARVAE FEEDING	*Pseudo m*	*Para p*	*Pseud-para*	*Cent typ*	*Cent ham*	*Cent spp*	*Oithona spp*	*Cal fin*	*Invert egg*	*Unident Cal adult*	*Unident Cal juv*	*Unident*
< 10														
10-14														
15-19														
20-24	18	6	1-A									6		
25-29	31	12	5-A	1-A								14		
30-39	27	4	9-A											
> 40														
LENGTH MISSING	10	3	5-A						1-A			4		
TOTAL	86	25	20-A	1-A					1-A			24		

Table 31. Cryos 74-04, 9/7-9/24/74, diel distribution of feeding larval herring by 5-mm length class.

TIME (GMT)

CRUISE Cryos 74-04 GEAR 61 cm Bongo MESH .333 mm

DIURNAL FEEDING-LARVAL GUT CONTENTS— SPECIES *Clupea harengus*

LARVAL LENGTH (MM)	0000-0200	0201-0400	0401-0600	0601-0800	0801-1000	1001-1200	1201-1400	1401-1600	1601-1800	1801-2000	2001-2200	2201-2400	TOTAL
<10				8					2	4			14
10-14				1					0	0			1
15-19													
20-24													
25-29													
30-39													
>40													
LENGTH MISSING				0					1	0			1
TOTAL				9					3	4			16

□ = Day ▥ = Twilight ■ = Night

Table 32. Prognoz 74-01, 10/18-10/30/74, diel distribution of feeding larval herring by 5-mm length class.

TIME (GMT)

CRUISE Prognoz 74-01 GEAR 61 cm Bongo MESH .333 mm

DIURNAL FEEDING-LARVAL GUT CONTENTS- SPECIES *Clupea harengus*

LARVAL LENGTH (MM)	0000-0200	0201-0400	0401-0600	0601-0800	0801-1000	1001-1200	1201-1400	1401-1600	1601-1800	1801-2000	2001-2200	2201-2400	TOTAL
<10		2							0		2		4
10-14		0							13		0		13
15-19													
20-24													
25-29													
30-39													
> 40													
LENGTH MISSING													
TOTAL		2							13		2		17

□ = Day ▥ = Twilight ■ = Night

Table 33. A. Dorhn 74-01, 11/16-11/23/74, diel distribution of feeding larval herring by 5-mm length class.

TIME (GMT)

CRUISE Anton Dohrn 74-01 GEAR 61 cm Bongo MESH .333 mm

DIURNAL FEEDING-LARVAL GUT CONTENTS— SPECIES *Clupea harengus*

LARVAL LENGTH (MM)	0000-0200	0201-0400	0401-0600	0601-0800	0801-1000	1001-1200	1201-1400	1401-1600	1601-1800	1801-2000	2001-2200	2201-2400	TOTAL
<10		2					3				0		5
10-14		0					5				5		10
15-19		0					2				10		12
20-24		0					0				1		1
25-29													
30-39													
> 40													
LENGTH MISSING													
TOTAL		2					10				16		28

□ = Day ▥ = Twilight ■ = Night

Table 34. Albatross IV 74-13, 12/4-12/19/74, diel distribution of feeding larval herring by 5-mm length class.

TIME (GMT)

CRUISE ALB IV 74-13 GEAR 61 cm Bongo MESH .505 mm

DIURNAL FEEDING-LARVAL GUT CONTENTS- SPECIES *Clupea harengus*

LARVAL LENGTH (MM)	0000-0200	0201-0400	0401-0600	0601-0800	0801-1000	1001-1200	1201-1400	1401-1600	1601-1800	1801-2000	2001-2200	2201-2400	TOTAL
<10		0		0	0		0	0	1	1	0	0	2
10-14		0		16	1		7	0	20	47	44	5	140
15-19		1		34	0		22	4	59	75	21	6	222
20-24		0		15	2		10	4	11	52	3	2	99
25-29		0		0	0		0	0	0	9	0	0	9
30-39		0		0	0		0	0	0	1	0	0	1
> 40													
LENGTH MISSING		0		0	0		0	0	0	2	0	0	2
TOTAL		1		65	3		39	8	91	187	68	13	475

□ = Day ▥ = Twilight ■ = Night

Table 35. Albatross IV 75-02, 2/12-2/28/75, diel distribution of feeding larval herring by 5-mm length class.

61 cm Bongo
0.5 x 1 m

TIME (GMT) CRUISE ALB IV 75-02 GEAR Neuston MESH .505 mm

DIURNAL FEEDING-LARVAL GUT CONTENTS-- SPECIES *Clupea harengus*

LARVAL LENGTH (MM)	0000-0200	0201-0400	0401-0600	0601-0800	0801-1000	1001-1200	1201-1400	1401-1600	1601-1800	1801-2000	2001-2200	2201-2400	TOTAL
<10													
10-14													
15-19													
20-24	40	1	0	0		0	0	1	0				42
25-29	93	9	3	0		1	9	4	0				119
30-39	25	2	1	2		1	2	2	1				36
> 40													
LENGTH MISSING													
TOTAL	158	12	4	2		2	11	7	1				197

□ = Day ▥ = Twilight ■ = Night

Table 36. Belogorsk 75-02, 9/25-10/8/75, diel distribution of feeding larval herring by 5-mm length class.

TIME (GMT) CRUISE Belogorsk 75-02 GEAR 61 cm Bongo MESH .333 mm

DIURNAL FEEDING-LARVAL GUT CONTENTS — SPECIES *Clupea harengus*

LARVAL LENGTH (MM)	0000-0200	0201-0400	0401-0600	0601-0800	0801-1000	1001-1200	1201-1400	1401-1600	1601-1800	1801-2000	2001-2200	2201-2400	TOTAL
<10													
10-14													
15-19													
20-24													
25-29													
30-39													
>40													
LENGTH MISSING													
TOTAL													0

Table 37. Belogorsk 75-03, 10/17-10/30/75, diel distribution of feeding larval herring by 5-mm length class.

TIME (GMT) CRUISE Belogorsk 75-03 GEAR 61 cm Bongo MESH .333 mm

DIURNAL FEEDING-LARVAL GUT CONTENTS— SPECIES *Clupea harengus*

LARVAL LENGTH (MM)	0000-0200	0201-0400	0401-0600	0601-0800	0801-1000	1001-1200	1201-1400	1401-1600	1601-1800	1801-2000	2001-2200	2201-2400	TOTAL
<10						1					11		12
10-14						1					1		2
15-19													
20-24													
25-29													
30-39													
>40													
LENGTH MISSING													
TOTAL						2					12		14

□ = Day ▥ = Twilight ■ = Night

Table 38. A. Dohrn 75-187, 11/1-11/18/75, diel distribution of feeding larval herring by 5-mm length class.

TIME (GMT)

CRUISE Anton Dohrn 75-187 GEAR 61 cm Bongo MESH .333 mm

DIURNAL FEEDING-LARVAL GUT CONTENTS — SPECIES *Clupea harengus*

LARVAL LENGTH (MM)	0000-0200	0201-0400	0401-0600	0601-0800	0801-1000	1001-1200	1201-1400	1401-1600	1601-1800	1801-2000	2001-2200	2201-2400	TOTAL
<10	6							0	0	0	6	3	15
10-14	12							4	3	1	5	7	32
15-19	3							4	1	0	3	5	16
20-24	0							0	0	0	0	1	1
25-29													
30-39													
>40													
LENGTH MISSING													
TOTAL	21							8	4	1	14	16	64

□ = Day ▥ = Twilight ■ = Night

Table 39. Albatross IV 75-14, 12/5-12/17/75, diel distribution of feeding larval herring by 5-mm larval length.

TIME (GMT) CRUISE ALB IV 75-14 GEAR 61 cm Bongo MESH .505 mm

DIURNAL FEEDING-LARVAL GUT CONTENTS— SPECIES *Clupea harengus*

LARVAL LENGTH (MM)	0000-0200	0201-0400	0401-0600	0601-0800	0801-1000	1001-1200	1201-1400	1401-1600	1601-1800	1801-2000	2001-2200	2201-2400	TOTAL
<10													
10-14	4	0	0			0	1	2	4	7	24	9	51
15-19	44	0	1			1	32	2	6	32	82	34	234
20-24	16	1	0			0	9	2	0	4	4	22	58
25-29	1	0	0			0	1	0	0	0	0	2	4
30-39													
>40													
LENGTH MISSING	3	0	0			0	3	0	0	0	1	0	7
TOTAL	68	1	1			1	46	6	10	43	111	67	354

□ = Day ▥ = Twilight ■ = Night

Table 40. Albatros IV 76-1, 2/10-2/25/76, diel distribution of feeding larval herring by 5-mm length class.

61 cm Bongo
0.5 x 1 m
Neuston

TIME (GMT) CRUISE ALB IV 76-01 GEAR Neuston MESH .505 mm

DIURNAL FEEDING-LARVAL GUT CONTENTS-- SPECIES *Clupea harengus*

LARVAL LENGTH (MM)	0000-0200	0201-0400	0401-0600	0601-0800	0801-1000	1001-1200	1201-1400	1401-1600	1601-1800	1801-2000	2001-2200	2201-2400	TOTAL
<10													
10-14													
15-19													
20-24	2	1	0	1		2	0	0	1	0	0	0	7
25-29	1	7	6	0		2	3	3	5	1	1	14	43
30-39	2	7	1	1		3	5	4	4	1	1	3	32
> 40													
LENGTH MISSING	0	2	0	1		0	0	0	0	0	0	0	3
TOTAL	5	17	7	3		7	8	7	10	2	2	17	85

□ = Day ▥ = Twilight ■ = Night

Table 41. Wieczno 76-01, 4/9-5/4/76, diel distribution of feeding larval herring by 5-mm length class.

TIME (GMT)

CRUISE Wieczno 76-01 GEAR 61 cm Bongo MESH .505 mm

DIURNAL FEEDING-LARVAL GUT CONTENTS-- SPECIES *Clupea harengus*

LARVAL LENGTH (MM)	0000-0200	0201-0400	0401-0600	0601-0800	0801-1000	1001-1200	1201-1400	1401-1600	1601-1800	1801-2000	2001-2200	2201-2400	TOTAL
<10													
10-14													
15-19													
20-24													
25-29	0	0	0			0		0		1	1	0	2
30-39	10	19	8			0		0		0	2	4	43
> 40	7	0	2			1		1		1	1	0	13
LENGTH MISSING	2	0	0			0		0		0	0	0	2
TOTAL	19	19	10			1		1		2	4	4	60

⊡ = Day ▥ = Twilight ■ = Night

Table 42. Wieczno 76-03, 10/14-11/3/76, diel distribution of feeding larval herring by 5-mm length class.

TIME (GMT)

CRUISE Wieczno 76-03 GEAR 61 cm Bongo MESH .505 mm

DIURNAL FEEDING-LARVAL GUT CONTENTS— SPECIES *Clupea harengus*

LARVAL LENGTH (MM)	0000-0200	0201-0400	0401-0600	0601-0800	0801-1000	1001-1200	1201-1400	1401-1600	1601-1800	1801-2000	2001-2200	2201-2400	TOTAL
<10	0	0					1		0	0		2	3
10-14	0	0					2		2	1		8	13
15-19	0	1					1		1	0		0	3
20-24													
25-29													
30-39													
> 40													
LENGTH MISSING	1	0					0		0	0		0	1
TOTAL	1	1					4		3	1		10	20

□ = Day ▥ = Twilight ■ = Night

Table 43. A. Dohrn 76-02, 11/15-11/29/76, diel distribution of feeding larval herring by 5-mm length class.

TIME (GMT) CRUISE Anton Dohrn 76-02 GEAR 61 cm Bongo MESH .505 mm

DIURNAL FEEDING-LARVAL GUT CONTENTS— SPECIES *Clupea harengus*

LARVAL LENGTH (MM)	0000-0200	0201-0400	0401-0600	0601-0800	0801-1000	1001-1200	1201-1400	1401-1600	1601-1800	1801-2000	2001-2200	2201-2400	TOTAL
<10													
10-14													
15-19			0								0	1	1
20-24			1								1	0	2
25-29			0								1	0	1
30-39													
>40													
LENGTH MISSING													
TOTAL			1								2	1	4

□ = Day ▥ = Twilight ■ = Night

Table 44. Researcher 76-01, 11/27-12/11/76, diel distribution of feeding larval herring by 5-mm length class.

TIME (GMT)

CRUISE Researcher 76-01 GEAR 61 cm Bongo MESH .505 mm

DIURNAL FEEDING-LARVAL GUT CONTENTS— SPECIES *Clupea harengus*

LARVAL LENGTH (MM)	0000-0200	0201-0400	0401-0600	0601-0800	0801-1000	1001-1200	1201-1400	1401-1600	1601-1800	1801-2000	2001-2200	2201-2400	TOTAL
<10													
10-14													
15-19							0		1	1		1	3
20-24							1		0	0		1	2
25-29													
30-39													
> 40													
LENGTH MISSING													
TOTAL							1		1	1		2	5

□ = Day ▥ = Twilight ■ = Night

Table 45. Mt. Mitchell 77-01, 2/13-2/24/77, diel distribution of feeding larval herring by 5-mm length class.

TIME (GMT)

CRUISE Mt.Mitchell 77-01 GEAR 61 cm Bongo MESH .505 mm

DIURNAL FEEDING-LARVAL GUT CONTENTS— SPECIES *Clupea harengus*

LARVAL LENGTH (MM)	0000-0200	0201-0400	0401-0600	0601-0800	0801-1000	1001-1200	1201-1400	1401-1600	1601-1800	1801-2000	2001-2200	2201-2400	TOTAL
<10													
10-14													
15-19													
20-24	0		0				0	2		4	0		6
25-29	0		1				1	2		7	1		12
30-39	1		0				2	1		0	0		4
>40													
LENGTH MISSING	1		0				0	1		0	1		3
TOTAL	2		1				3	6		11	2		25

□ = Day ▥ = Twilight ■ = Night

Table 46. Cryos 74-04, 9/7-9/24/74, mean value of larval herring condition factor measurements by 5-mm length class.

CRUISE Cryos 74-04 GEAR 61 cm Bongo MESH .333 mm

MEAN VALUES OF CONDITION FACTOR MEASUREMENTS – LARVAL GUT CONTENTS: SP *Clupea harengus*

STD LENGTH (MM)	NUMBER LARVAE EXAMINED	SKULL WIDTH (MM)			MOUTH GAPE (MM)			MAXILLARY LENGTH (MM)			EYE HEIGHT (MM)			HEAD HEIGHT (MM)			EYE/HEAD HEIGHT RATIO			BODY HEIGHT (MM)			PECTORAL ANGLE (°)			BODY HEIGHT/ STD LENGTH RATIO			WEIGHT (MGDRY) X 1000 / STD LENGTH (MM) 3		
		NO.	$\bar{X}$	CL	NO	$\bar{X}$	CL	NO	$\bar{X}$	CL	NO	$\bar{X}$	CL	NO	$\bar{X}$	CL	NO	$\bar{X}$	CL	NO	$\bar{X}$	CL	NO	$\bar{X}$	CL	NO	$\bar{X}$	CL	NO	$\bar{X}$	CL
<10	262	174	.456	±.012	36	.614	±.035	36	.434	±.025	78	.261	±.011	184	.473	±.009	76	.520	±.019	235	.318	.029	122	129.8	±1.15	235	.050	±.006	262	.043	±.002
10-14	35	31	.633	±.043	20	.827	±.047	20	.584	±.033	17	.368	±.039	27	.652	±.029	16	.546	±.054	33	.459	.034	28	132.1	±2.48	33	.038	±.002	35	.116	±.007
15-19	7	6	.947	±.102	7	1.19	±.154	7	.840	±.109	6	.553	±.077	7	.903	±.060	6	.621	±.096	7	.680	.123	7	141.3	±7.08	7	.040	±.004	7	.203	±.030
20-24																															
25-29																															
30-39																															
40																															
LENGTH MISSING	8	2	.455	±1.33	1	.382		1	.270					2	.475	±1.08				8	.313	±.067	2	128.5	±19.1						
TOTAL	312	213	.495	±.018	64	.740	±.054	64	.523	±.038	101	.296	±.019	220	.508	±.015	98	.530	±.018	283	.343	±.026	159	130.7	±1.07	275	.048	±.005	304	.055	±.004

NOTE: CL = 95% confidence limits.

Table 47. Prognoz 74-01, 10/18-10/30/74, mean value of larval herring condition factor measurements by 5-mm length class.

MEAN VALUES OF CONDITION FACTOR MEASUREMENTS — LARVAL GUT CONTENTS, SP Clupea harengus

CRUISE Prognoz 74-01 GEAR 61 cm Bongo MESH .333 mm

STD LENGTH (MM)	NUMBER LARVAE EXAMINED	SKULL WIDTH (MM)			MOUTH GAPE (MM)			MAXILLARY LENGTH (MM)			EYE HEIGHT (MM)			HEAD HEIGHT (MM)			EYE/HEAD HEIGHT RATIO			BODY HEIGHT (MM)			PECTORAL ANGLE (°)			BODY HEIGHT/STD LENGTH RATIO			WEIGHT (MGDRY) X 1000 / STD LENGTH (MM)3		
		NO.	X̄	CL	NO	X̄	CL	NO	X̄	CL	NO	X̄	CL	NO	X̄	CL	NO	X̄	CL	NO	X̄	CL	NO	X̄	CL	NO	X̄	CL	NO	X̄	CL
<10	89	42	.447	±.021	15	.581	±.050	15	.411	±.035	7	.263	±.036	66	.438	±.013	6	.556	±.050	89	.312	±.008	40	126.6	±1.60	4	.047	±.013	4	.048	±.011
10-14	61	54	.776	±.023	45	.882	±.034	45	.624	±.024	23	.421	±.026	56	.707	±.021	23	.582	±.043	61	.513	±.015	50	129.3	±1.63	13	.041	±.002	13	.125	±.012
15-19																															
20-24																															
25-29																															
30-39																															
40																															
LENGTH MISSING																															
TOTAL	150	96	.632	±.037	60	.807	±.044	60	.571	±.031	30	.384	±.033	122	.562	±.027	29	.576	±.035	150	.393	±.017	90	128.1	±1.17	17	.042	±.003	17	.107	±.020

NOTE: CL = 95% confidence limits.

Table 48. A. Dohrn 74-01, 11/16-11/23/74, mean value of larval herring condition factor measurements by 5-mm length class.

CRUISE A. Dohrn 74-01 GEAR 61 cm Bongo MESH .333 mm

MEAN VALUES OF CONDITION FACTOR MEASUREMENTS – LARVAL GUT CONTENTS · SP Clupea harengus

STD LENGTH (MM)	NUMBER LARVAE EXAMINED	SKULL WIDTH (MM)			MOUTH GAPE (MM)			MAXILLARY LENGTH (MM)			EYE HEIGHT (MM)			HEAD HEIGHT (MM)			EYE/HEAD HEIGHT RATIO			BODY HEIGHT (MM)			PECTORAL ANGLE (°)			BODY HEIGHT/STD LENGTH RATIO			WEIGHT (MGDRY) X 1000 / STD LENGTH (MM) 3		
		NO	X̄	CL	NO	X̄	CL	NO	X̄	CL	NO	X̄	CL	NO	X̄	CL	NO	X̄	CL	NO	X̄	CL	NO	X̄	CL	NO	X̄	CL	NO	X̄	CL
<10	35	26	.475	±.038	3	.660	±.215	3	.467	±.152	6	.220	±.035	30	.469	±.022	5	.466	±.100	35	.334	±.013	10	124.4	±3.49	35	.046	±.002	35	.052	±.004
10-14	41	35	.869	±.034	20	.973	±.034	30	.688	±.024	13	.535	±.035	35	.760	±.025	12	.677	±.036	41	.571	±.028	32	133.5	±1.85	41	.042	±.002	41	.140	±.006
15-19	72	64	1.05	±.021	57	1.20	±.040	57	.851	±.028	37	.603	±.024	65	.925	±.025	37	.644	±.026	71	.748	±.019	65	135.1	±1.43	71	.045	±.001	72	.200	±.005
20-24	2	2	1.32		1	1.87		1	1.32		1	.840		2	1.26	±.762	1	.636		2	1.08	±.019	2	136.5	±44.5	2	.050	±.028	2	.305	±.194
25-29																															
30-39																															
40																															
LENGTH MISSING																															
TOTAL	150	127	.887	±.042	91	1.12	±.042	91	.790	±.030	57	.552	±.037	132	.783	±.035	55	.635	±.025	149	.607	±.031	109	133.7	±1.18	149	.044	±.001	150	.150	±.010

NOTE: CL = 95% confidence limits.

Table 49. Albatross IV 74-13, 12/4-12/19/74, mean value of larval herring condition factor measurements by 5-mm length class.

MEAN VALUES OF CONDITION FACTOR MEASUREMENTS – LARVAL GUT CONTENTS · SP, *Clupea harengus*

CRUISE ALB IV 74-13 GEAR 61 cm Bongo MESH .505 mm

STD LENGTH (MM)	NUMBER LARVAE EXAMINED	SKULL WIDTH (MM)			MOUTH GAPE (MM)			MAXILLARY LENGTH (MM)			EYE HEIGHT (MM)			HEAD HEIGHT (MM)			EYE/HEAD HEIGHT RATIO			BODY HEIGHT (MM)			PECTORAL ANGLE (°)			BODY HEIGHT/ STD LENGTH RATIO			WEIGHT (MGDRY) X 1000 / STD LENGTH (MM) 3		
		NO.	$\bar{X}$	CL	NO	$\bar{X}$	CL	NO	$\bar{X}$	CL	NO	$\bar{X}$	CL	NO	$\bar{X}$	CL	NO	$\bar{X}$	CL	NO	$\bar{X}$	CL	NO	$\bar{X}$	CL	NO	$\bar{X}$	CL	NO	$\bar{X}$	CL
<10	119	106	.574	±.018	86	.809	±.026	86	.572	±.018	16	.375	±.061	99	.581	±.013	15	.649	±.119	109	.319	±.011	52	151.9	±2.92	109	.035	±.001	119	.073	±.002
10-14	1589	1450	.757	±.006	1353	1.01	±.009	1353	.715	±.007	390	.469	±.007	1452	.722	±.006	383	.622	±.010	1557	.432	±.008	1138	150.4	±1.13	1557	.034	±.001	1589	.125	±.001
15-19	1066	998	1.02	±.008	957	1.49	±.015	957	1.05	±.011	612	.660	±.017	1005	1.04	±.011	600	.598	±.006	1059	.610	±.009	961	152.1	±.708	1059	.036	±.001	1066	.208	±.002
20-24	286	282	1.25	±.013	277	1.82	±.029	277	1.29	±.020	241	.824	±.016	283	1.33	±.023	240	.616	±.009	284	.883	±.002	284	151.0	±1.06	284	.041	±.001	286	.305	±.003
25-29	34	34	1.50	±.061	34	2.26	±.083	34	1.60	±.059	34	1.09	±.040	34	1.80	±.077	34	.608	±.020	34	1.33	±.081	34	152.7	±2.60	34	.051	±.003	34	.423	±.012
30-39	2	2	1.69	±.381	2	2.77	±2.25	2	1.96	±1.59	2	1.37	±.445	2	2.16	±4.13	2	.646	±1.03	2	1.57	±2.99	2	157.0		2	.051	±.091	2	.548	±.013
40																															
LENGTH MISSING	32	21	.823	±.150	18	1.14	±.166	18	.807	±.117	5	.770	±.163	22	.815	±.117	5	.692	±.164	31	.436	±.066	14	148.7	±9.54						
TOTAL	3128	2893	.899	±.008	2727	1.27	±.014	2727	.898	±.010	1300	.642	±.012	2897	.899	±.010	1279	.610	±.480	3076	.542	±.008	2485	151.2	±.604	3045	.036	±.0004	3096	.172	±.002

NOTE: CL = 95% confidence limits.

Table 50. Albatross IV 75-02, 2/12-2/28/75, mean value of larval herring condition factor measurements by 5-mm length class.

CRUISE ALB IV 75-02 GEAR 61 cm Bongo 0.5x1m Neuston MESH .505 mm

MEAN VALUES OF CONDITION FACTOR MEASUREMENTS – LARVAL GUT CONTENTS: SPCLUPEA HARENGUS

STD LENGTH (MM)	NUMBER LARVAE EXAMINED	SKULL WIDTH (MM)			MOUTH GAPE (MM)			MAXILLARY LENGTH (MM)			EYE HEIGHT (MM)			HEAD HEIGHT (MM)			EYE/HEAD HEIGHT RATIO			BODY HEIGHT (MM)			PECTORAL ANGLE (°)			BODY HEIGHT/ STD LENGTH RATIO			WEIGHT (MGDRY) X 1000 / STD LENGTH (MM) 3		
		NO.	X̄	CL	NO	X̄	CL	NO	X̄	CL	NO	X̄	CL	NO	X̄	CL	NO	X̄	CL	NO	X̄	CL	NO	X̄	CL	NO	X̄	CL	NO	X̄	CL
<10																															
10-14	2	1	.520								1	.600		1	.880					2	.380	±.254				2	.034	±.013	2	.103	±.048
15-19	7	4	1.02	±.122	4	1.36	±.244	4	.960	±.172	1	.600		5	1.00	±.186	1	.600		6	.740	±.087	4	149.2	±15.3	6	.040	±.003	7	.227	±.016
20-24	231	204	1.28	±.013	200	1.82	±.028	200	1.29	±.019	144	.864	±.020	215	1.29	±.025	143	.648	±.014	222	1.05	±.077	213	149.2	±.982	222	.045	±.003	231	.345	±.003
25-29	658	618	1.46	±.013	596	2.22	±.037	596	1.57	±.026	570	1.10	±.012	635	1.70	±.028	567	.644	±.006	645	1.30	±.017	636	153.2	±1.18	645	.048	±.000	659	.445	±.003
30-39	327	321	1.68	±.017	313	2.86	±.045	313	2.02	±.032	314	1.46	±.023	322	2.37	±.042	312	.619	±.006	323	1.89	±.045	318	157.6	±.615	323	.060	±.001	327	.573	±.005
40																															
LENGTH MISSING	5	1	1.36		1	1.92		1	1.36		1	.920		1	1.40		1	.657		2	1.08	±1.02	1	150.0							
TOTAL	1230	1149	1.49	±.011	1114	2.32	±.032	1114	1.64	±.023	1031	1.17	±.016	1179	1.81	±.029	1024	.637	±.004	1200	1.41	±.027	1172	153.7	±.706	1198	.051	±.001	1226	.458	±.005

NOTE: CL = 95% confidence limits.

Table 51. Belogorsk 75-02, 9/25-10/8/75, mean value of larval herring condition factor measurements by 5-mm length class.

CRUISE Belogorsk 75-02 GEAR 61 cm Bongo MESH .333 mm

MEAN VALUES OF CONDITION FACTOR MEASUREMENTS – LARVAL GUT CONTENTS · SP *Clupea harengus*

STD LENGTH (MM)	NUMBER LARVAE EXAMINED	SKULL WIDTH (MM)			MOUTH GAPE (MM)			MAXILLARY LENGTH (MM)			EYE HEIGHT (MM)			HEAD HEIGHT (MM)			EYE/HEAD HEIGHT RATIO			BODY HEIGHT (MM)			PECTORAL ANGLE (°)			BODY HEIGHT/ STD LENGTH RATIO			WEIGHT (MGDRY) X 1000 / STD LENGTH (MM) 3		
		NO.	$\bar{X}$	CL	NO	$\bar{X}$	CL	NO	$\bar{X}$	CL	NO	$\bar{X}$	CL	NO	$\bar{X}$	CL	NO	$\bar{X}$	CL	NO	$\bar{X}$	CL	NO	$\bar{X}$	CL	NO	$\bar{X}$	CL	NO	$\bar{X}$	CL
<10	15	12	.534	± .040	6	.608	± .075	6	.430	± .053	9	.243	± .031	14	.517	± .035	9	.460	± .027	15	.310	± .022	9	132.3	± 3.61	15	.049	± .003	15	.040	± .003
10-14	1	1	.700		1	.764		1	.540					1	.580					1	.470		1	124.0		1	.046		1	.089	
15-19																															
20-24																															
25-29																															
30-39																															
40																															
LENGTH MISSING	1	1	.620		1	.665		1	.470					1	.540					1	.390		1	141.1							
TOTAL	17	14	.552	± .043	8	.635	± .069	8	.449	± .049	9	.243	± .031	16	.523	± .031	9	.460	± .027	17	.324	± .029	11	132.4	± 3.80	16	.049	± .003	16	.043	± .007

NOTE: CL = 95% confidence limits.

Table 52. Belogorsk 75-03, 10/17-10/30/75, mean value of larval herring condition factor measurements by 5-mm length class.

MEAN VALUES OF CONDITION FACTOR MEASUREMENTS — LARVAL GUT CONTENTS · SP Clupea harengus

CRUISE Belogorsk 75-03 GEAR 61 cm Bongo MESH .333 mm

STD LENGTH (MM)	NUMBER LARVAE EXAMINED	SKULL WIDTH (MM)			MOUTH GAPE (MM)			MAXILLARY LENGTH (MM)			EYE HEIGHT (MM)			HEAD HEIGHT (MM)			EYE/HEAD HEIGHT RATIO			BODY HEIGHT (MM)			PECTORAL ANGLE (°)			BODY HEIGHT/ STD LENGTH RATIO			WEIGHT (MGDRY) X 1000 / STD LENGTH (MM) 3		
		NO.	X̄	CL	NO	X̄	CL	NO	X̄	CL	NO	X̄	CL	NO	X̄	CL	NO	X̄	CL	NO	X̄	CL	NO	X̄	CL	NO	X̄	CL	NO	X̄	CL
<10	97	85	.535	±.021	38	.628	±.037	38	.442	±.026	31	.279	±.018	92	.498	±.016	31	.550	±.022	97	.345	±.014	68	131.4	±1.28	97	.046	±.001	97	.055	±.004
10-14	52	48	.703	.020	38	.808	±.029	38	.571	±.021	21	.392	±.020	49	.646	±.019	20	.605	±.023	50	.459	±.015	48	131.7	±1.47	50	.042	±.001	52	.098	±.003
15-19																															
20-24																															
25-29																															
30-39																															
40																															
LENGTH MISSING	1	1	.580		1	.764		1	.540		1	.350		1	.580		1	.603		1	.430		1	140.0							
TOTAL	150	134	.595	±.020	77	.719	±.030	77	.508	±.022	53	.325	±.020	142	.550	±.017	52	.572	±.017	148	.384	±.013	117	131.6	±.952	147	.005	±.001	149	.070	±.004

NOTE: CL = 95% confidence limits.

Table 53. A. Dohrn 75-187, 11/1-11/18/75, mean value of larval herring condition factor measurements by 5-mm length class.

MEAN VALUES OF CONDITION FACTOR MEASUREMENTS – LARVAL GUT CONTENTS - SP Clupea harengus

CRUISE A. Dohrn 75-187 GEAR 61 cm Bongo MESH .333 mm

STD LENGTH (MM)	NUMBER LARVAE EXAMINED	SKULL WIDTH (MM)			MOUTH GAPE (MM)			MAXILLARY LENGTH (MM)			EYE HEIGHT (MM)			HEAD HEIGHT (MM)			EYE/HEAD HEIGHT RATIO			BODY HEIGHT (MM)			PECTORAL ANGLE (°)			BODY HEIGHT/ STD LENGTH RATIO			WEIGHT (MGDRY) X 1000 / STD LENGTH (MM) 3		
		NO.	$\bar{X}$	CL	NO	$\bar{X}$	CL	NO	$\bar{X}$	CL	NO	$\bar{X}$	CL	NO	$\bar{X}$	CL	NO	$\bar{X}$	CL	NO	$\bar{X}$	CL	NO	$\bar{X}$	CL	NO	$\bar{X}$	CL	NO	$\bar{X}$	CL
<10	133	111	.533	± .016	79	.705	± .028	79	.499	± .020	10	.344	± .045	110	.494	± .015	9	.641	± .073	128	.315	± .010	34	132.0	± 8.73	128	.038	± .002	133	.067	± .002
10-14	439	398	.737	± .012	331	.985	± .045	331	.696	± .032	68	.476	± .021	359	.666	± .012	64	.666	± .031	430	.462	± .022	199	140.6	± 1.78	430	.037	± .002	439	.125	± .002
15-19	174	162	.972	± .019	145	1.43	± .172	145	1.01	± .122	52	.611	± .025	152	.891	± .012	52	.675	± .027	171	.635	± .019	124	140.2	± 2.01	171	.038	± .001	174	.198	± .004
20-24	12	12	1.19	± .099	12	1.57	± .137	12	1.11	± .097	6	.763	± .138	12	1.09	± .149	6	.642	± .108	12	.902	± .120	12	134.8	± 3.34	12	.043	± .005	12	.293	± .016
25-29																															
30-39																															
40																															
LENGTH MISSING	23	8	.596	± .111	7	.859	± .212	7	.607	± .150	1	.560		7	.524	± .089	1	.778		19	.405	± .056	3	123.0	± 54.5						
TOTAL	781	691	.766	± .014	574	1.07	± .055	574	.756	± .020	137	.531	± .022	640	.696	± .014	132	.667	± .019	760	.482	± .016	372	139.3	± 1.43	741	.037	± .001	758	.134	± .004

NOTE: CL = 95% confidence limits.

Table 54. Albatross IV 75-14, 12/5-12/17/75, mean value of larval herring condition factor measurements by 5-mm length class.

MEAN VALUES OF CONDITION FACTOR MEASUREMENTS – LARVAL GUT CONTENTS: SP *Clupea harengus*

CRUISE ALB IV 75-14 GEAR 61 cm Bongo MESH .505 mm

STD LENGTH (MM)	NUMBER LARVAE EXAMINED	SKULL WIDTH (MM)			MOUTH GAPE (MM)			MAXILLARY LENGTH (MM)			EYE HEIGHT (MM)			HEAD HEIGHT (MM)			EYE/HEAD HEIGHT RATIO			BODY HEIGHT (MM)			PECTORAL ANGLE (°)			BODY HEIGHT/ STD LENGTH RATIO			WEIGHT (MGDRY) X 1000 / STD LENGTH (MM) 3		
		NO.	$\bar{X}$	CL	NO	$\bar{X}$	CL	NO	$\bar{X}$	CL	NO	$\bar{X}$	CL	NO	$\bar{X}$	CL	NO	$\bar{X}$	CL	NO	$\bar{X}$	CL	NO	$\bar{X}$	CL	NO	$\bar{X}$	CL	NO	$\bar{X}$	CL
<10	41	5	.576	±.444										5	.544	±.027				6	.360	±.531	5	149.6	±6.60	6	.040	±.008	41	.053	±.004
10-14	277	255	.885	±.018							61	.514	±.016	251	.661	±.012	60	.742	±.030	250	.530	±.014	221	147.8	±1.76	250	.041	±.001	277	.132	±.003
15-19	743	708	1.12	±.011							375	.665	±.030	686	.843	±.010	362	.763	±.035	718	.692	±.009	675	149.3	±1.05	718	.040	±.001	743	.212	±.002
20-24	149	147	1.31	±.023							133	.812	±.019	147	1.18	±.034	131	.690	±.017	145	.829	±.025	141	155.0	±2.52	145	.039	±.001	149	.299	±.005
25-29	15	14	1.52	±.117							14	1.08	±.123	14	1.64	±.195	14	.661	±.031	15	1.12	±.104	15	155.9	±8.83	15	.043	±.004	15	.412	±.013
30-39																															
40																															
LENGTH MISSING	42	18	1.08	±.085							9	.596	±.081	18	.774	±.092	8	.713	±.082	22	.705	±.070	19	145.7	±7.87						
TOTAL	1267	1147	1.09	±.012							592	.691	±.021	1121	.854	±.013	575	.741	±.023	1156	.678	±.009	1076	149.7	±.851	1134	.040	±.0004	1225	.202	±.004

NOTE: CL = 95% confidence limits.

Table 55. Albatross IV 76-01, 2/10-2/25/76, mean value of larval herring condition factor measurements by 5-mm length class.

