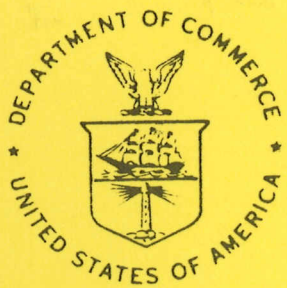


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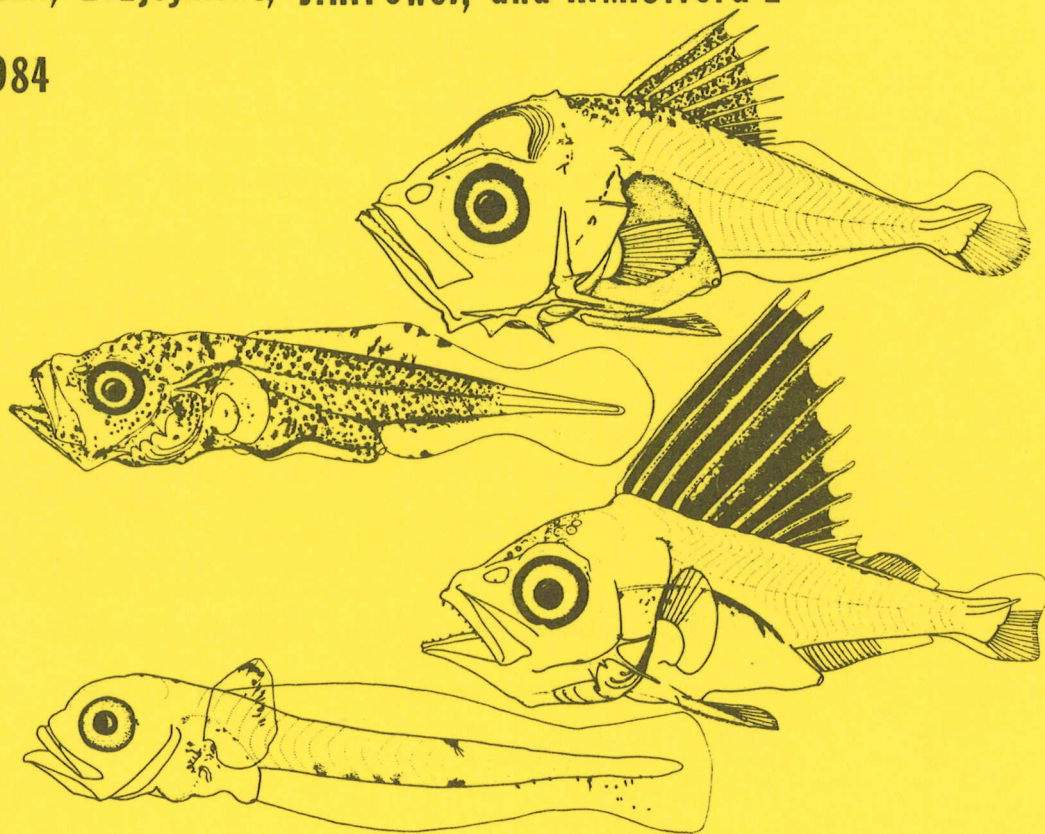


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SEAMAP 1982 - ICHTHYOPLANKTON Larval Distribution and Abundance of Engraulidae, Carangidae, Clupeidae, Lutjanidae, Serranidae, Coryphaenidae, Istiophoridae, Xiphiidae and Scombridae in the Gulf of Mexico

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SEAMAP 1982 - ICHTHYOPLANKTON

Larval Distribution and Abundance of Engraulidae, Carangidae, Clupeidae, Lutjanidae, Serranidae, Coryphaenidae, Istiophoridae, Xiphiidae, and Scombridae in the Gulf of Mexico

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September 1984

U.S. DEPARTMENT OF COMMERCE
Malcolm Baldrige, Secretary
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
John V. Byrne, Administrator
NATIONAL MARINE FISHERIES SERVICE
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Fisheries

A Gulf-wide ichthyoplankton survey under the Southeast Area Monitoring and Assessment Program (SEAMAP) was conducted in the spring and early summer of 1982 in the Gulf of Mexico. Vessels from Mexico and the United States participated in the survey (Figure 1 and Table 1). Mexican vessels (BIP and ONJUKU) sampled Mexican waters, including a portion of the northern Caribbean off Mexico and the United States. Vessels from the National Marine Fisheries Service (OREGON II and JEFF AND TINA), Texas (WESTERN GULF), Florida (BELLOWS and HERNAN CORTEZ), and Louisiana (small vessels designated LOUISIANA) sampled U.S. waters. Three types of nets were used: A large 60 cm bongo net was towed from the surface to 200 m or to within 5 m of the bottom in depths less than 200 m; a one-half meter ring net was used in shallow coastal waters by Louisiana vessels, and a 1 by 2 m neuston net was towed at the surface for 10 minutes by some U.S. vessels. The samples were sorted at the Polish Plankton Sorting and Identification Center in Szczecin, Poland, and the ichthyoplankton was enumerated, measured, and identified to the family level under the supervision of Ejsymont. The samples were returned to the Miami Laboratory where larvae of juvenile Scombridae and Coryphaenidae were identified to the lowest taxa possible by Potthoff, Kelley, and Richards. The data base was developed by McGowan and corrected by Kelley and Richards. The distribution and abundance charts were made by Power, and the tables for the computer data printouts were developed by Potthoff. Olvera furnished data and samples from tows taken in Mexican water in the Gulf of Mexico south of the Fishery Conservation Zone. The material is archived at the Marine Resource Laboratory of the Florida Department of Natural Resources in St. Petersburg, Florida.

In this paper we present charts (Figs. 2-40) of selected taxa showing their distribution and abundance from bongo, ring net, and neuston net tows. Flow meters were used in bongo tows only. In some instances either a flow meter failed, the flow meter was not used, or the flow meter data could not be validated; in these instances the number of larvae are shown as number caught per tow. For the quantified tows the computer plot program adjusts the size of the circle for the actual value. Thus, one can use the scale as a guide and with dividers estimate the actual value. The ichthyoplankton data (SEAMAP 1982) contain 12,000 individual records which are stored in the National Marine Fisheries Service computer at the Miami Laboratory. The following printouts of the data are available from the SEFC Miami Laboratory:

1. List of SEAMAP 1982 participants, vessel, cruise, number of stations, gear, and cruise dates (Table 1).
2. List of stations for participating vessels containing position, sampling date and time, gear, sampling depth, and zooplankton displacement volumes for bongo nets. Table 2 is an example of the printout.
3. List of all larval fish taxa caught during SEAMAP 1982 arranged in alphabetical order containing vessel, cruise, station, gear, mesh, capture position, date and time of capture, number captured, length measurement, and computed number of larvae under 10 square meters of sea surface. Table 3 is an example of the printout.
4. List of all plankton tows during SEAMAP 1982 arranged by cruise containing the following information for each tow: position, time and date

of sampling, gear and mesh size, zooplankton displacement volume, sampling depth, volume of water filtered by bongo net, standard haul factor of bongo tow, distance traveled by bongo net, ichthyoplankton taxa present in tow, their number and lengths, and computed number of larvae under 10 square meters of sea surface. Table 4 is an example of the printout.

5. Alphabetical list of taxa and their numbers for SEAMAP 1982 (Table 5).

The following are brief accounts for each of the 40 charts included in this report.

Engraulidae (Figs. 2-3). Anchovy larvae were most abundant and widely distributed in the northwestern Gulf of Mexico. No work is in progress to identify these to lower taxa.

Carangidae (Figs. 4-5). Jack larvae were found throughout the Gulf of Mexico.

Work is in progress to identify these to lower taxa.

Sciaenidae (Figs. 6-7). Croaker larvae were found throughout the Gulf of Mexico. Work is in progress to identify these to lower taxa.

Clupeidae (Figs. 8-9). Herring larvae were found throughout the Gulf of Mexico.

Work is in progress to identify these to lower taxa.

Lutjanidae (Figs. 10-11). Snapper larvae were generally found over shelf waters throughout the Gulf of Mexico. Work is in progress to identify these to lower taxa.

Serranidae (Figs. 12-13). Larvae of the groupers are currently being identified. They are abundant in both bongo and neuston tows in the sampling area.

Coryphaenidae (Figs. 14-15). The two species of dolphin cannot be readily separated at small sizes. The two charts represent these small sizes and indicate that they are quite abundant in the southern Gulf of Mexico and northern Caribbean, a distribution not seen from the specifically identified material depicted in the following charts.

Coryphaena hippurus (Figs. 16-17). Common dolphin larvae were found at the surface in low abundance in both bongo and neuston tows in the northern Gulf of Mexico.

Coryphaena equisetis (Fig. 18). Pompano dolphin were found throughout the northern Gulf of Mexico in low abundance in neuston tows only.

Istiophoridae (Figs. 19-20). Most of these larvae were probably sailfish (Istiophorus platypterus) but they are very difficult to identify at small sizes. They are found at the surface as evidenced by the wide oceanic distribution in the neuston tows.

Xiphias gladius (Figs. 21-22). Swordfish larvae are oceanic and are found at the surface as evidenced by the wide distribution seen in the neuston tows.

Katsuwonus pelamis (Figs. 23-24). Larvae of the skipjack tuna are widely distributed throughout the Gulf of Mexico. It is an oceanic species but interestingly was found over the shelf in the southwestern gulf.

Auxis (Figs. 25-26). The frigate and bullet tunnies cannot be satisfactorily separated in larval stages and are treated as one taxa. They are probably the world's most abundant tuna and are widely distributed throughout the Gulf of Mexico. They are only found at the surface at night; thus, the neuston tows are not the best indicators of true abundance.

Euthynnus alletteratus (Figs. 27-28). The little tunny is generally found over the continental shelf, occasionally in the open ocean. The distribution in the Gulf of Mexico reflects this. These larvae are not abundant at the surface which accounts for the low abundance in the neuston tows.

Thunnus (Figs. 29-30). This category represents tuna larvae of the genus Thunnus which are less than 6.0 mm in length and cannot be positively identified to species. They probably are mostly T. atlanticus and some T. albacares. The distribution is generally oceanic throughout the Gulf of Mexico.

Thunnus atlanticus (Figs. 31-32). Larval concentrations of the blackfin tuna were mostly oceanic and found throughout the Gulf of Mexico, with greatest concentrations in the western gulf for estimated numbers in bongo tows, with a more uniform distribution in neuston tows in the northern gulf.

Thunnus thynnus (Figs. 33-34). The bluefin tuna was found widespread in the Gulf of Mexico in both bongo and neuston tows, but not in great abundance.

Scomberomorus maculatus (Figs. 35-36). Larvae of this coastal species were found mostly in the northern Gulf of Mexico in both bongo and neuston tows. One bongo tow in the Gulf of Campeche was the only occurrence in Mexican waters.

Scomberomorus cavalla (Figs. 37-38). Larvae were only found west of the Mississippi delta in the northern Gulf of Mexico in seven bongo tows and in only two neuston tows, one of which was off Mississippi. This is a coastal species and is not often found at the surface.

Acanthocybium solandri (Figs. 39-40). Larvae of the wahoo are generally rare, they were taken at two locations in bongo tows and at one location in a neuston tow.

The taxa initially identified in the SEAMAP 82 surveys are being reidentified by experts. Thus, the composition of the above figures may change.

Acknowledgments

We thank Judy Applegate for her work in the SEAMAP 82 program and Bill George for correcting the data base and writing computer programs. Harriet Corvino typed all drafts of the manuscript.

List of Figures

<p>Station Location</p> <p>2 <u>Engraulidae</u> Bongo & Ring</p> <p>3 <u>Engraulidae</u> Neuston</p> <p>4 <u>Carangidae</u> Bongo & Ring</p> <p>5 <u>Carangidae</u> Neuston</p> <p>6 <u>Sciaenidae</u> Bongo & Ring</p> <p>7 <u>Sciaenidae</u> Neuston</p> <p>8 <u>Clupeidae</u> Bongo & Ring</p> <p>9 <u>Clupeidae</u> Neuston</p> <p>10 <u>Lutjanidae</u> Bongo & Ring</p> <p>11 <u>Lutjanidae</u> Neuston</p> <p>12 <u>Serranidae</u> Bongo & Ring</p> <p>13 <u>Serranidae</u> Neuston</p> <p>14 <u>Coryphaenidae</u> Bongo & Ring</p> <p>15 <u>Coryphaenidae</u> Neuston</p> <p>16 <u>C. hippurus</u> Bongo & Ring</p> <p>17 <u>C. hippurus</u> Neuston</p> <p>18 <u>C. equisetis</u> Neuston</p> <p>19 <u>Istiophoridae</u> Bongo & Ring</p> <p>20 <u>Istiophoridae</u> Neuston</p> <p>21 <u>Xiphias gladius</u> Bongo & Ring</p> <p>22 <u>Xiphias gladius</u> Neuston</p> <p>23 <u>Katsuwonus pelamis</u> Bongo & Ring</p> <p>24 <u>Katsuwonus pelamis</u> Neuston</p>	<p>25 <u>Auxis</u> Bongo & Ring</p> <p>26 <u>Auxis</u> Neuston</p> <p>27 <u>Euthynnus alletteratus</u> Bongo & Ring</p> <p>28 <u>Euthynnus alletteratus</u> Neuston</p> <p>29 <u>Thunnus</u> Bongo & Ring</p> <p>30 <u>Thunnus</u> Neuston</p> <p>31 <u>Thunnus atlanticus</u> Bongo & Ring</p> <p>32 <u>Thunnus atlanticus</u> Neuston</p> <p>33 <u>Thunnus thynnus</u> Bongo & Ring</p> <p>34 <u>Thunnus thynnus</u> Neuston</p> <p>35 <u>Scomberomorus maculatus</u> Bongo & Ring</p> <p>36 <u>Scomberomorus maculatus</u> Neuston</p> <p>37 <u>Scomberomorus cavalla</u> Bongo & Ring</p> <p>38 <u>Scomberomorus cavalla</u> Neuston</p> <p>39 <u>Acanthocybium solandri</u> Bongo & Ring</p> <p>40 <u>Acanthocybium solandri</u> Neuston</p>
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Table 1. SEAMAP 1982 Participants