CRUISE ALB IV 76-01 GEAR 61 cm Bongo 0.5x1m Neuston MESH .505 mm

MEAN VALUES OF CONDITION FACTOR MEASUREMENTS – LARVAL GUT CONTENTS · SP *Clupea harengus*

STD LENGTH (MM)	NUMBER LARVAE EXAMINED	SKULL WIDTH (MM)			MOUTH GAPE (MM)			MAXILLARY LENGTH (MM)			EYE HEIGHT (MM)			HEAD HEIGHT (MM)			EYE/HEAD HEIGHT RATIO			BODY HEIGHT (MM)			PECTORAL ANGLE (°)			BODY HEIGHT/ STD LENGTH RATIO			WEIGHT (MGDRY) X 1000 / STD LENGTH (MM)3		
		NO.	$\bar{X}$	CL	NO	$\bar{X}$	CL	NO	$\bar{X}$	CL	NO	$\bar{X}$	CL	NO	$\bar{X}$	CL	NO	$\bar{X}$	CL	NO	$\bar{X}$	CL	NO	$\bar{X}$	CL	NO	$\bar{X}$	CL	NO	$\bar{X}$	CL
<10																															
10-14																															
15-19																															
20-24	39	33	1.51	±.150							26	.906	±.065	32	1.47	±.077	26	.622	±.036	34	.931	±.041	27	166.5	±1.93	34	.398	±.002	39	.350	±.009
25-29	410	388	1.61	±.016							324	1.16	±.017	394	1.81	±.026	324	.638	±.008	398	1.15	±.018	369	165.8	±.625	398	.416	±.001	409	.462	±.003
30-39	320	312	1.83	±.020							303	1.46	±.022	318	2.44	±.046	302	.603	±.008	317	1.54	±.031	303	166.7	±.611	317	.482	±.001	320	.581	±.005
40																															
LENGTH MISSING	17	9	1.52	±.206							10	1.14	±.169	10	1.87	±.286	9	.624	.057	10	1.25	±.262	7	165.0	±8.41						
TOTAL	786	743	1.70	±.016							664	1.28	±.018	755	2.06	±.033	662	.622	±.006	760	1.30	±.022	707	166.2	±.430	750	.443	±.000	769	.506	±.006

NOTE: CL = 95% confidence limits.

Table 56. Wieczno 76-01, 4/9-5/4/76, mean value of larval herring condition factor measurements by 5-mm length class.

CRUISE Wieczno 76-01 GEAR 61 cm Bongo MESH .505 mm

MEAN VALUES OF CONDITION FACTOR MEASUREMENTS — LARVAL GUT CONTENTS: SP Clupea harengus

STD LENGTH (MM)	NUMBER LARVAE EXAMINED	SKULL WIDTH (MM)			MOUTH GAPE (MM)			MAXILLARY LENGTH (MM)			EYE HEIGHT (MM)			HEAD HEIGHT (MM)			EYE/HEAD HEIGHT RATIO			BODY HEIGHT (MM)			PECTORAL ANGLE (°)			BODY HEIGHT/ STD LENGTH RATIO			WEIGHT (MGDRY) X 1000 / STD LENGTH (MM) 3		
		NO.	$\bar{X}$	CL	NO	$\bar{X}$	CL	NO	$\bar{X}$	CL	NO	$\bar{X}$	CL	NO	$\bar{X}$	CL	NO	$\bar{X}$	CL	NO	$\bar{X}$	CL	NO	$\bar{X}$	CL	NO	$\bar{X}$	CL	NO	$\bar{X}$	CL
<10																															
10-14																															
15-19																															
20-24																															
25-29	4	4	1.67	±.183	4	2.35	±.714	4	1.66	±.505	4	1.36	±.137	4	2.14	±.354	4	.640	±.106	4	1.91	±.477	3	155.3	±27.9	4	.067	±.017	4	.484	±.038
30-39	128	128	1.93	±.030	115	3.59	±.105	115	2.54	±.073	123	1.82	±.035	119	3.41	±.099	117	.537	±.009	127	3.49	±.115	123	162.3	±1.51	127	.097	±.003	128	.711	±.012
40	22	22	2.31	±.104	20	4.30	±.264	20	3.04	±.186	22	2.25	±.072	20	4.48	±.235	20	.506	±.020	22	4.98	±.275	20	161.6	±3.50	22	.120	±.006	22	.906	±.018
LENGTH MISSING	4	4	1.98	±.335	3	3.83	±.936	3	2.71	±.662	3	1.84	±.688	3	3.61	±.845	3	.508	±.115	3	3.92	±.526	3	168.7	±6.25						
TOTAL	158	158	1.98	±.036	142	3.66	±.105	142	2.59	±.075	152	1.81	±.041	146	3.53	±.111	144	.535	±.009	156	3.67	±.137	149	162.2	±1.36	153	.099	±.003	154	.733	±.016

NOTE: CL = 95% confidence limits.

Table 57. Wieczno 76-03, 10/14-11/3/76, mean value of larval herring condition factor measurements by 5-mm length class.

MEAN VALUES OF CONDITION FACTOR MEASUREMENTS – LARVAL GUT CONTENTS - SP. Clupea harengus

CRUISE Wieczno 76-03 GEAR 61 cm Bongo MESH .505 mm

STD LENGTH (MM)	NUMBER LARVAE EXAMINED	SKULL WIDTH (MM)			MOUTH GAPE (MM)			MAXILLARY LENGTH (MM)			EYE HEIGHT (MM)			HEAD HEIGHT (MM)			EYE/HEAD HEIGHT RATIO			BODY HEIGHT (MM)			PECTORAL ANGLE (°)			BODY HEIGHT/STD LENGTH RATIO			WEIGHT (MGDRY) X 1000 / STD LENGTH (MM) 3		
		NO.	$\bar{X}$	CL	NO	$\bar{X}$	CL	NO	$\bar{X}$	CL	NO	$\bar{X}$	CL	NO	$\bar{X}$	CL	NO	$\bar{X}$	CL	NO	$\bar{X}$	CL	NO	$\bar{X}$	CL	NO	$\bar{X}$	CL	NO	$\bar{X}$	CL
<10	25	20	.586	±.053	16	.629	±.041	16	.445	±.029	3	.400		15	.560	±.041	2	.646	±.265	24	.387	±.038	10	148.4	±4.40	24	.043	±.004	25	.072	±.005
10-14	174	147	.709	±.019	139	.745	±.024	139	.527	±.017	39	.496	±.019	139	.721	±.018	38	.675	±.028	158	.529	±.015	111	146.6	±1.54	158	.044	±.001	174	.115	±.003
15-19	28	25	1.05	±.046	27	1.17	±.067	27	.828	±.047	14	.691	±.043	26	1.01	±.050	14	.681	±.054	28	.859	±.046	24	148.0	±3.41	28	.051	±.002	28	.205	±.010
20-24	1	1	1.08		1	1.53		1	1.08					1	1.32					1	1.04		1	160.0		1	.051		1	.278	
25-29																															
30-39																															
40																															
LENGTH MISSING	10	6	.607	±.434	5	.747	±.182	5	.528	±.128	1	.440		4	.600	±.125				5	.387	±.145	2	147.0	±38.1						
TOTAL	6	199	.738	±.024	188	.801	±.031	188	.566	±.022	57	.538	±.029	185	.749	±.024	54	.676	±.023	216	.556	±.022	148	147.1	±1.30	211	.045	±.001	228	.122	±.005

NOTE: CL = 95% confidence limits.

Table 58. A. Dohrn 76-02, 11/15-11/29/76, mean value of larval herring condition factor measurements by 5-mm length class.

MEAN VALUES OF CONDITION FACTOR MEASUREMENTS – LARVAL GUT CONTENTS: SP Clupea harengus

CRUISE A. Dohrn 76-02 GEAR 61 cm Bongo MESH .505 mm

STD LENGTH (MM)	NUMBER LARVAE EXAMINED	SKULL WIDTH (MM)			MOUTH GAPE (MM)			MAXILLARY LENGTH (MM)			EYE HEIGHT (MM)			HEAD HEIGHT (MM)			EYE/HEAD HEIGHT RATIO			BODY HEIGHT (MM)			PECTORAL ANGLE (°)			BODY HEIGHT/STD LENGTH RATIO			WEIGHT (MGDRY) X 1000 / STD LENGTH (MM)3		
		NO.	X̄	CL	NO	X̄	CL	NO	X̄	CL	NO	X̄	CL	NO	X̄	CL	NO	X̄	CL	NO	X̄	CL	NO	X̄	CL	NO	X̄	CL	NO	X̄	CL
<10																															
10-14	3	1	.720																	2	.640	±.511				2	.046	±.003	3	.132	±.081
15-19	21	13	1.13	±.106	8	1.32	±.097	8	.930	±.069	5	.736	±.151	9	.973	±.129	4	.740	±.108	20	.776	±.062	4	142.8	±11.4	20	.044	±.002	21	.217	±.014
20-24	21	15	1.25	±.066	14	1.47	±.111	14	1.04	±.078	10	.792	±.088	11	1.22	±.084	8	.631	±.049	16	.915	±.070	10	145.0	±5.25	16	.044	±.005	17	.286	±.009
25-29	1	1	1.56		1	1.92		1	1.36		1	1.04		1	1.92		1	.542		1	1.40		1	152.0		1	.053		1	.421	
30-39																															
40																															
LENGTH MISSING	2													1	.800					2	.980	±3.81	1	133.0							
TOTAL	44	30	1.19	±.071	23	1.43	±.089	23	1.01	±.063	16	.790	±.072	22	1.13	±.116	13	.658	±.051	41	.849	±.059	16	144.1	±3.99	39	.044	±.002	42	.244	±.018

NOTE: CL = 95% confidence limits.

Table 59. Researcher 76-01, 11/27-12/11/76, mean value of larval herring condition factor measurements by 5-mm length class.

MEAN VALUES OF CONDITION FACTOR MEASUREMENTS – LARVAL GUT CONTENTS · SP Clupea harengus

CRUISE Researcher 76-01 GEAR 61 cm Bongo MESH .505 mm

STD LENGTH (MM)	NUMBER LARVAE EXAMINED	SKULL WIDTH (MM)			MOUTH GAPE (MM)			MAXILLARY LENGTH (MM)			EYE HEIGHT (MM)			HEAD HEIGHT (MM)			EYE/HEAD HEIGHT RATIO			BODY HEIGHT (MM)			PECTORAL ANGLE (°)			BODY HEIGHT/STD LENGTH RATIO			WEIGHT (MGDRY) X 1000 / STD LENGTH (MM) 3		
		NO.	X̄	CL	NO	X̄	CL	NO	X̄	CL	NO	X̄	CL	NO	X̄	CL	NO	X̄	CL	NO	X̄	CL	NO	X̄	CL	NO	X̄	CL	NO	X̄	CL
<10																															
10-14																															
15-19	14	13	1.14	± .055	13	1.35	± .106	13	.957	± .075	4	.760	± .104	13	.985	± .060	4	.725	± .076	14	.863	± .079	13	140.7	± 4.25	14	.048	± .005	14	.227	± .015
20-24	35	33	1.33	± .042	31	1.62	± .112	31	1.14	± .079	24	.832	± .057	33	1.35	± .060	24	.618	± .035	34	1.09	± .048	33	147.8	± 2.73	34	.050	± .002	35	.311	± .011
25-29	7	7	1.51	± .137	6	2.01	± .337	6	1.42	± .239	6	1.02	± .115	7	1.77	± .269	6	.601	± .055	7	1.43	± .193	7	156.9	± 5.32	7	.055	± .008	7	.414	± .020
30-39																															
40																															
LENGTH MISSING																															
TOTAL	56	53	1.31	± .043	50	1.60	± .095	50	1.13	± .067	34	.857	± .051	53	1.31	± .081	34	.628	± .029	55	1.07	± .060	53	147.2	± 2.39	55	.050	± .002	56	.303	± .017

NOTE: CL = 95% confidence limits.

Table 60. Mt. Mitchell 77-01, 2/13-2/24/77, mean value of larval herring condition factor measurements by 5-mm length class.

MEAN VALUES OF CONDITION FACTOR MEASUREMENTS — LARVAL GUT CONTENTS · SP Clupea harengus

CRUISE Mt. Mitchell 77-01 GEAR 61 cm Bongo MESH .505 mm

STD LENGTH (MM)	NUMBER LARVAE EXAMINED	SKULL WIDTH (MM)			MOUTH GAPE (MM)			MAXILLARY LENGTH (MM)			EYE HEIGHT (MM)			HEAD HEIGHT (MM)			EYE/HEAD HEIGHT RATIO			BODY HEIGHT (MM)			PECTORAL ANGLE (°)			BODY HEIGHT/ STD LENGTH RATIO			WEIGHT (MGDRY) X1000 STD LENGTH (MM) 3		
		NO.	X̄	CL	NO	X̄	CL	NO	X̄	CL	NO	X̄	CL	NO	X̄	CL	NO	X̄	CL	NO	X̄	CL	NO	X̄	CL	NO	X̄	CL	NO	X̄	CL
<10																															
10-14																															
15-19																															
20-24	18	14	1.41	±.082	11	1.91	±.194	11	1.35	±.137	6	.953	±.077	13	1.49	±.106	6	.613	±.098	15	1.21	±.089	11	150.7	±.672	15	.051	±.004	18	.356	±.010
25-29	31	30	1.58	±.033	23	2.28	±.096	23	1.61	±.068	26	1.13	±.046	24	1.87	±.112	22	.605	±.031	29	1.56	±.063	21	154.7	±4.50	29	.057	±.002	31	.458	±.013
30-39	27	25	1.78	±.052	24	3.00	±.188	24	2.12	±.133	24	1.44	±.076	24	2.63	±.171	21	.562	±.025	25	2.28	±.181	23	160.3	±4.03	25	.070	±.029	27	.604	±.024
40																															
LENGTH MISSING	10	6	1.59	±.153	3	2.15	±1.83	3	1.52	±1.29	2	.940	±3.30	1	2.08					5	1.86	±.665	3	151.3	±18.8						
TOTAL	86	75	1.62	±.041	61	2.49	±.144	61	1.76	±.051	58	1.23	±.062	62	2.09	±.140	49	.588	±.020	74	1.75	±.120	58	156.0	±2.66	69	.060	±.003	76	.486	±.024

NOTE: CL = 95% confidence limits.

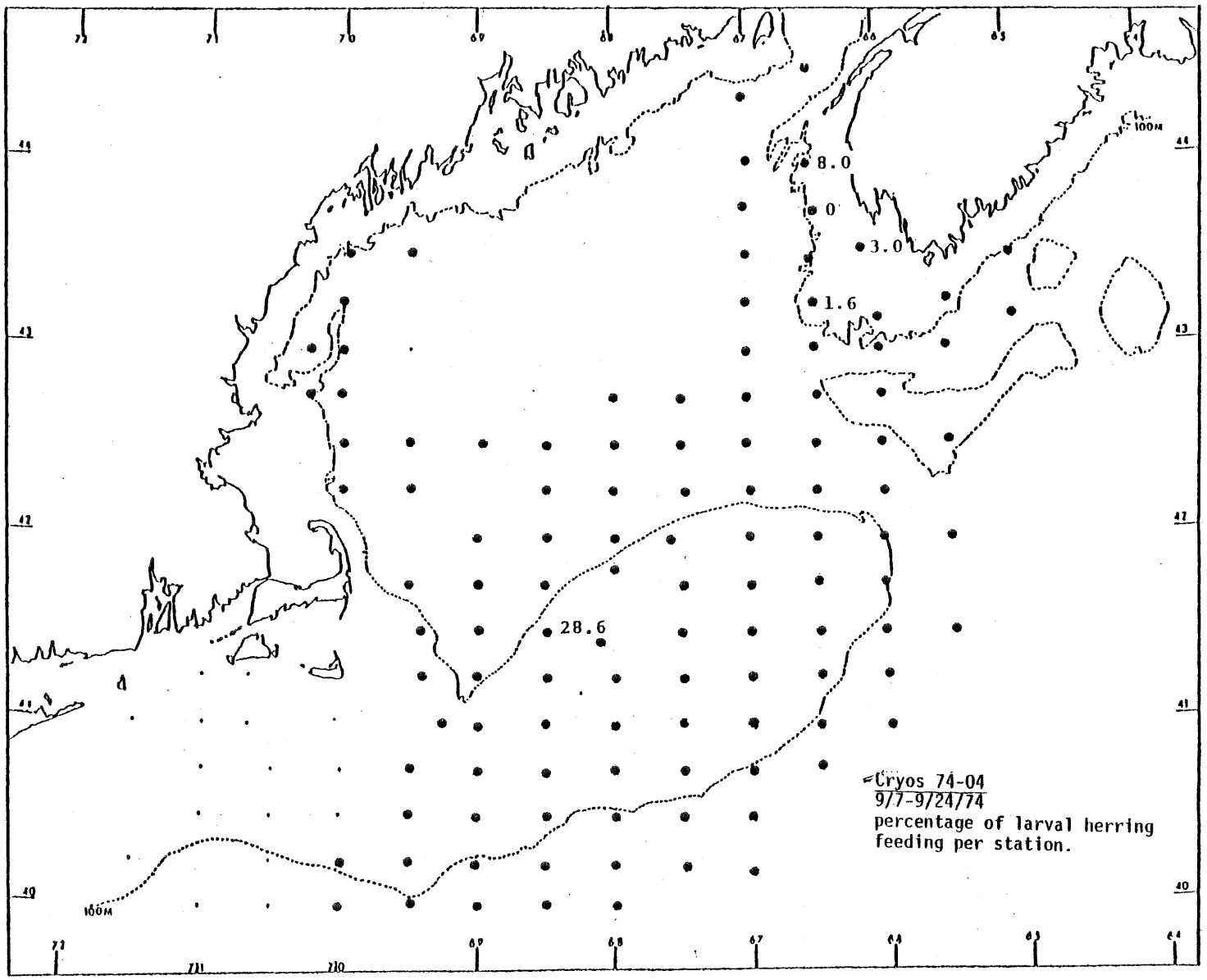
8.0
0
3.0
1.6
28.6
100M
100M
Cryos 74-04
9/7-9/24/74
percentage of larval herring
feeding per station.

Figure 1

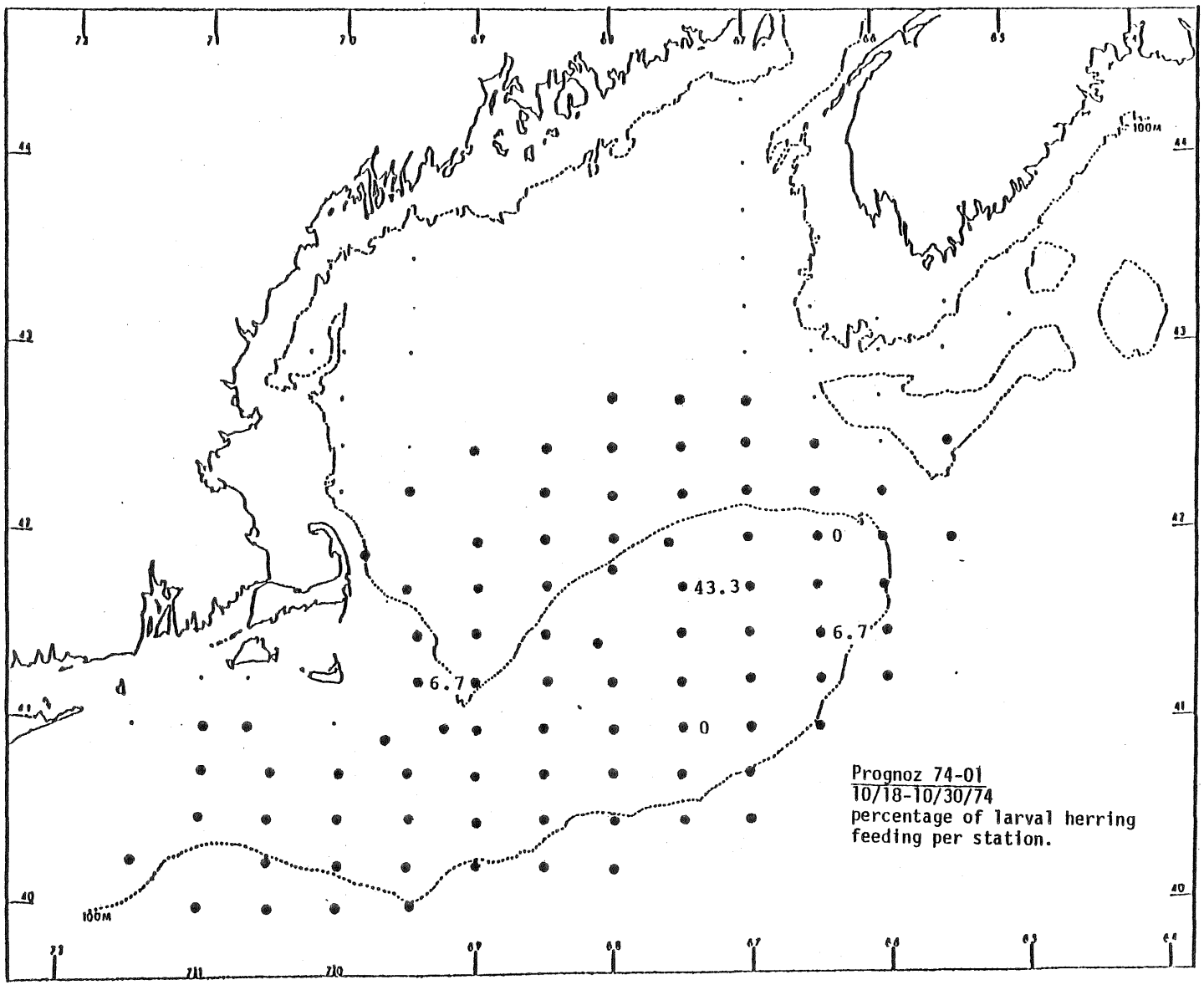
100M
100M
0
43.3
6.7
6.7
0
Prognoz 74-01
10/18-10/30/74
percentage of larval herring
feeding per station.

Figure 2

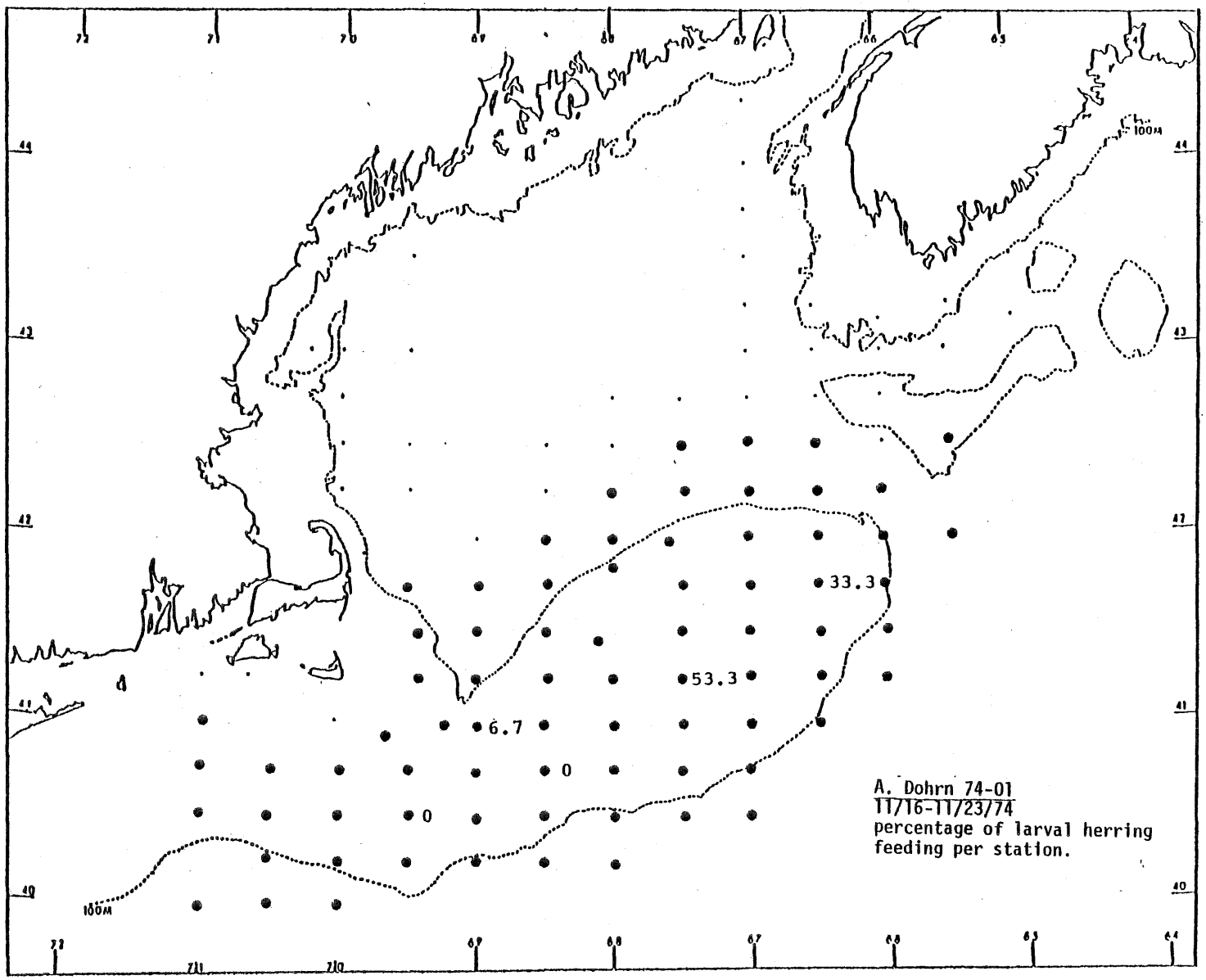
A. Dohrn 74-01
11/16-11/23/74
percentage of larval herring
feeding per station.
33.3
53.3
6.7
0
0
100M
100M

Figure 3

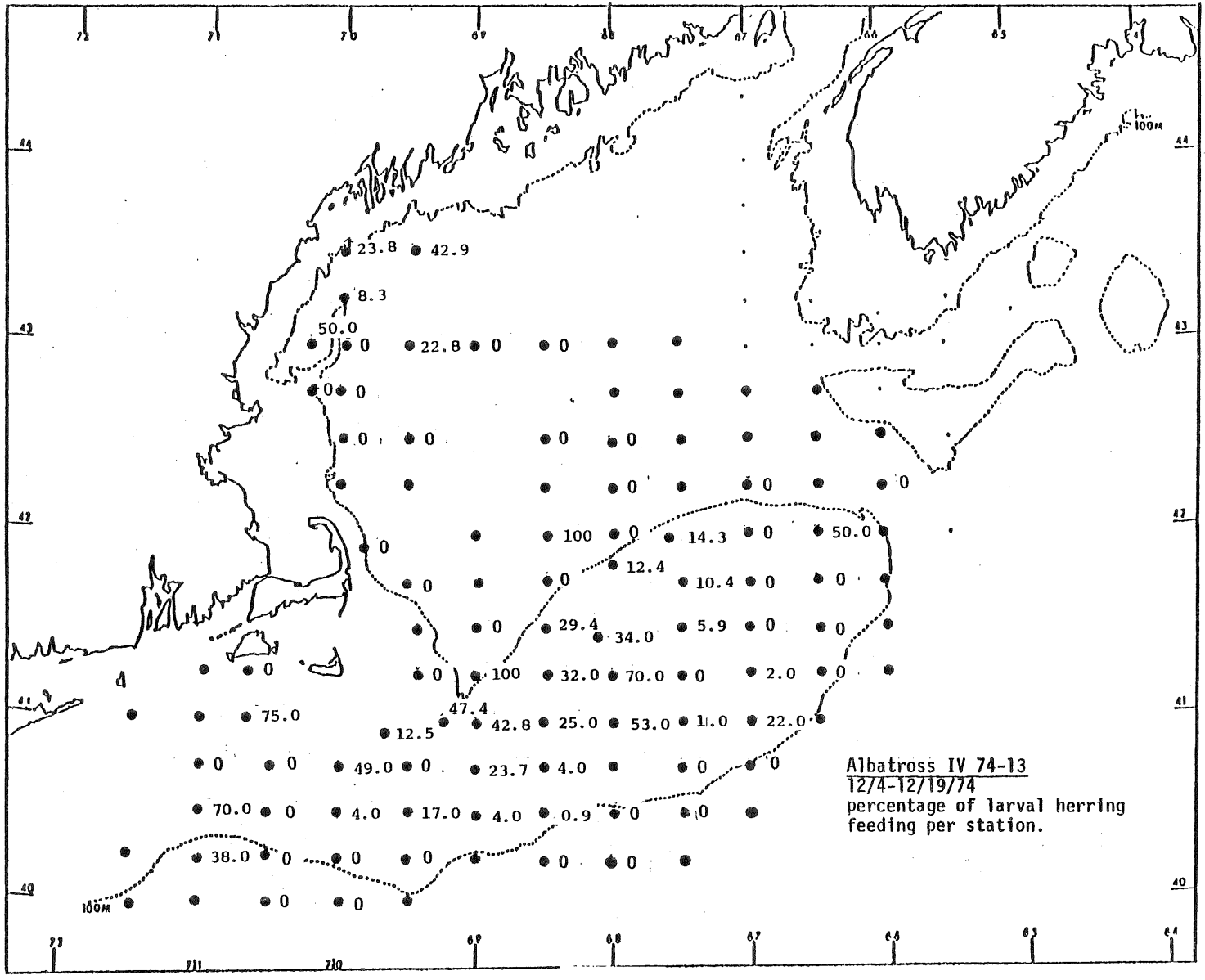
Albatross IV 74-13
12/4-12/19/74
percentage of larval herring feeding per station.
100M
23.8
42.9
8.3
50.0
22.8
100
14.3
50.0
12.4
10.4
29.4
34.0
5.9
32.0
70.0
2.0
47.4
42.8
25.0
53.0
22.0
75.0
12.5
49.0
23.7
4.0
70.0
4.0
17.0
4.0
0.9
38.0

Figure 4

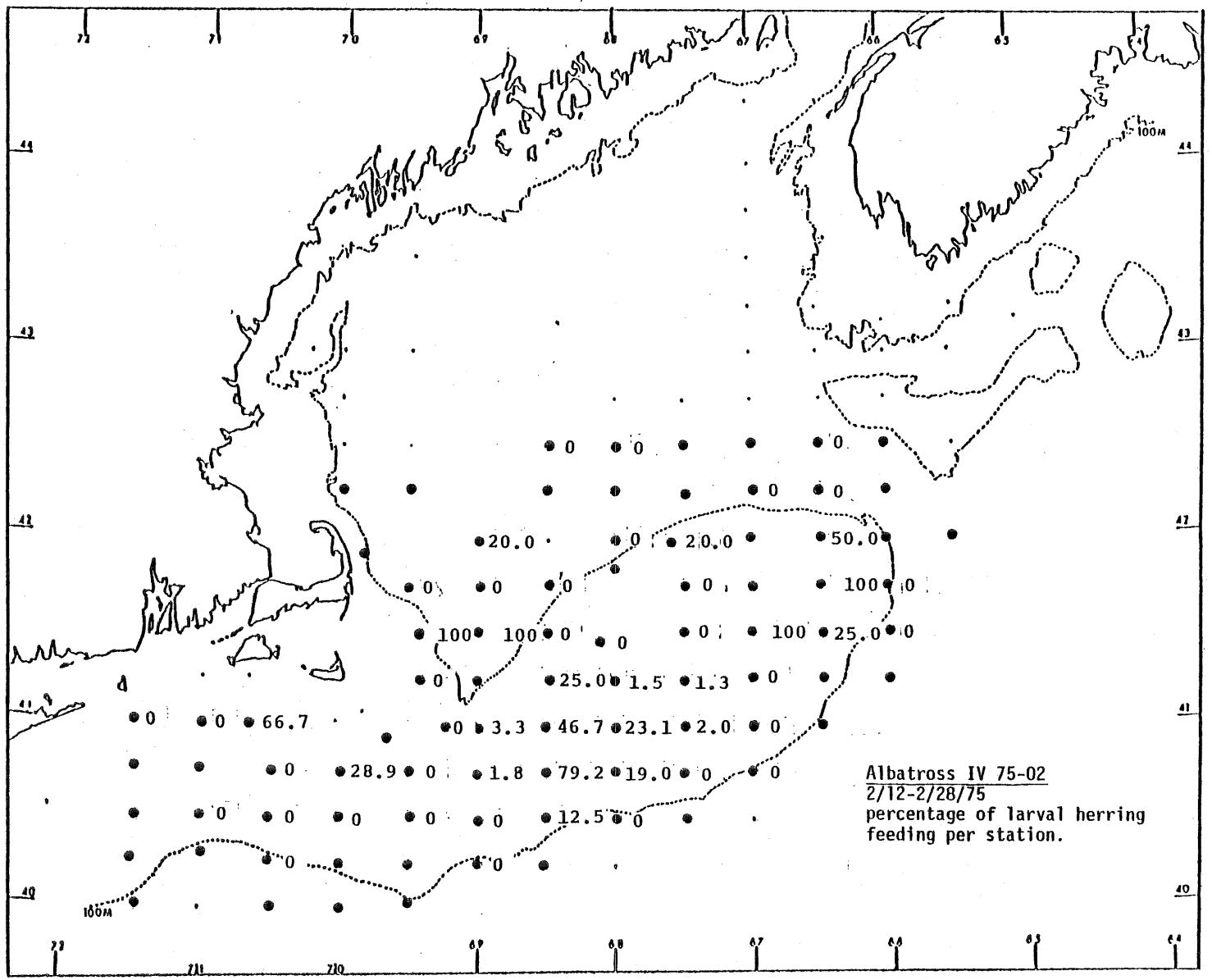
Albatross IV 75-02
2/12-2/28/75
percentage of larval herring
feeding per station.
100M
100M

Figure 5

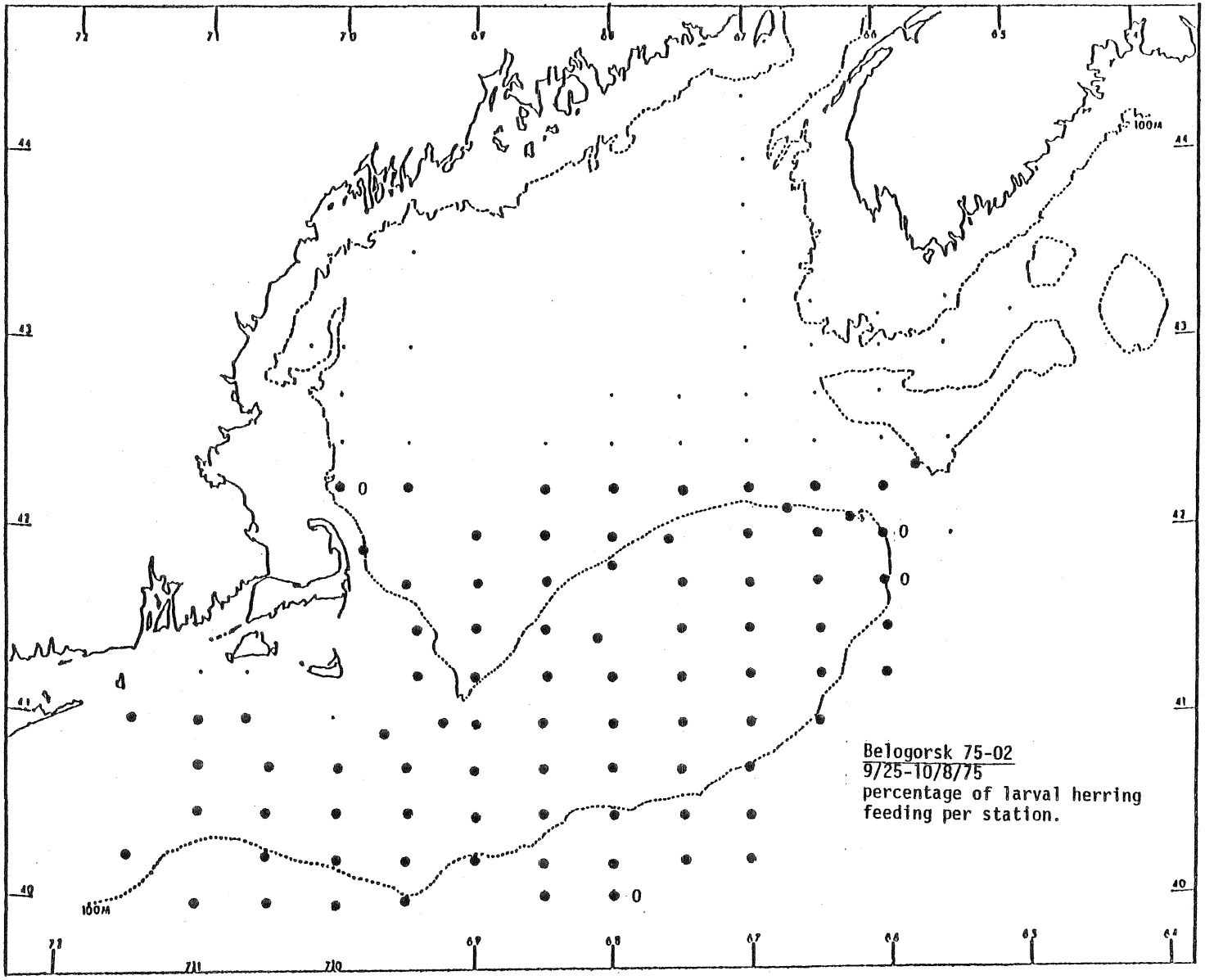
Belogorsk 75-02
9/25-10/8/75
percentage of larval herring
feeding per station.
100M
100M

Figure 6

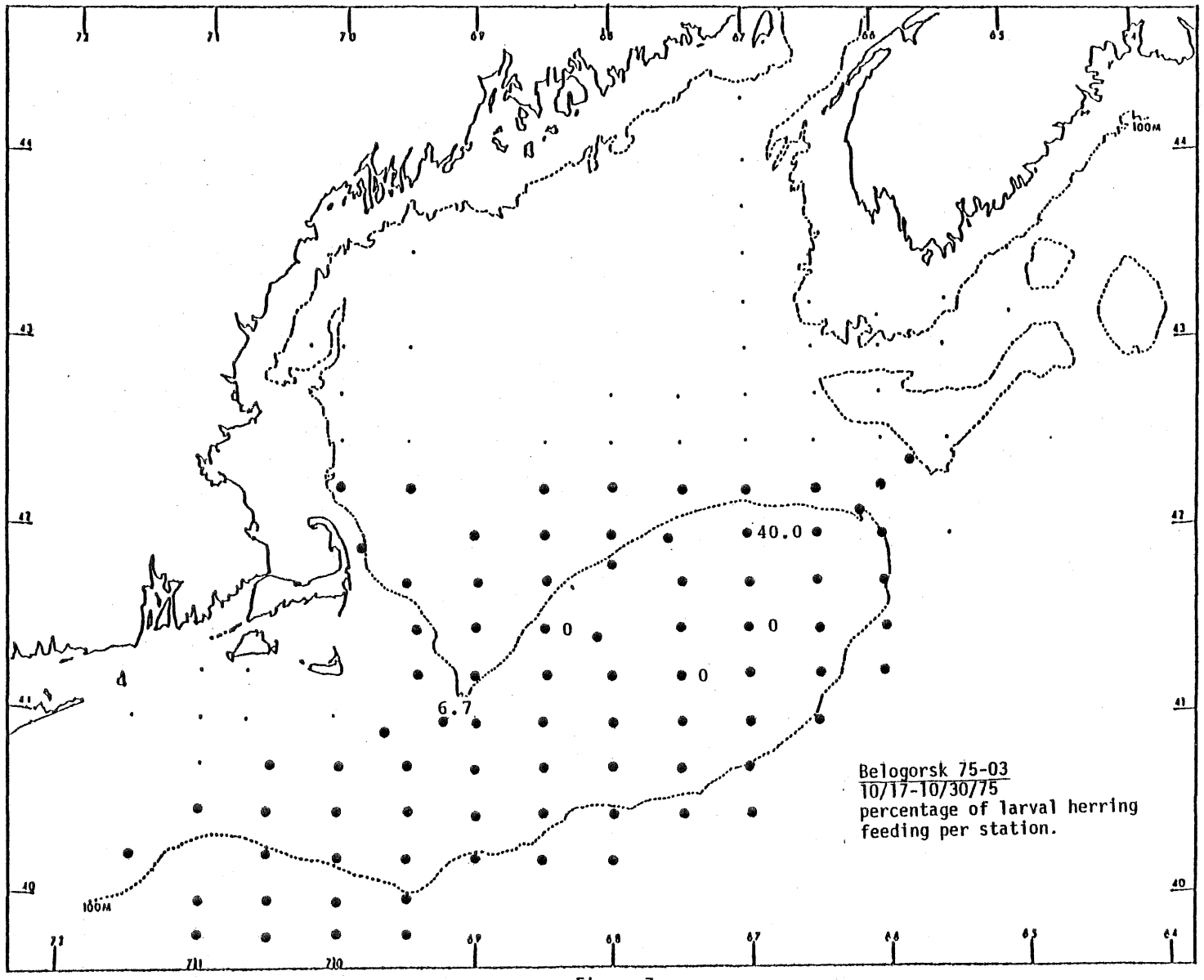
40.0
0
0
0
6.7
100M
100M
Belogorsk 75-03
10/17-10/30/75
percentage of larval herring
feeding per station.

Figure 7

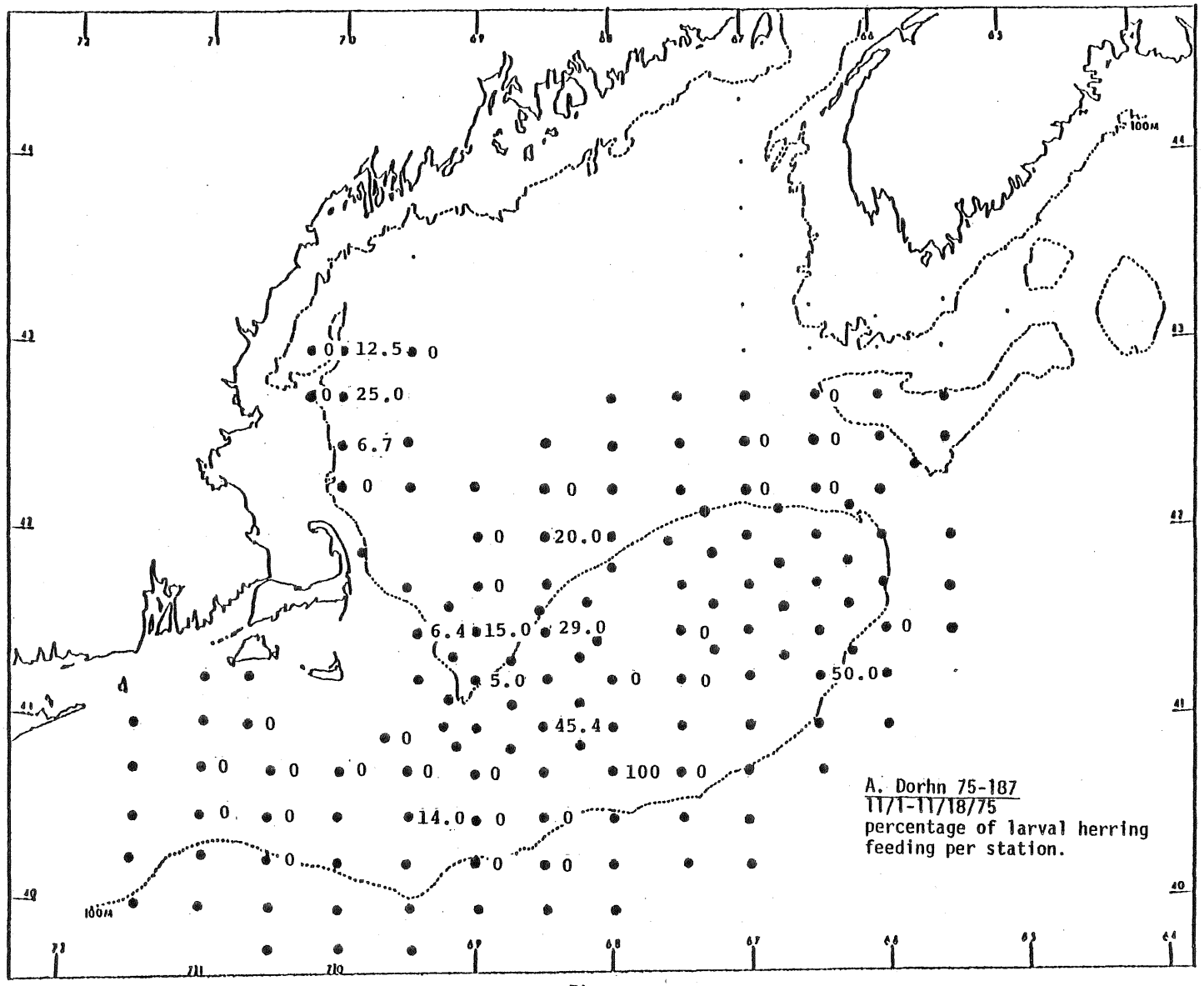
A. Dorhn 75-187
11/1-11/18/75
percentage of larval herring
feeding per station.
100M
0
12.5
25.0
6.7
20.0
6.4
15.0
29.0
5.0
50.0
45.4
100
14.0

Figure 8

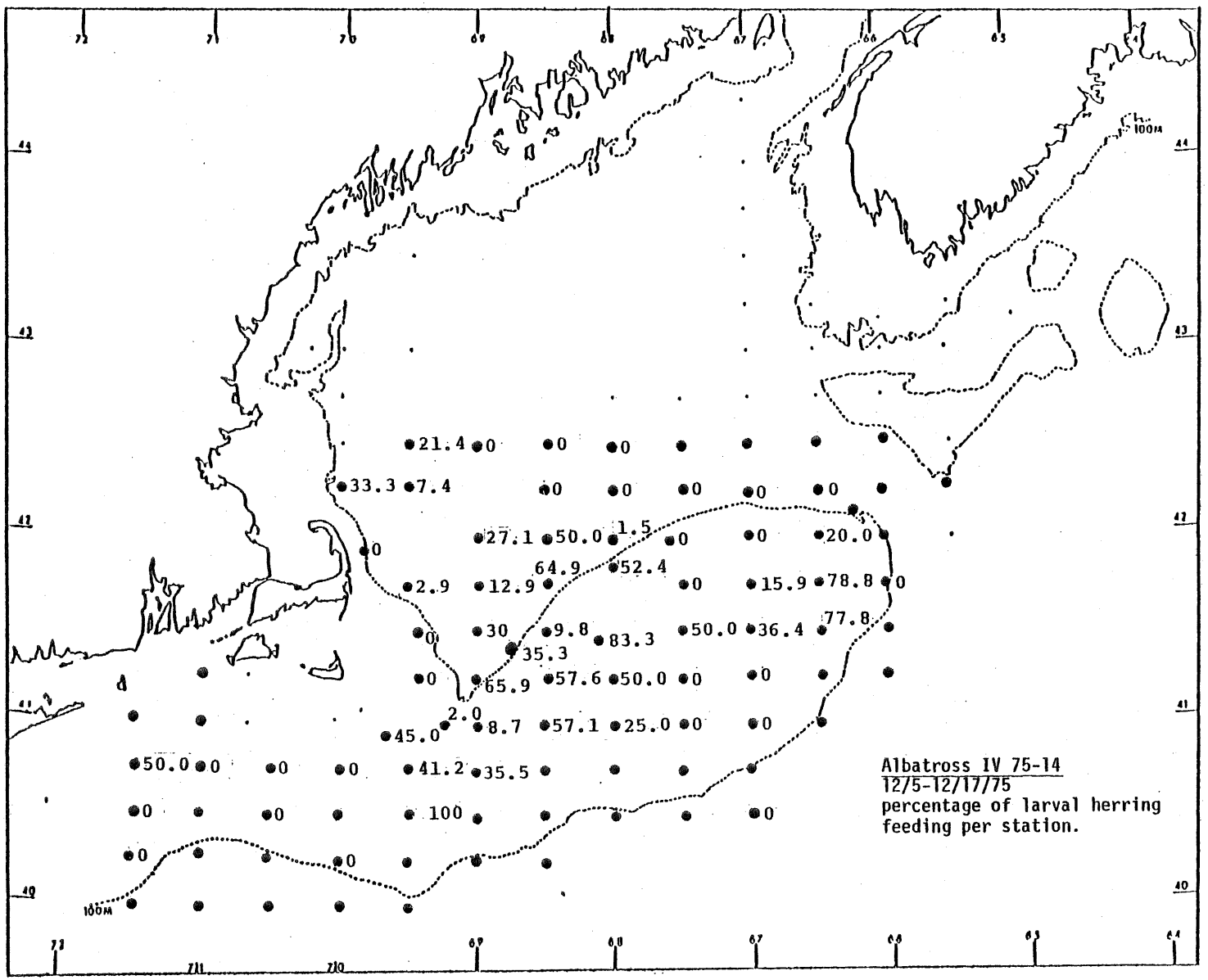
Albatross IV 75-14
12/5-12/17/75
percentage of larval herring
feeding per station.
100M
21.4
0
33.3
7.4
27.1
50.0
1.5
20.0
64.9
52.4
2.9
12.9
15.9
78.8
30
9.8
83.3
50.0
36.4
77.8
35.3
65.9
57.6
2.0
8.7
57.1
25.0
45.0
41.2
35.5
100

Figure 9

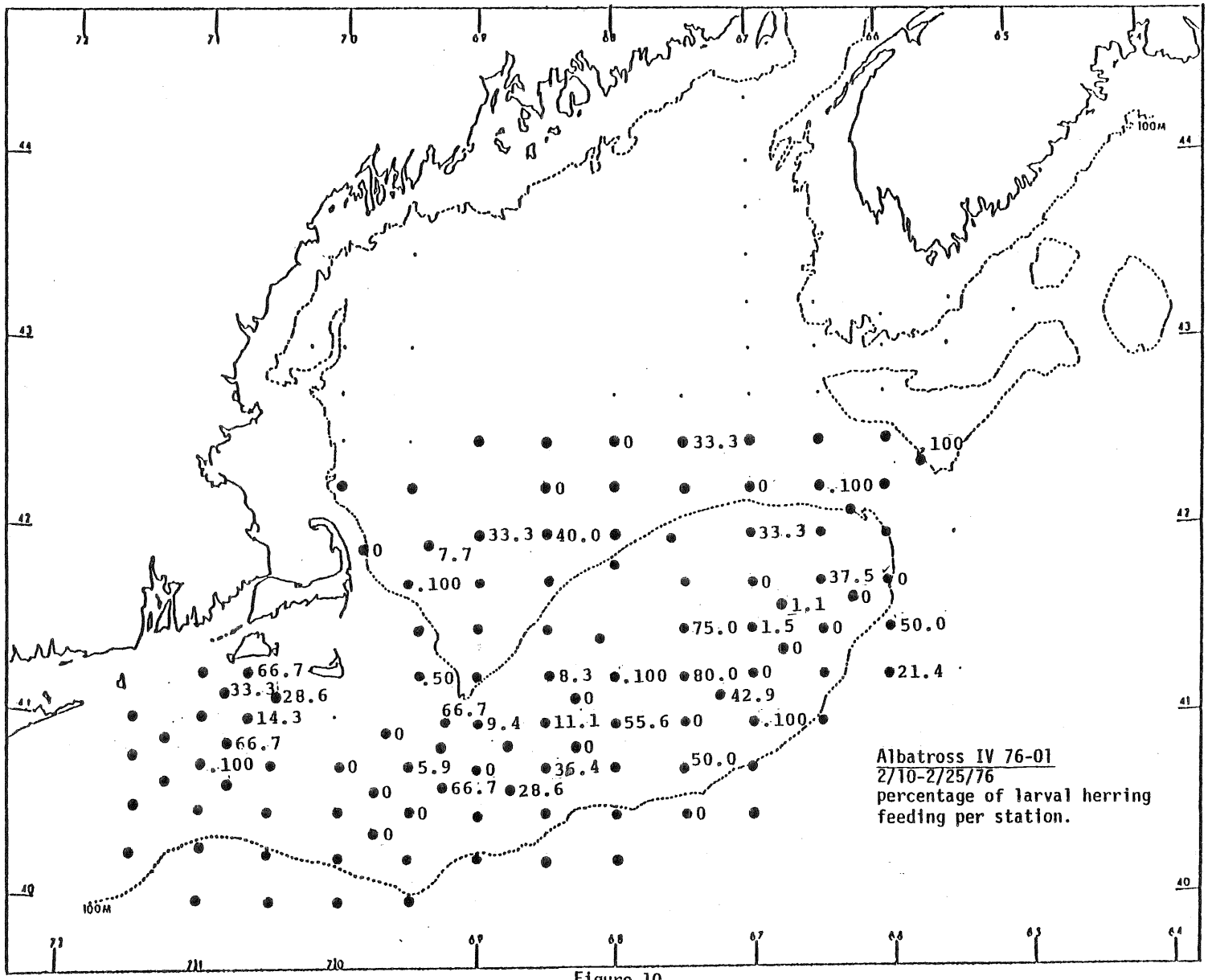
Albatross IV 76-01
2/10-2/25/76
percentage of larval herring
feeding per station.
100M
100M

Figure 10

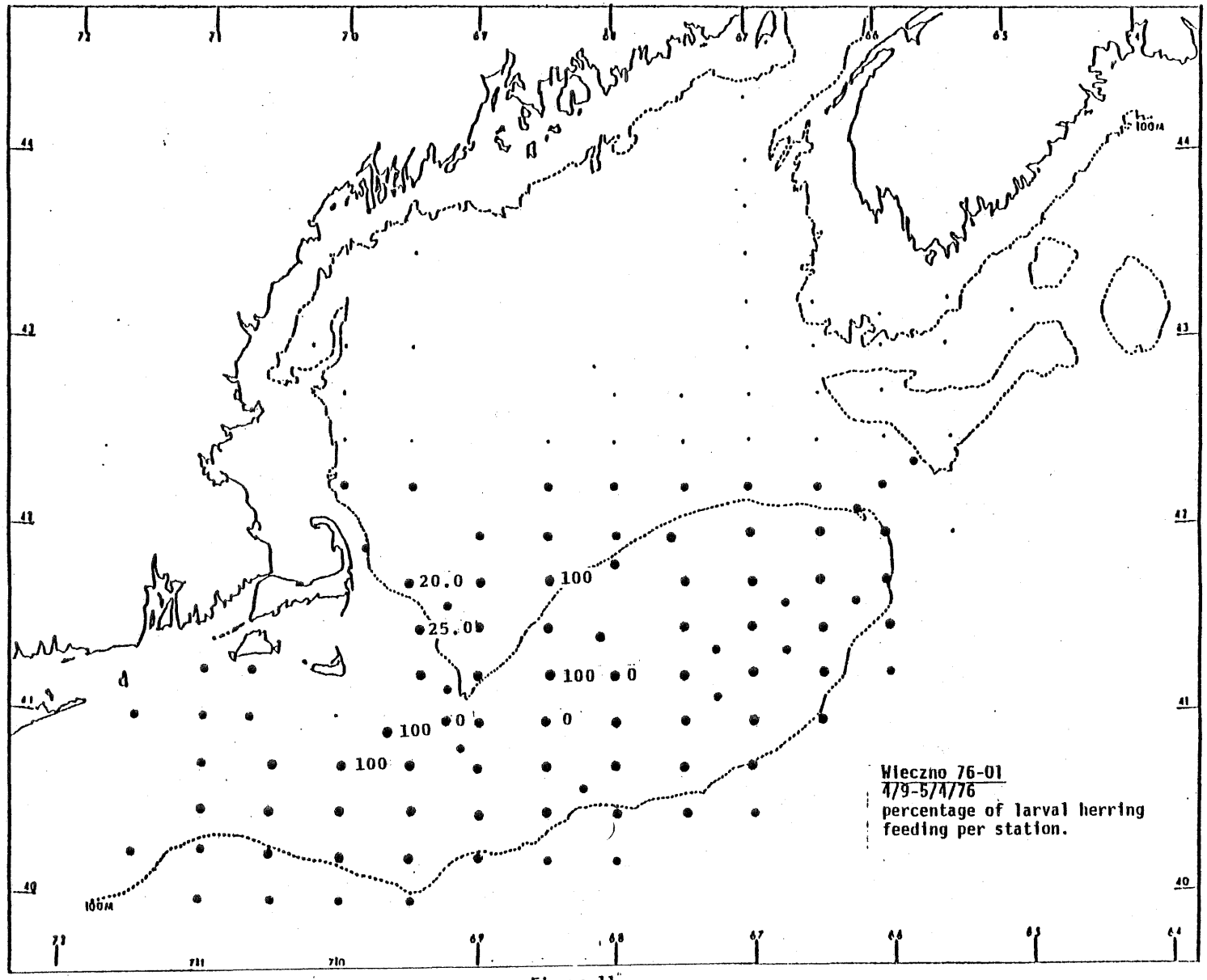
20.0
25.0
100
100
0
100
0
0
100
100M
100M
Wieczno 76-01
4/9-5/4/76
percentage of larval herring
feeding per station.

Figure 11

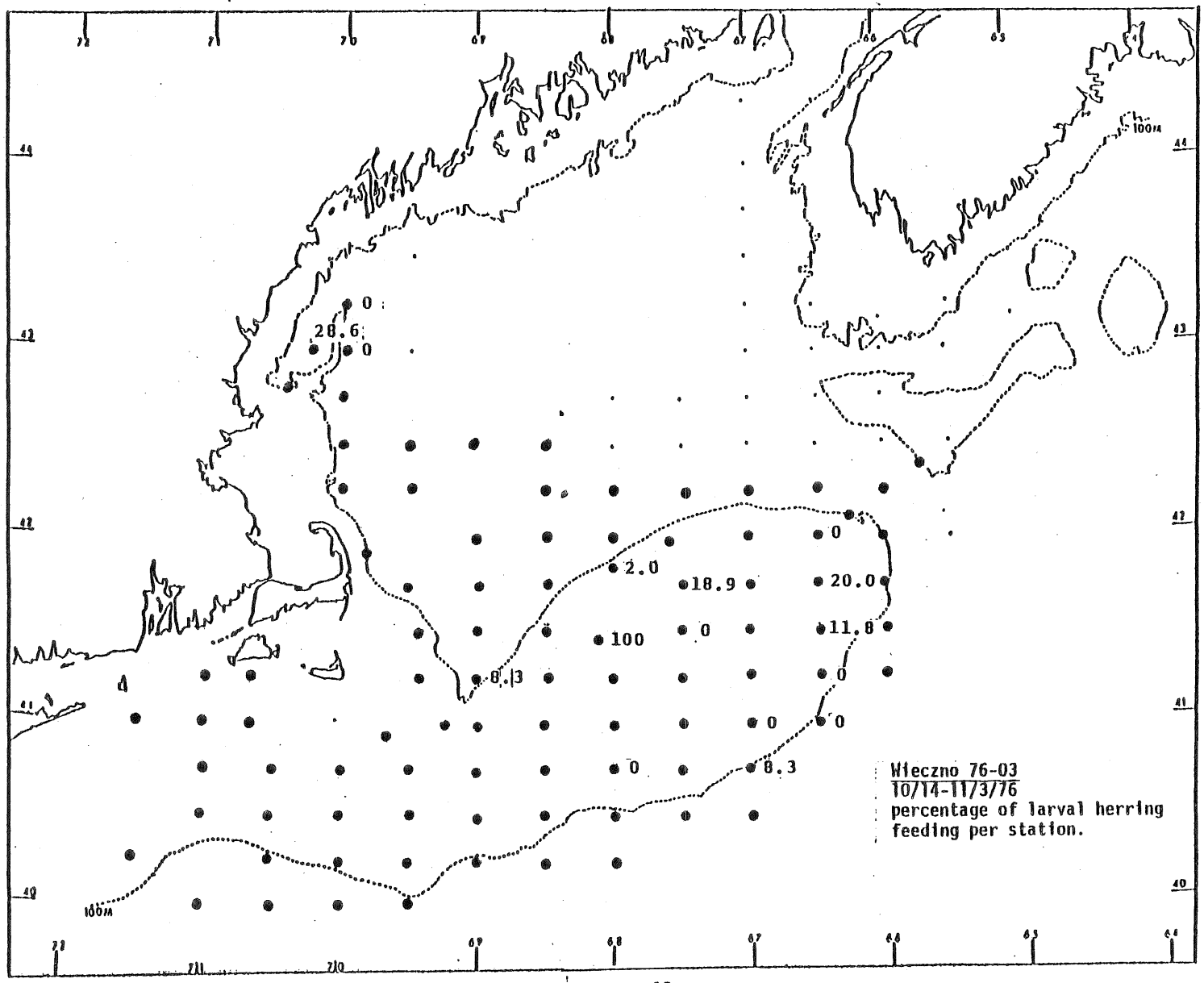
0
28.6
0
2.0
18.9
20.0
100
0
11.8
8.3
0
0
0
0
8.3
100m
100m
Wieczno 76-03
10/14-11/3/76
percentage of larval herring
feeding per station.

Figure 12

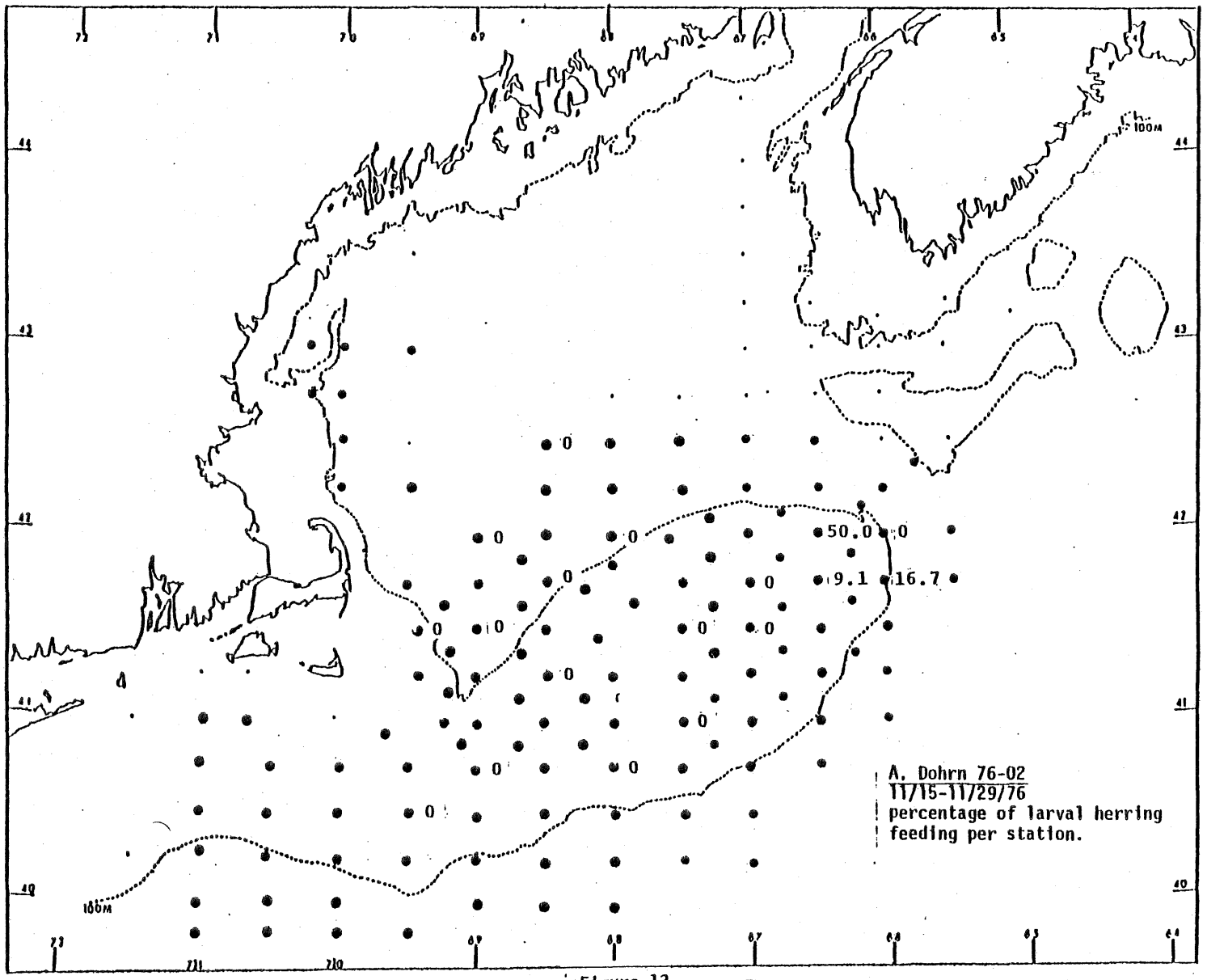
A. Dohrn 76-02
11/15-11/29/76
percentage of larval herring
feeding per station.
100M
100M
50.0
9.1
16.7

Figure 13

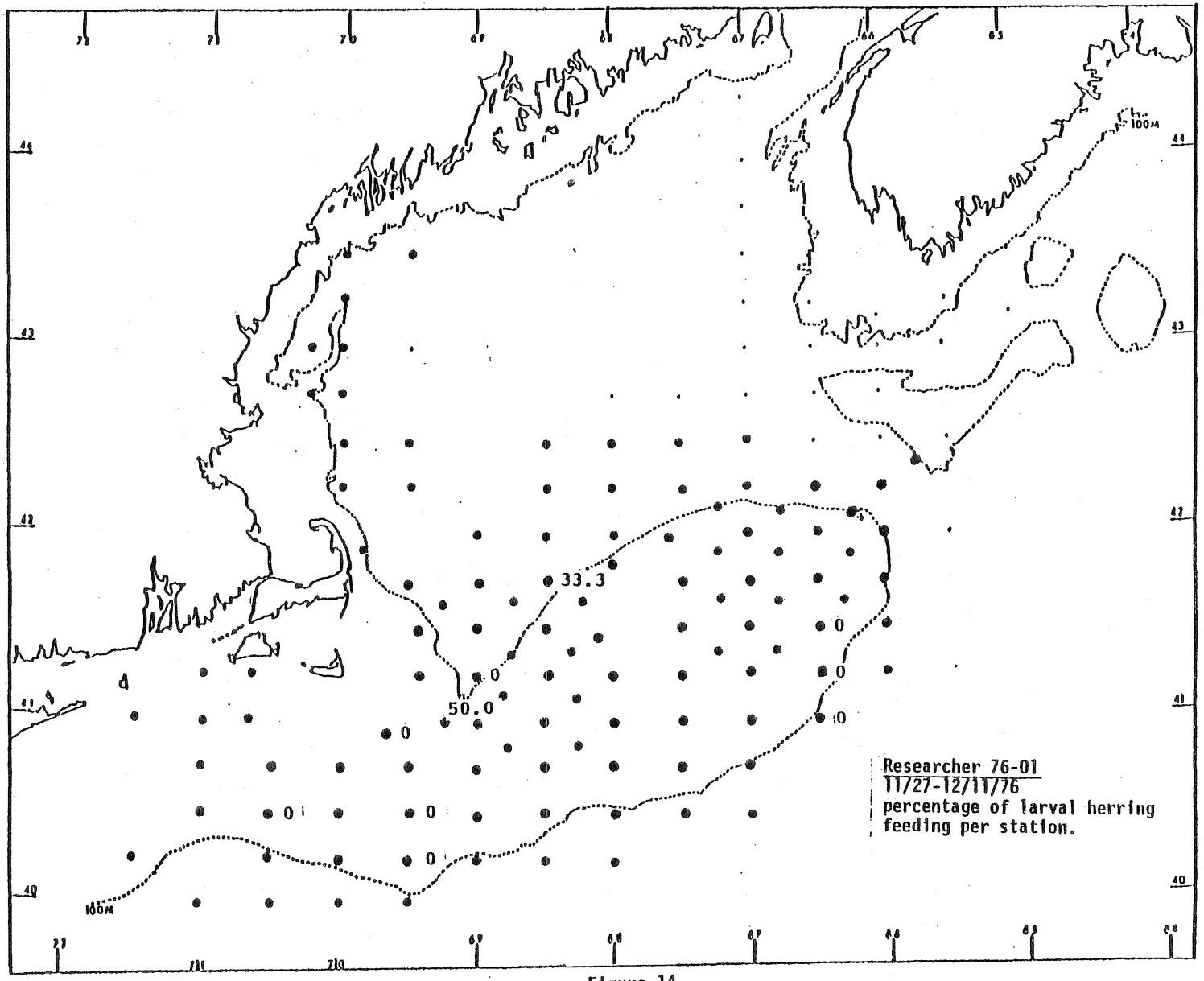
Researcher 76-01
11/27-12/11/76
percentage of larval herring
feeding per station.
33.3
50.0
0
100M

Figure 14

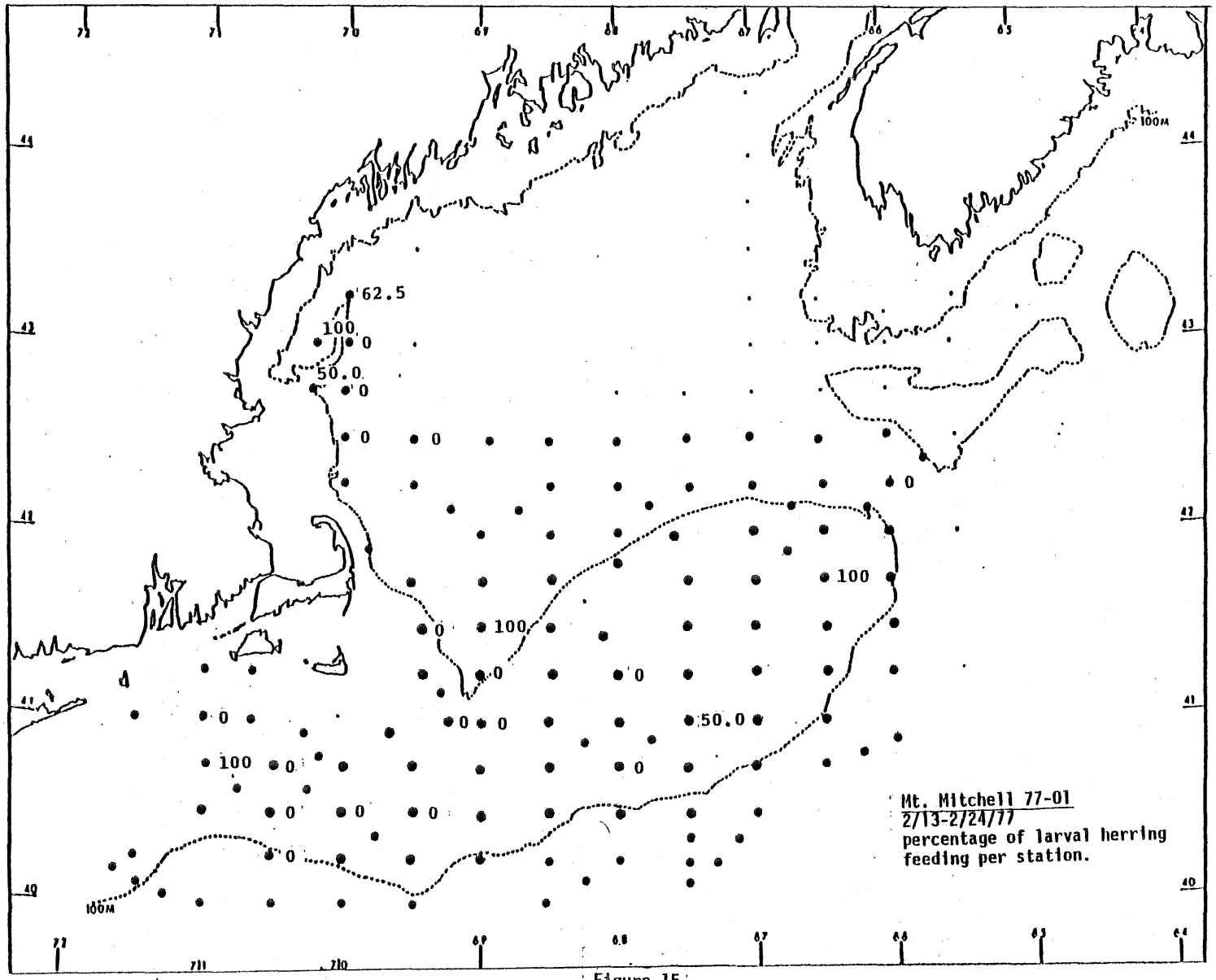
Mt. Mitchell 77-01
2/13-2/24/77
percentage of larval herring
feeding per station.
100M
62.5
100
50.0
0
100
50.0

Figure 15

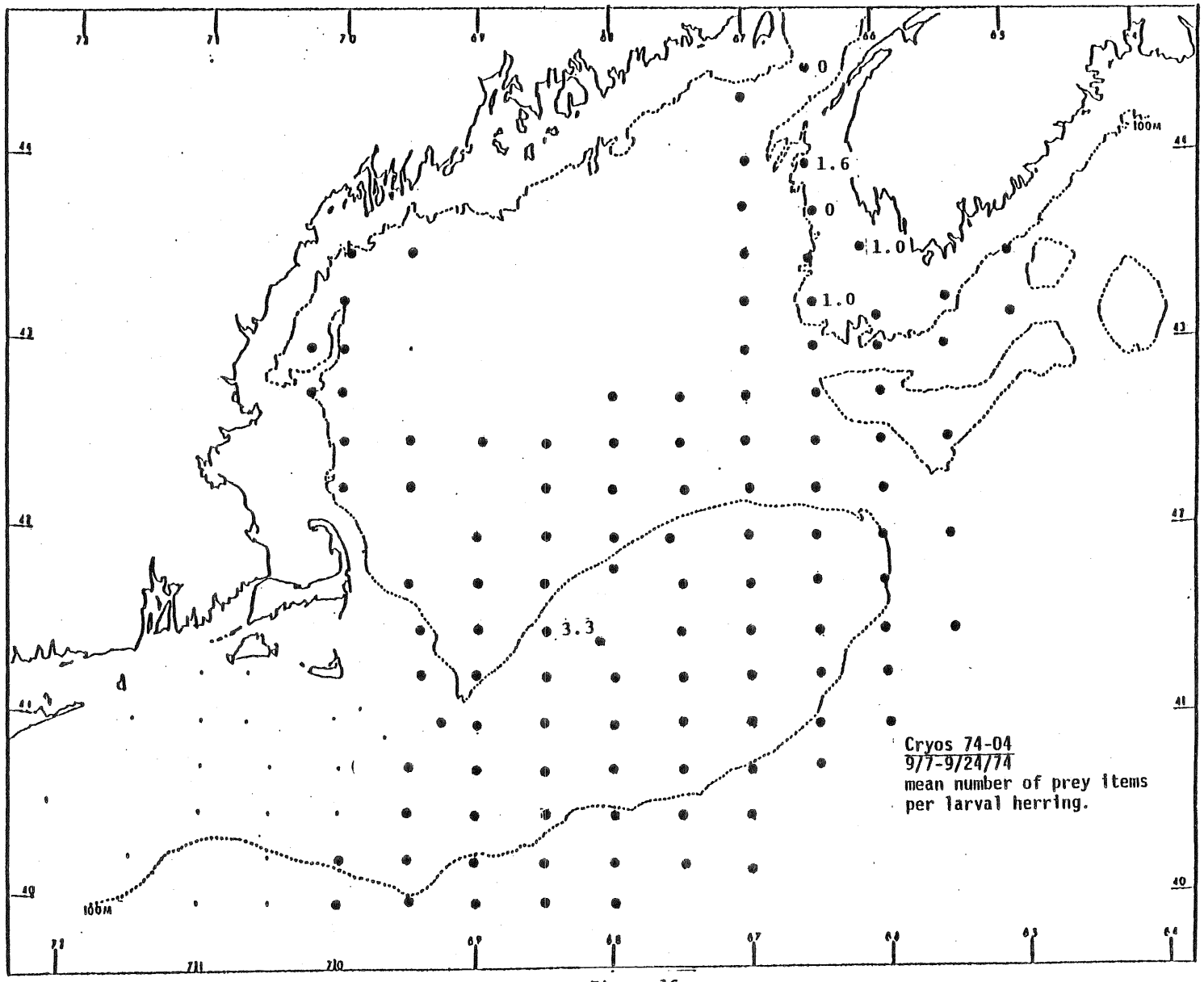
0
1.6
0
1.0
1.0
3.3
100M
100M
Cryos 74-04
9/7-9/24/74
mean number of prey items
per larval herring.