VESSEL	CRUISE NUMBER	STATION NUMBERS	GEAR	DATES 1982	AFFILIATION
OREGON II	126	36659-36787	BONGO NEUSTON	4/15 - 5/25	NMFS, NOAA
BELLOWS	S482	1-8	NEUSTON BONGO	4/27 - 4/28	Florida Dept. of Natural Resources
JEFF+TINA	3	B213-B220	BONGO NEUSTON	6/15 - 7/6	NMFS, NOAA
WESTERN GULF	15	B233-B234	BONGO	6/23 - 6/24	Texas Dept. of Parks & Wildlife
LOUISIANA	0	1-43	RING	6/1 - 7/30	Louisiana Dept. of Wildlife & Fisheries
OREGON II	127	36788-37059	BONGO NEUSTON	6/1 - 7/13	NMFS, NOAA
HERNAN CORTEZ	1	5-11	NEUSTON	5/16 - 5/20	Florida Dept. of Natural Resources
HERNAN CORTEZ	2	A2-A30	BONGO NEUSTON	6/9 - 6/13	Florida Dept. of Natural Resources
HERNAN CORTEZ	3	31-49	NEUSTON BONGO	6/20 - 6/22	Florida Dept. of Natural Resources
OREGON II	125	36005-36627	BONGO	2/24 - 3/17	NMFS, NOAA
ONJUKU	82	65-13050	BONGO	-	Instituto Nacional de la Pesca, Mexico
BIP	82-01	11040-13050	BONGO	-	Instituto Nacional de la Pesca, Mexico
ONJUKU	82-04	50110-15011	BONGO	6/1 - 7/23	Instituto Nacional de la Pesca, Mexico
BIP	82-01	70-30-80-30	BONGO	5/1 - 6/21	Instituto Nacional de la Pesca, Mexico
ONJUKU	82-04	14090-16023	BONGO	5/1 - 6/30	Instituto Nacional de la Pesca, Mexico

TABLE 2. Example of data printout for "List of stations for participating vessels" SEAMAP 1982

 OREGON II CRUISE 126 NMFS

STATION	LATITUDE	LONGITUDE	DATE 1982	TIME	GEAR	DEPTH GEAR TOWED, m	CUBIC METERS WATER FILTERED	ZOOPLANKTON DISPLACEMENT VOLUME, ml
36659	2900.00N	08800.00W	4/15	0911	BONGO NEUSTON	192 1	273 -	20 -
36660	2859.60N	08730.20W	4/15	1232	BONGO NEUSTON	201 1	377 -	30 -
36661	2900.00N	08700.00W	4/15	1607	BONGO NEUSTON	205 1	360 -	10 -
36662	2829.00N	08700.00W	4/15	1947	BONGO NEUSTON	202 1	335 -	5 -
36663	2830.10N	08730.10W	4/15	2317	BONGO NEUSTON	202 1	291 -	5 -

TABLE 3. Example of data printout for "List of larval fish taxa caught during SEAMAP 1982"

ACANTHURIDAE

VESSEL	CRUISE	STATION	GEAR	MESH, mm	LATITUDE	LONGITUDE	DATE 1982	TIME	NUMBER LARVAE	LENGTHS, mm SL				NUMBER UNDER 10MSQ
OREGON II	126	36664	BONGO	.333	2830.30N	08800.00W	4/16	0237	1	9.9				6
OREGON II	126	36674	BONGO	.333	2630.00N	08500.00W	4/17	1824	4	1.8	2.9	2.1	1.4	12
OREGON II	126	36675	BONGO	.333	2559.40N	08459.80W	4/17	2216	1	4.0				5
OREGON II	126	36677	BONGO	.333	2500.20N	08500.30W	4/18	0419	3	2.0	2.1	10.0		15
OREGON II	126	36684	BONGO	.333	2630.00N	08600.00W	4/19	0713	1	9.0				4
OREGON II	126	36720	NEUSTON	.946	2700.20N	08659.90W	4/27	0820	1	4.0				-
OREGON II	126	36724	BONGO	.333	2730.00N	08530.50W	5/02	1349	1	2.5				2
OREGON II	126	36739	BONGO	.333	2859.90N	08800.90W	5/06	1337	1	4.0				6
OREGON II	126	36742	BONGO	.333	2800.40N	08600.20W	5/07	1041	2	2.5	3.0			12
OREGON II	126	36742	NEUSTON	.946	2800.40N	08600.20W	5/07	1016	4	3.0	4.0	3.0	2.5	-
OREGON II	126	36745	NEUSTON	.946	2759.00N	08800.90W	5/08	0113	1	4.6				-

TABLE 4. Example of data printout for "Tow and Ichthyoplankton data SEAMAP 82"

STATION										
36659	OREGON II	CRUISE	126	NMFS						
LATITUDE	LONGITUDE	DATE 1982	TIME	GEAR	MESH, mm	DISP.VOL.,ml	DEPTH, m	CUBIC METERS WATER FILTERED	STANDARD HAUL FACTOR	DIST. NET TRAVELED,m
2900.00N	08800.00W	4/15	0911	BONGO	.333	20	192	273	0.70	936
FAMILY GENUS SPECIES	NUMBER		LENGTH,mm SL		NO. UNDER 10MSQ					
ANGUILLIFORMES	2		20.0- 92.0		14					
BOTHIDAE	1		10.0		7					
BREGMACEROTIDAE	7		2.0- 7.0		49					
CARANGIDAE	1		3.5		7					
CARAPIDAE	1		50.0		7					
CHAULIODONTIDAE	2		11.0- 19.0		14					
UNIDENTIFIED FISH	23		-		-					
GEMPYLIDAE	1		5.0		7					
GOBIIDAE	3		8.0- 9.0		21					
GONOSTOMATIDAE	22		2.5- 16.0		154					
KATSUWONUS PELAMIS	1		3.3		7					
MYCTOPHIDAE	172		2.0- 13.0		1207					
PARALEPIDIDAE	2		19.5- 22.0		14					
SCARIDAE	2		7.0- 10.0		14					
STROMATEIDAE	14		2.0- 3.5		98					
LATITUDE	LONGITUDE	DATE 1982	TIME	GEAR	MESH, mm	DISP.VOL.,ml	DEPTH, m	CUBIC METERS WATER FILTERED	STANDARD HAUL FACTOR	DIST. NET TRAVELED,m
2900.00N	0800.00W	4/15	0913	NEUSTON	.946	-	1	-	-	-
FAMILY GENUS SPECIES	NUMBER		LENGTH,mm SL		NO. UNDER 10MSQ					
CARANX SP	1		3.9		-					
CLUPEIDAE	1		8.5		-					
CORYPHAENA HIPPURUS	1		6.2		-					
DECAPTERUS SP	1		15.0		-					
EXOCOETIDAE	1		15.0		-					
HOLOCENTRIDAE	1		9.8		-					
KATSUWONUS PELAMIS	6		3.2- 5.0		-					
MELAMPHAEIDAE	1		4.0		-					
MYCTOPHIDAE	6		21.0- 35.0		-					
PRIACANTHIDAE	1		3.0		-					
SCORPAENIDAE	1		4.1		-					
SERRANIDAE	1		3.1		-					
STROMATEIDAE	1		4.0		-					
TETRAODONTIDAE	1		14.0		-					

TABLE 5. Ichthyoplankton taxa and numbers for SEAMAP 1982

<u>TAXA</u>	<u>NUMBER</u>	<u>TAXA</u>	<u>NUMBER</u>
<u>Acanthocybium solandri</u>	3	<u>Bregmaceros sp</u>	1
<u>Acanthuridae</u>	38	<u>Bregmaceros atlanticus</u>	9
<u>Acanthurus sp</u>	5	<u>Bregmacerotidae</u>	279
<u>Acropomatidae</u>	1	<u>Bryx randalli</u>	1
<u>Agonidae</u>	20	<u>Callionymidae</u>	79
<u>Alectis sp</u>	1	<u>Caproidae</u>	2
<u>Alosa sp</u>	1	<u>Carangidae</u>	333
<u>Alutera sp</u>	1	<u>Caranx sp</u>	84
<u>Aluterus hendeloti</u>	1	<u>Caranx bartholomae</u>	4
<u>Aluterus schoepfi</u>	5	<u>Caranx crysos</u>	9
<u>Aluterus scriptus</u>	4	<u>Caranx hippos</u>	10
<u>Anchoa hepsetus</u>	2	<u>Caranx ruber</u>	3
<u>Anchoa mitchilli</u>	1	<u>Caranx sp</u>	1
<u>Anchoviella prefasciata</u>	2	<u>Carapidae</u>	34
<u>Anguillidae</u>	10	<u>Cantherhines sp</u>	5
<u>Anguilliformes</u>	44	<u>Centrobranchus nigrocellatus</u>	1
<u>Antennariidae</u>	34	<u>Ceratioideip</u>	19
<u>Anthias sp</u>	3	<u>Cerastoscoelus sp</u>	5
<u>Apogonidae</u>	144	<u>Chaetodipterus faber</u>	1
<u>Argentinidae</u>	22	<u>Chauliodontidae</u>	76
<u>Argyrolepecus aculeatus</u>	1	<u>Chauliodus sp</u>	1
<u>Argyrolepecus hemigymnus</u>	1	<u>Chiasmodontidae</u>	7
<u>Astronesthes sp</u>	2	<u>Chlorophthalmidae</u>	17
<u>Astronesthes niger</u>	1	<u>Chlorophthalmus sp</u>	1
<u>Astronesthidae</u>	15	<u>Chloroscombrus chrysurus</u>	13
<u>Atherina prebyster</u>	1	<u>Citharichthys sp</u>	9
<u>Atherinidae</u>	10	<u>Clupeidae</u>	245
<u>Aulostomus maculatus</u>	1	<u>Clupeiformes</u>	32
<u>Auxis sp</u>	68	<u>Coccorella atlantica</u>	1
<u>Bairdiella chrysur</u>	1	<u>Congridae</u>	67
<u>Balistes capricus</u>	1	<u>Coryphaena sp</u>	40
<u>Balistidae</u>	149	<u>Coryphaena equisetis</u>	13
<u>Bathylagidae</u>	58	<u>Coryphaena hippurus</u>	73
<u>Bathylagus sp</u>	1	<u>Cottidae</u>	10
<u>Belonidae</u>	14	<u>Cubiceps sp</u>	13
<u>Benthabella infans</u>	4	<u>Cyclopsetta sp</u>	2
<u>Benthoosema suborbitale</u>	2	<u>Cyclothone sp</u>	94
<u>Blenniidae</u>	64	<u>Cynoglossidae</u>	30
<u>Bodianus sp</u>	2	<u>Cynoscion sp</u>	1
<u>Bothidae</u>	313	<u>Cynoscion arenarius</u>	4
<u>Bothus robinsi</u>	3	<u>Cynoscion nebulosus</u>	2
<u>Bothus sp</u>	75	<u>Cynoscion nothus</u>	1
<u>Bramidae</u>	35	<u>Cynoscion sp</u>	1
<u>Branchiostegidae</u>	16	<u>Dactylopterus volitans</u>	8
		<u>Decapterus sp</u>	26

TABLE 5.....continued

<u>TAXA</u>	<u>NUMBER</u>	<u>TAXA</u>	<u>NUMBER</u>
<u>Decapterus punctatus</u>	6	<u>Katsuwonus pelamis</u>	133
<u>Diaphus sp</u>	4	<u>Labridae</u>	166
<u>Diaphus dumerilii</u>	1	<u>Lampadena sp</u>	2
<u>Diodon holacanthus</u>	1	<u>Lampanyctus sp</u>	4
<u>Diodontidae</u>	15	<u>Lampanyctus nobilis</u>	2
<u>Diogenichthys atlanticus</u>	4	<u>Leptostomias sp</u>	1
<u>Diplospinus multistriatus</u>	19	<u>Lophiidae</u>	2
<u>Dysommidae</u>	6	<u>Lophiiformes</u>	1
<u>Elopidae</u>	2	<u>Lutjanidae</u>	107
<u>Engraulidae</u>	161	<u>Lutjanus campechanus</u>	1
<u>Engyophrys senta</u>	1	<u>Macrouridae</u>	25
<u>Ephippidae</u>	3	<u>Makaira nigricans</u>	3
<u>Epigonidae</u>	5	<u>Malacosteidae</u>	5
<u>Epigonus sp</u>	1	<u>Maurolicus muelleri</u>	5
<u>Epinephelus sp</u>	1	<u>Melamphaeidae</u>	109
<u>Eutaeniophoridae</u>	3	<u>Melamphaes sp</u>	3
<u>Eutaeniophorus festivus</u>	1	<u>Melanostomiidae</u>	58
<u>Euthymus alletteratus</u>	72	<u>Menticirrhus sp</u>	3
<u>Evermannellidae</u>	16	<u>Microstoma microstoma</u>	1
<u>Exocoetidae</u>	224	<u>Monacanthus sp</u>	2
<u>Gadidae</u>	22	<u>Monolene sessilicauda</u>	1
<u>Gempylidae</u>	139	<u>Moridae</u>	6
<u>Gempylus serpens</u>	2	<u>Mugilidae</u>	37
<u>Gobiesocidae</u>	1	<u>Mullidae</u>	66
<u>Gobiidae</u>	398	<u>Muraenidae</u>	32
<u>Gonostoma atlanticum</u>	5	<u>Myctophidae</u>	475
<u>Gonostoma sp</u>	1	<u>Myctophum sp</u>	1
<u>Gonostomatidae</u>	377	<u>Myctophum affine</u>	1
<u>Gymnothorax saxicola</u>	1	<u>Myctophum nitidulum</u>	7
<u>Hemiramphidae</u>	1	<u>Myctophum obtusirostris</u>	5
<u>Hemiramphinae</u>	1	<u>Myctophum selenops</u>	4
<u>Hemiramphus sp</u>	1	<u>Nealotus tripes</u>	1
<u>Hippocampus sp</u>	3	<u>Nemichthyidae</u>	16
<u>Holocentridae</u>	39	<u>Neoepinnula orientalis</u>	2
<u>Howella sp</u>	1	<u>Neoscopelus microchir</u>	1
<u>Hygophum sp</u>	2	<u>Nesiarchus nasutus</u>	8
<u>Hygophum benoiti</u>	1	<u>Nettastomatidae</u>	36
<u>Hygophum hygomi</u>	1	<u>Nettenchelys pygmaeus</u>	1
<u>Hygophum reinhardti</u>	5	<u>Nomeidae</u>	1
<u>Hygophum taaningi</u>	1	<u>Notolychnus valdiviae</u>	11
<u>Hypsoblennius sp</u>	2	<u>Oligoplites saurus</u>	3
<u>Idiacanthidae</u>	6	<u>Ophichthidae</u>	89
<u>Istiophoridae</u>	10	<u>Ophidiidae</u>	129
<u>Istiophorus platypterus</u>	26	<u>Opostomias sp</u>	1