Figure 16

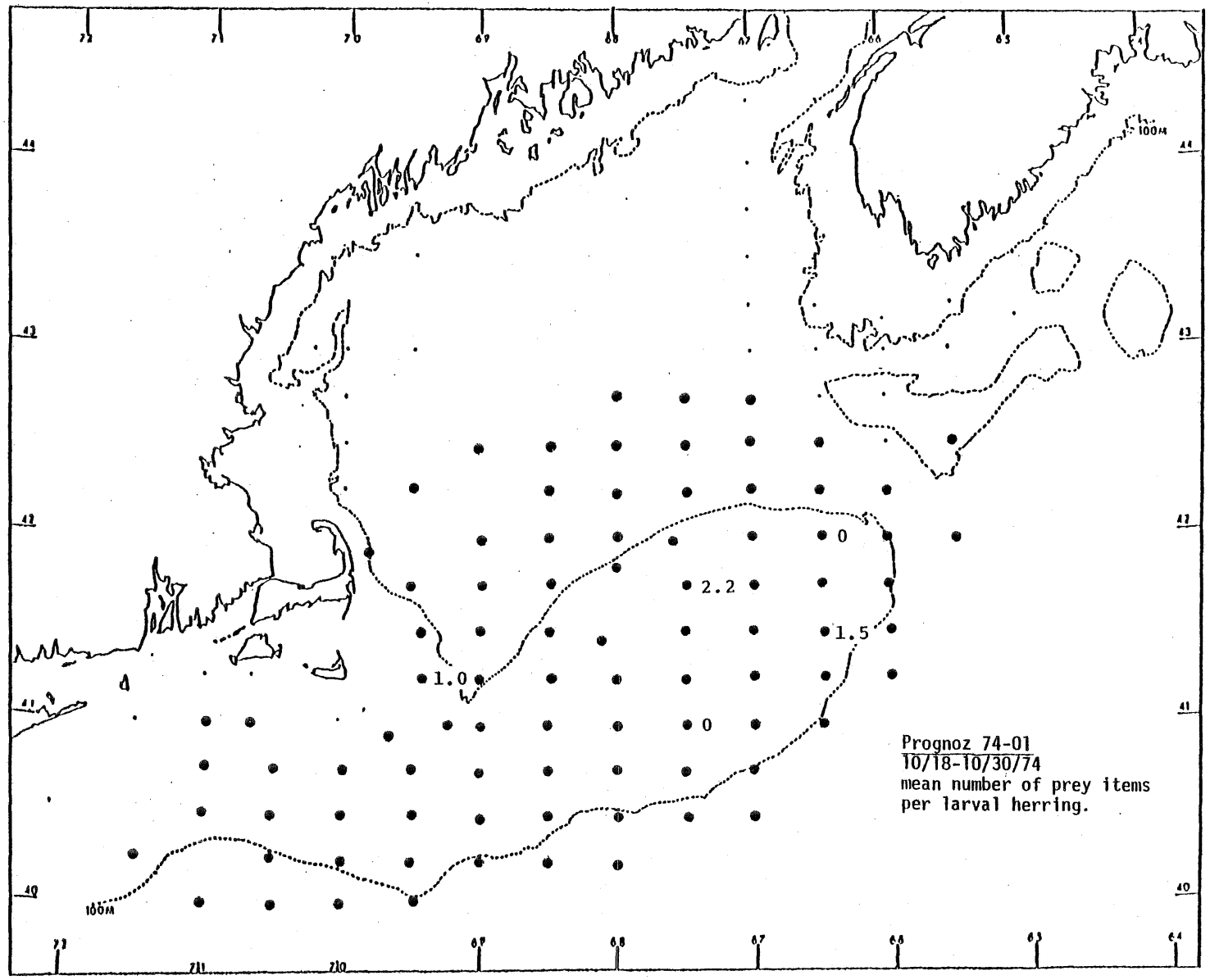
Prognoz 74-01
10/18-10/30/74
mean number of prey items
per larval herring.
100M
100M
1.0
2.2
0
1.5
0

Figure 17

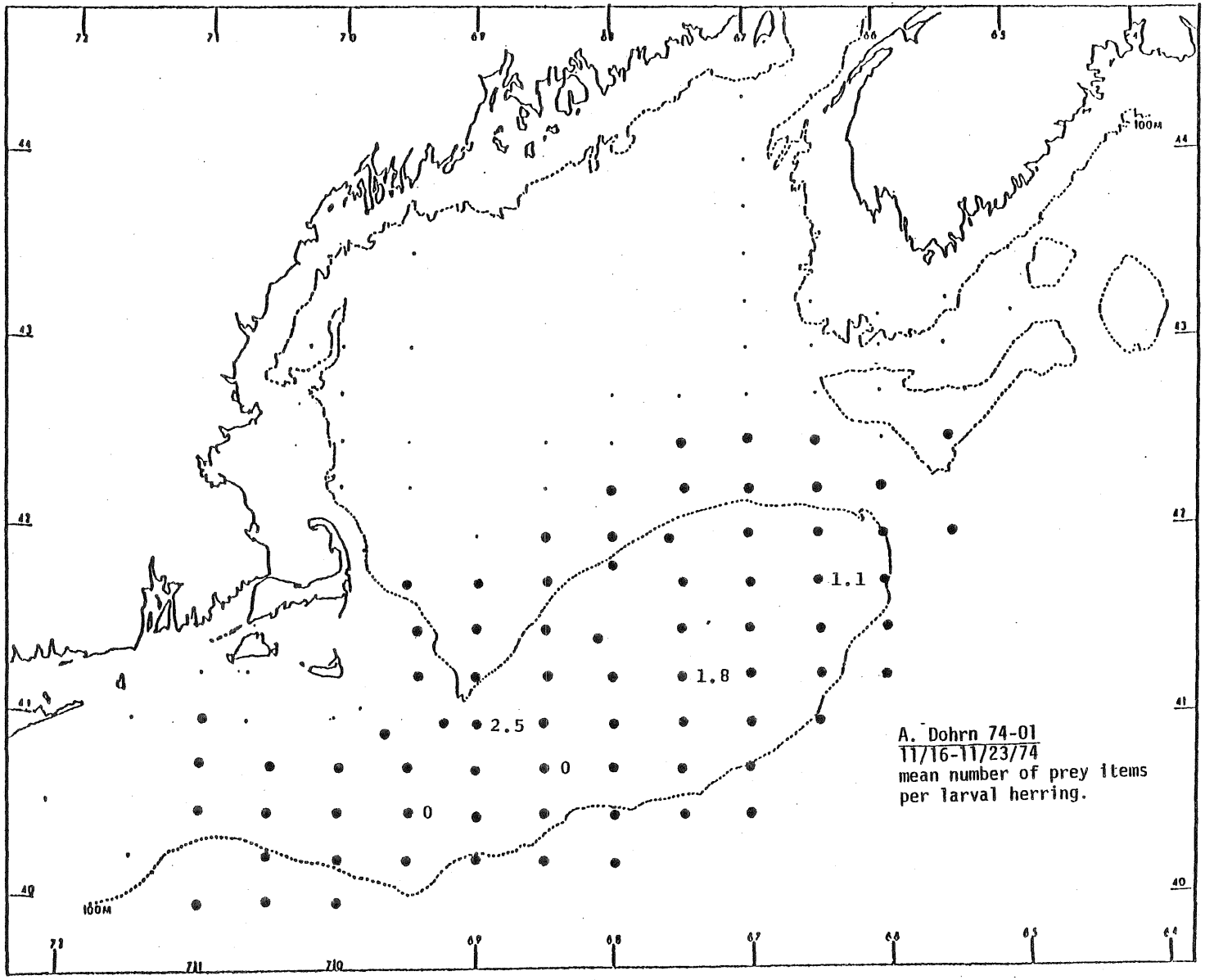
A. Dohrn 74-01
11/16-11/23/74
mean number of prey items
per larval herring.
1.1
1.8
2.5
0
0
100M
100M

Figure 18

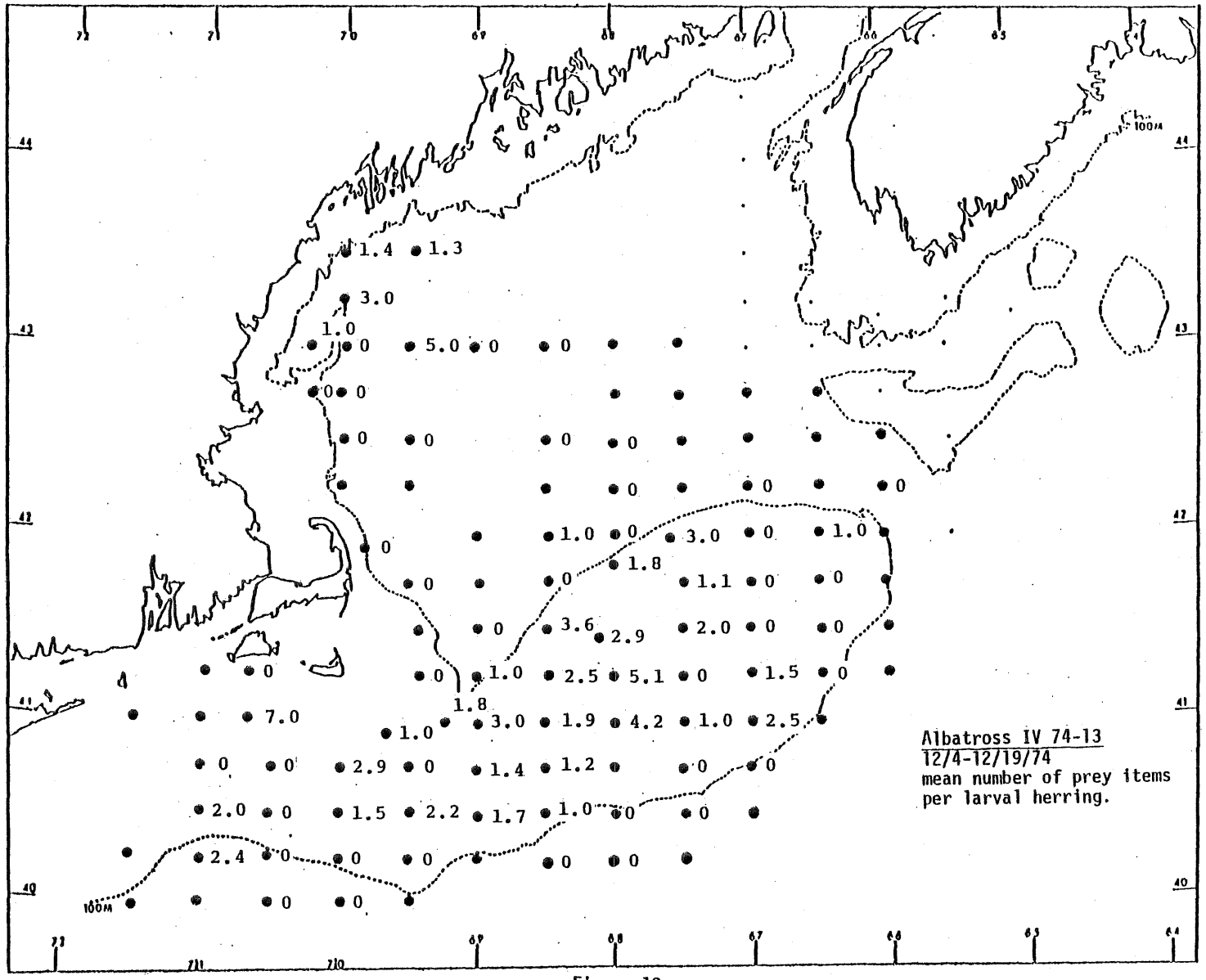
Albatross IV 74-13
12/4-12/19/74
mean number of prey items
per larval herring.
100M

Figure 19

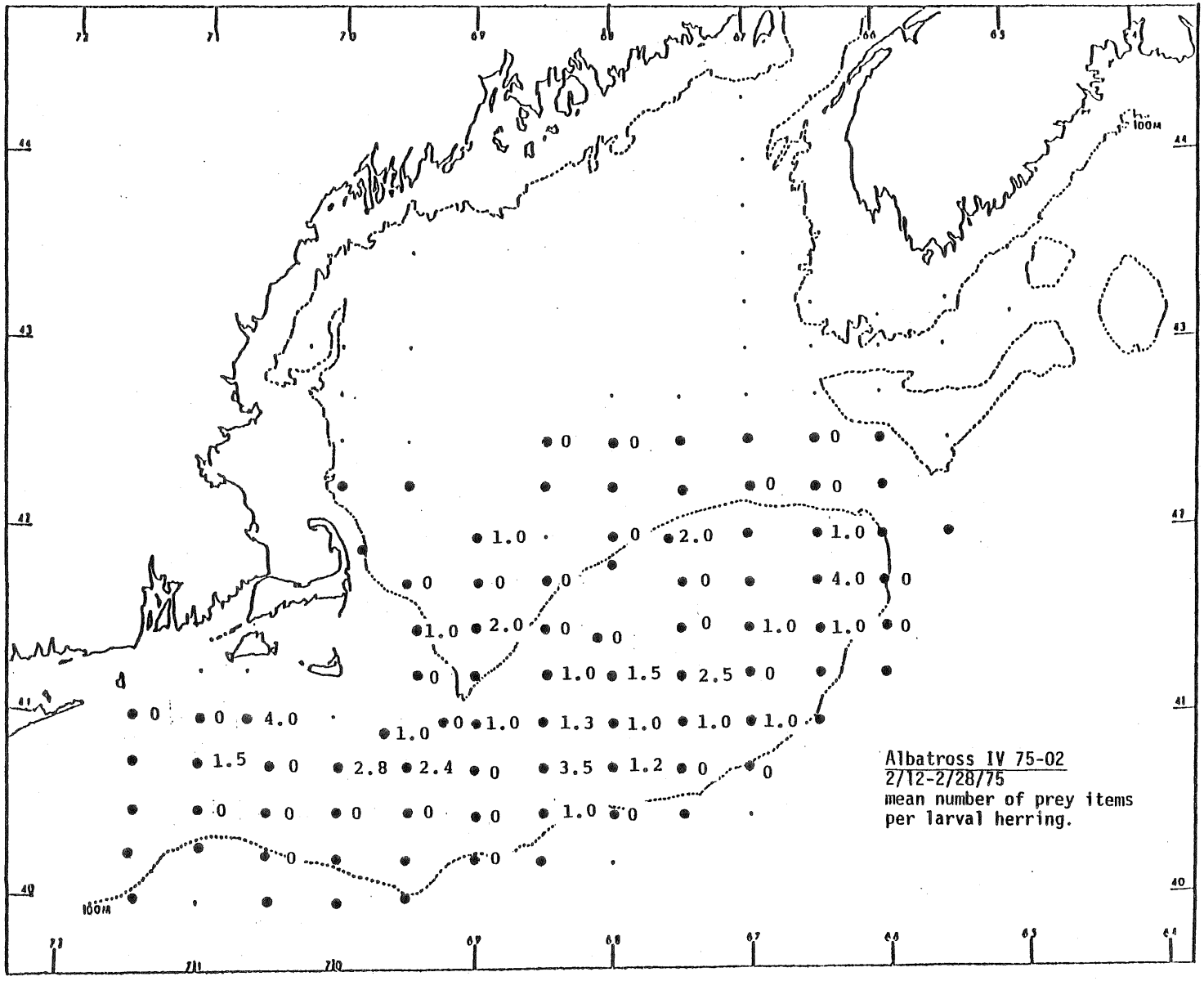
Albatross IV 75-02
2/12-2/28/75
mean number of prey items
per larval herring.
100M
100M

Figure 20

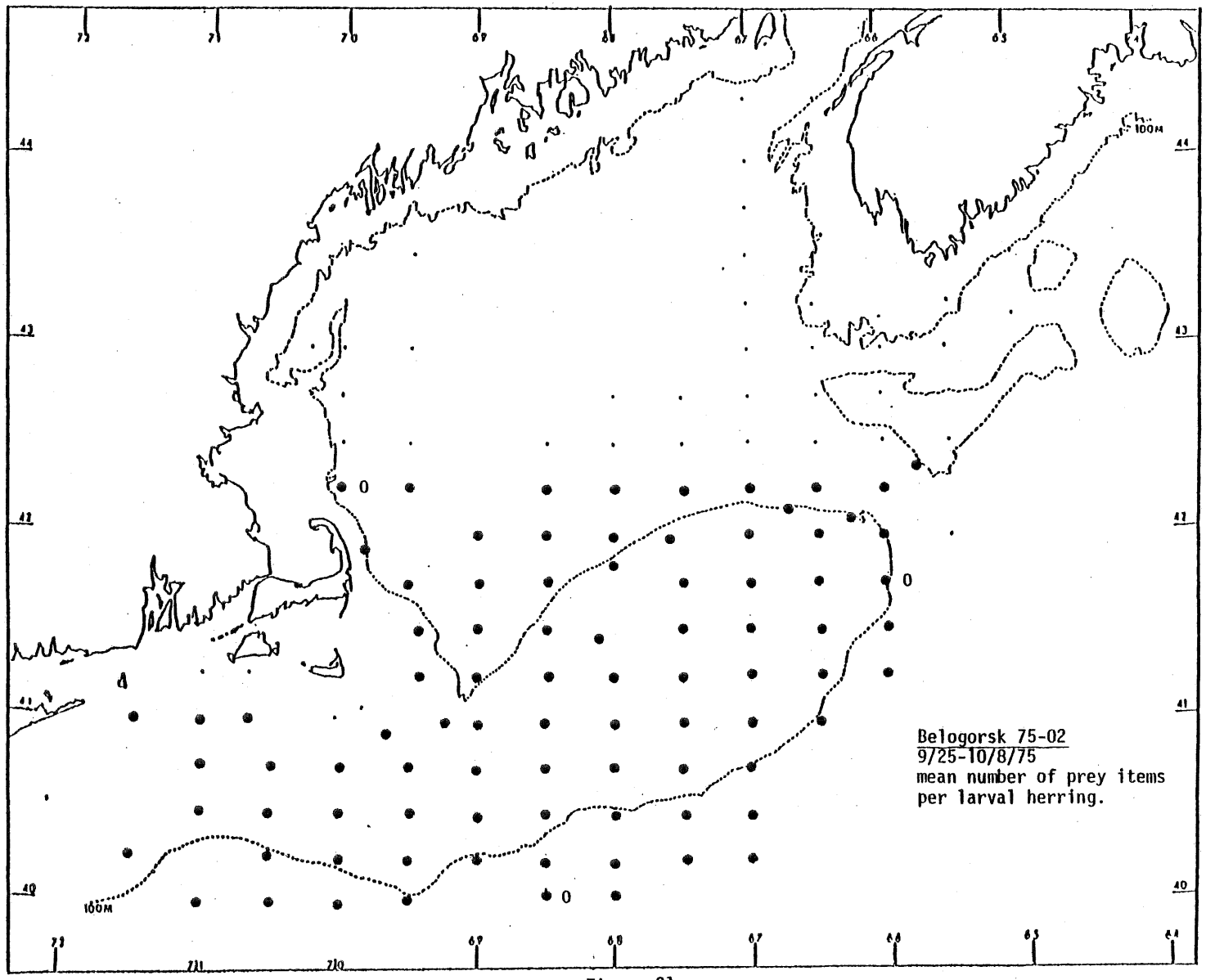
Belogorsk 75-02
9/25-10/8/75
mean number of prey items
per larval herring.
100M
100M

Figure 21

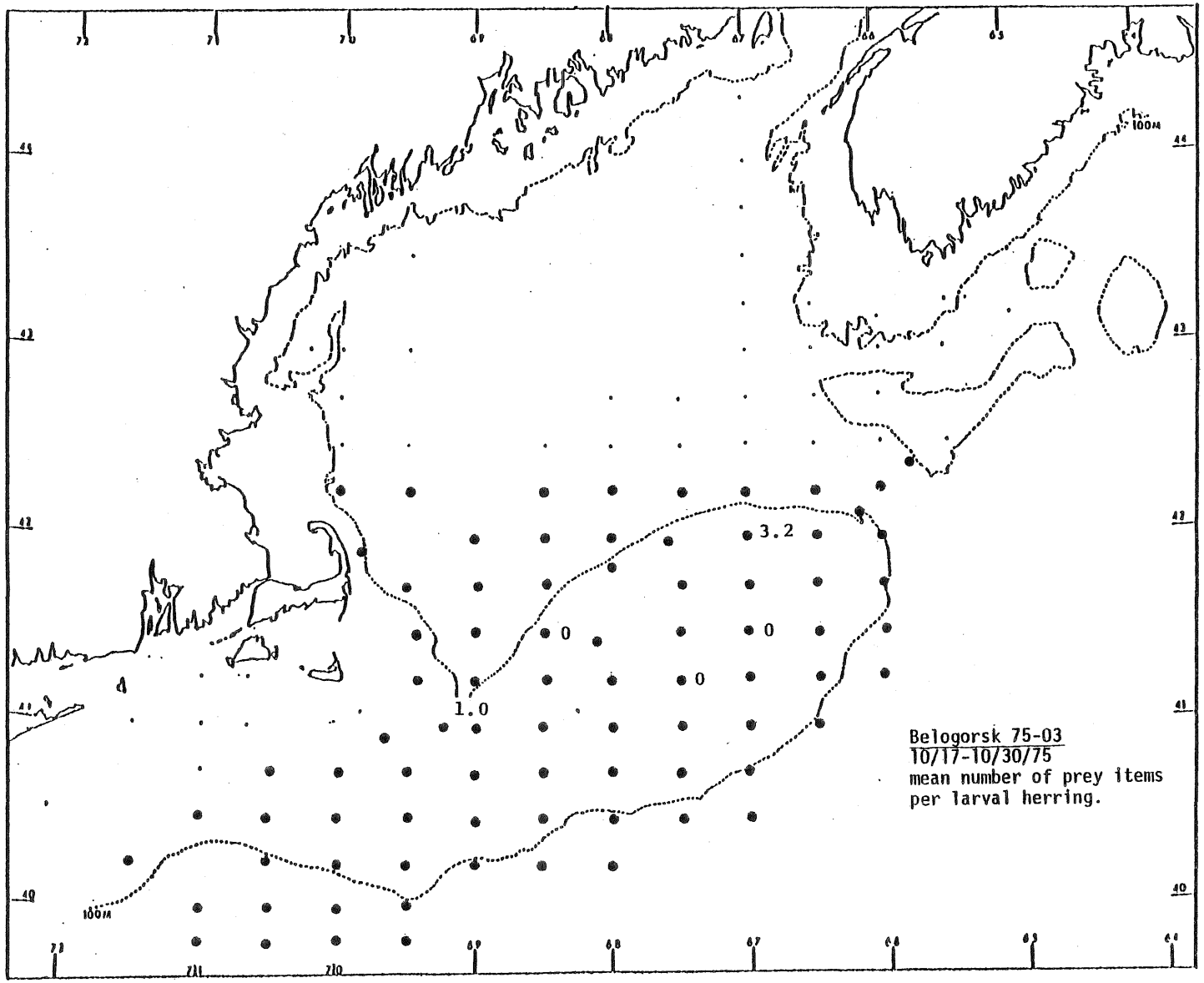
3.2
0
0
0
1.0
100M
100M
Belogorsk 75-03
10/17-10/30/75
mean number of prey items
per larval herring.

Figure 22

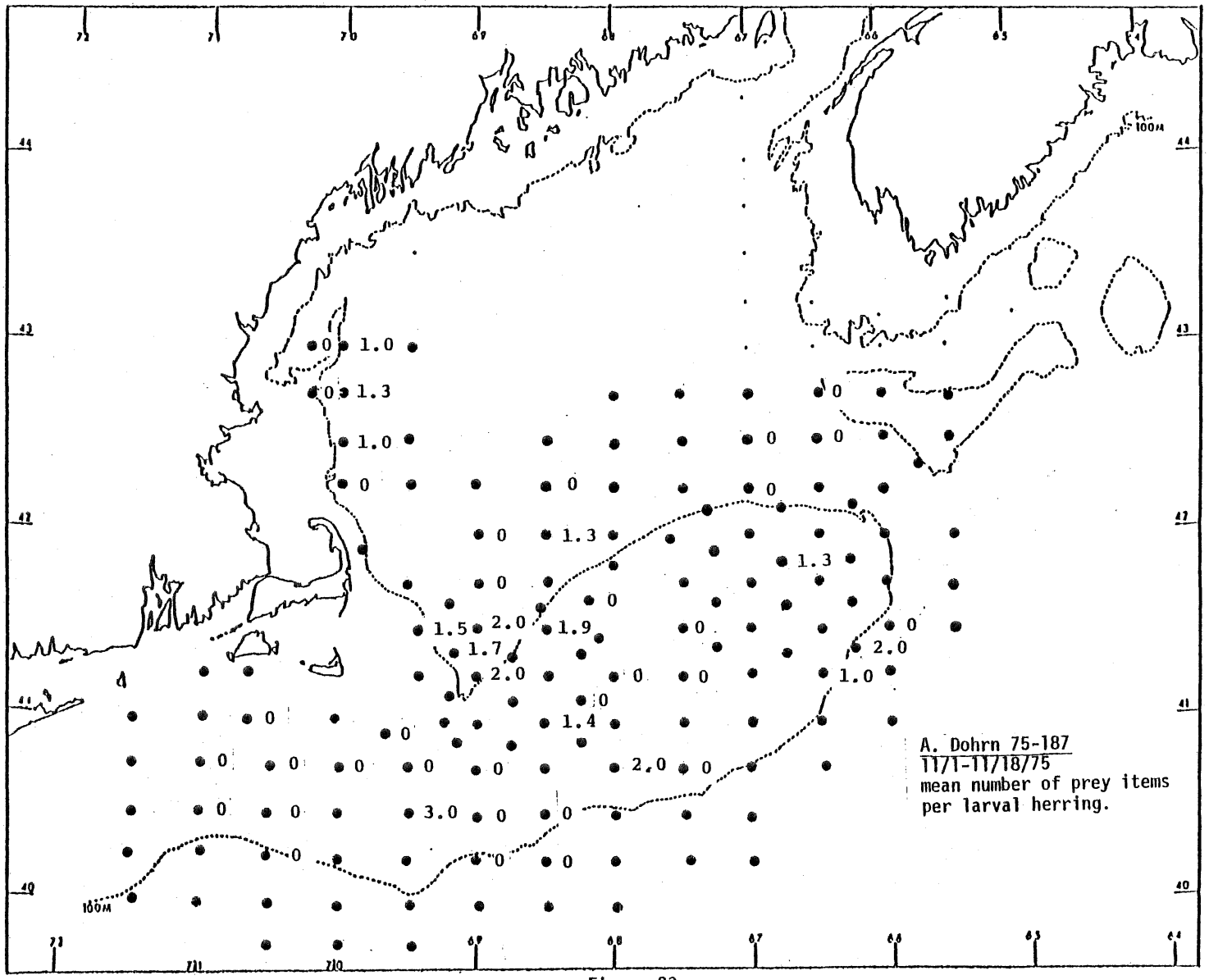
A. Dohrn 75-187
11/1-11/18/75
mean number of prey items
per larval herring.
100M

Figure 23

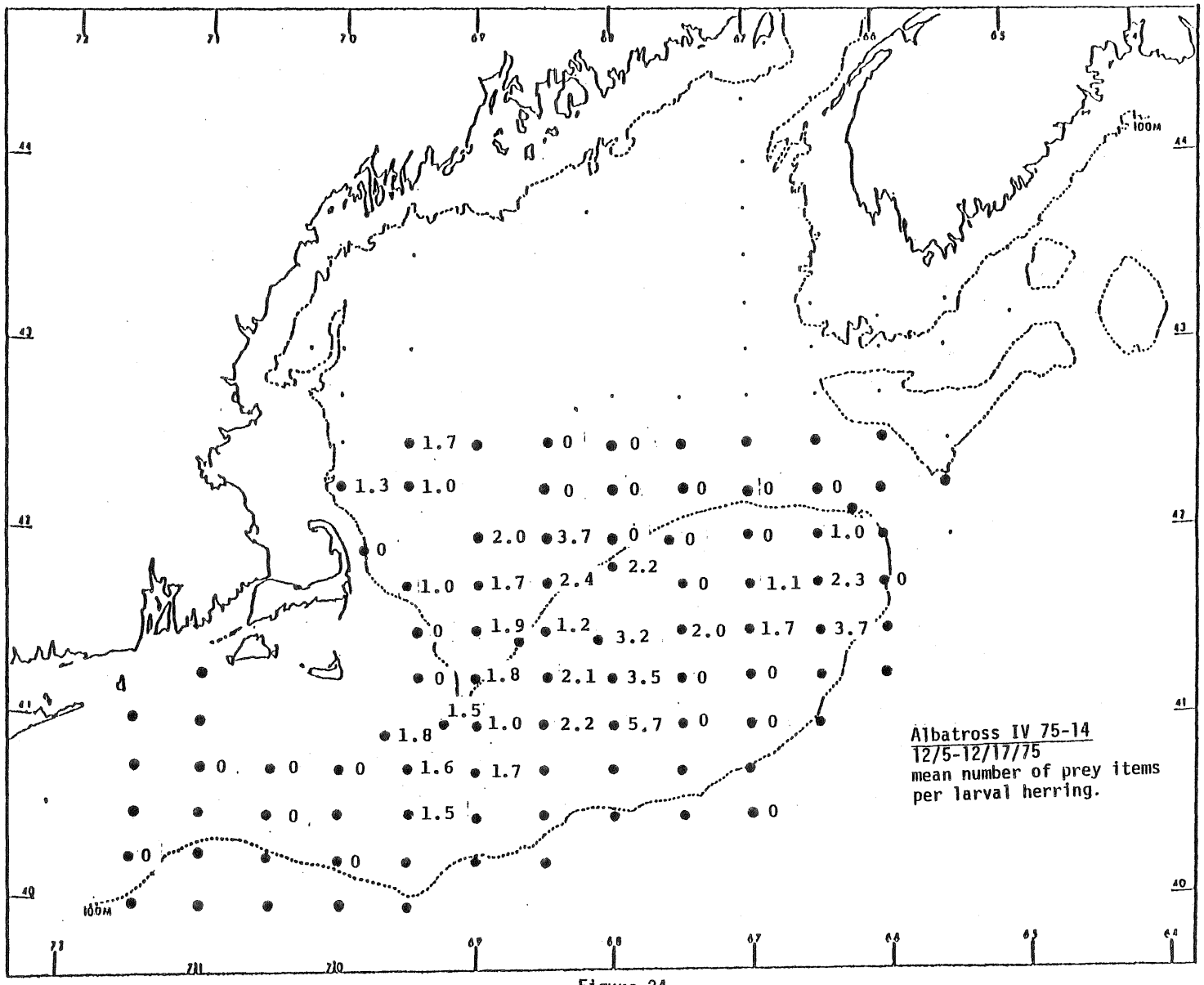
Albatross IV 75-14
12/5-12/17/75
mean number of prey items
per larval herring.
100M
100M