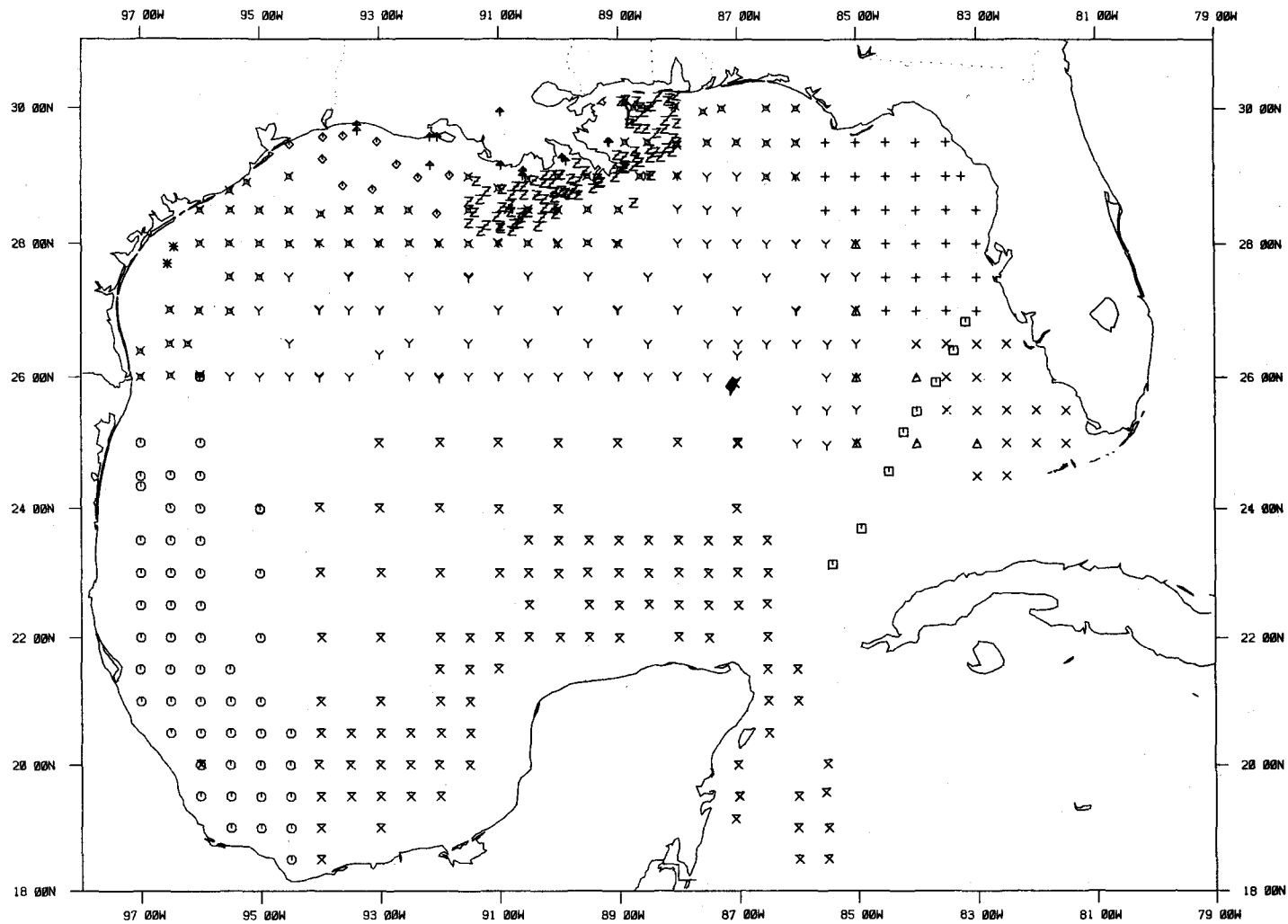
TABLE 5.....continued

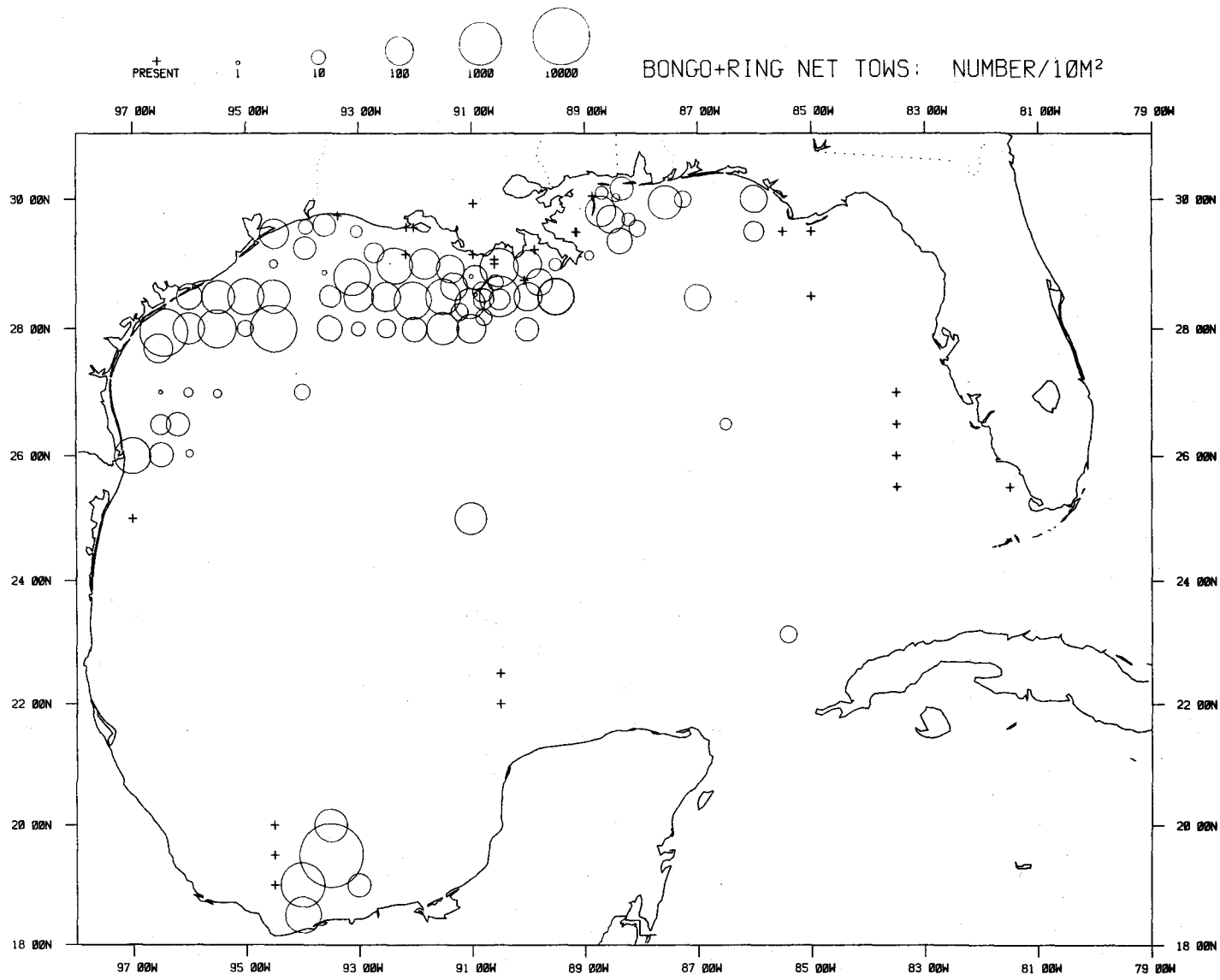
<u>TAXA</u>	<u>NUMBER</u>	<u>TAXA</u>	<u>NUMBER</u>
Ostraciidae	5	<u>Stephanolepis hispidus</u>	10
<u>Oxyporhamphus micropterus</u>	1	<u>Stephanolepis setifer</u>	2
Paralepididae	219	<u>Stephanolepis sp</u>	2
<u>Peprilus paru</u>	7	<u>Sternoptyx sp</u>	11
Perciformes	1	Stomiidae	6
Peristediidae	1	Stromateidae	364
Pleuronectidae	4	<u>Sudis atrox</u>	2
<u>Pollichthys maui</u>	5	<u>Syacium sp</u>	42
Polymixiidae	1	<u>Symbolophorus rufinus</u>	5
Polynemidae	6	<u>Symphurus plagiusa</u>	118
Pomacentridae	57	<u>Symphysanodon sp</u>	1
Pomadasyidae	2	<u>Synagrops sp</u>	3
Pomatomidae	1	Synphobranchidae	1
Priacanthidae	49	Syngnathidae	37
<u>Psenes arafurensis</u>	3	<u>Syngnathus sp</u>	3
<u>Psenes cyanophrys</u>	2	Synodontidae	188
<u>Psenes sp</u>	1	<u>Taractes rubescens</u>	1
<u>Pseudogramma gregoryi</u>	1	Tetraodontidae	162
<u>Pseudopriacanthus altus</u>	1	<u>Tetrapturus albidus</u>	2
<u>Rhynchoconger flavus</u>	1	<u>Tetrapturus pfluegeri</u>	1
Scaridae	115	<u>Thalassoma bifasciatum</u>	1
Schindleriidae	35	<u>Thunnus albacares</u>	1
Sciaenidae	135	<u>Thunnus atlanticus</u>	171
<u>Scomber japonicus</u>	4	<u>Thunnus sp</u>	68
<u>Scomberomorus sp</u>	2	<u>Thunnus thymus</u>	70
<u>Scomberomorus cavalla</u>	9	<u>Trachinotus sp</u>	4
<u>Scomberomorus maculatus</u>	214	<u>Trachinotus carolinus</u>	9
Scombridae	38	<u>Trachinotus falcatus</u>	2
<u>Scombrolabrax heterolepis</u>	1	<u>Trachinotus goodei</u>	1
Scopelarchidae	7	Trachipteridae	13
<u>Scopelgenys sp</u>	1	Trichiuridae	22
Scopelosauridae	3	Triglidae	105
Scorpaenidae	108	Unidentified Fish Larvae	623
<u>Selene vomer</u>	2	Uranoscopidae	3
<u>Seriola sp</u>	5	<u>Uroconger syringinus</u>	1
<u>Seriola zonata</u>	6	<u>Valenciennellus tripunctulatus</u>	7
Serranidae	296	<u>Vinciguerria attenuata</u>	3
<u>Serranus sp</u>	3	<u>Vinciguerria nimbaria</u>	3
Soleidae	29	<u>Vinciguerria poweriae</u>	7
Sparidae	16	<u>Vinciguerria sp</u>	39
<u>Sphoeroides maculatus</u>	1	<u>Vomer setapinnis</u>	3
<u>Sphyraena sp</u>	3	<u>Xenomystax sp</u>	1
<u>Sphyraena barracuda</u>	3	<u>Xiphias gladius</u>	26
Sphyraenidae	64	<u>Xyrichthys sp</u>	1
<u>Stellifer lanceolatus</u>	2		