Figure 24

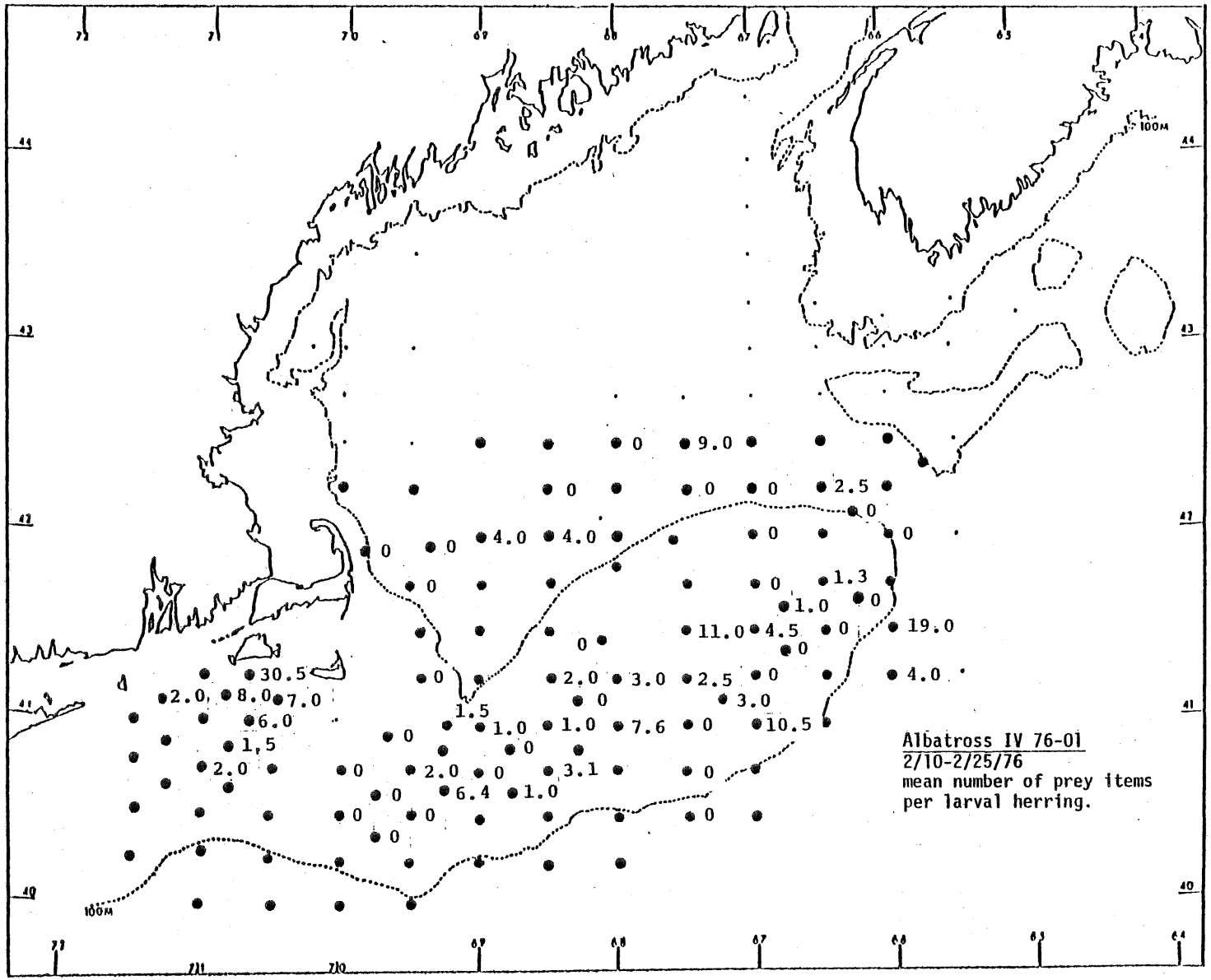
Albatross IV 76-01
2/10-2/25/76
mean number of prey items
per larval herring.
100M
100M

Figure 25

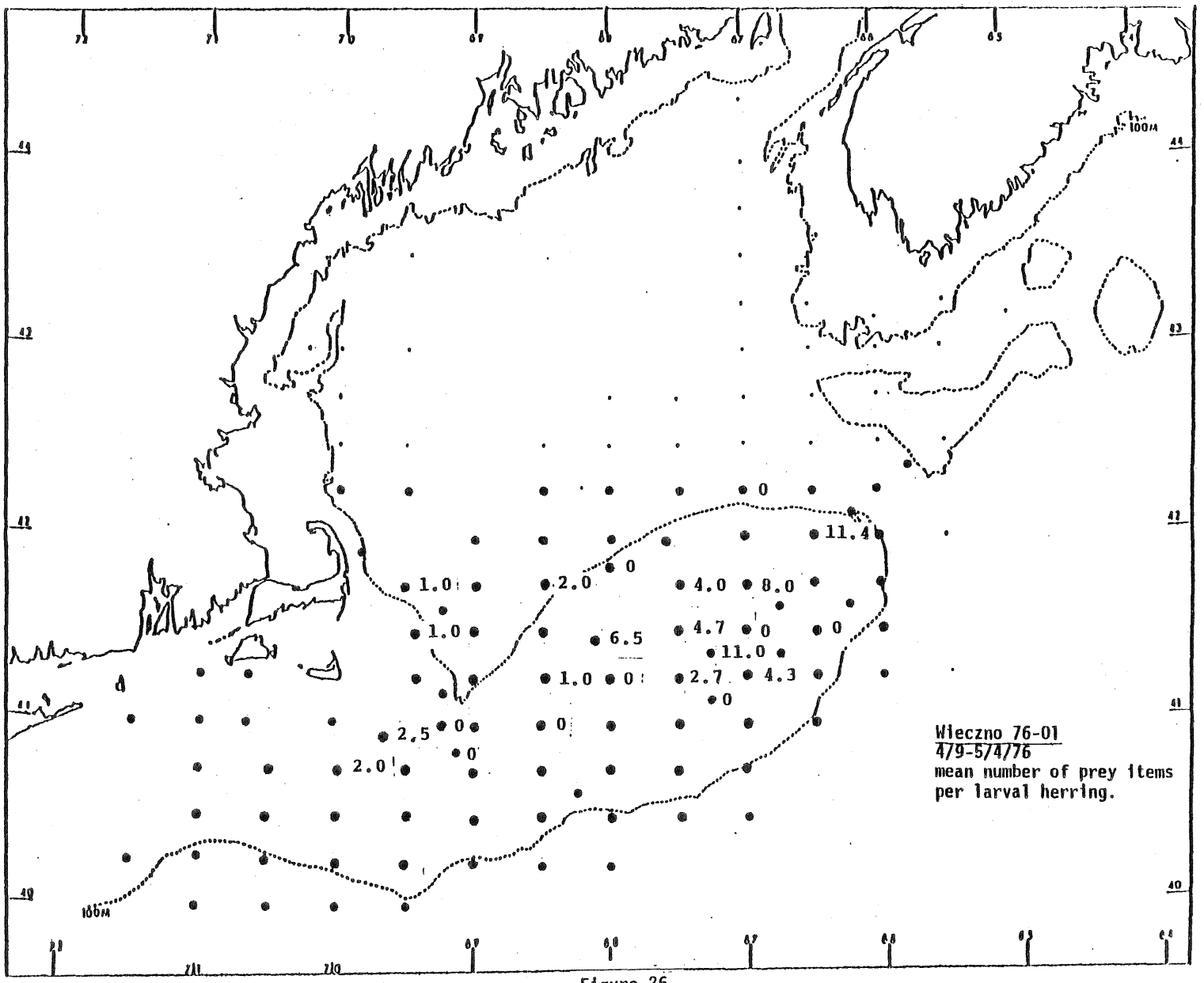
Wieczno 76-01
4/9-5/4/76
mean number of prey items
per larval herring.
100M
100M
0
11.4
0
1.0
2.0
4.0
8.0
1.0
6.5
4.7
0
0
11.0
1.0
0
2.7
4.3
0
2.5
0
0
0
2.0

Figure 26

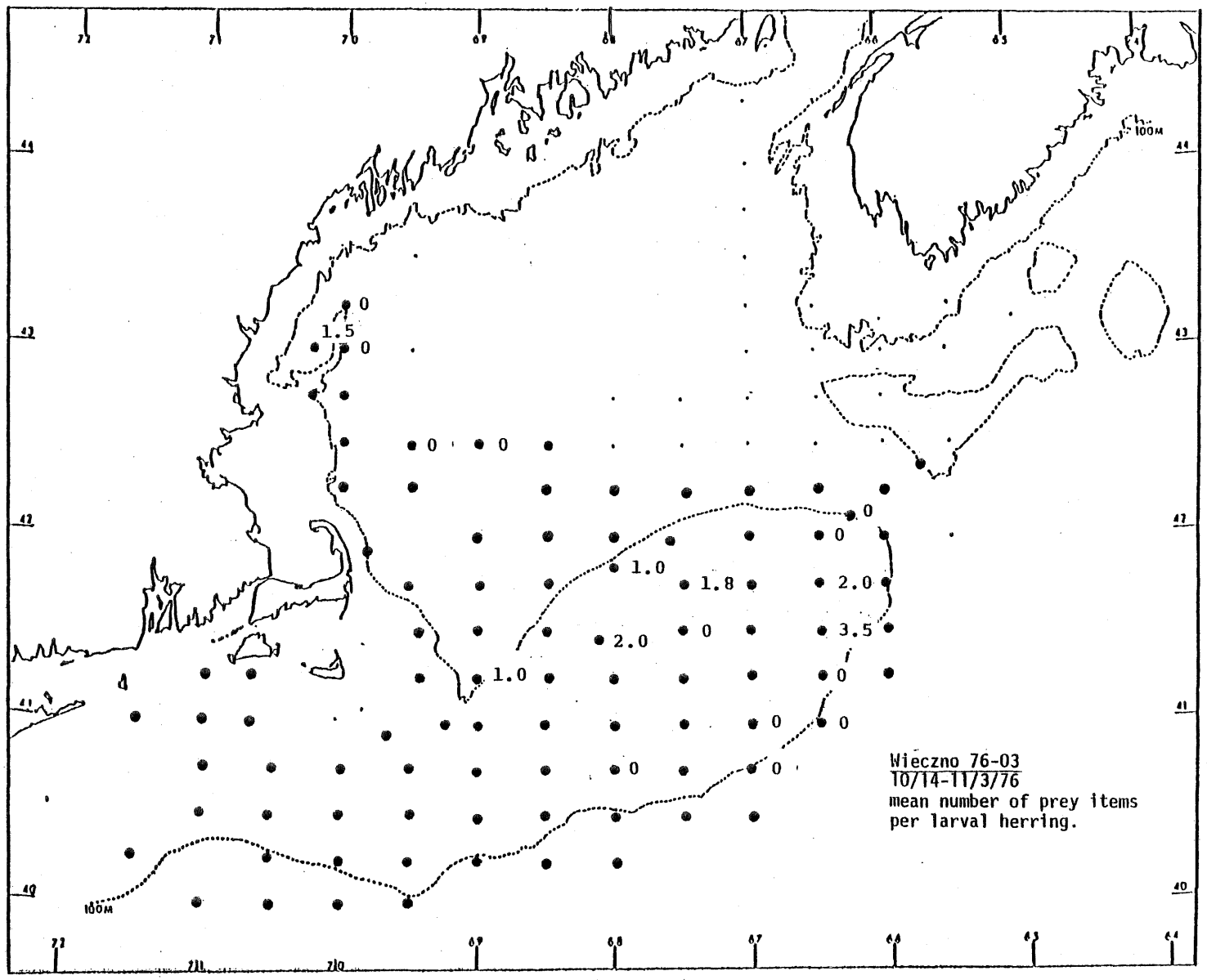
Wieczno 76-03
10/14-11/3/76
mean number of prey items
per larval herring.
100M
100M

Figure 27

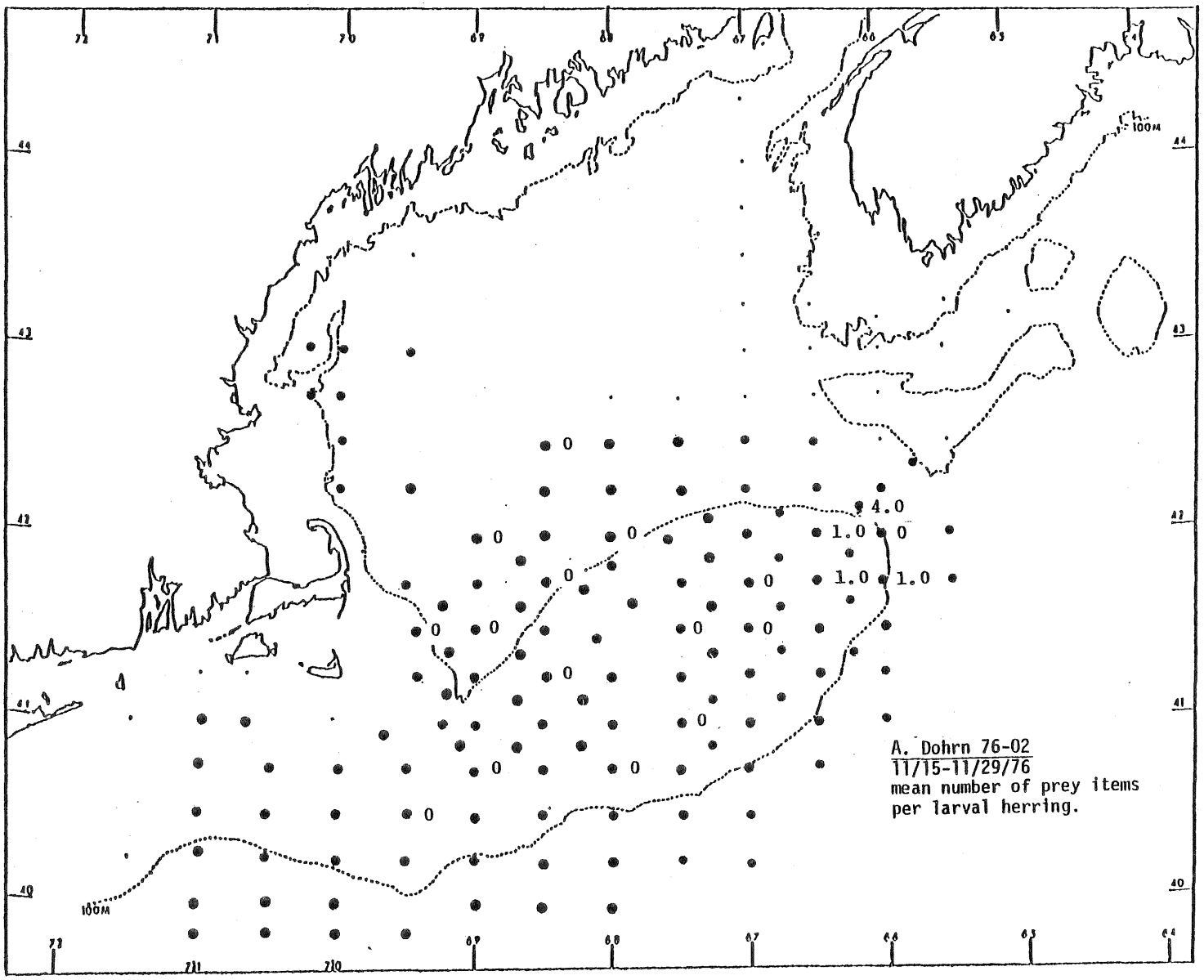
A. Dohrn 76-02
11/15-11/29/76
mean number of prey items
per larval herring.
100M
100M
4.0
1.0
1.0
1.0
0

Figure 28

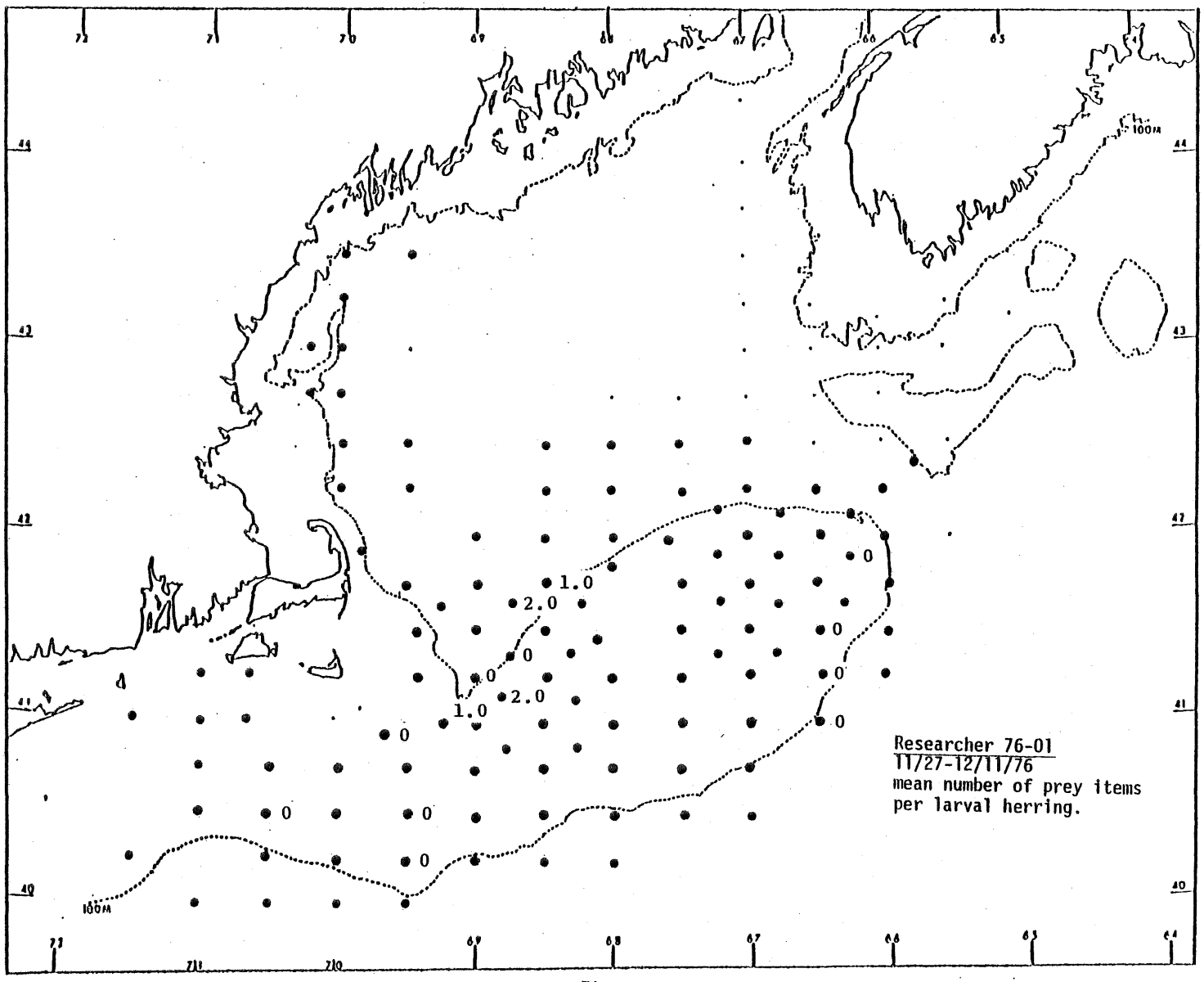
Researcher 76-01
11/27-12/11/76
mean number of prey items
per larval herring.
100M
1.0
2.0
0

Figure 29

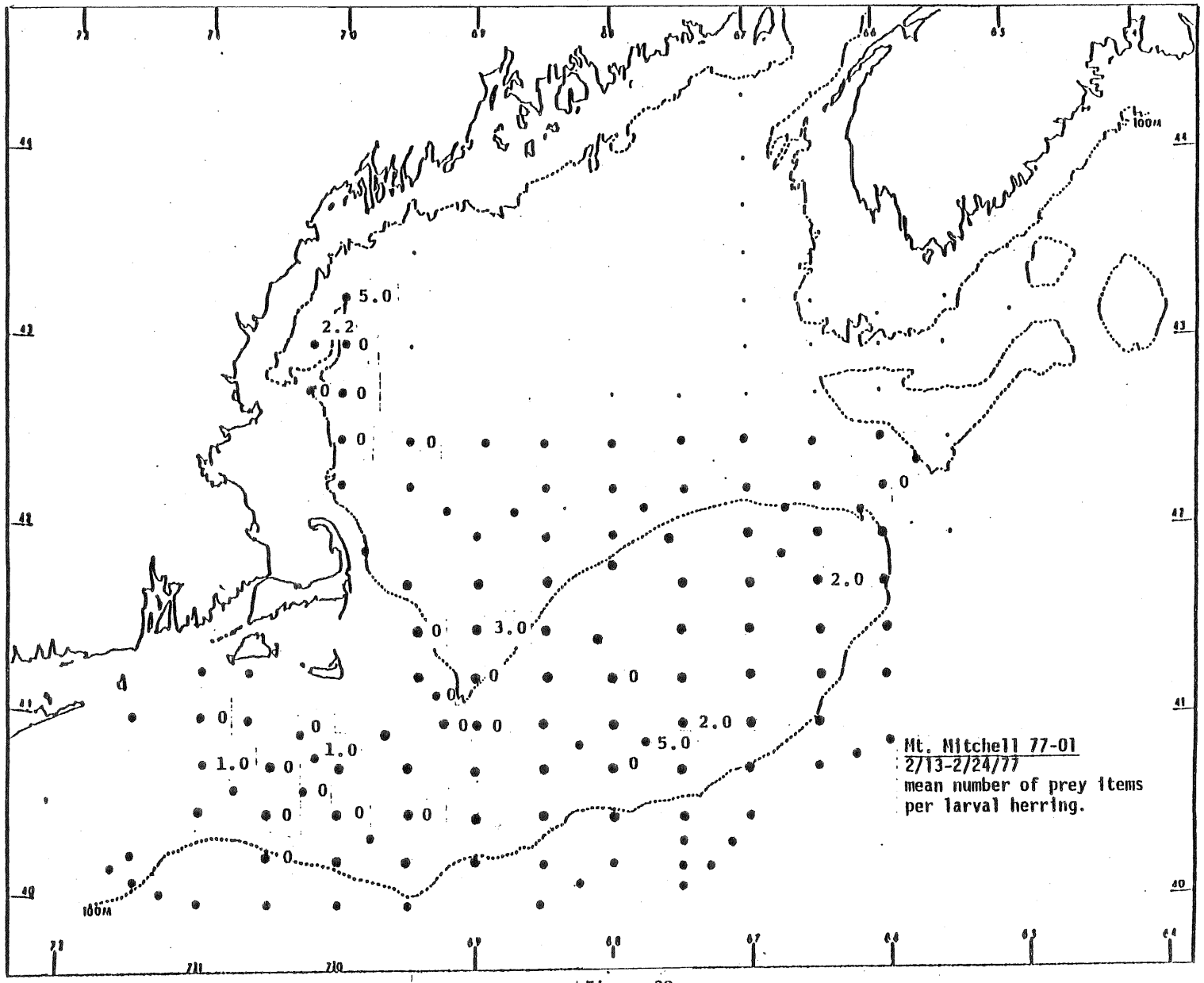
Mt. Mitchell 77-01
2/13-2/24/77
mean number of prey items
per larval herring.
100M
100M
5.0
2.2
0
3.0
2.0
1.0
5.0

Figure 30

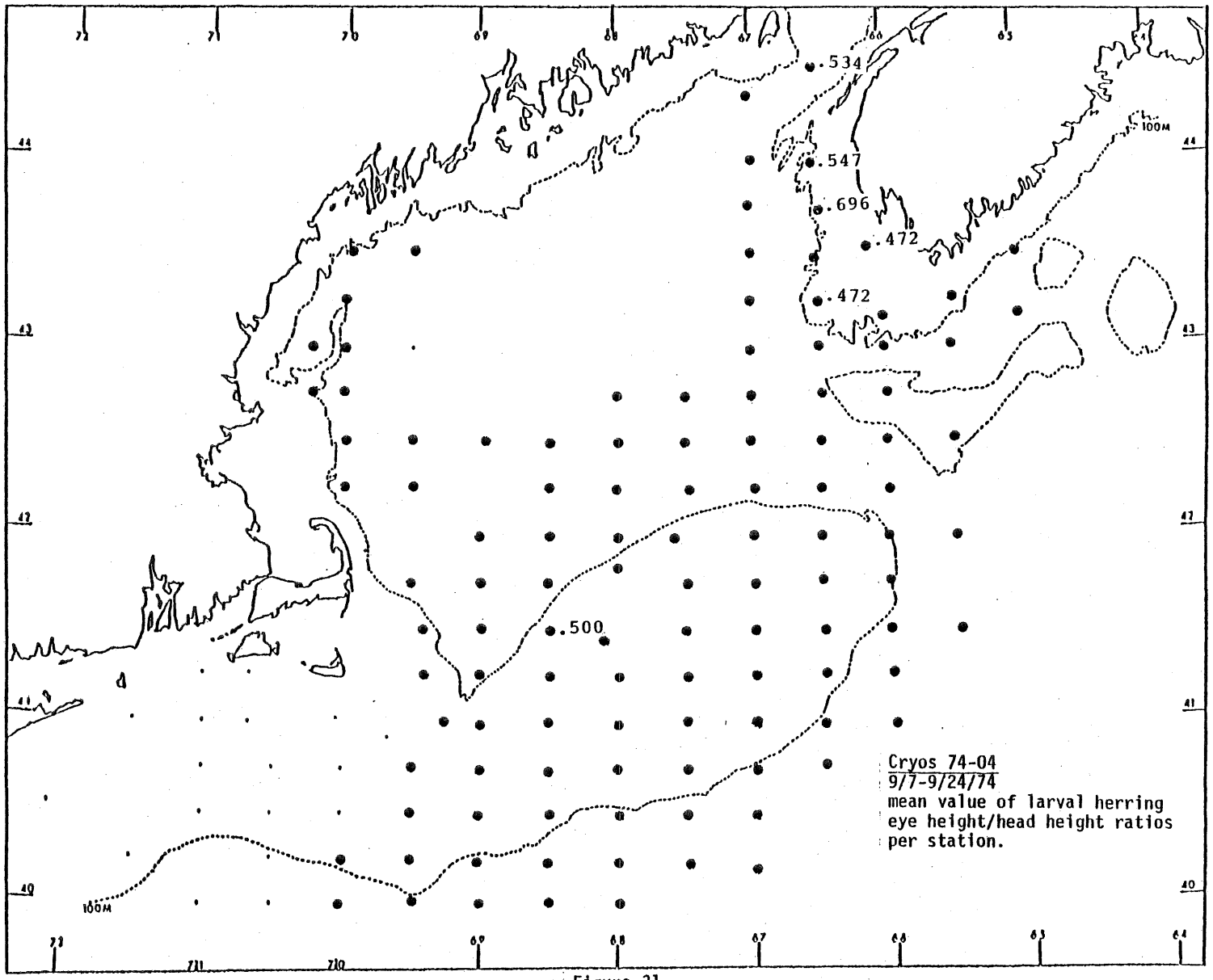
.534
.547
.696
.472
.472
.500
100M
100M
Cryos 74-04
9/7-9/24/74
mean value of larval herring
eye height/head height ratios
per station.

Figure 31

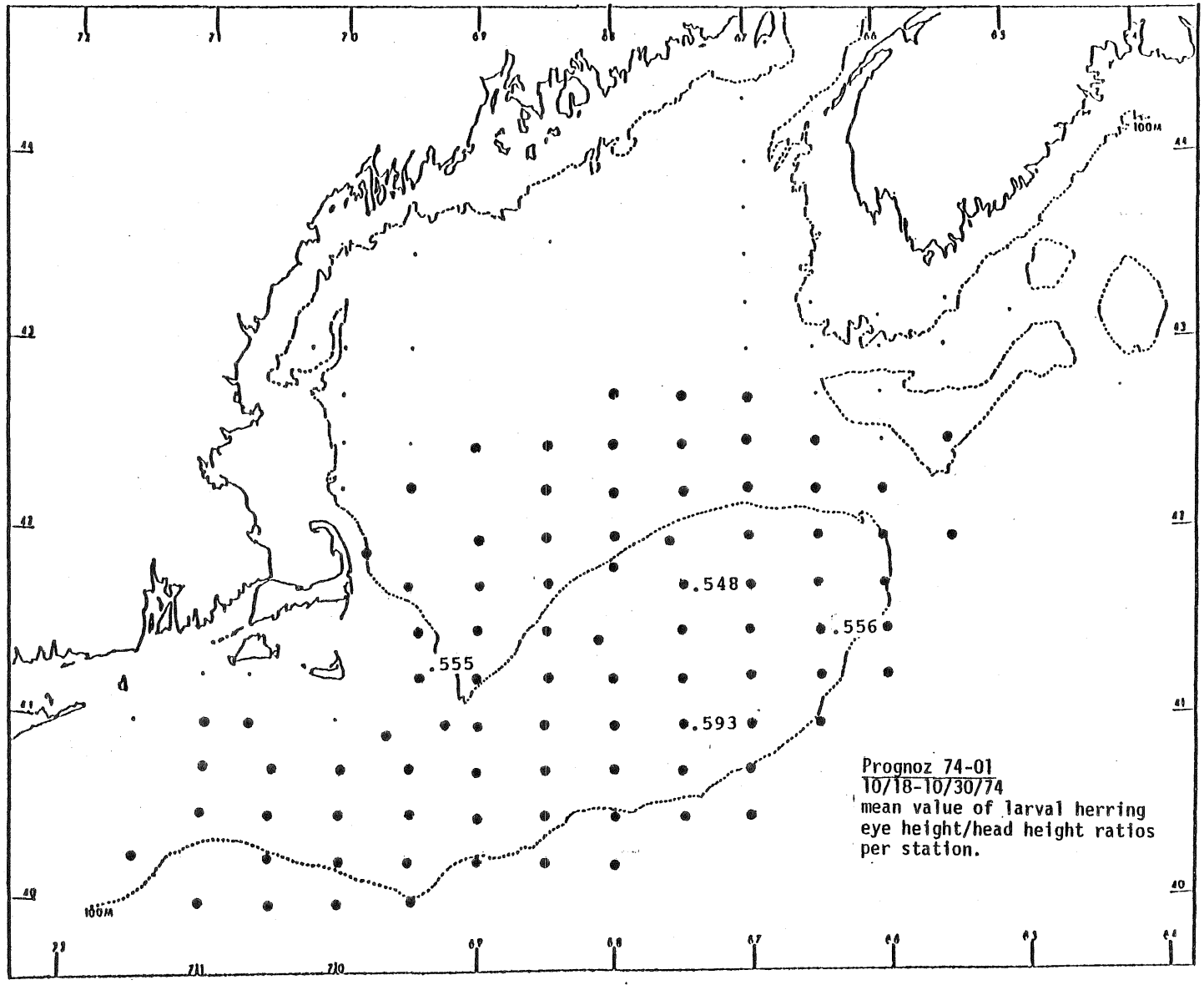
.548
.556
.555
.593
100M
100M
Prognoz 74-01
10/18-10/30/74
mean value of larval herring
eye height/head height ratios
per station.

Figure 32

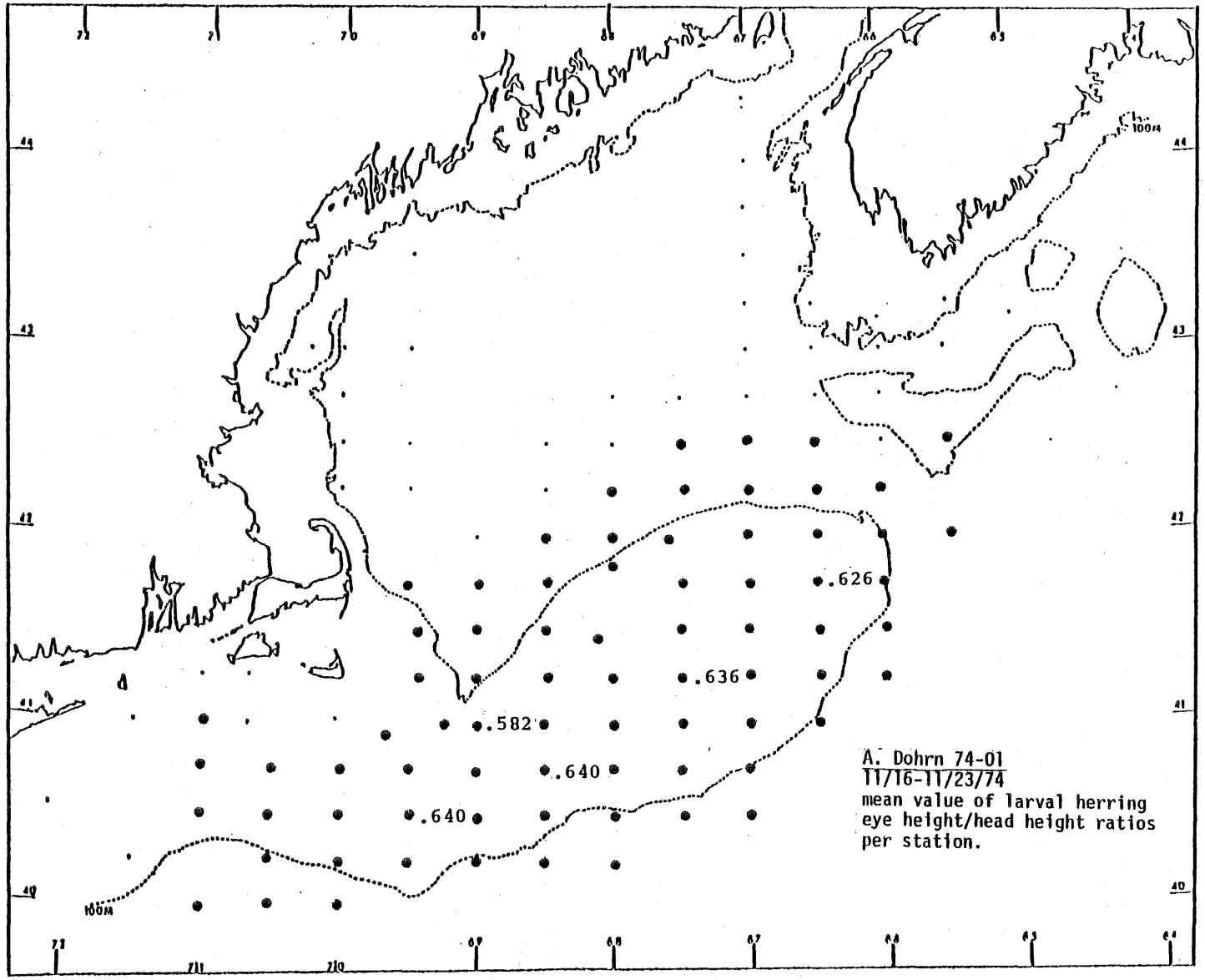
.626
.636
.582
.640
.640
100M
100M
A. Dohrn 74-01
11/16-11/23/74
mean value of larval herring
eye height/head height ratios
per station.