□ BELLOWS S482
 ○ BIP 82-01
 △ HERNAN CORTEZ 1
 + HERNAN CORTEZ 2
 × HERNAN CORTEZ 3
 ◇ JEFF + TINA 3

† LOUISIANA
 × ONJUKU 82-04
 Z OREGON II 125
 Y OREGON II 126
 ✕ OREGON II 127
 * WESTERN GULF 15

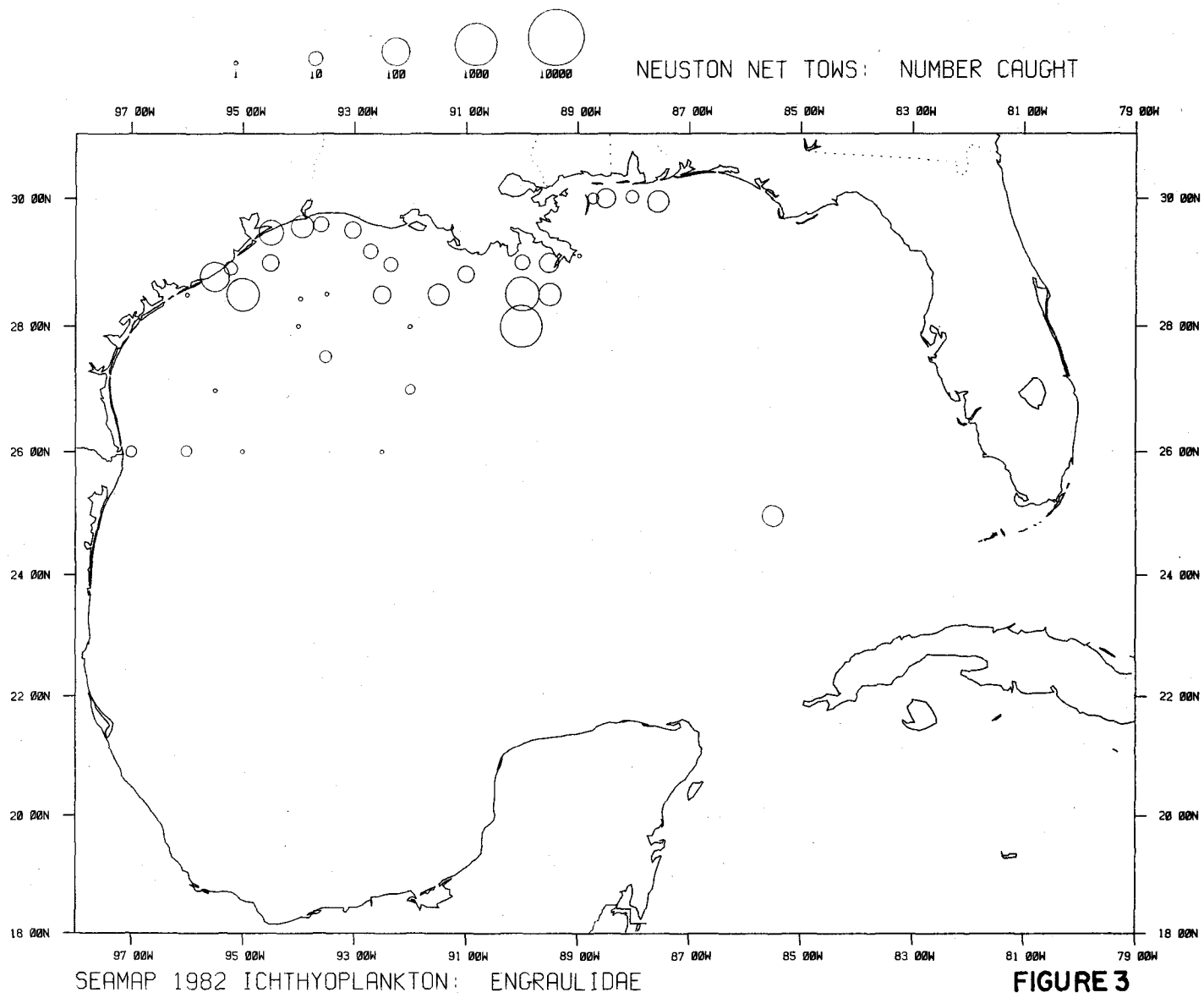
FIGURE I

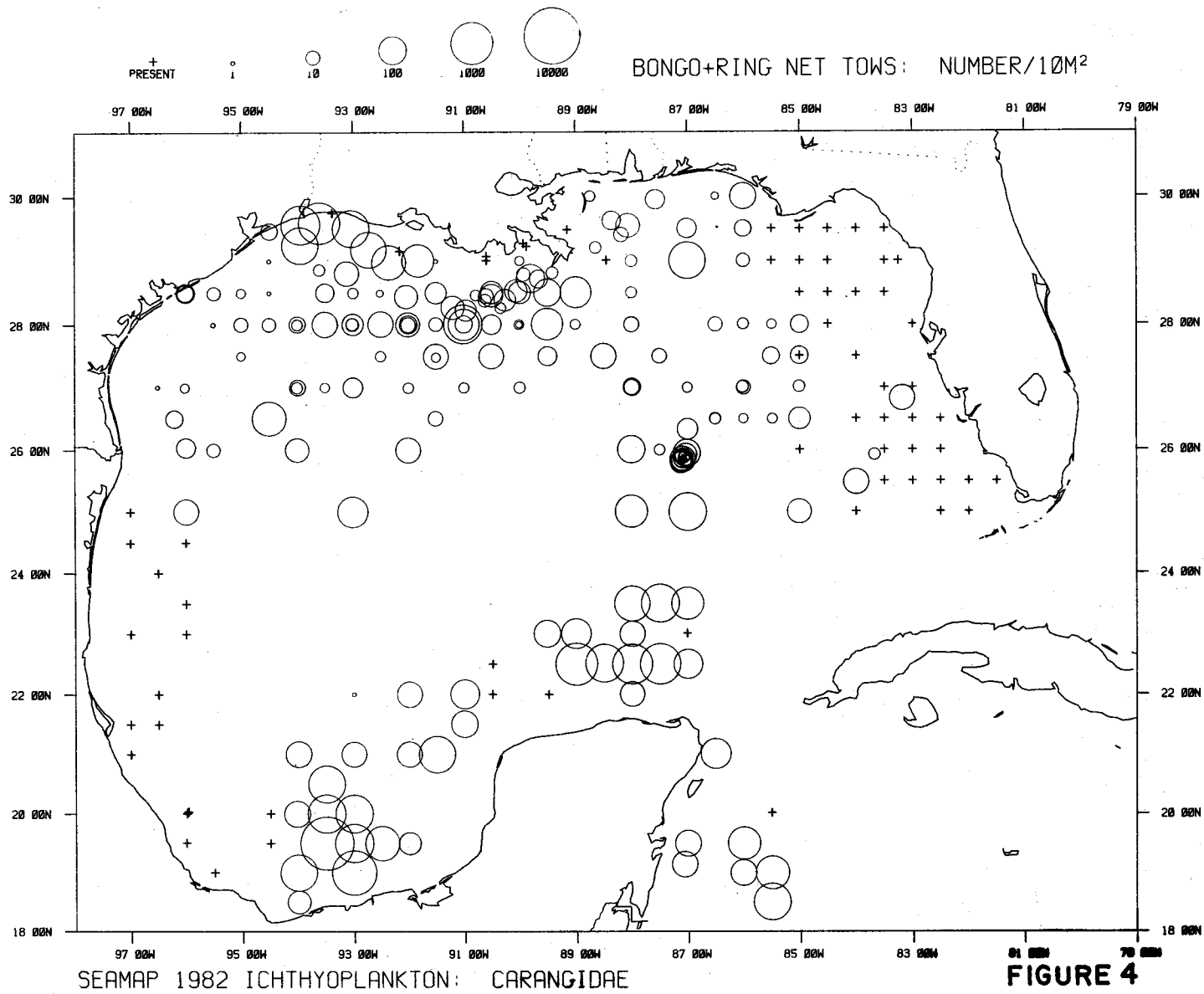


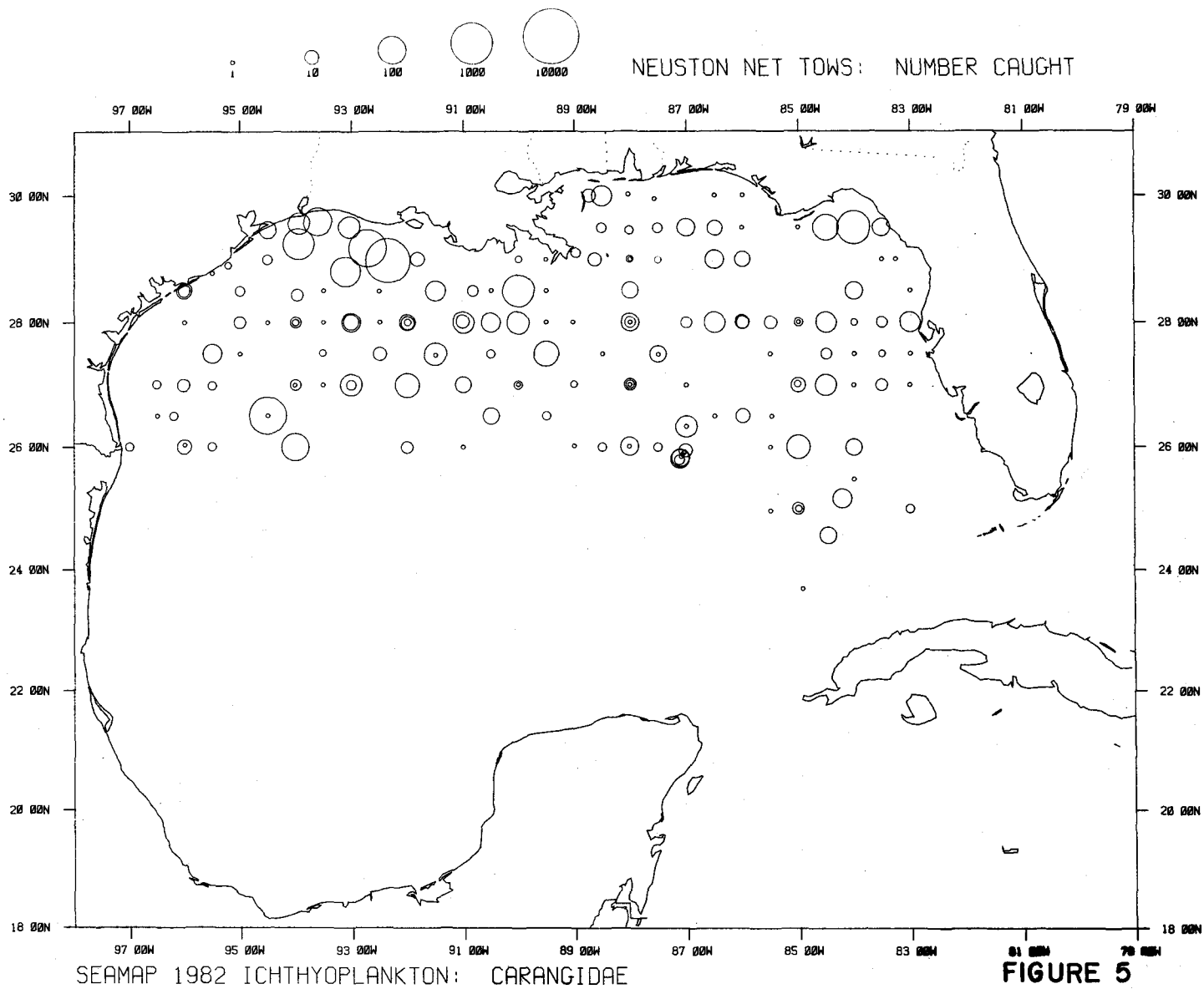


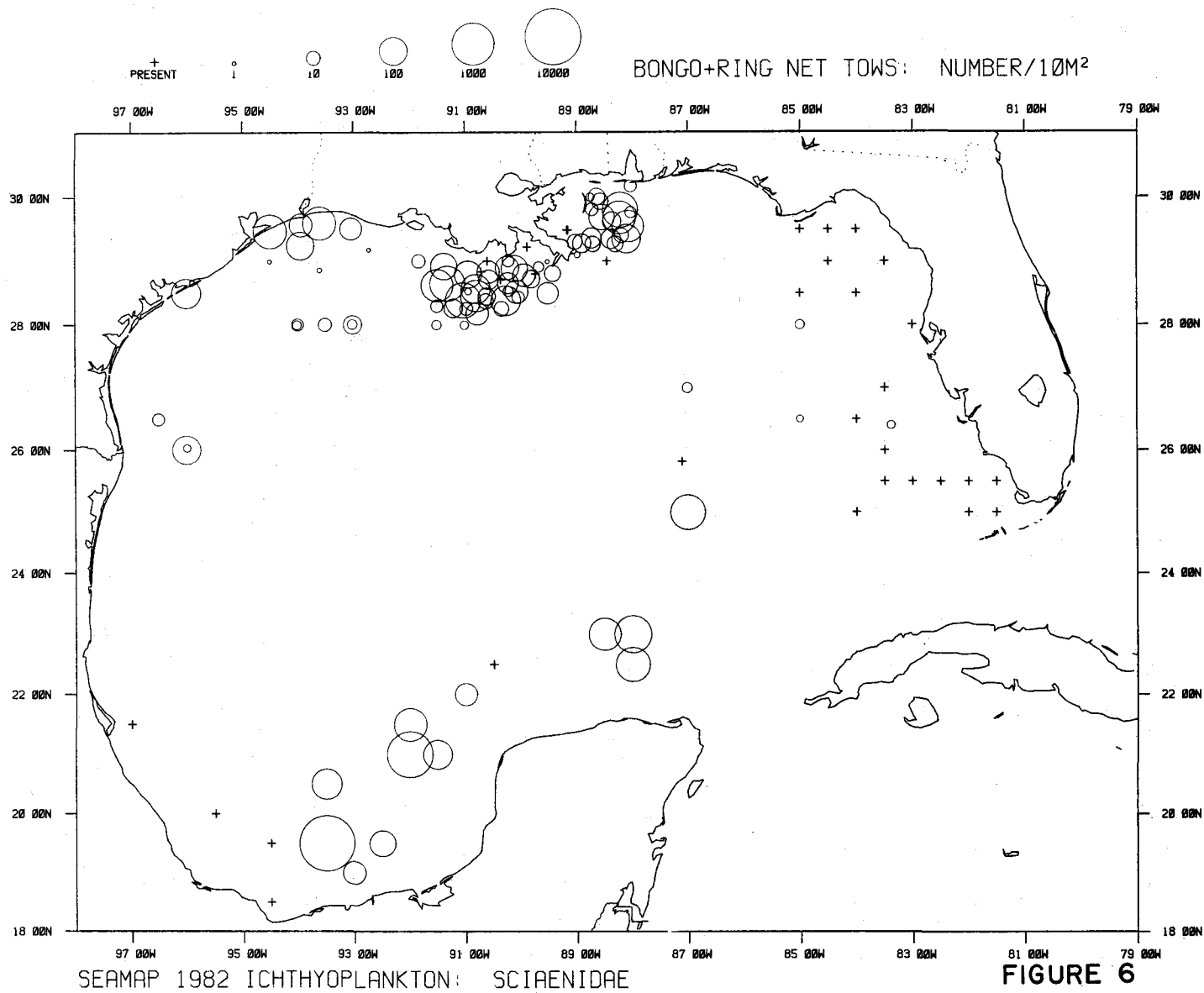
SEAMAP 1982 ICHTHYOPLANKTON: ENGRAULIDAE