Figure 33

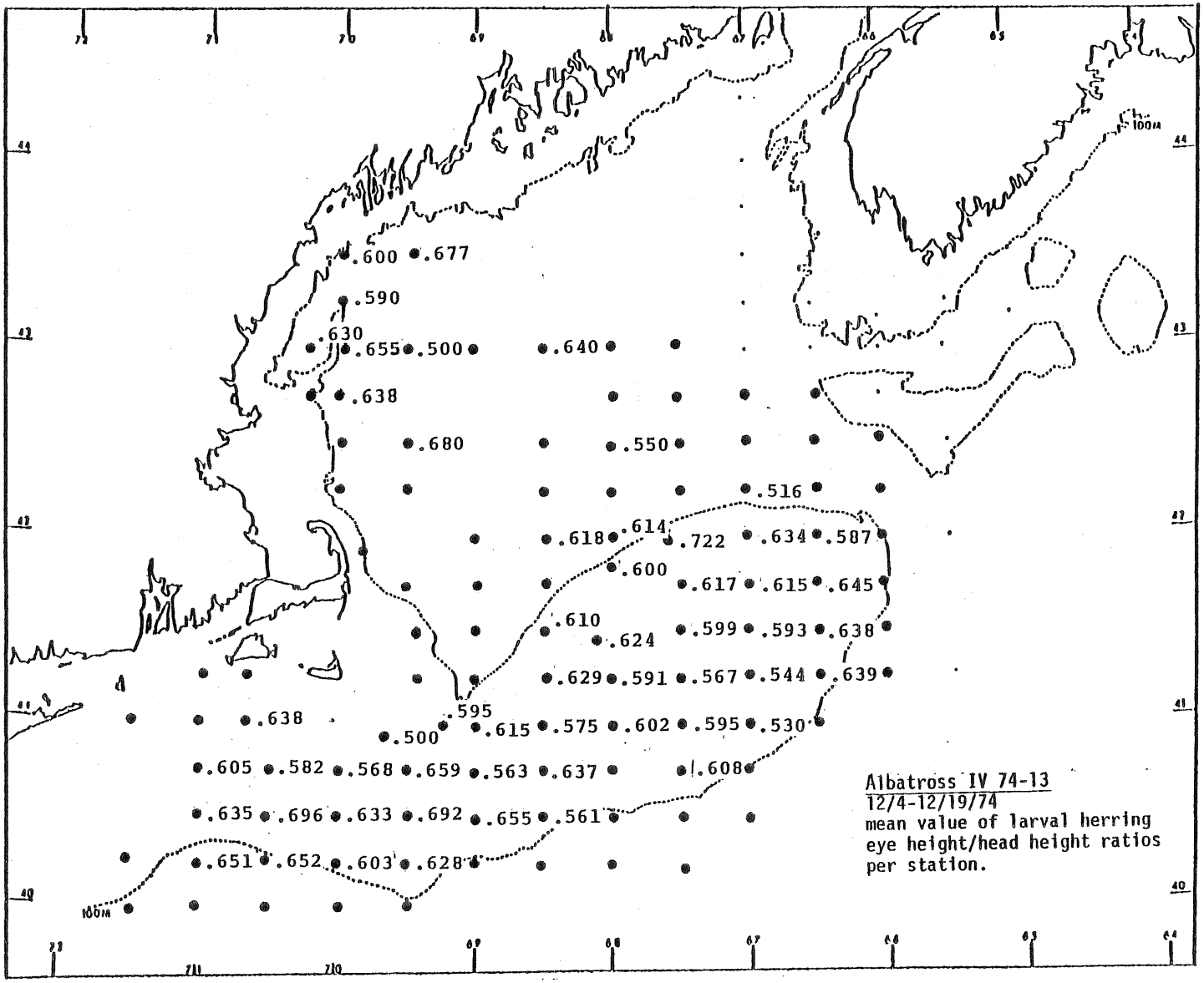
.600 .677
.590
.630
.655 .500
.640
.638
.680
.550
.516
.618 .614 .722 .634 .587
.600
.617 .615 .645
.610
.624
.599 .593 .638
.629 .591 .567 .544 .639
.595
.638
.500
.615 .575 .602 .595 .530
.605 .582 .568 .659 .563 .637
.608
.635 .696 .633 .692 .655 .561
.651 .652 .603 .628
100M
Albatross IV 74-13
12/4-12/19/74
mean value of larval herring
eye height/head height ratios
per station.

Figure 34

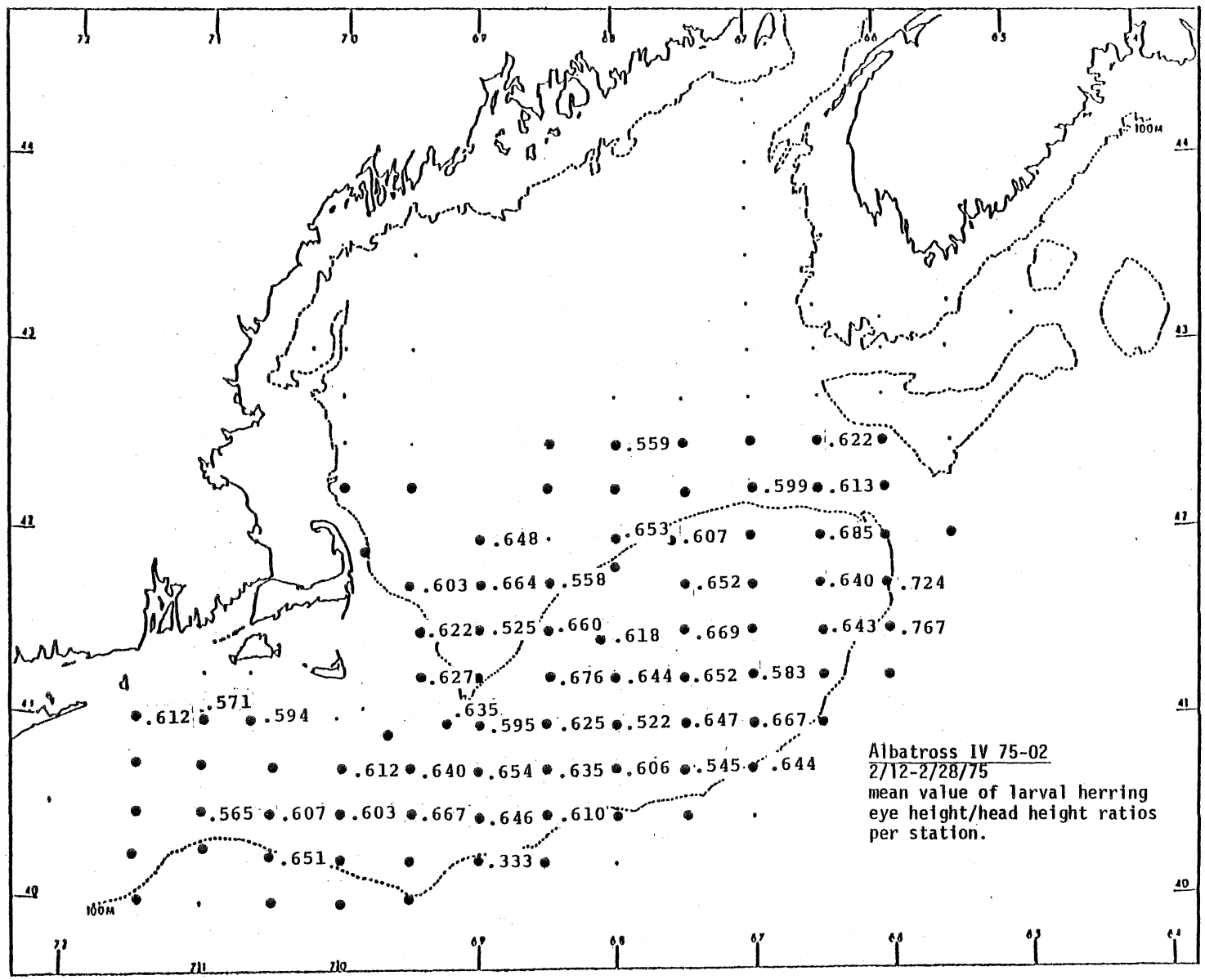
Albatross IV 75-02
2/12-2/28/75
mean value of larval herring
eye height/head height ratios
per station.
100M
.559
.622
.599
.613
.648
.653
.607
.685
.603
.664
.558
.652
.640
.724
.622
.525
.660
.618
.669
.643
.767
.627
.676
.644
.652
.583
.612
.571
.594
.635
.595
.625
.522
.647
.667
.612
.640
.654
.635
.606
.545
.644
.565
.607
.603
.667
.646
.610
.651
.333

Figure 35

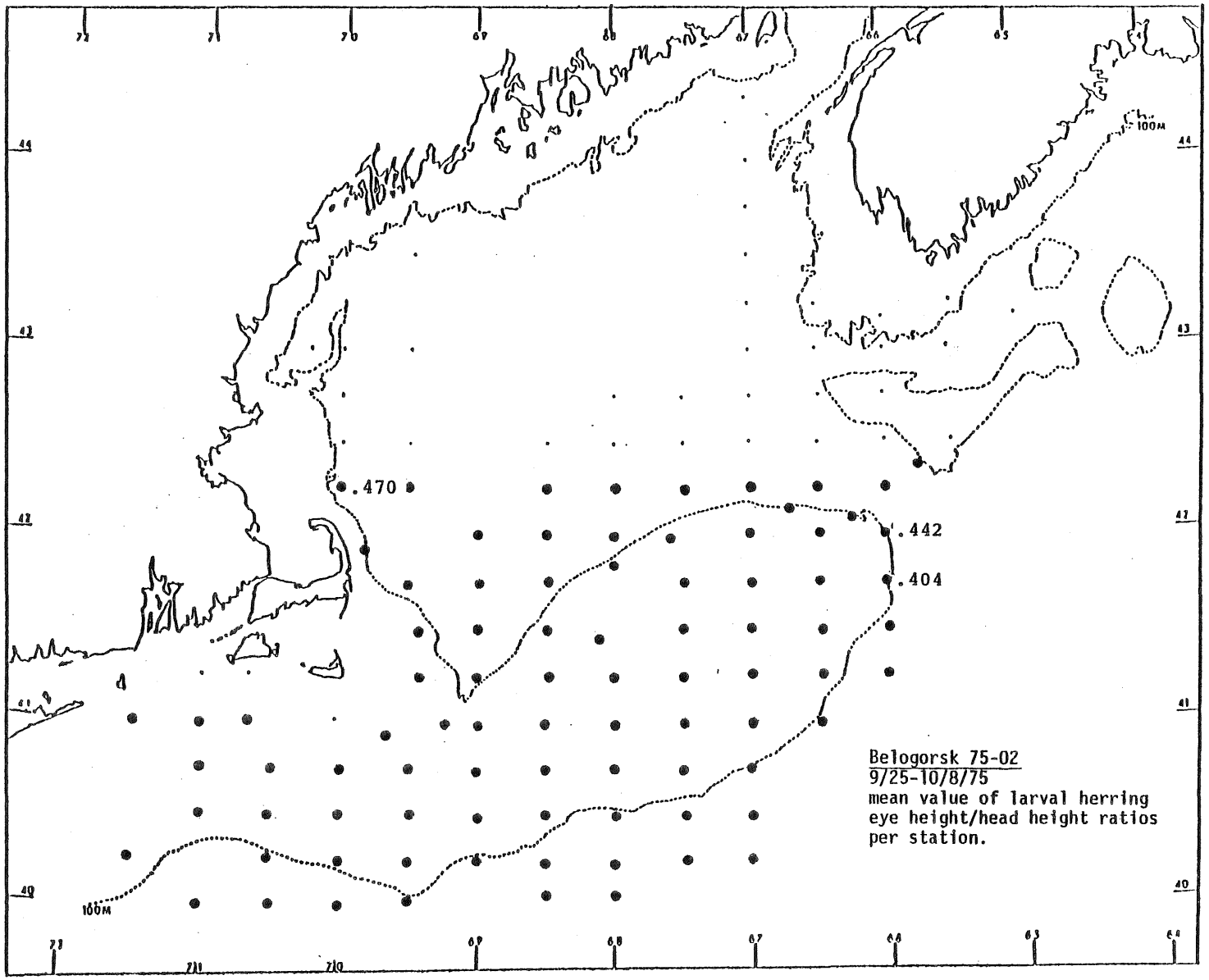
.470
.442
.404
100M
100M
Belogorsk 75-02
9/25-10/8/75
mean value of larval herring
eye height/head height ratios
per station.

Figure 36

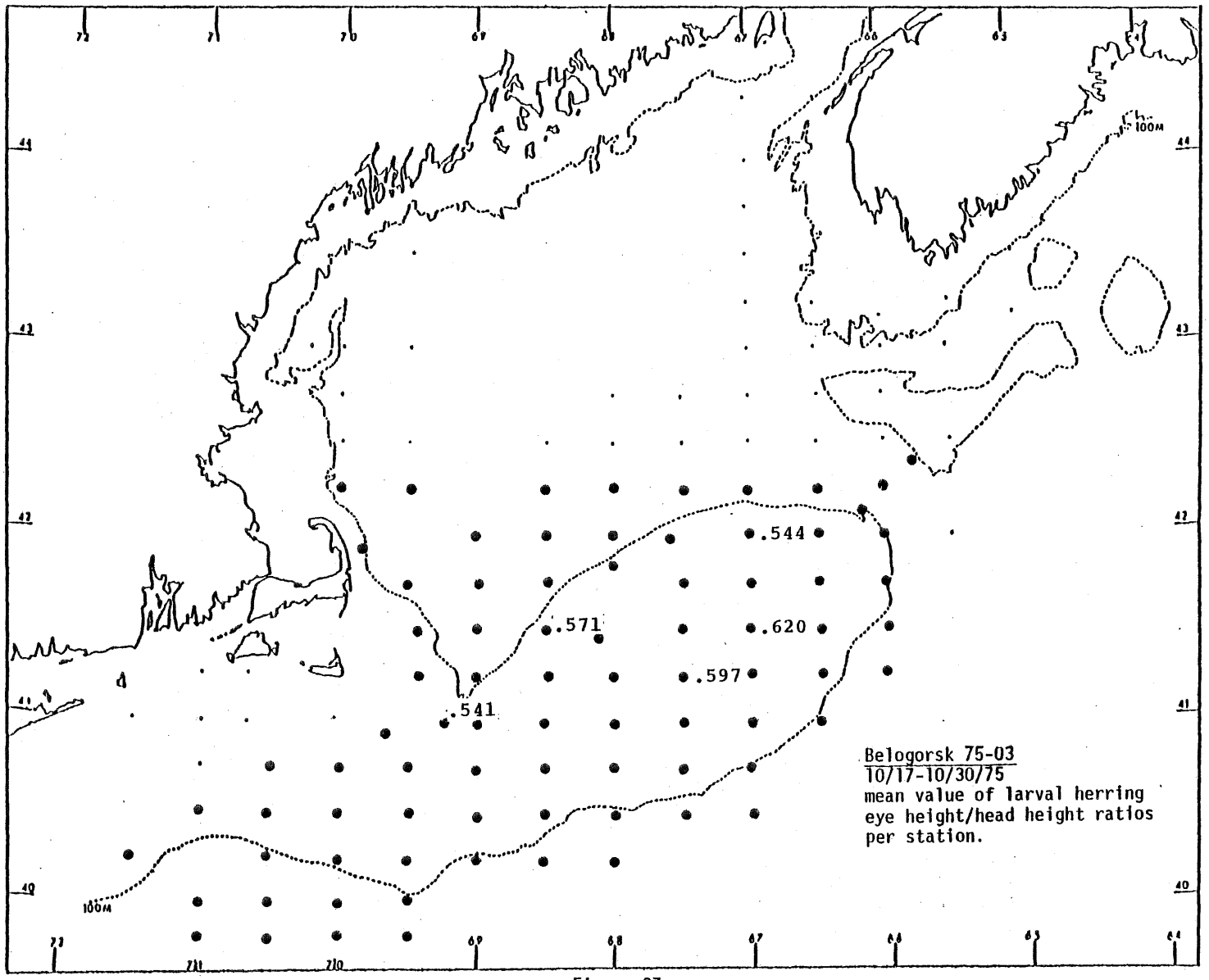
.544
.571
.620
.597
.541
100M
100M
Belogorsk 75-03
10/17-10/30/75
mean value of larval herring
eye height/head height ratios
per station.

Figure 37

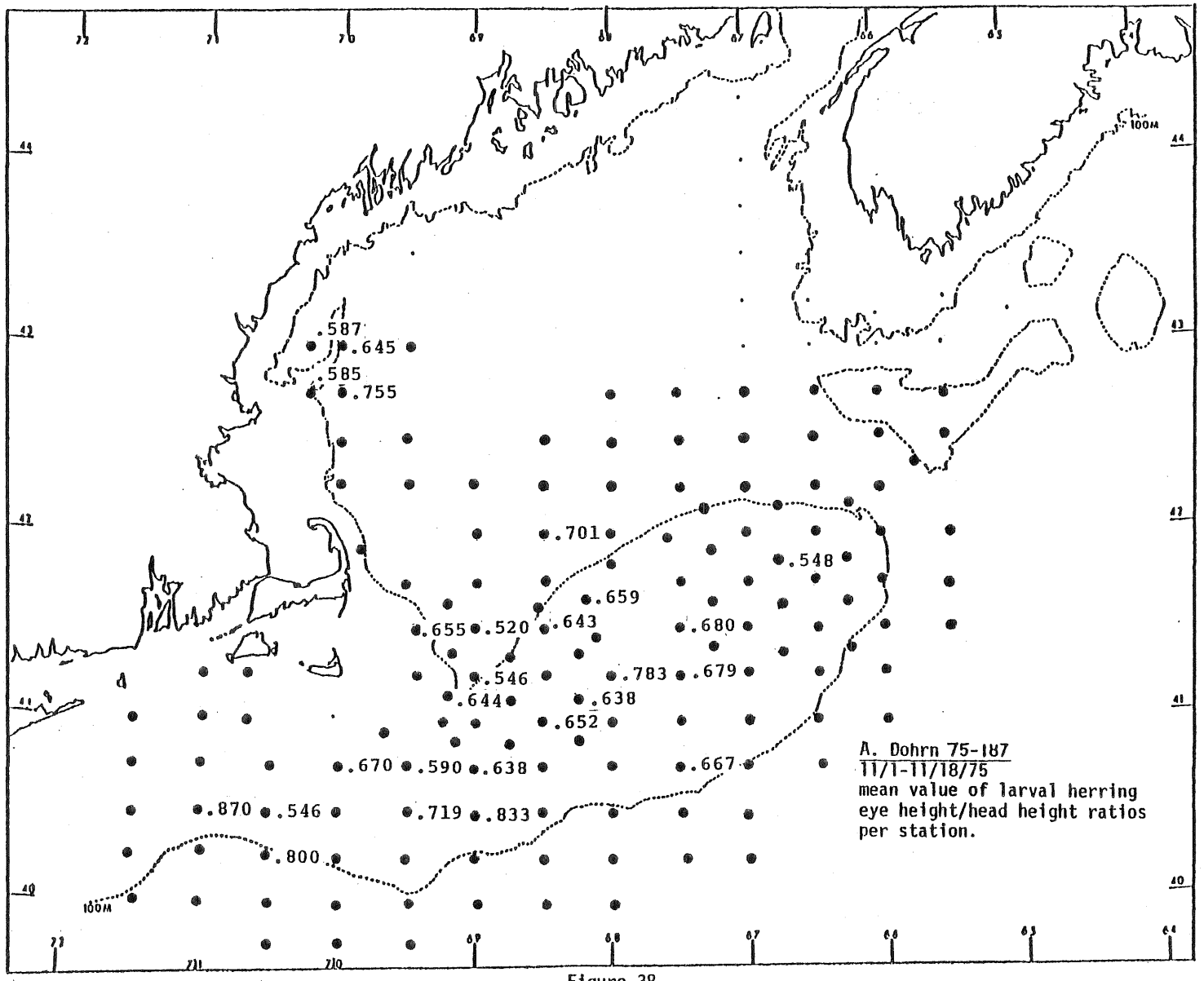
.587
.645
.585
.755
.701
.548
.659
.655
.520
.643
.680
.546
.783
.679
.644
.638
.652
.670
.590
.638
.667
.870
.546
.719
.833
.800
100M
100M
A. Dohrn 75-187
11/1-11/18/75
mean value of larval herring
eye height/head height ratios
per station.

Figure 38

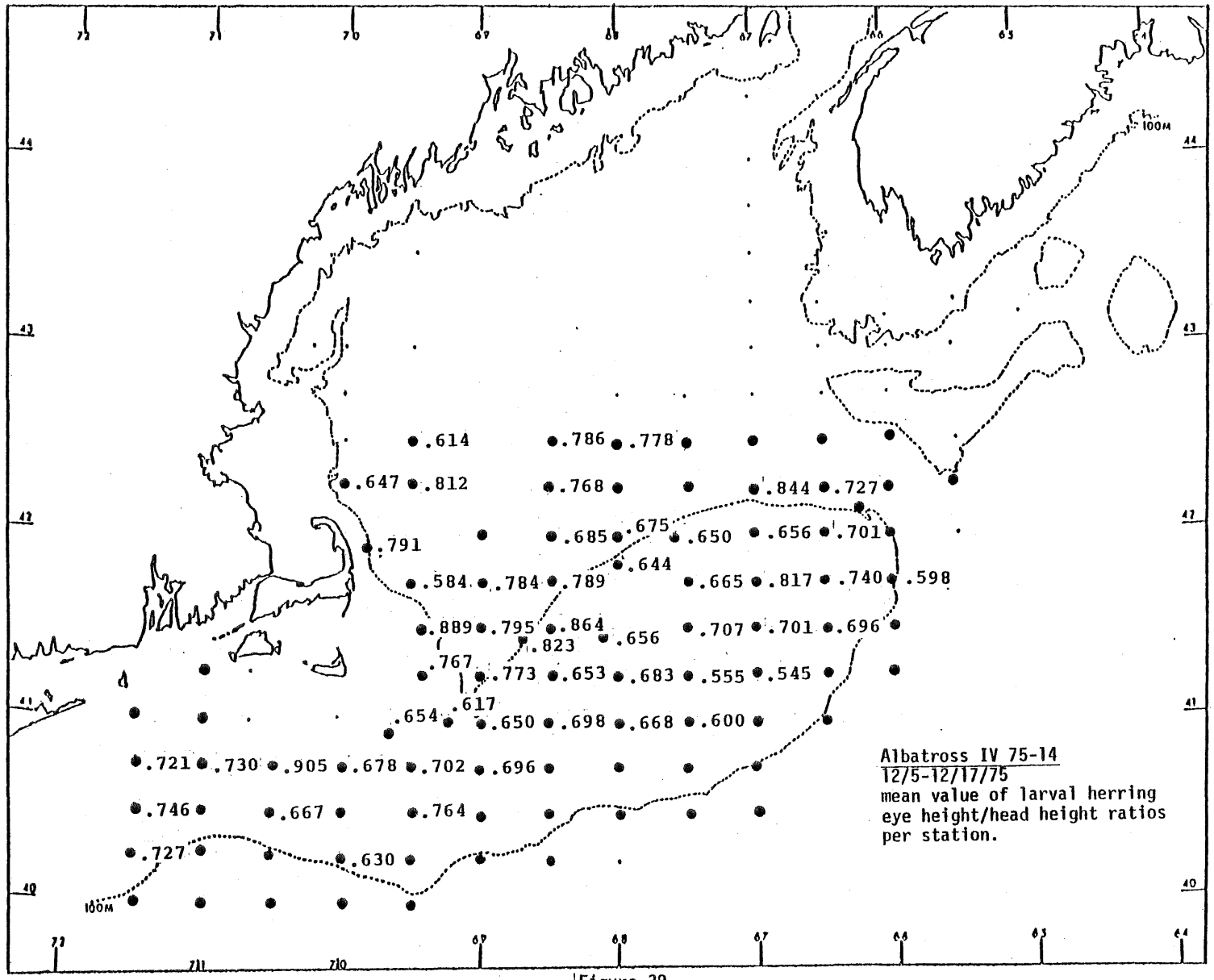
.614
.786
.778
.647
.812
.768
.844
.727
.675
.791
.685
.650
.656
.701
.644
.584
.784
.789
.665
.817
.740
.598
.889
.795
.864
.707
.701
.696
.823
.656
.767
.773
.653
.683
.555
.545
.617
.654
.650
.698
.668
.600
.721
.730
.905
.678
.702
.696
.746
.667
.764
.727
.630
100M
Albatross IV 75-14
12/5-12/17/75
mean value of larval herring
eye height/head height ratios
per station.

Figure 39

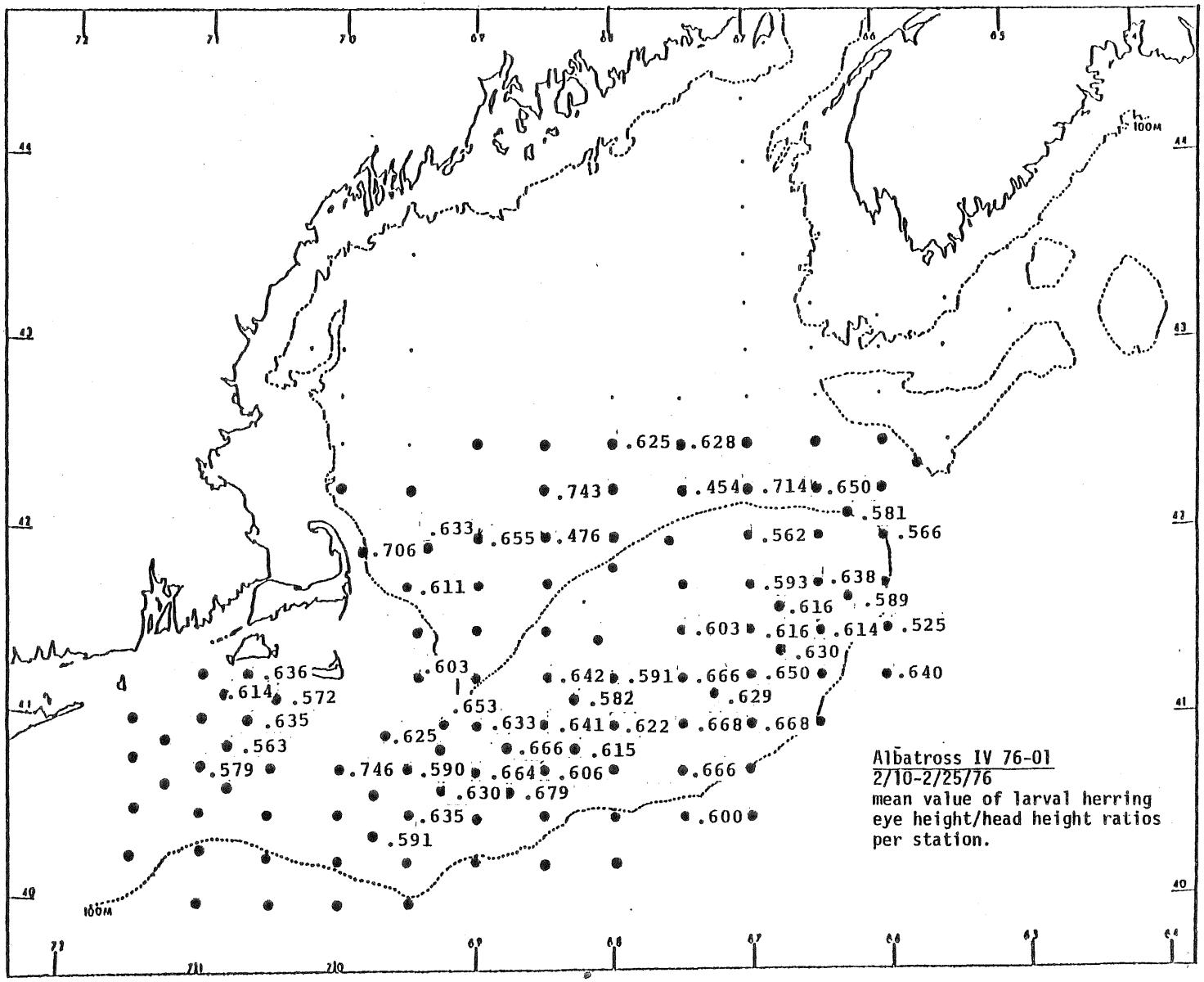
Albatross IV 76-01
2/10-2/25/76
mean value of larval herring eye height/head height ratios per station.
100M
.625 .628
.743 .454 .714 .650
.581
.633 .655 .476 .562 .566
.706
.611 .593 .638
.616 .589
.603 .616 .614 .525
.630
.636 .603 .642 .591 .666 .650 .640
.614 .572 .582 .629
.653
.635 .633 .641 .622 .668 .668
.625
.563 .666 .615
.579 .746 .590 .664 .606 .666
.630 .679
.635 .600
.591

Figure 40

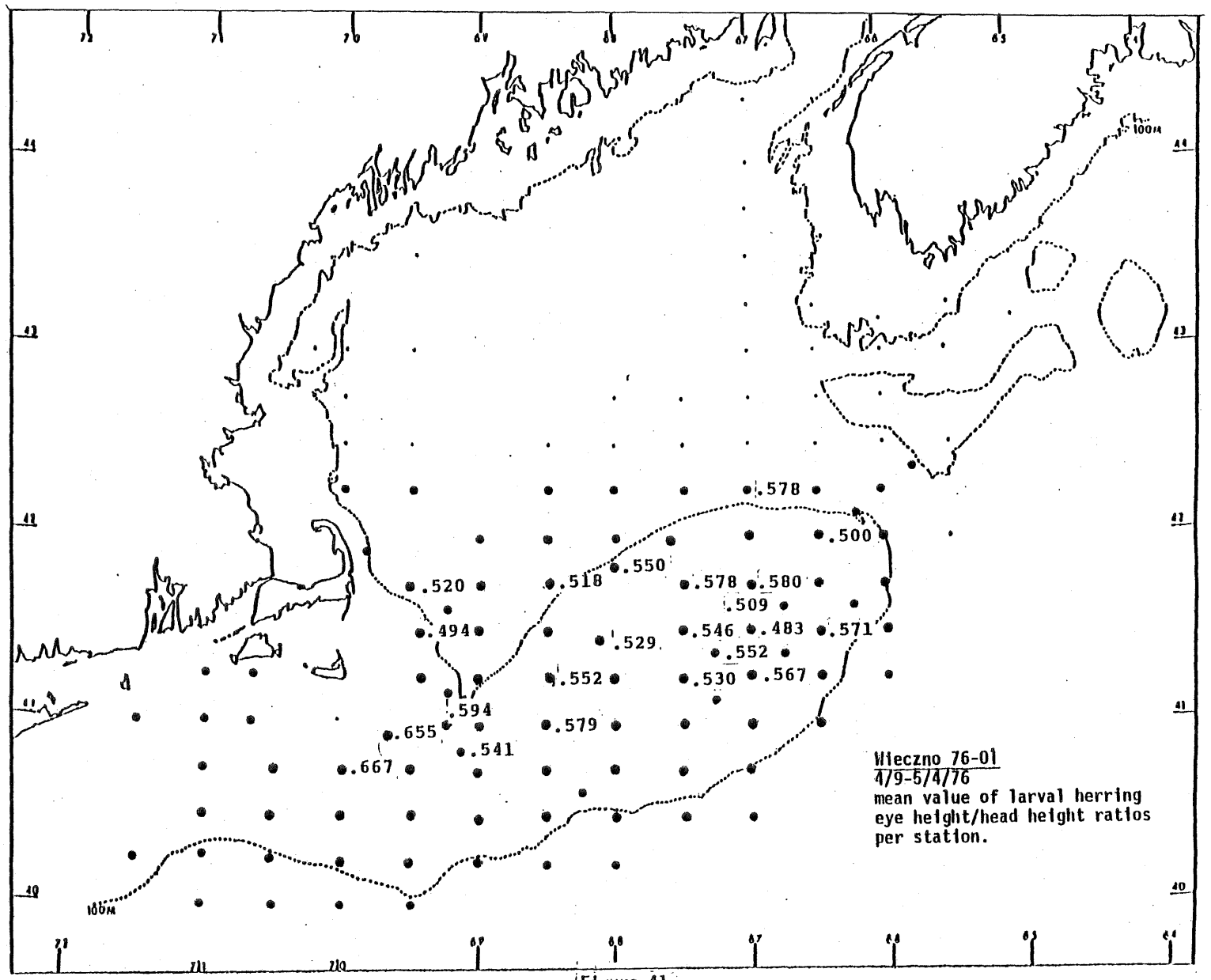
.578
.500
.550
.520
.518
.578
.580
.509
.494
.546
.483
.571
.529
.552
.552
.530
.567
.594
.579
.655
.541
.667
Wieczno 76-01
4/9-5/4/76
mean value of larval herring
eye height/head height ratios
per station.
100M
100M

Figure 41

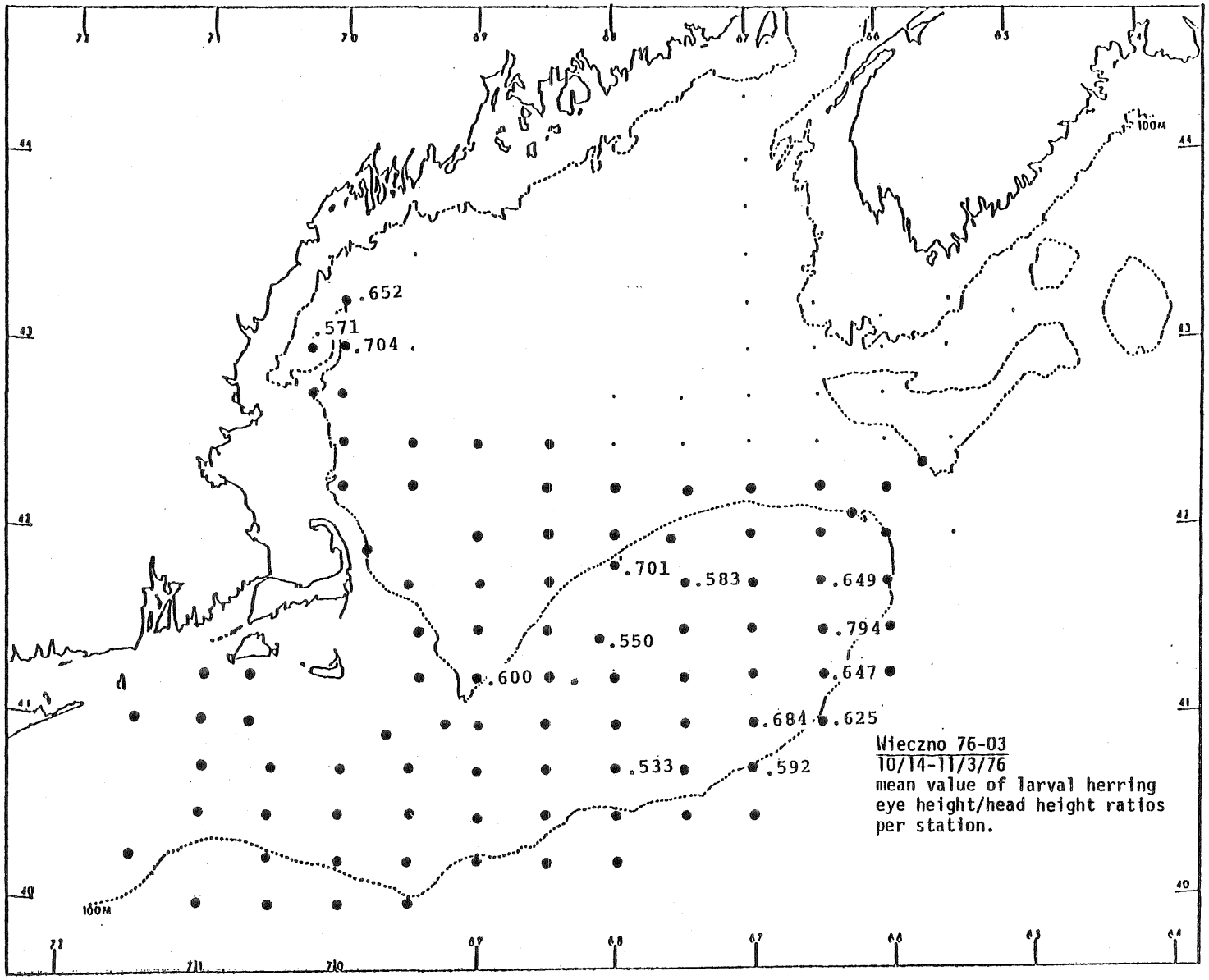
.652
.571
.704
.701
.583
.649
.550
.794
.600
.647
.684
.625
.533
.592
100M
100M
Wieczno 76-03
10/14-11/3/76
mean value of larval herring
eye height/head height ratios
per station.