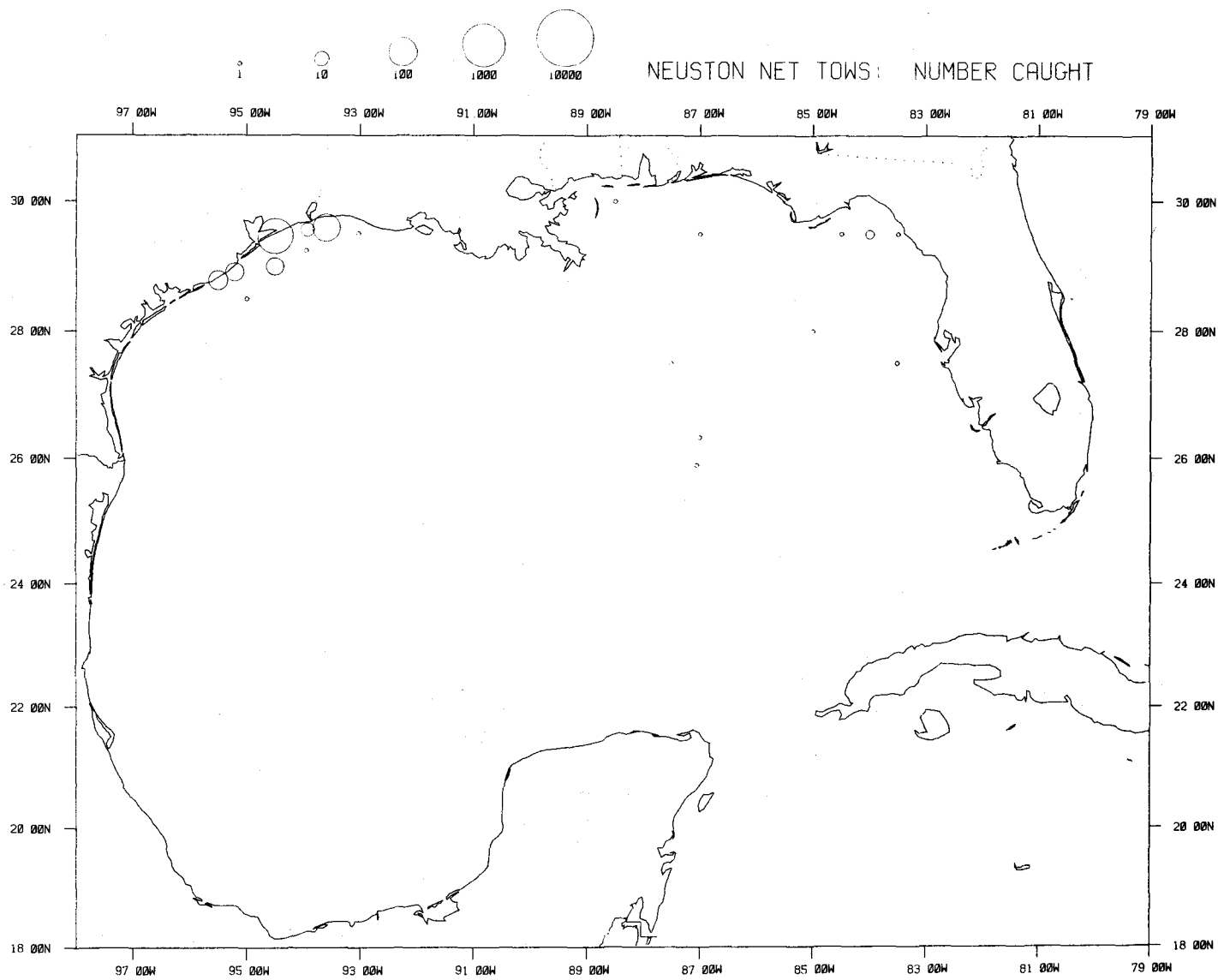
FIGURE 2





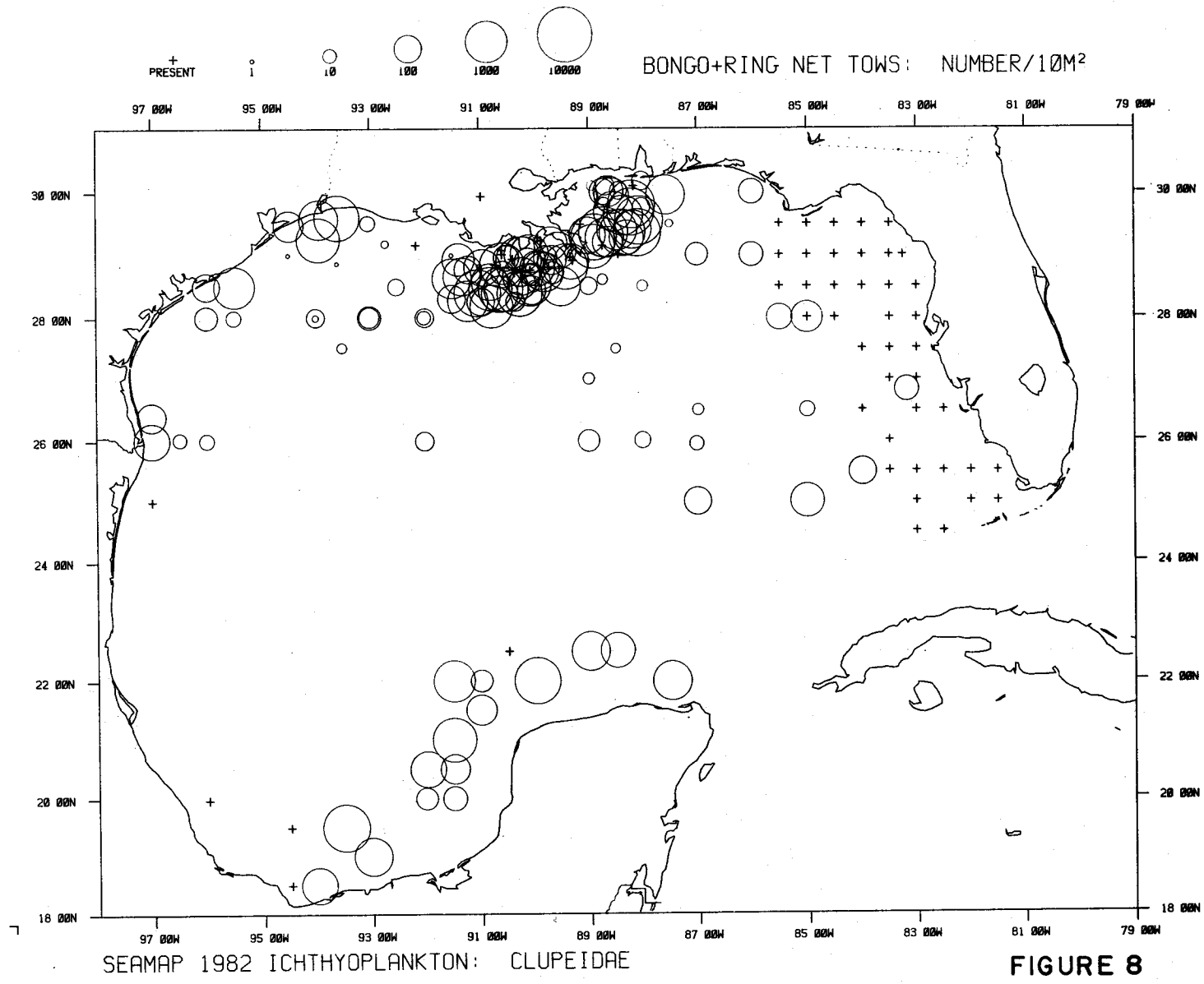


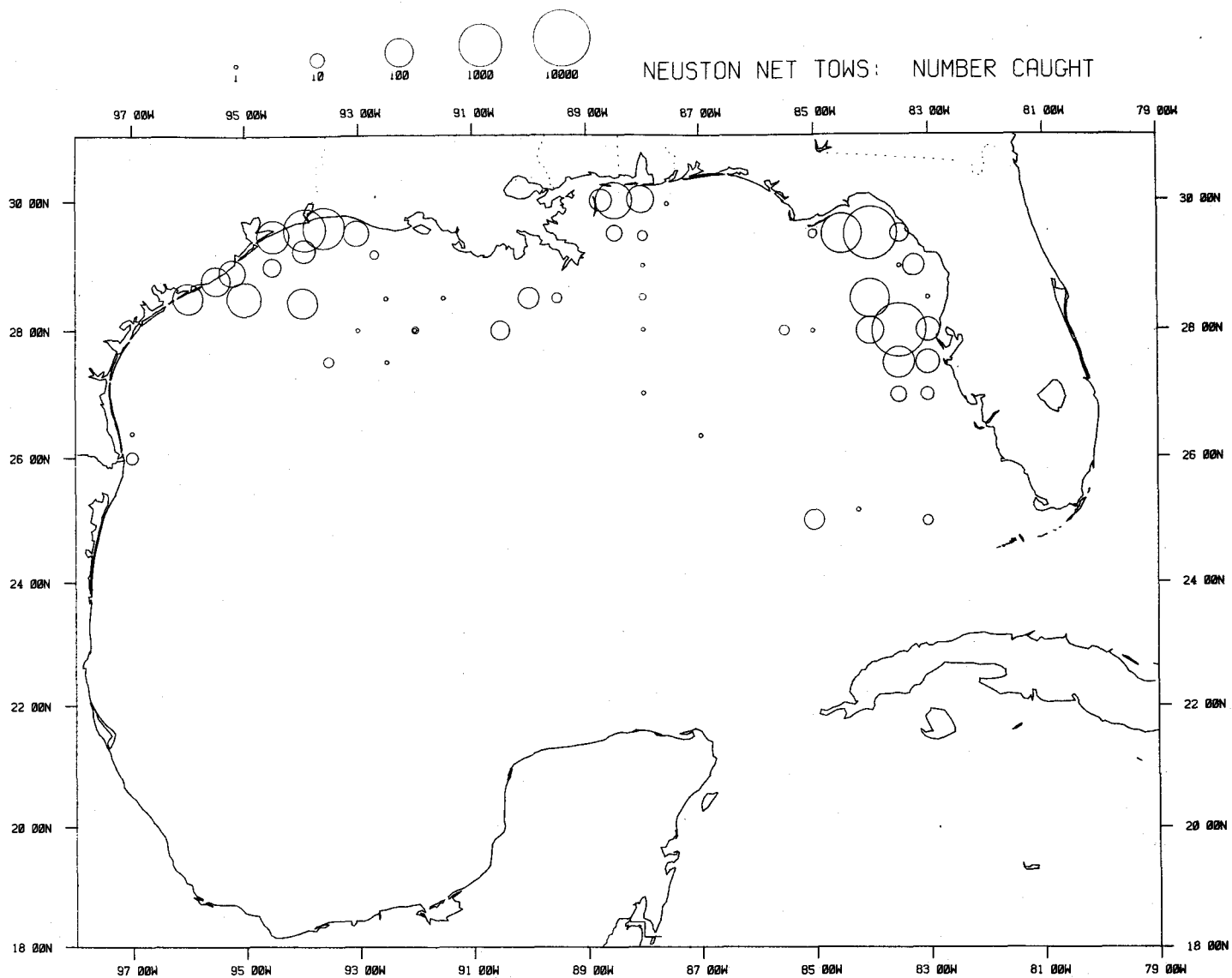




SEAMAP 1982 ICHTHYOPLANKTON: SCIAENIDAE

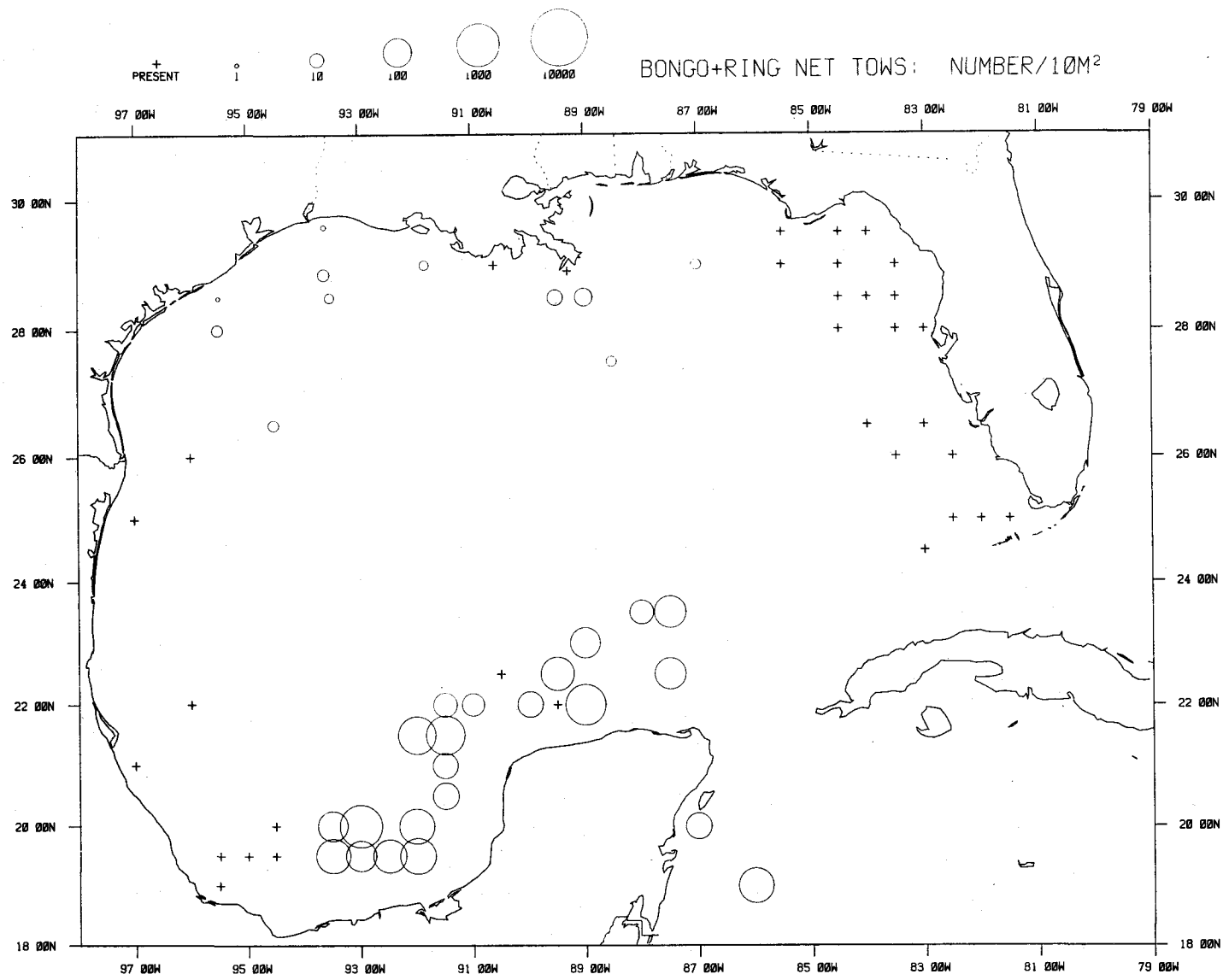
FIGURE 7





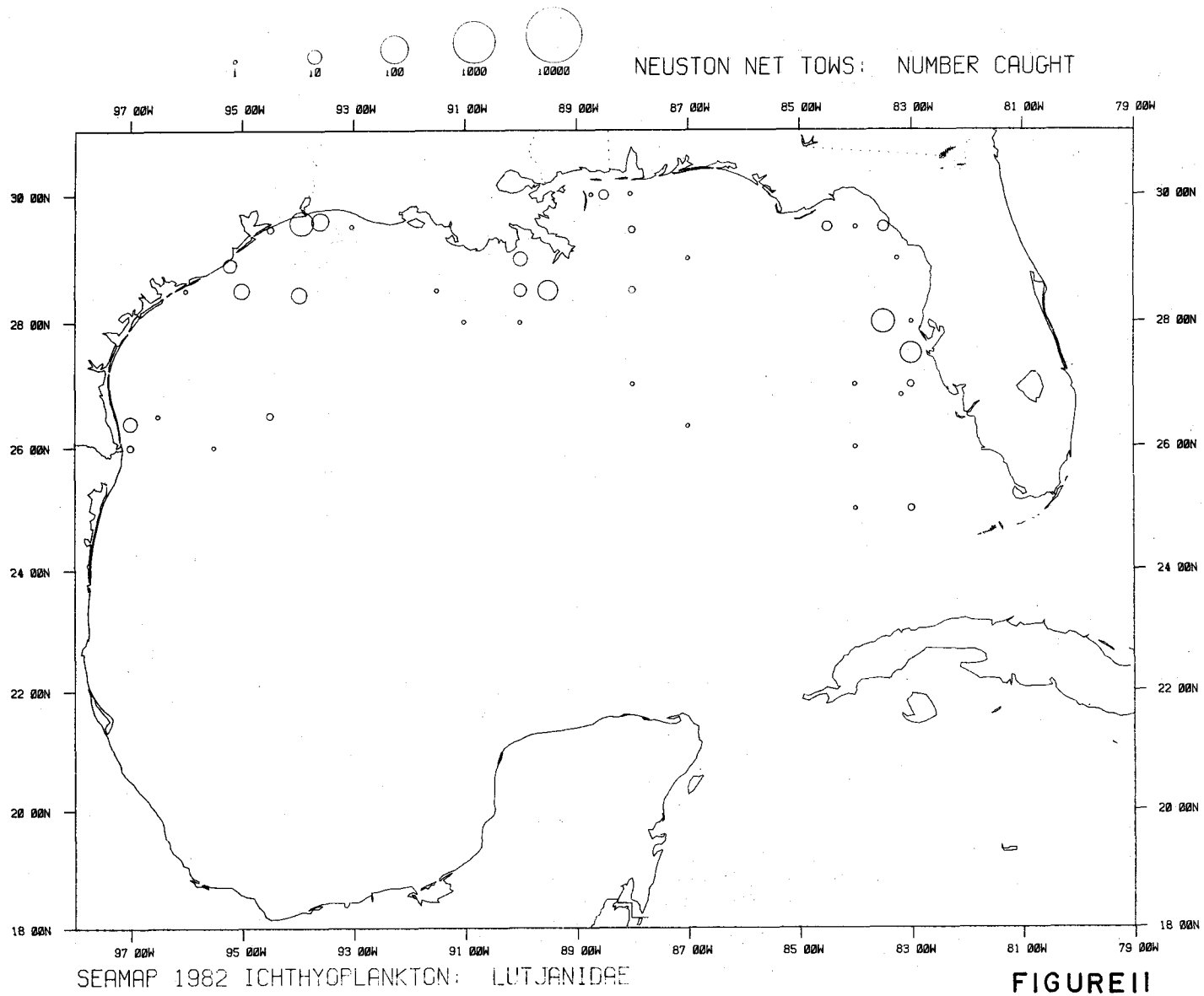