Figure 42

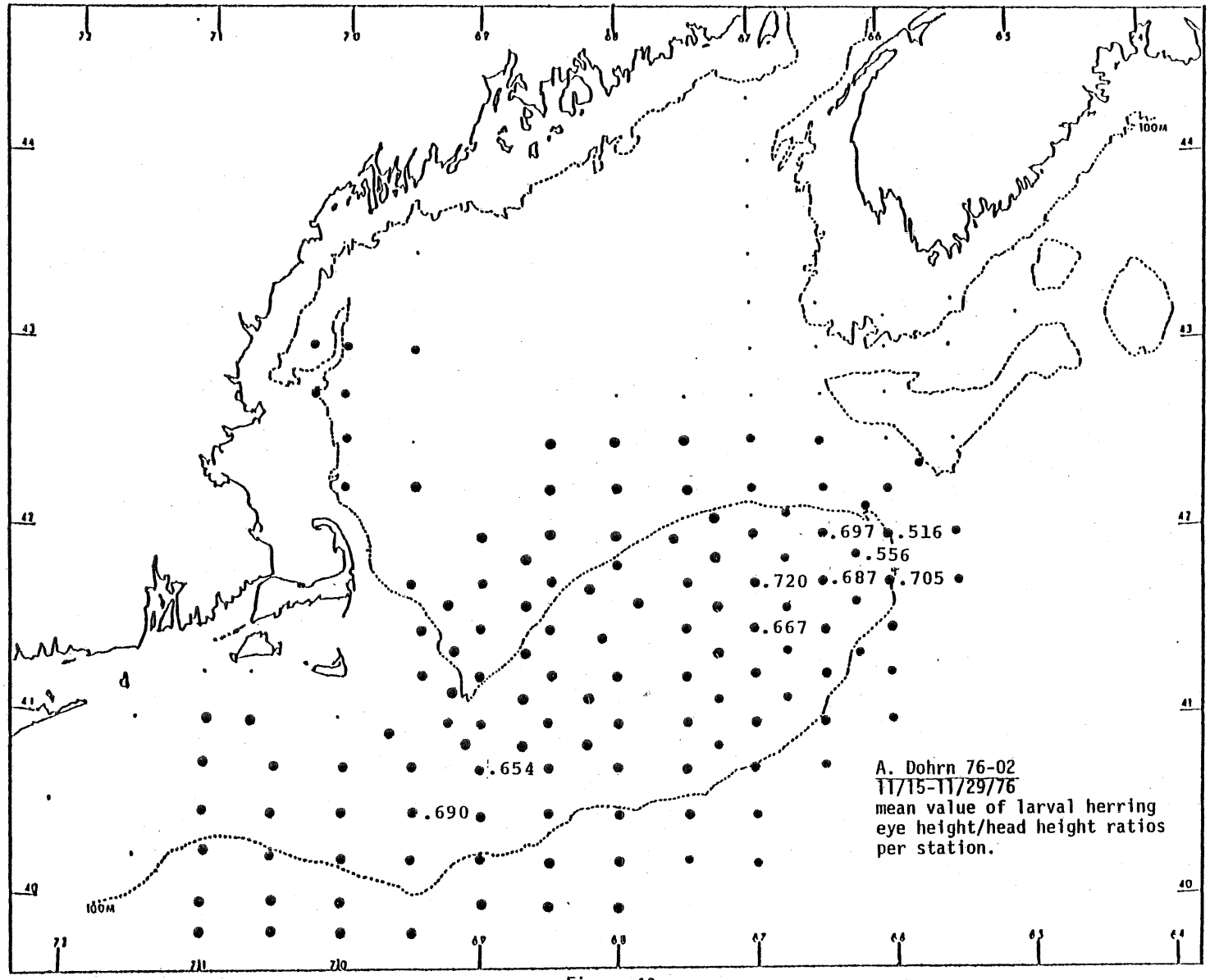
.697
.516
.556
.720
.687
.705
.667
.654
.690
100M
100M
A. Dohrn 76-02
11/15-11/29/76
mean value of larval herring
eye height/head height ratios
per station.

Figure 43

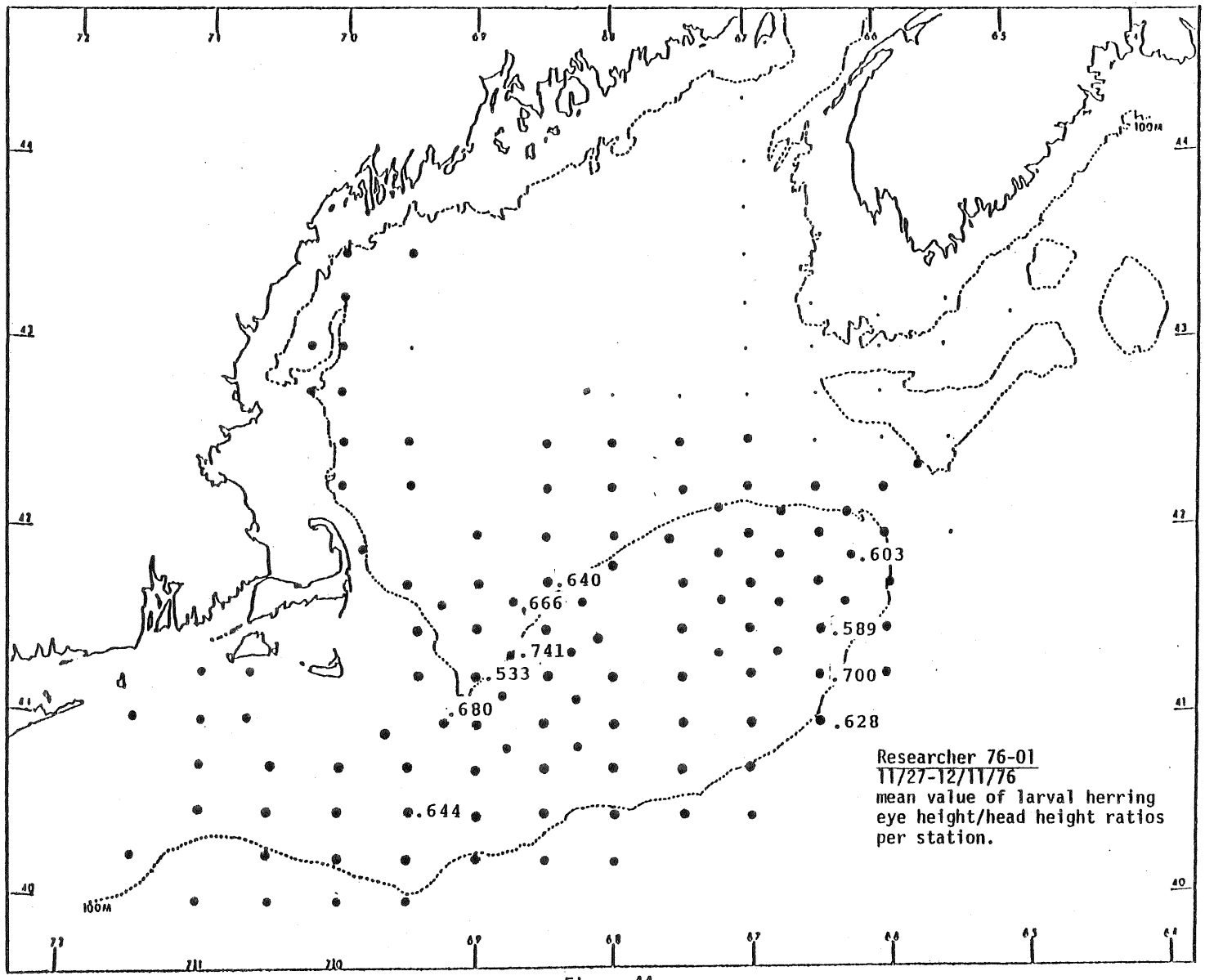
.603
.640
.666
.589
.741
.533
.700
.680
.628
.644
100M
100M
Researcher 76-01
11/27-12/11/76
mean value of larval herring
eye height/head height ratios
per station.

Figure 44

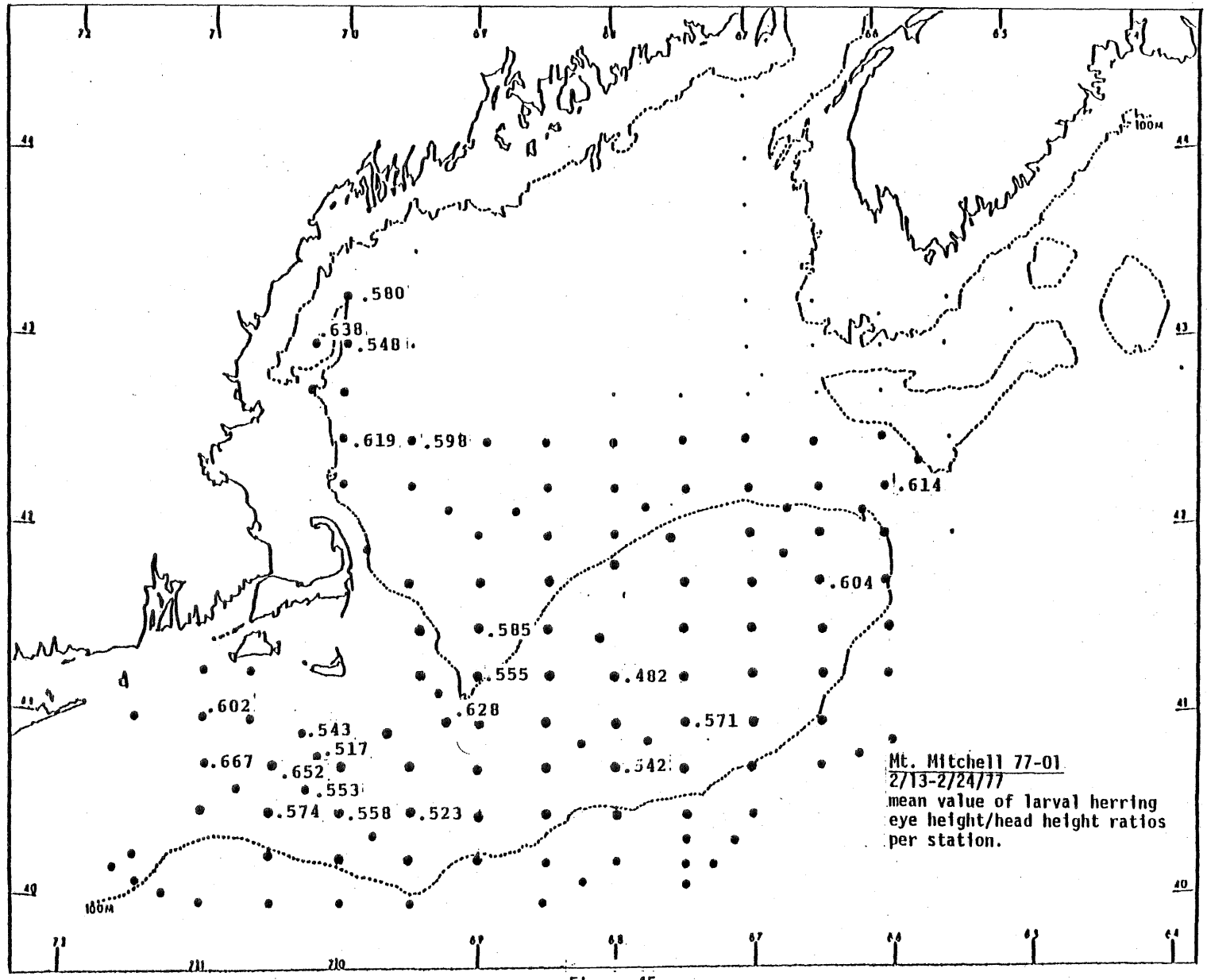
.580
.638
.548
.619
.598
.614
.604
.585
.555
.482
.628
.571
.602
.543
.517
.667
.652
.542
.553
.574
.558
.523
100M
Mt. Mitchell 77-01
2/13-2/24/77
mean value of larval herring
eye height/head height ratios
per station.

Figure 45

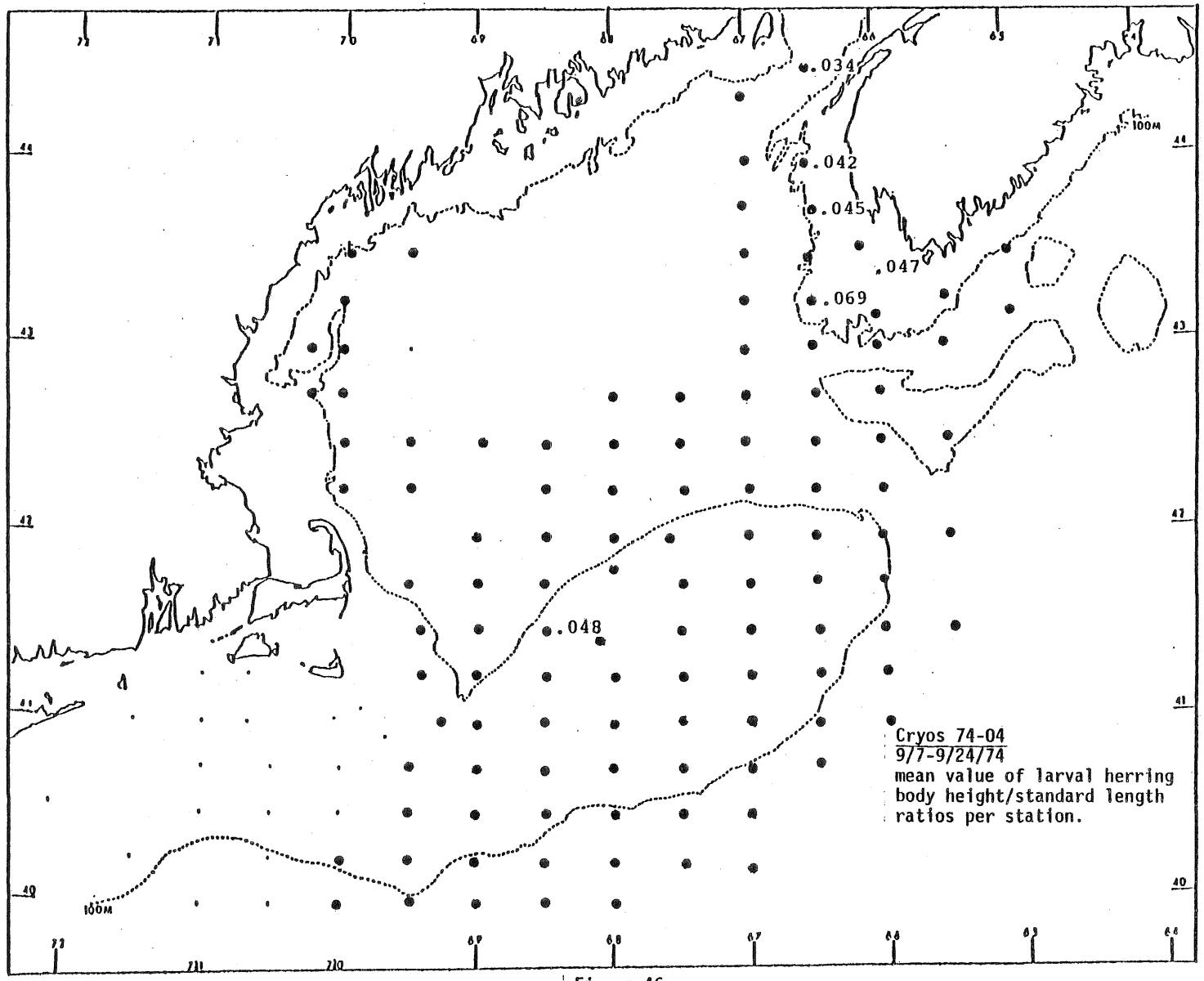
.034
.042
.045
.047
.069
.048
100M
100M
Cryos 74-04
9/7-9/24/74
mean value of larval herring
body height/standard length
ratios per station.

Figure 46

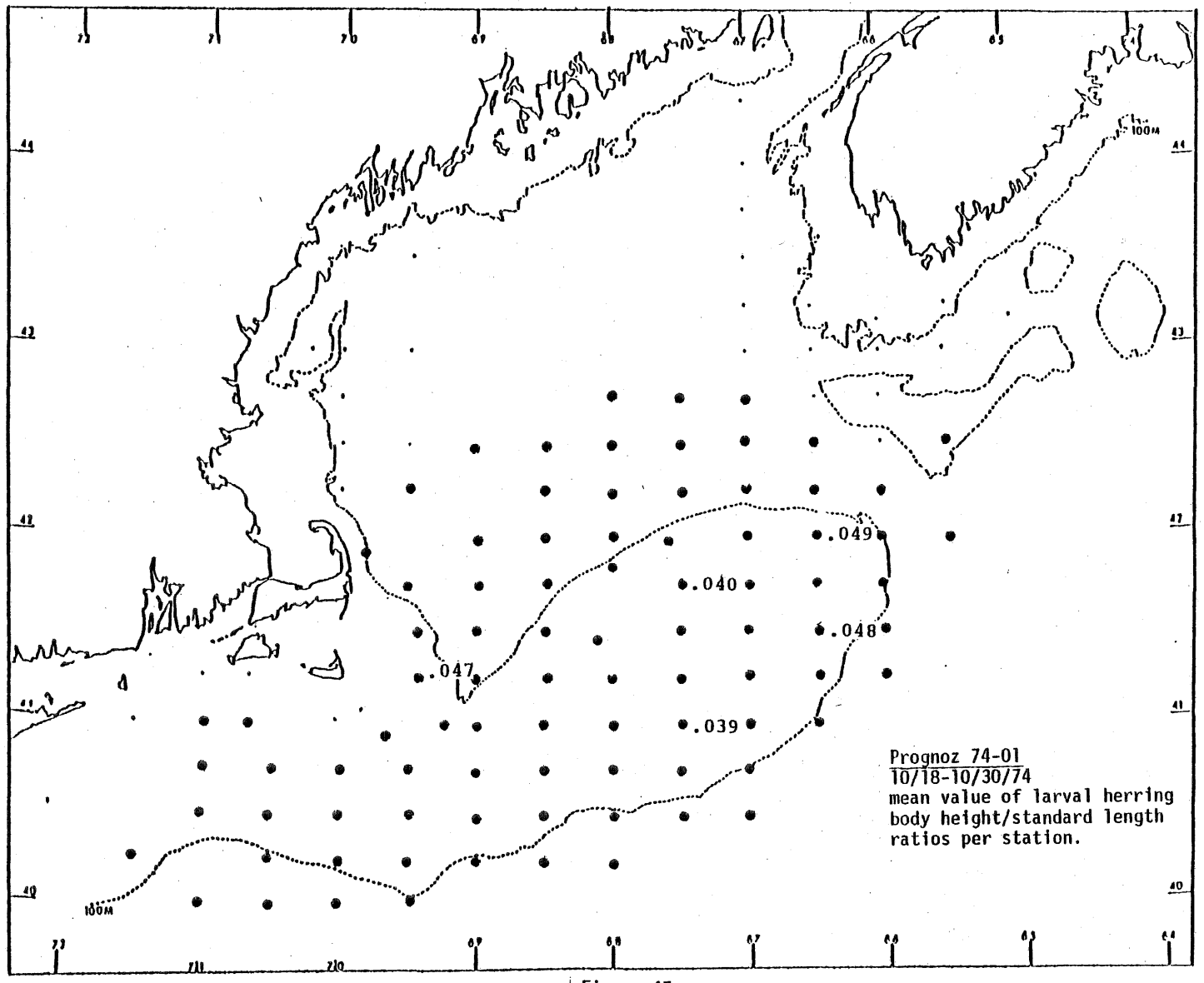
.049
.040
.048
.047
.039
100M
Prognoz 74-01
10/18-10/30/74
mean value of larval herring
body height/standard length
ratios per station.

Figure 47

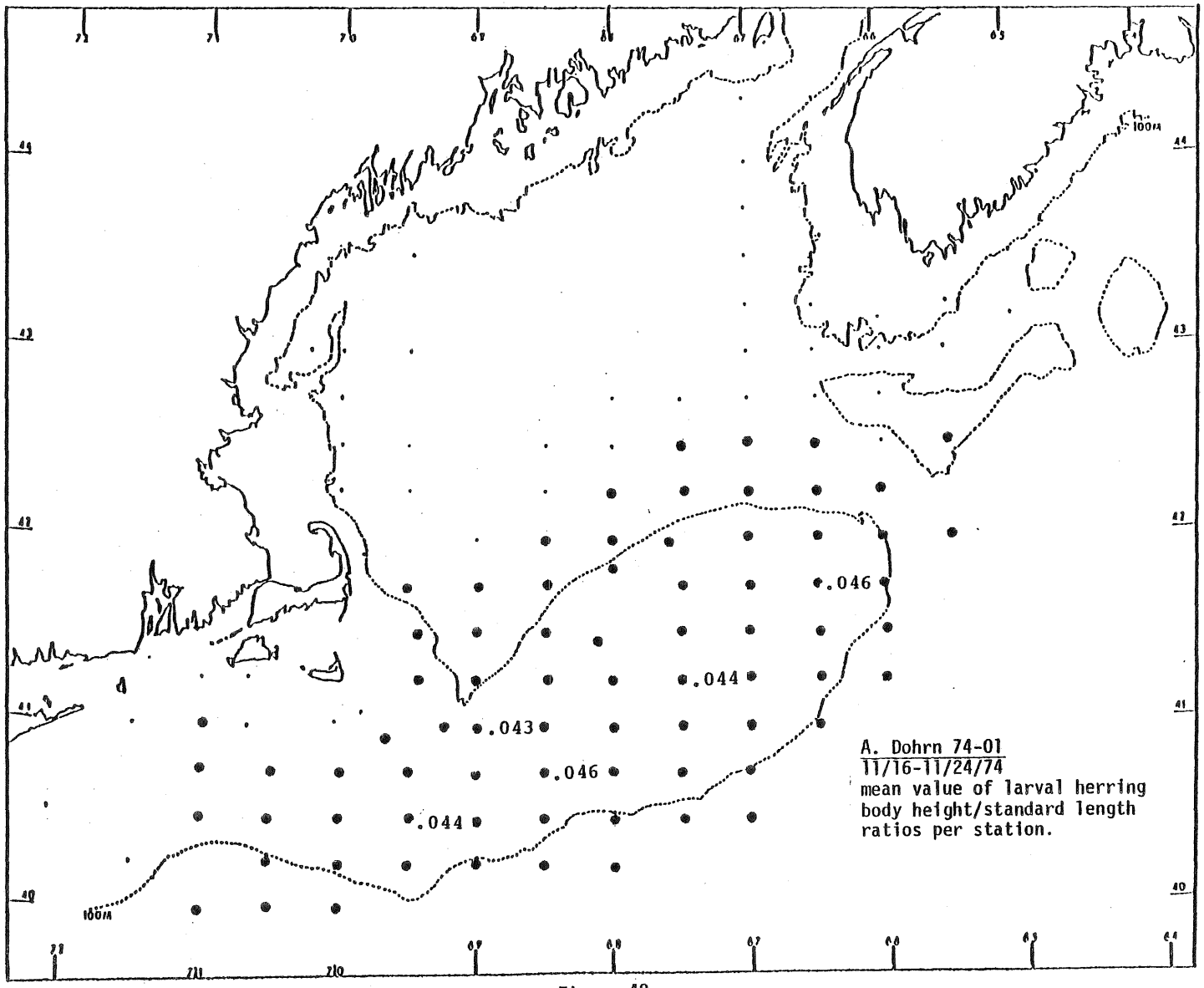
.046
.044
.043
.046
.044
100M
100M
A. Dohrn 74-01
11/16-11/24/74
mean value of larval herring
body height/standard length
ratios per station.

Figure 48

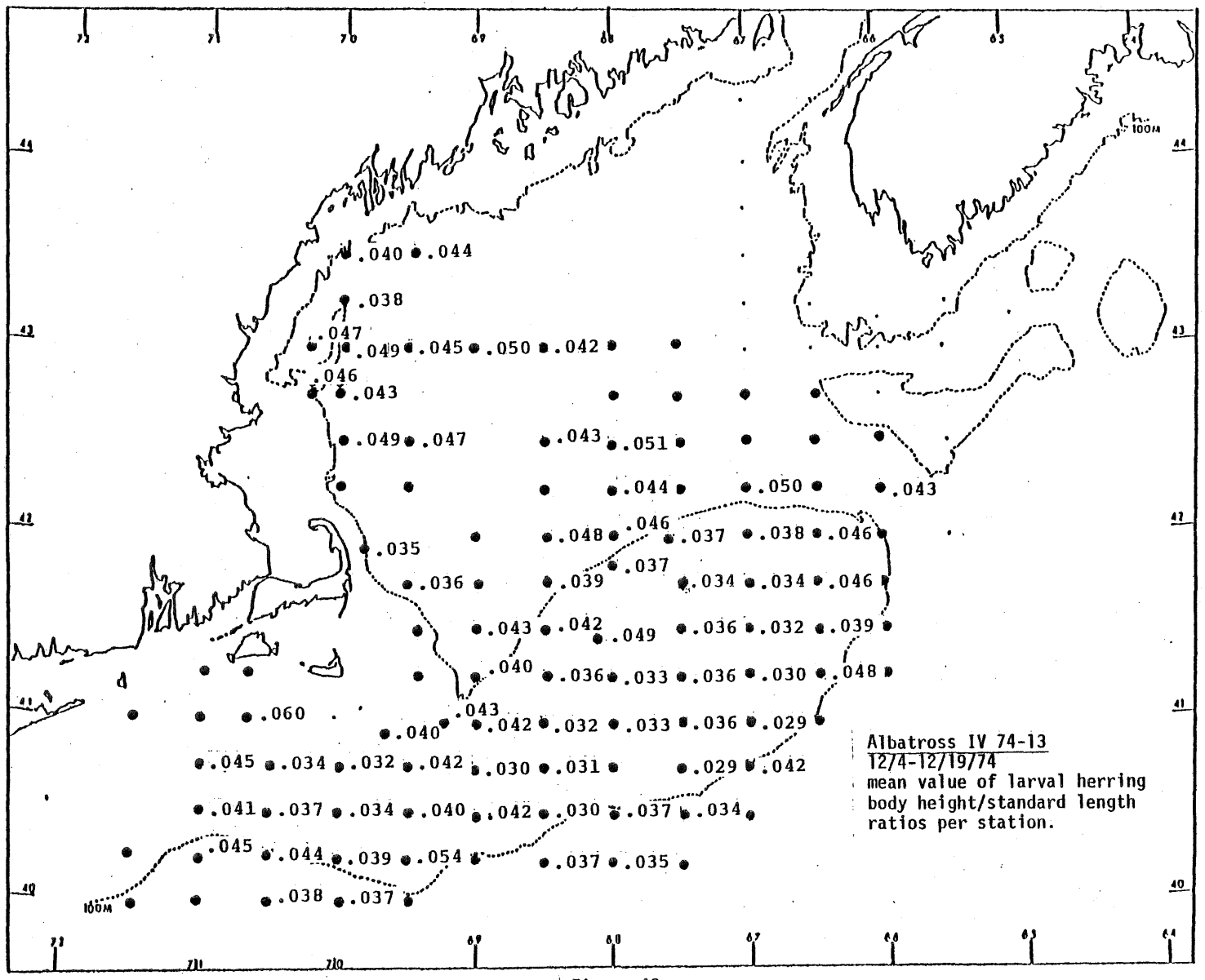
Albatross IV 74-13
12/4-12/19/74
mean value of larval herring body height/standard length ratios per station.
100M
.040 .044
.038
.047
.049 .045 .050 .042
.046
.043
.049 .047 .043 .051
.044 .050 .043
.046
.048 .037 .038 .046
.035
.037
.036 .039 .034 .034 .046
.043 .042 .049 .036 .032 .039
.040 .036 .033 .036 .030 .048
.060
.043
.040 .042 .032 .033 .036 .029
.045 .034 .032 .042 .030 .031 .029 .042
.041 .037 .034 .040 .042 .030 .037 .034
.045 .044 .039 .054 .037 .035
.038 .037

Figure 49

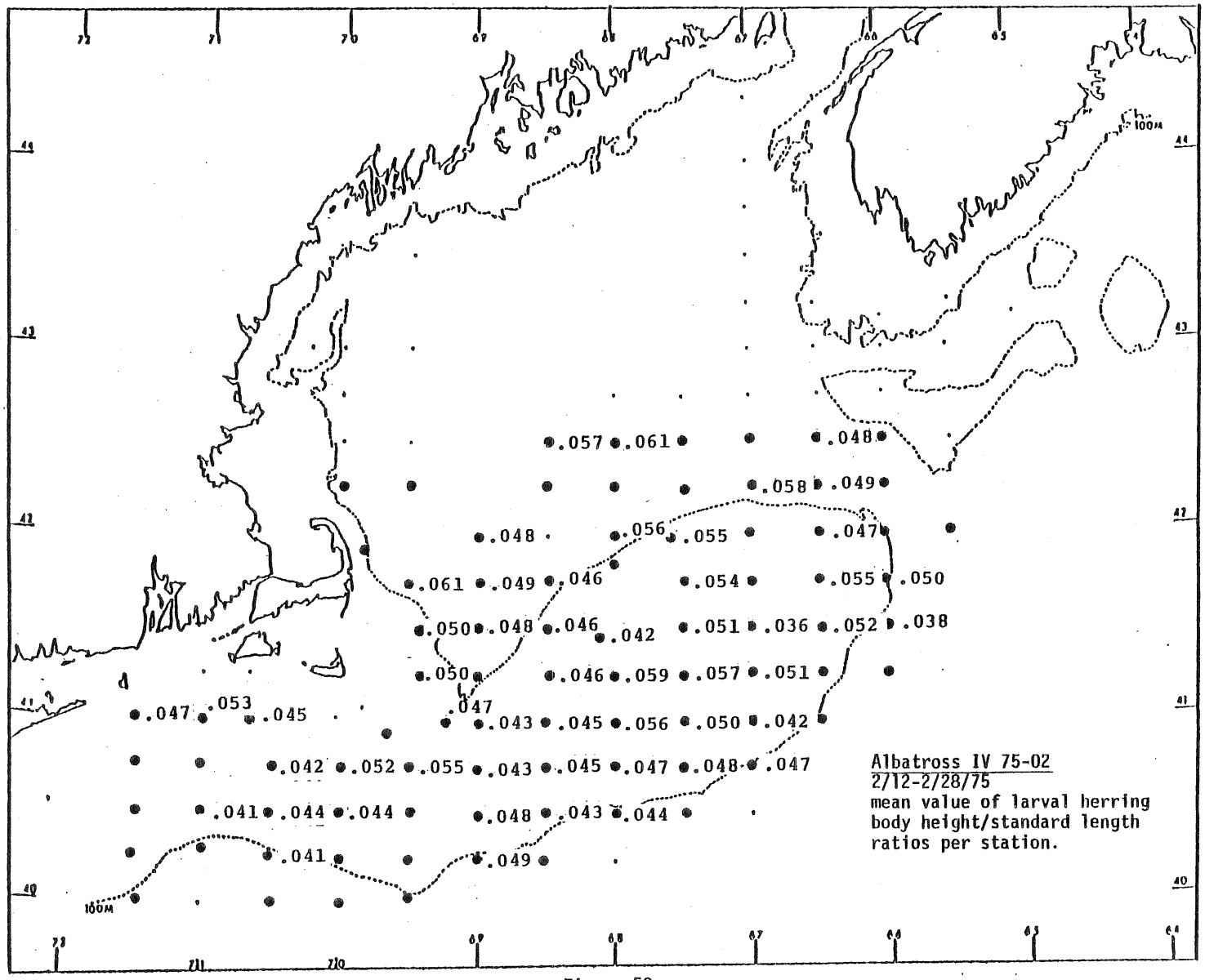
Albatross IV 75-02
2/12-2/28/75
mean value of larval herring
body height/standard length
ratios per station.
100M
.057 .061 .048
.058 .049
.048 .056 .055 .047
.061 .049 .046 .054 .055 .050
.050 .048 .046 .042 .051 .036 .052 .038
.050 .046 .059 .057 .051
.047 .053 .045 .047 .043 .045 .056 .050 .042
.042 .052 .055 .043 .045 .047 .048 .047
.041 .044 .044 .048 .043 .044
.041 .049

Figure 50

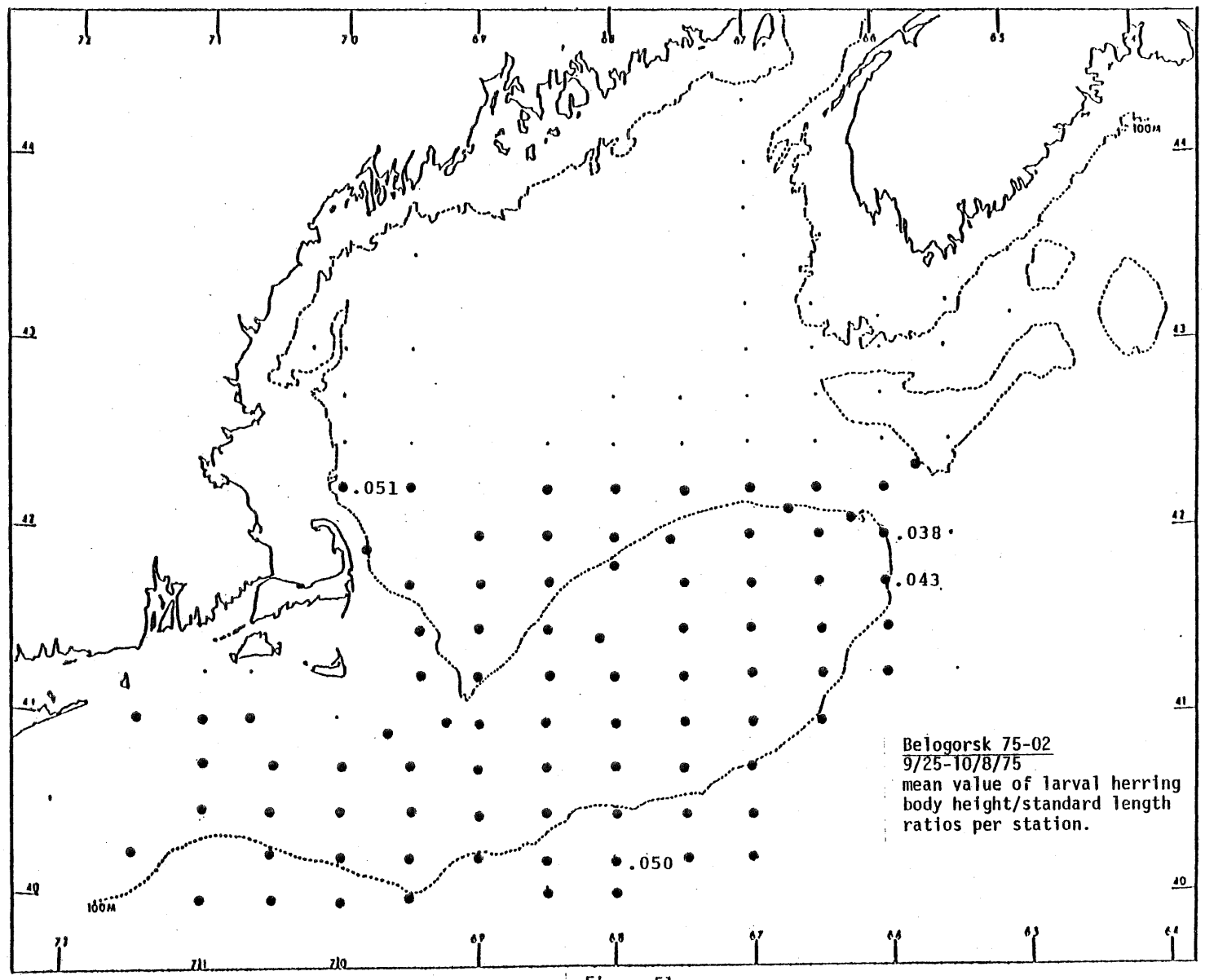
.051
.038
.043
.050
100M
100M
Belogorsk 75-02
9/25-10/8/75
mean value of larval herring
body height/standard length
ratios per station.