SEAMAP 1982 ICHTHYOPLANKTON: CLUPEIDAE

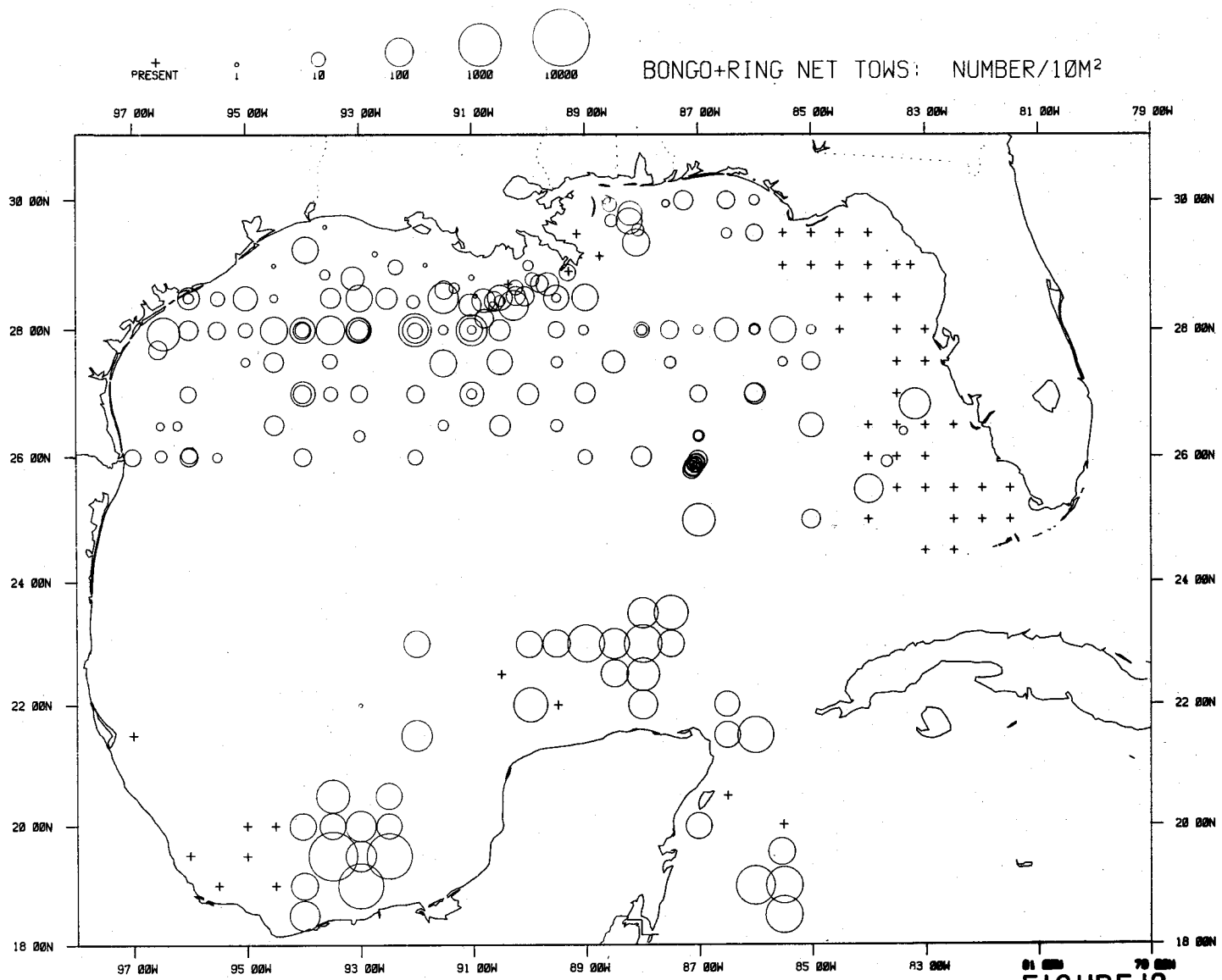
FIGURE 9



SEAMAP 1982 ICHTHYOPLANKTON: LUTJANIDAE

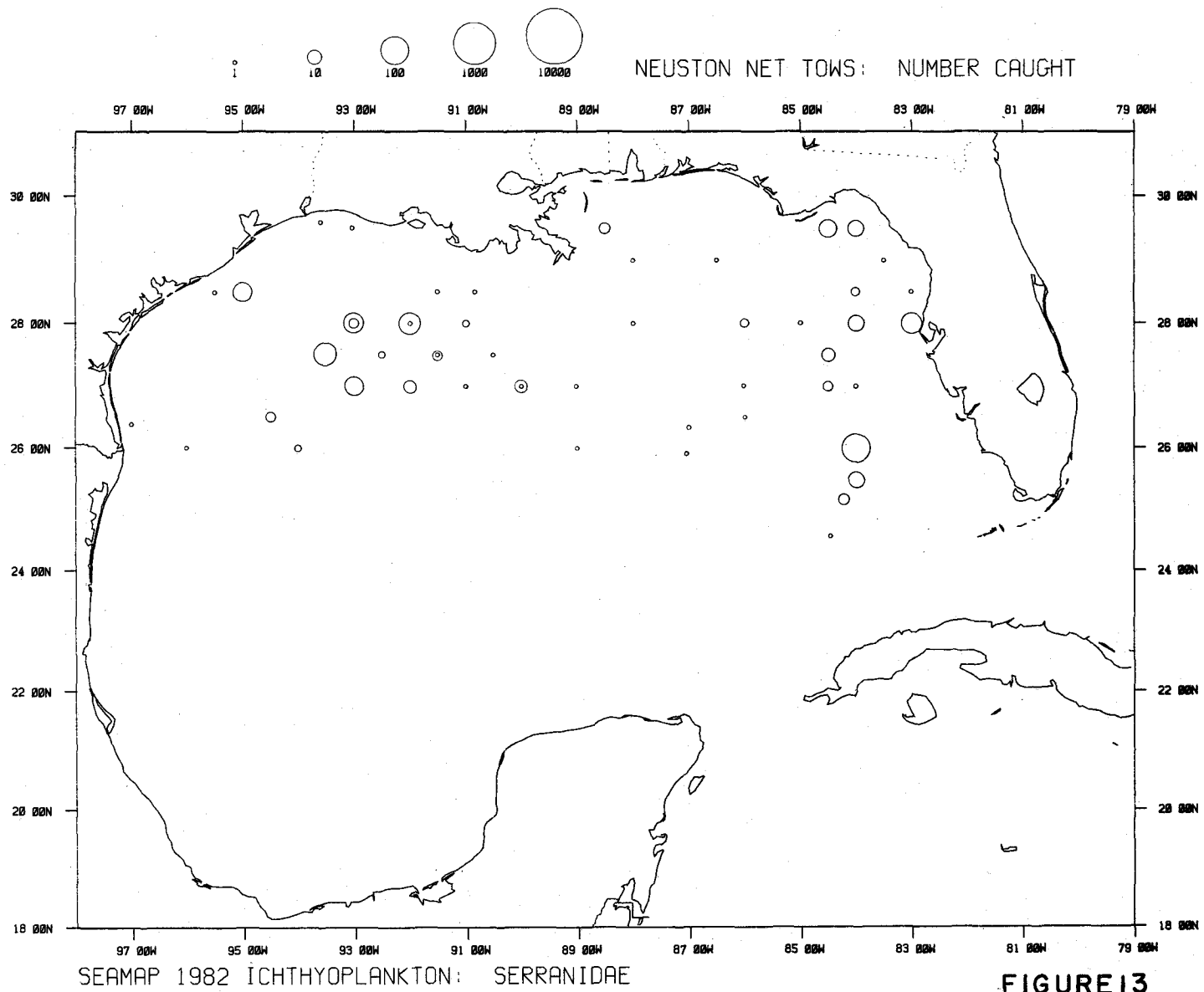
FIGURE 10

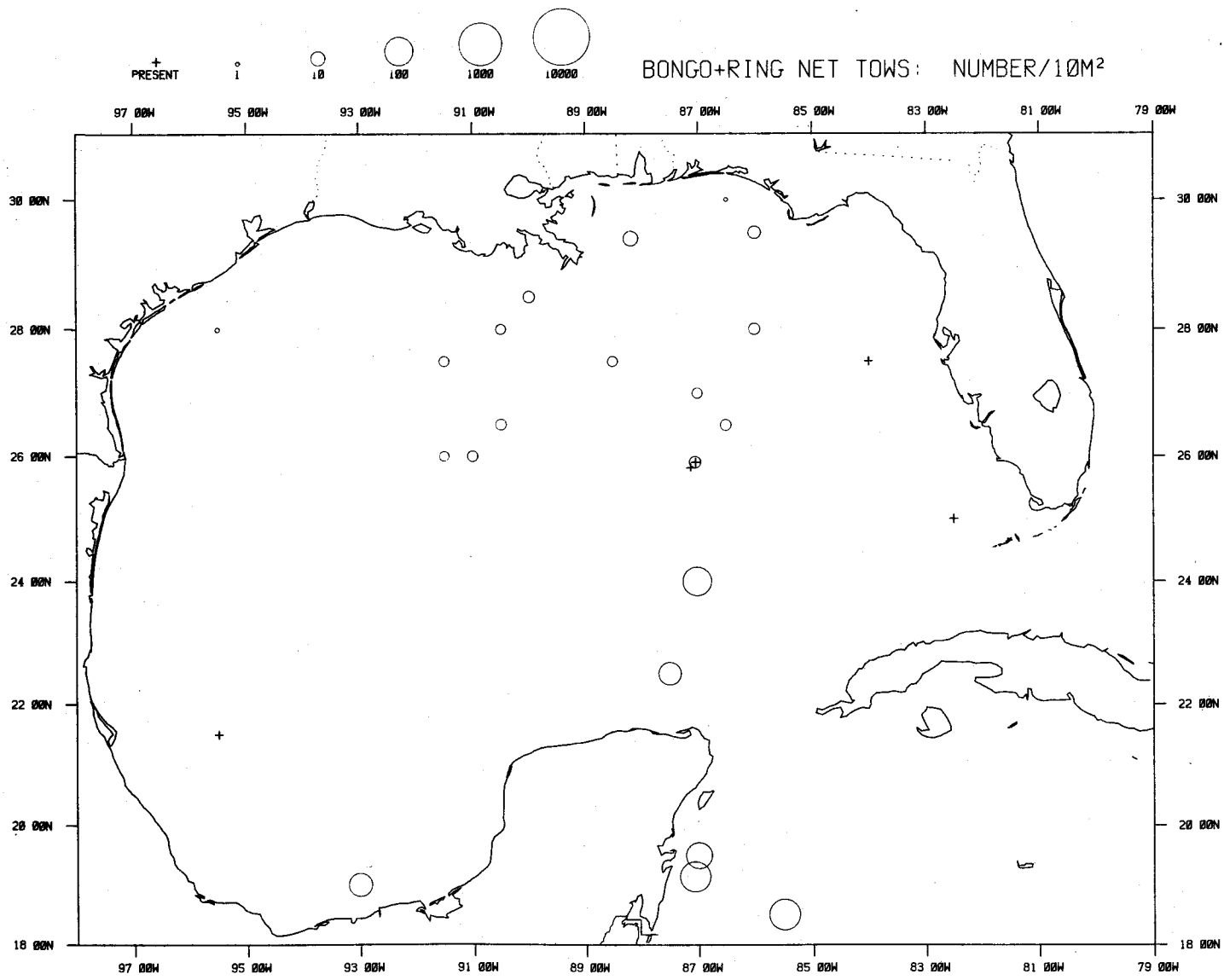




SEAMAP 1982 ICHTHYOPLANKTON: SERRANIDAE