Figure 51

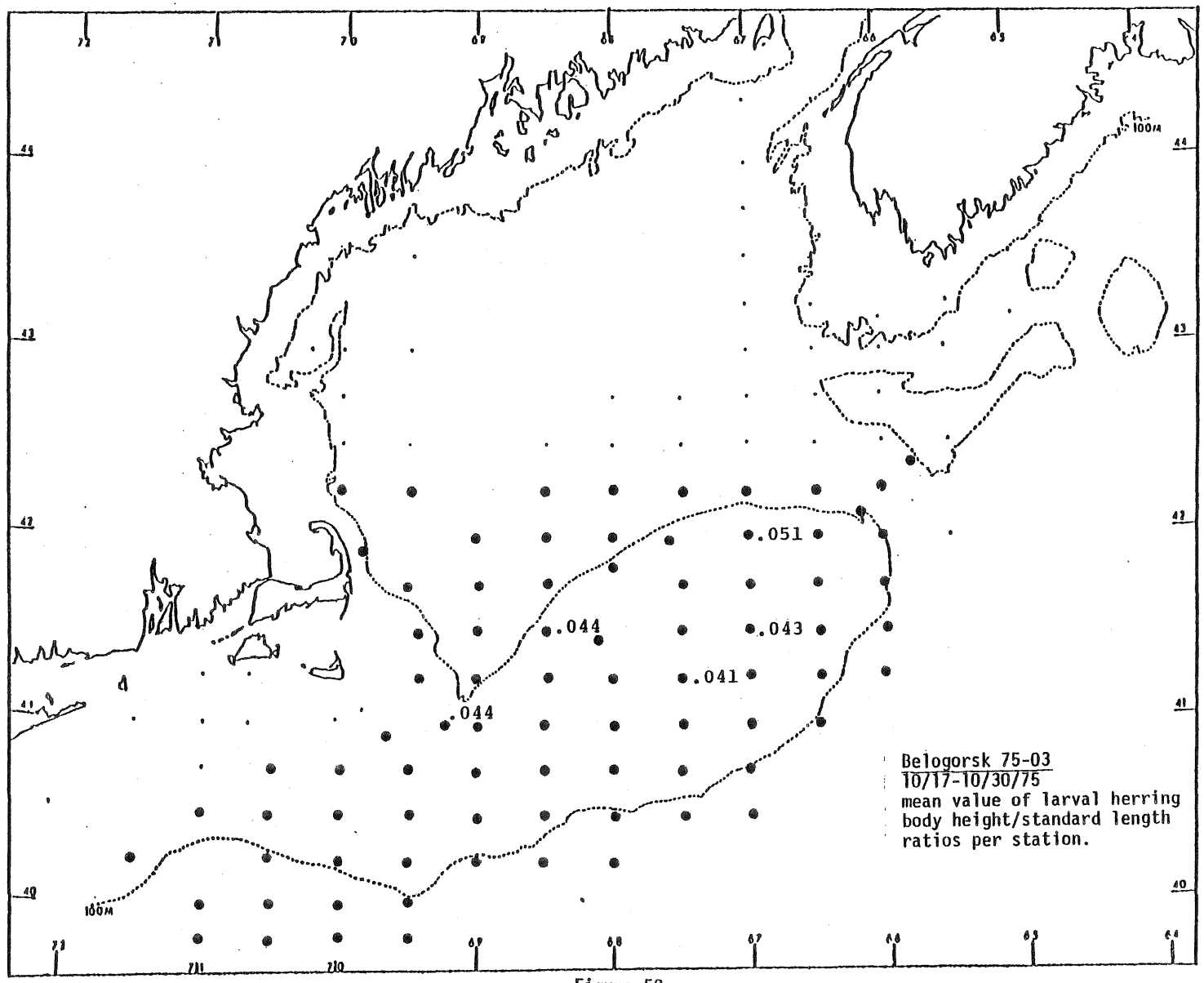
.051
.044
.043
.041
.044
100M
100M
Belogorsk 75-03
10/17-10/30/75
mean value of larval herring
body height/standard length
ratios per station.

Figure 52

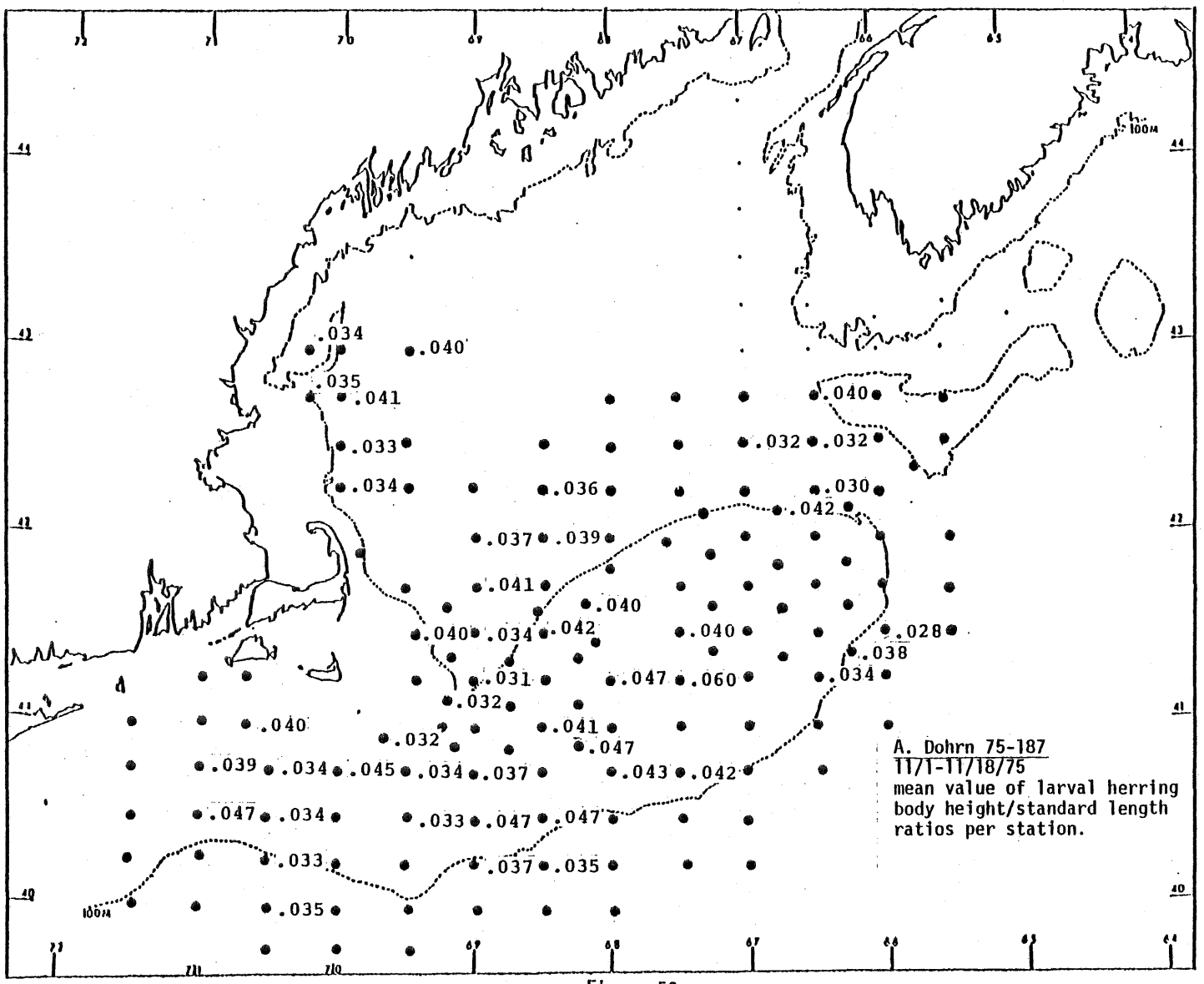
.034
.040
.035
.041
.033
.034
.036
.037
.039
.041
.040
.040
.034
.042
.031
.047
.060
.032
.041
.047
.032
.040
.039
.034
.045
.034
.037
.043
.042
.047
.034
.033
.047
.047
.033
.037
.035
.035
.040
.032
.032
.030
.042
.040
.028
.038
.034
100M
A. Dohrn 75-187
11/1-11/18/75
mean value of larval herring
body height/standard length
ratios per station.

Figure 53

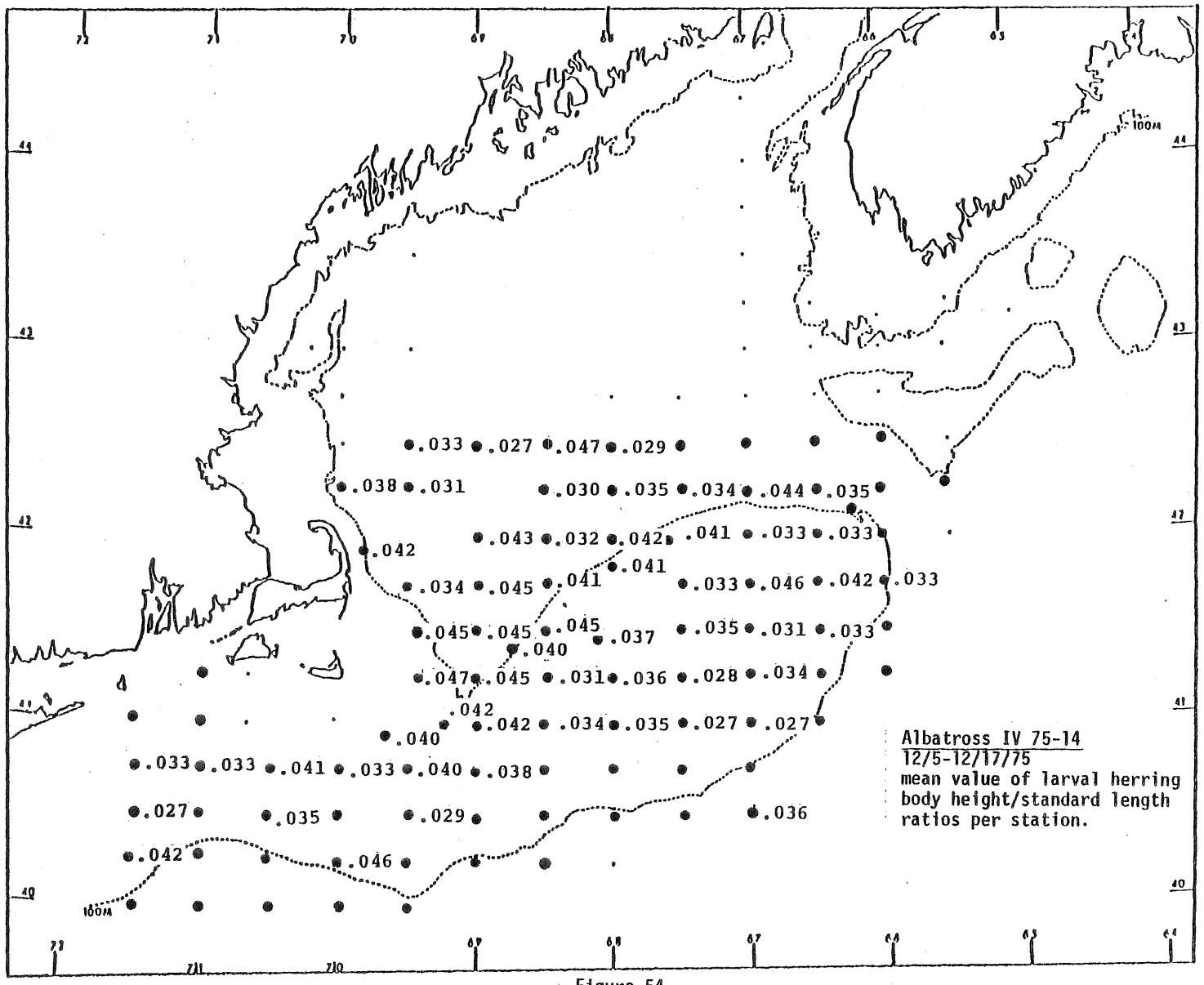
Albatross IV 75-14
12/5-12/17/75
mean value of larval herring body height/standard length ratios per station.
100M
.033 .027 .047 .029
.038 .031 .030 .035 .034 .044 .035
.043 .032 .042 .041 .033 .033
.042 .041
.034 .045 .041 .033 .046 .042 .033
.045 .045 .045 .037 .035 .031 .033
.040
.047 .045 .031 .036 .028 .034
.042
.042 .034 .035 .027 .027
.040
.033 .033 .041 .033 .040 .038
.027 .035 .029 .036
.042 .046

Figure 54

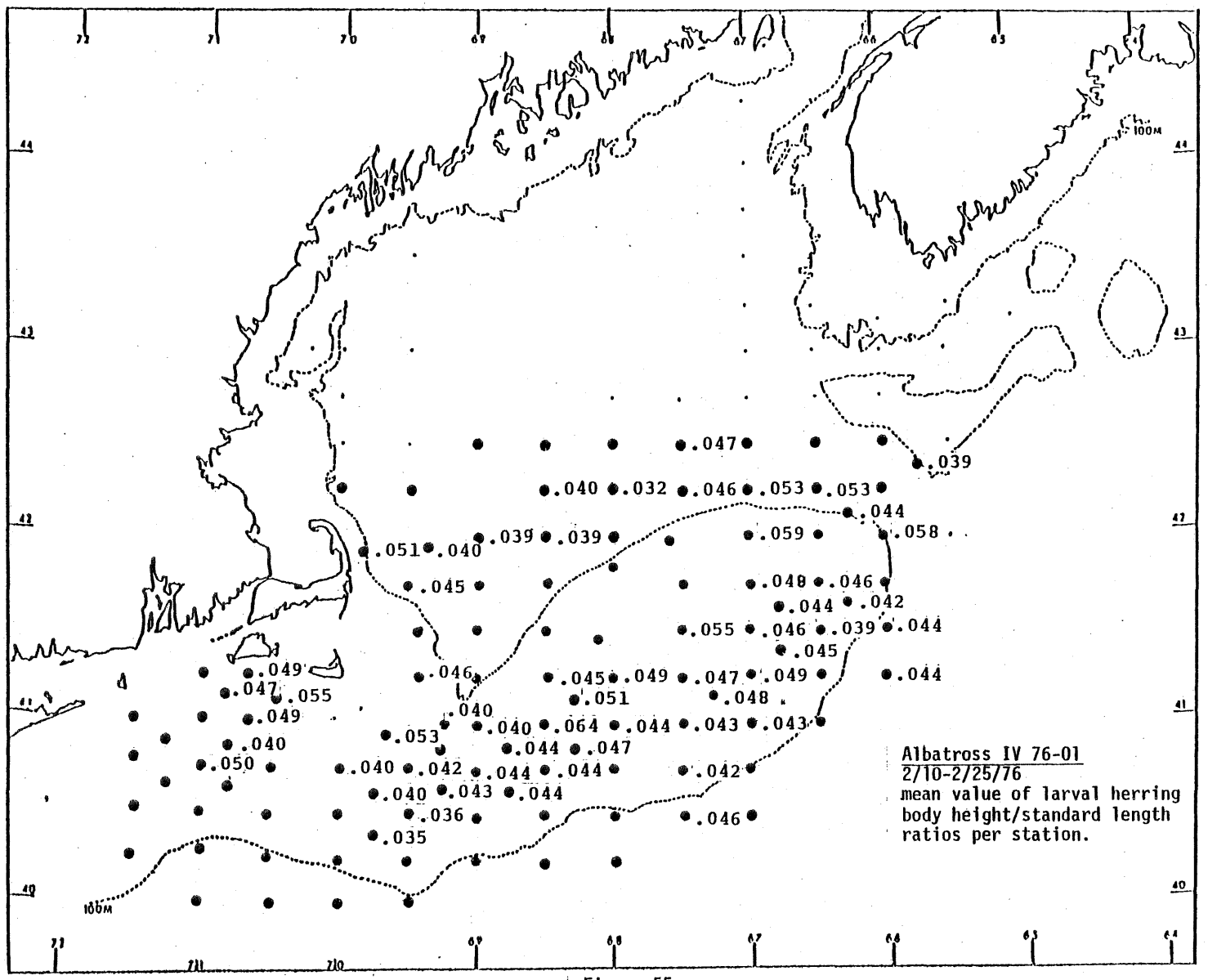
Albatross IV 76-01
2/10-2/25/76
mean value of larval herring body height/standard length ratios per station.
100M
.047
.039
.040 .032 .046 .053 .053
.044
.051 .040 .039 .039 .059 .058
.045 .048 .046
.044 .042
.055 .046 .039 .044
.045
.049 .046 .045 .049 .047 .049 .044
.047 .055 .051 .048
.049 .040
.040 .040 .064 .044 .043 .043
.053 .044 .047
.040 .050 .040 .042 .044 .044 .042
.040 .043 .044
.036 .046
.035

Figure 55

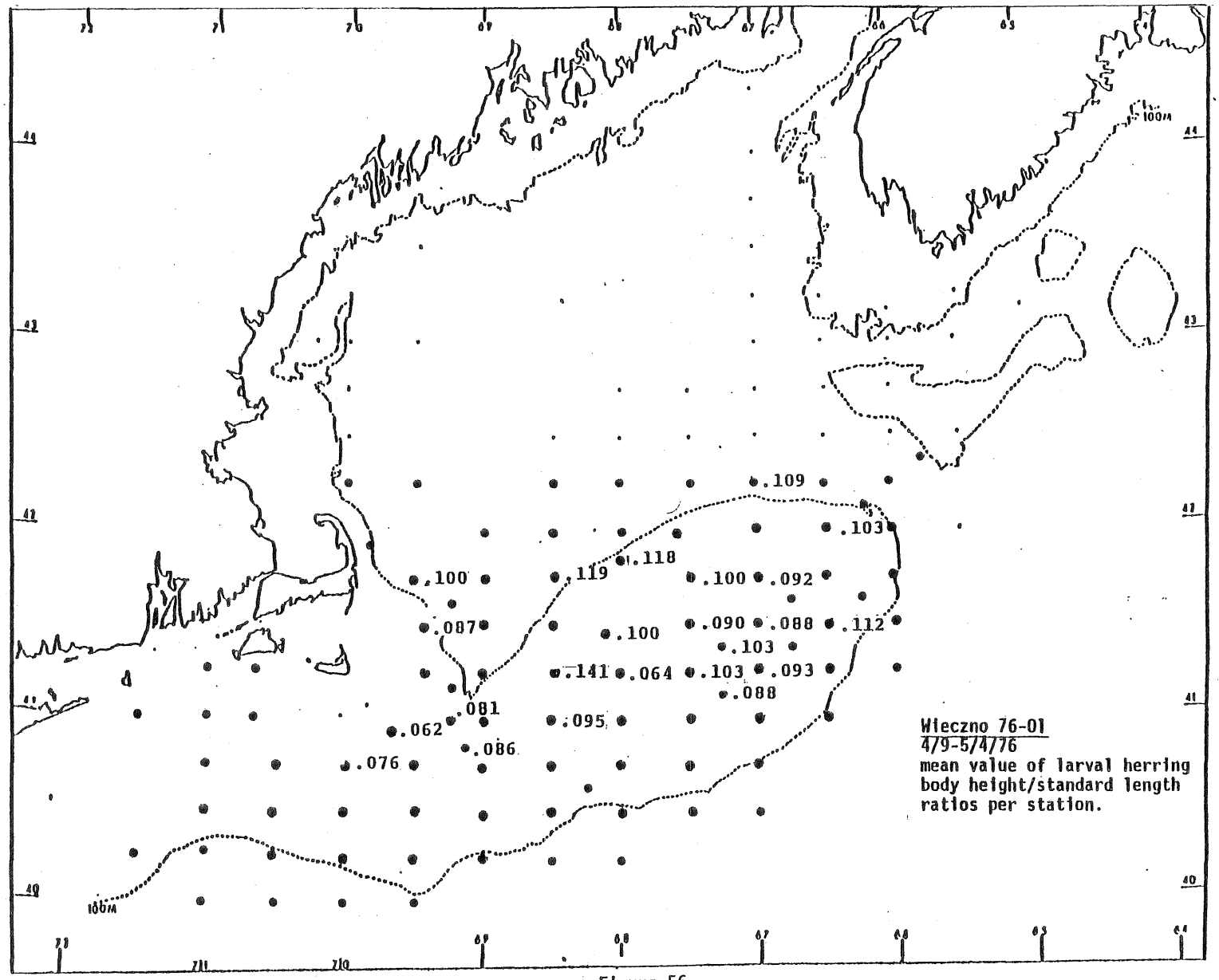
.109
.103
.118
.100
.119
.100
.092
.087
.100
.090
.088
.112
.103
.141
.064
.103
.093
.088
.081
.062
.095
.086
.076
100m
100m
Wieczno 76-01
4/9-5/4/76
mean value of larval herring
body height/standard length
ratios per station.

Figure 56

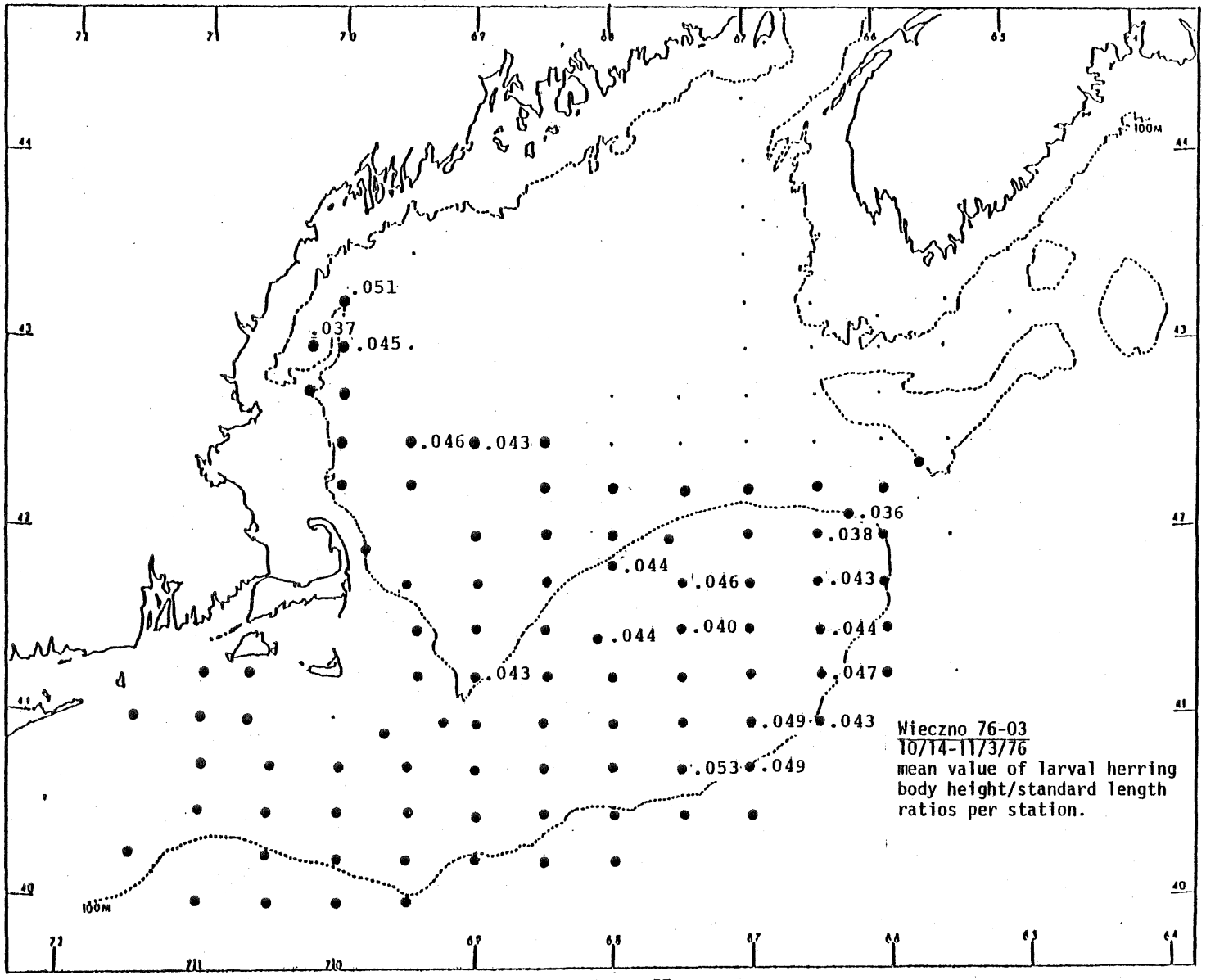
.051
.037
.045
.046
.043
.036
.038
.044
.046
.043
.044
.040
.044
.043
.047
.049
.043
.053
.049
Wieczno 76-03
10/14-11/3/76
mean value of larval herring
body height/standard length
ratios per station.
100M
100M

Figure 57

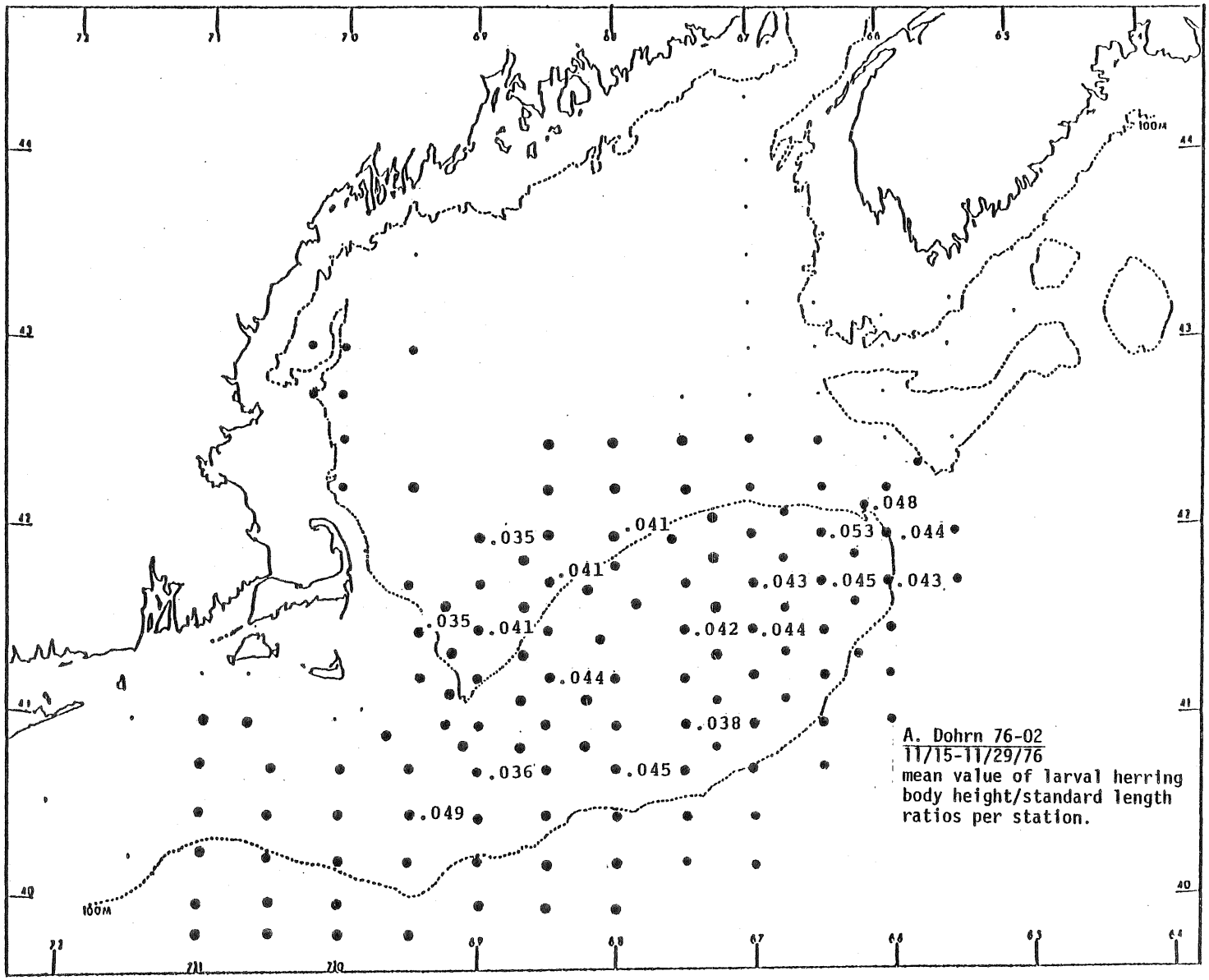
A. Dohrn 76-02
11/15-11/29/76
mean value of larval herring body height/standard length ratios per station.
.035
.041
.041
.048
.053
.044
.043
.045
.043
.035
.041
.042
.044
.044
.038
.036
.045
.049
100M
100M

Figure 58

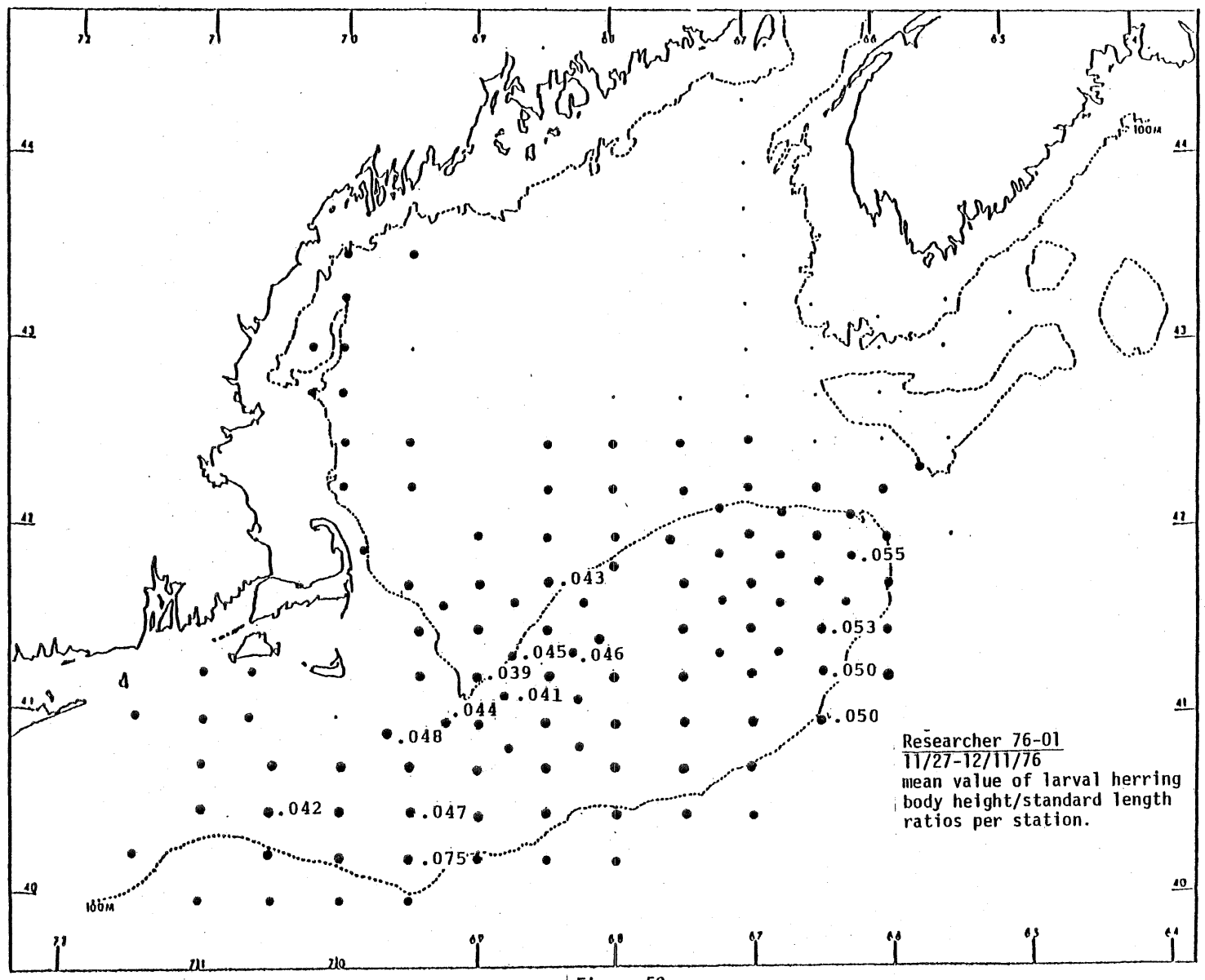
.055
.043
.053
.045
.046
.039
.050
.041
.044
.050
.048
.042
.047
.075
100M
100M
Researcher 76-01
11/27-12/11/76
mean value of larval herring
body height/standard length
ratios per station.

Figure 59

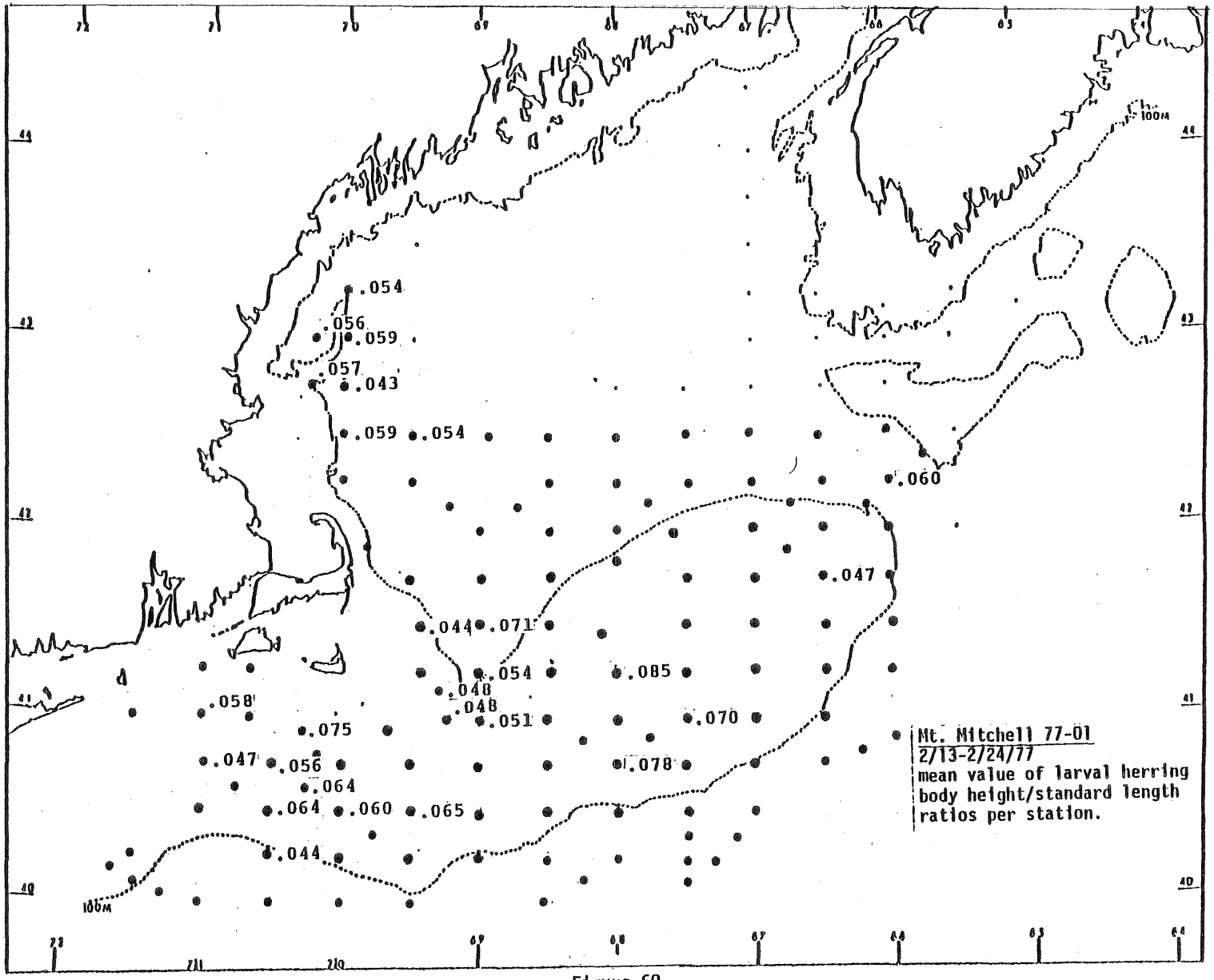
.054
.056
.059
.057
.043
.059
.054
.060
.047
.044
.071
.054
.085
.048
.048
.051
.070
.058
.075
.047
.056
.078
.064
.064
.060
.065
.044
100M
Mt. Mitchell 77-01
2/13-2/24/77
mean value of larval herring
body height/standard length
ratios per station.

Figure 60