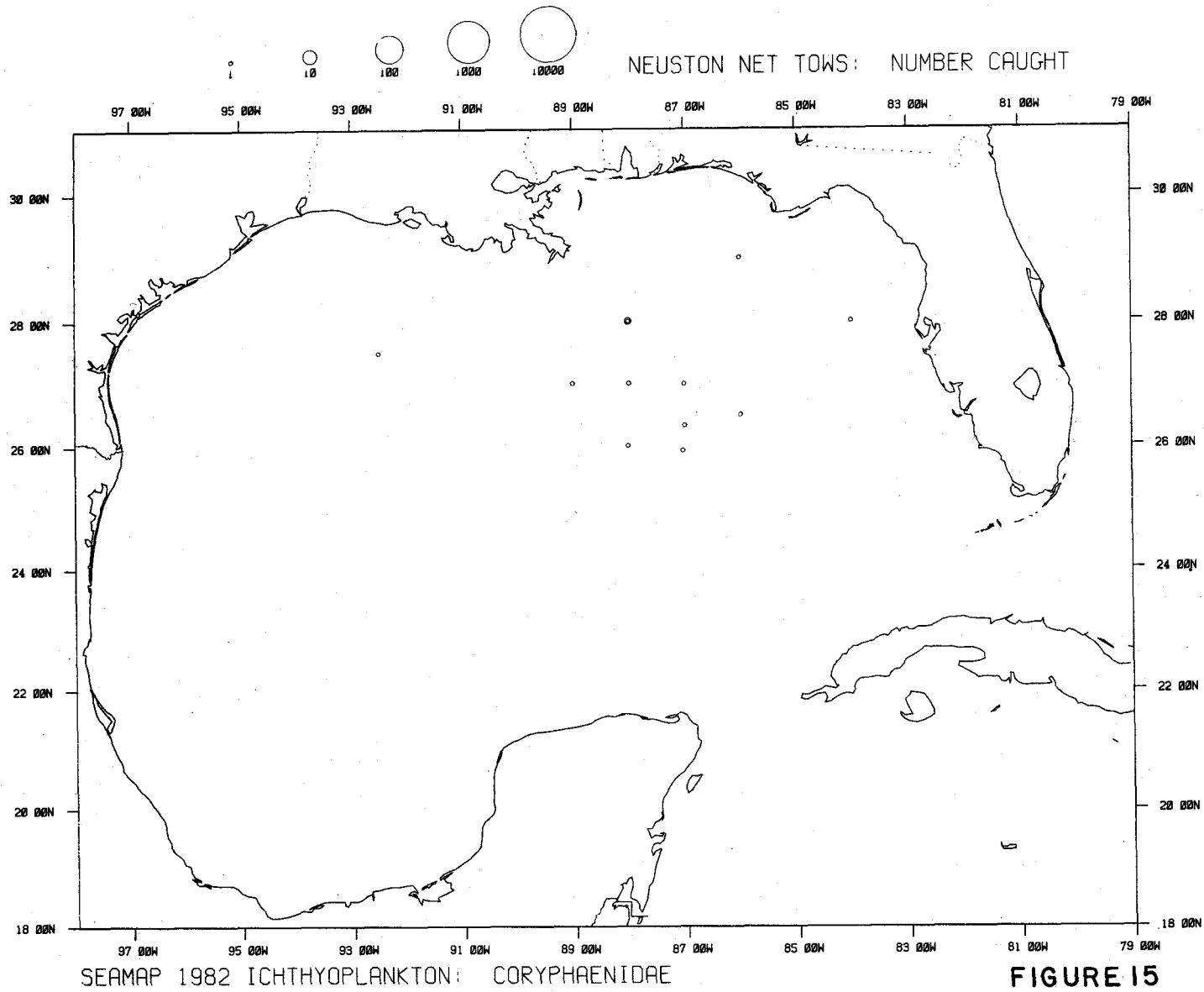
FIGURE 12

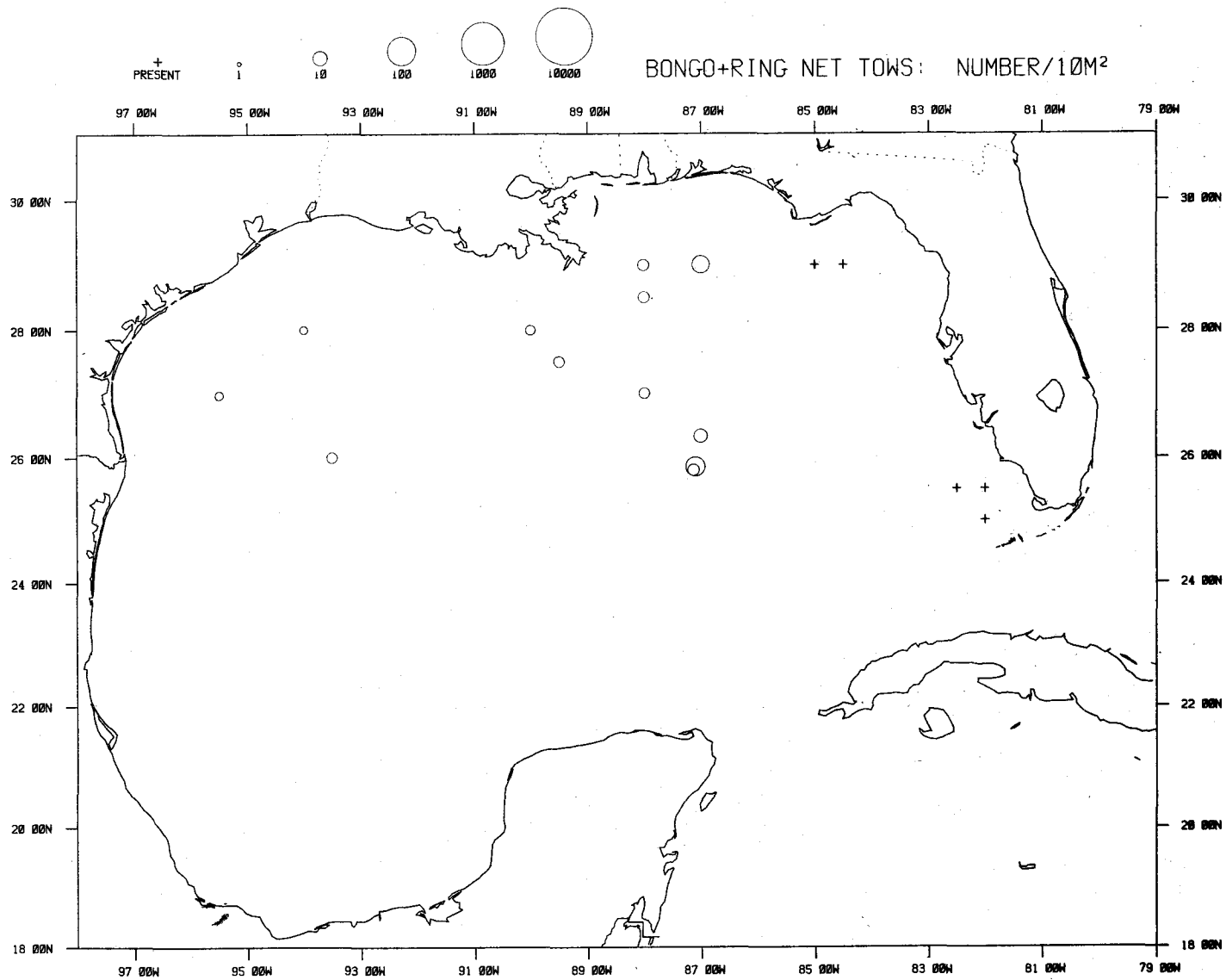




SEAMAP 1982 ICHTHYOPLANKTON: CORYPHAENIDAE

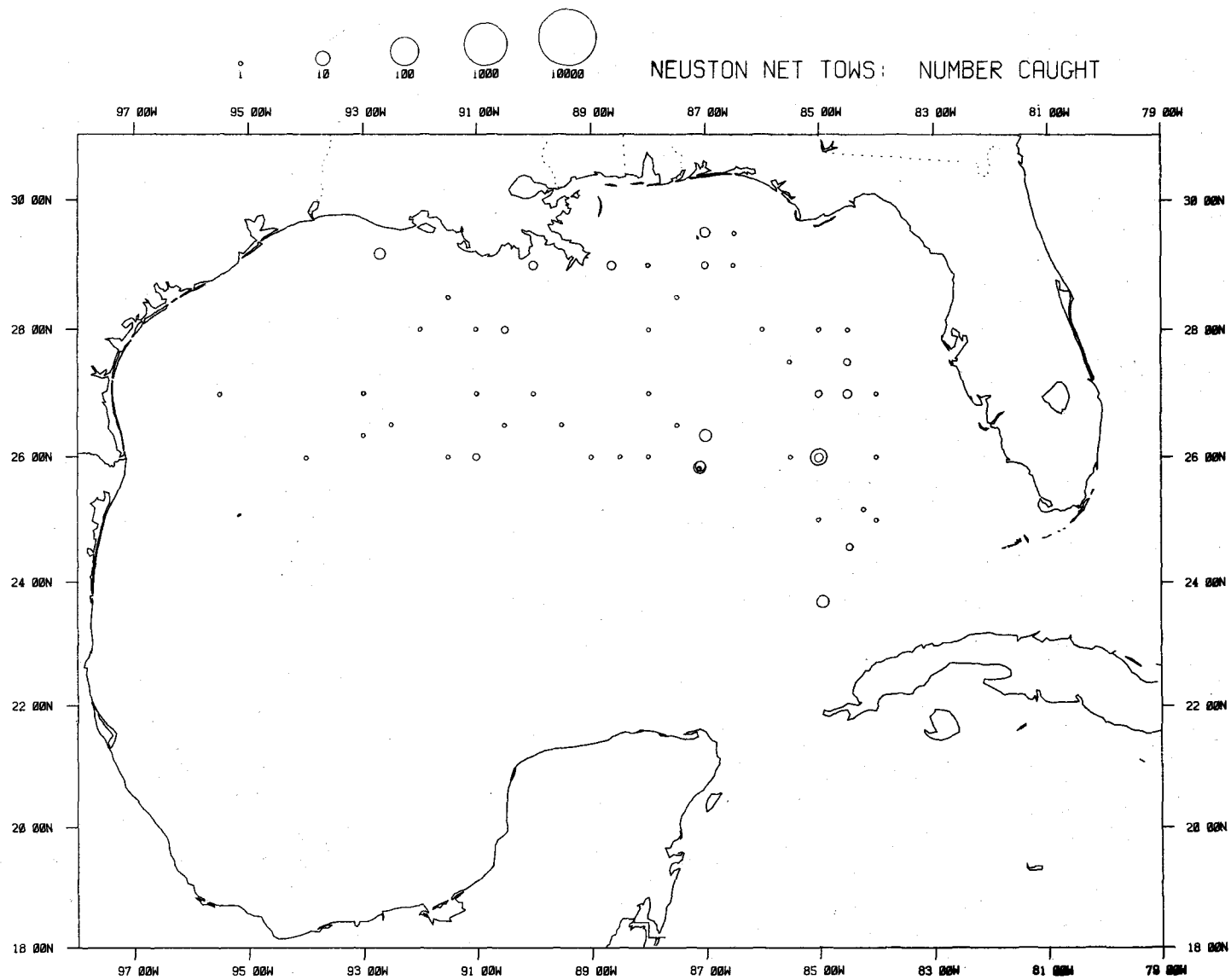
FIGURE 14





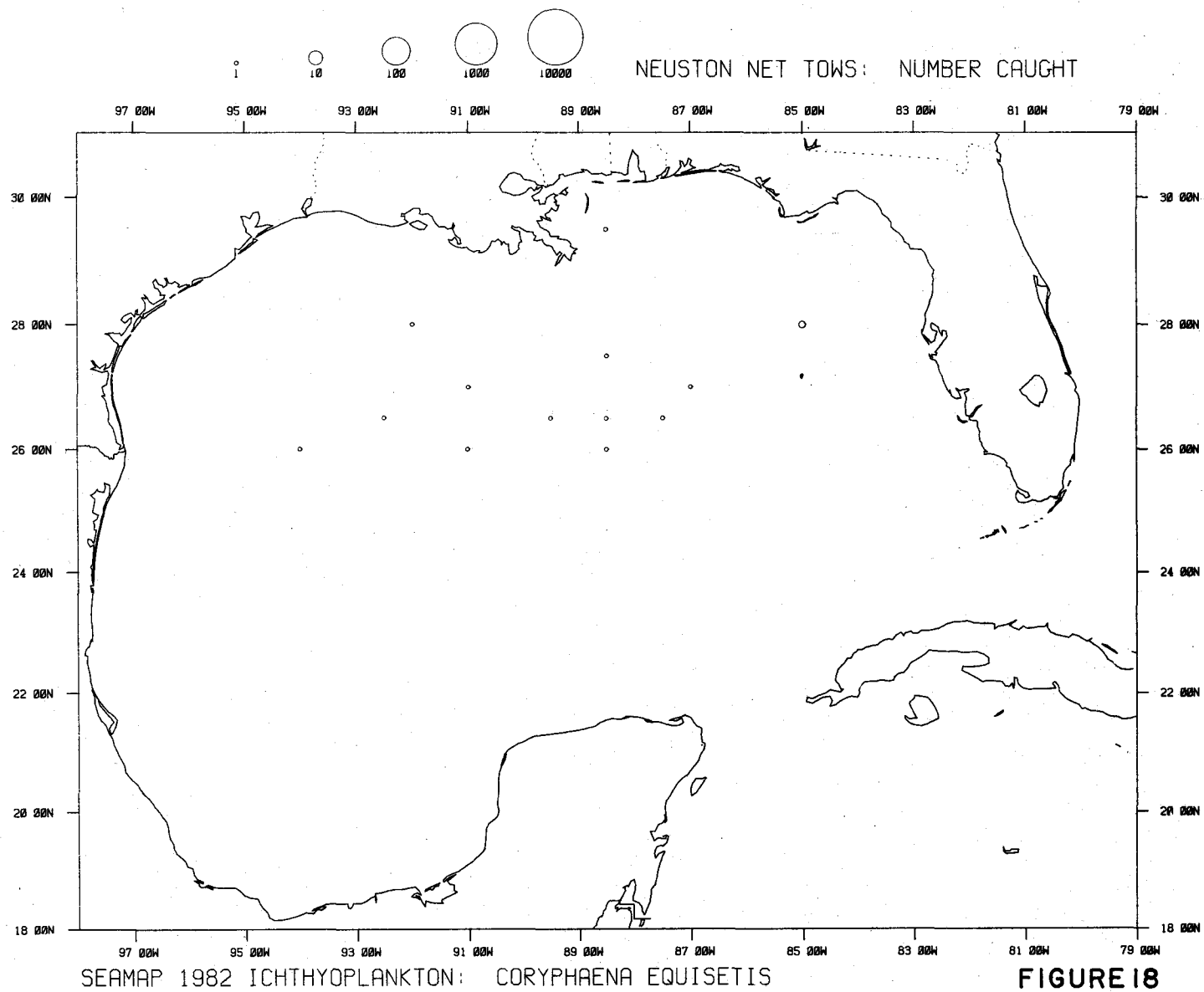
SEAMAP 1982 ICHTHYOPLANKTON: CORYPHAENA HIPPURUS

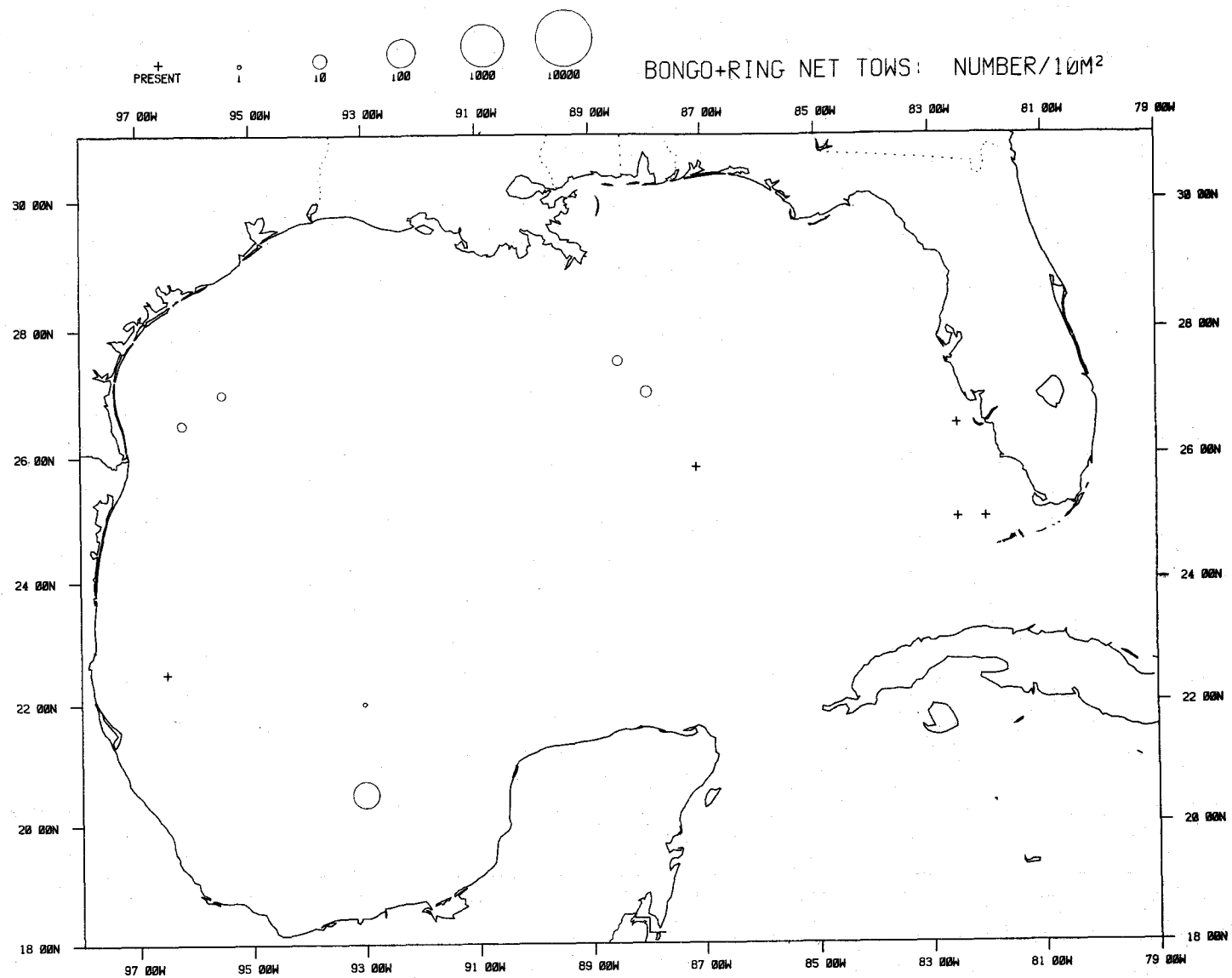
FIGURE 16



SEAMAP 1982 ICHTHYOPLANKTON: CORYPHAENA HIPPURUS

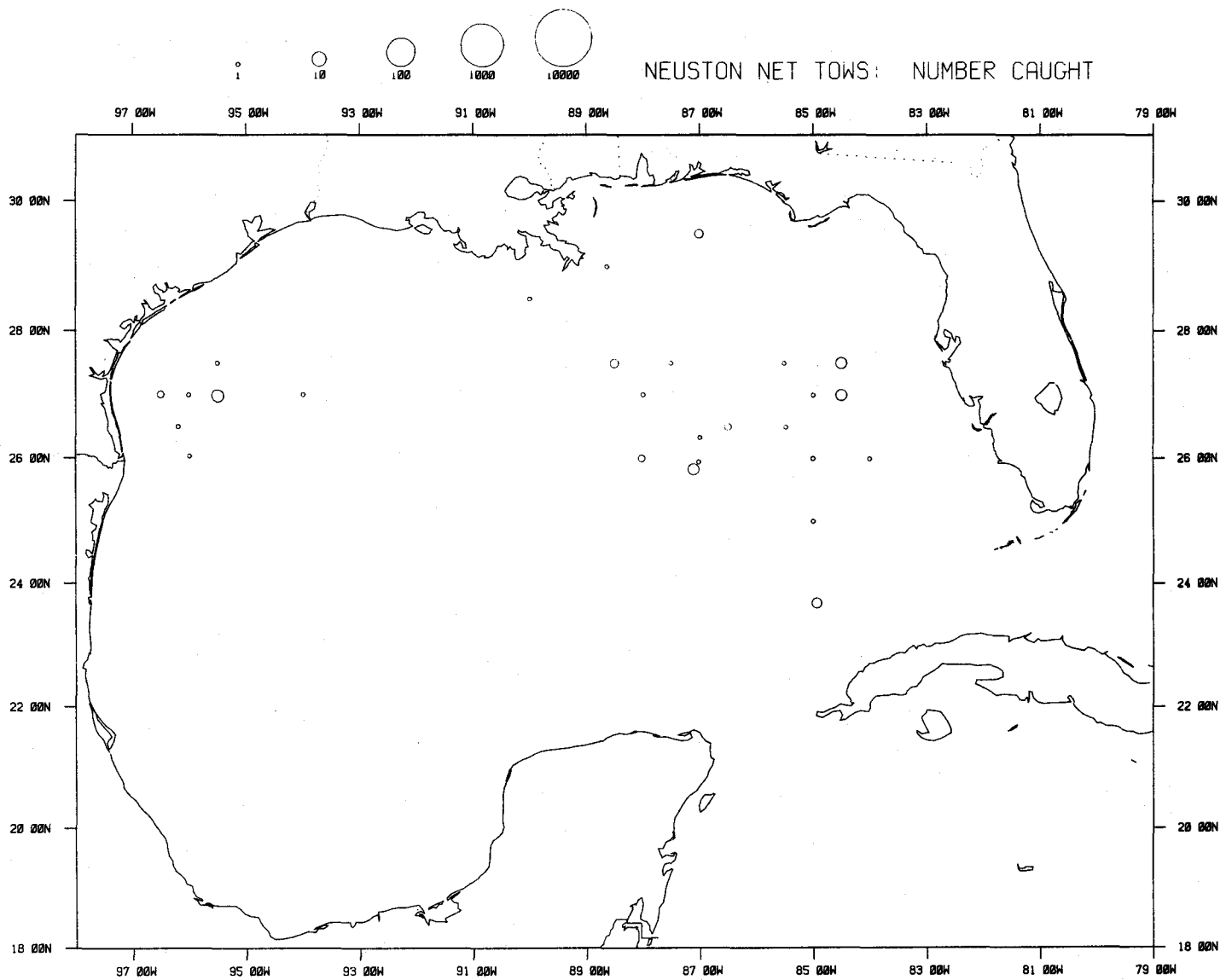
FIGURE 17





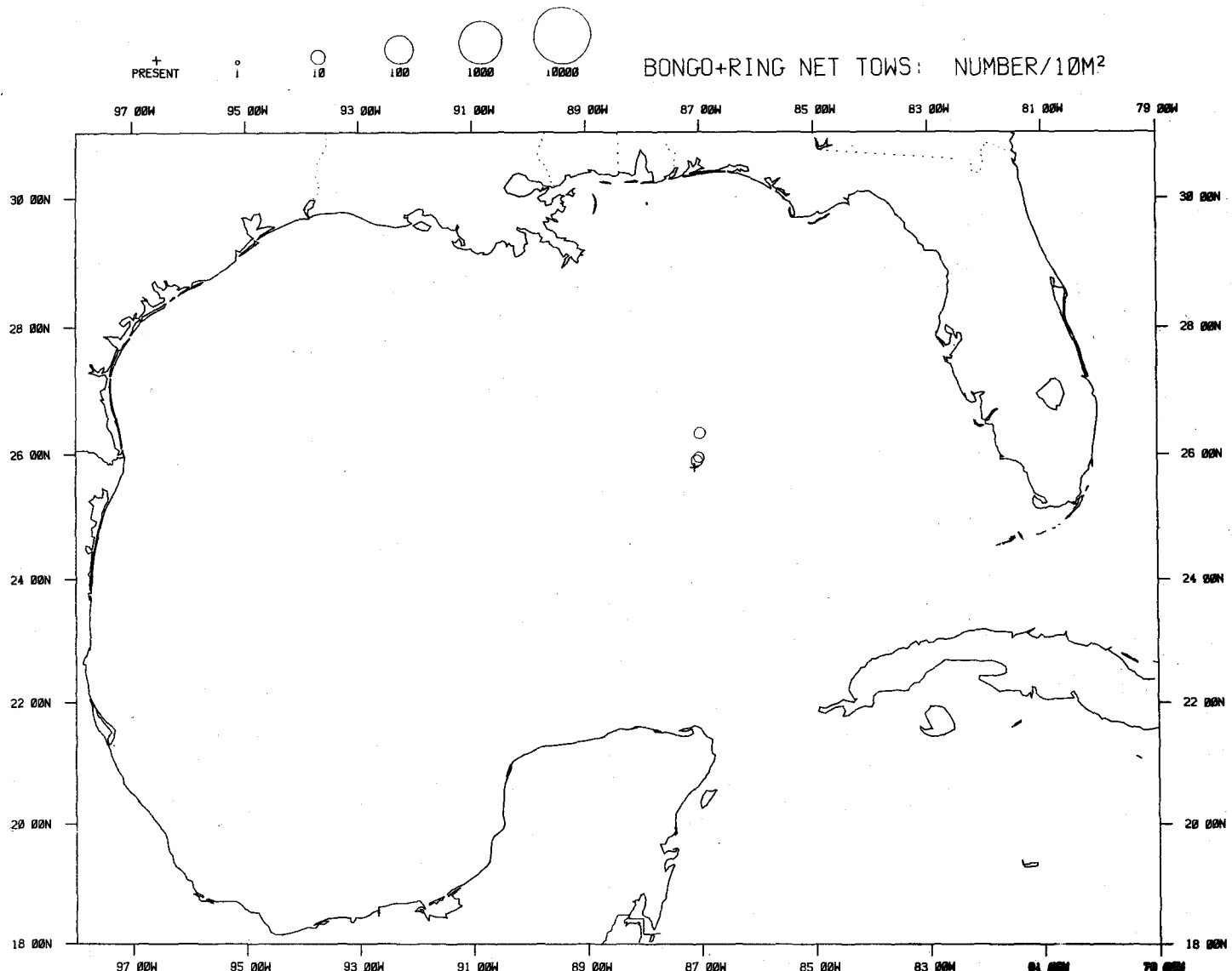
SEAMAP 1982 ICHTHYOPLANKTON: ISTIOPHORIDAE

FIGURE 19



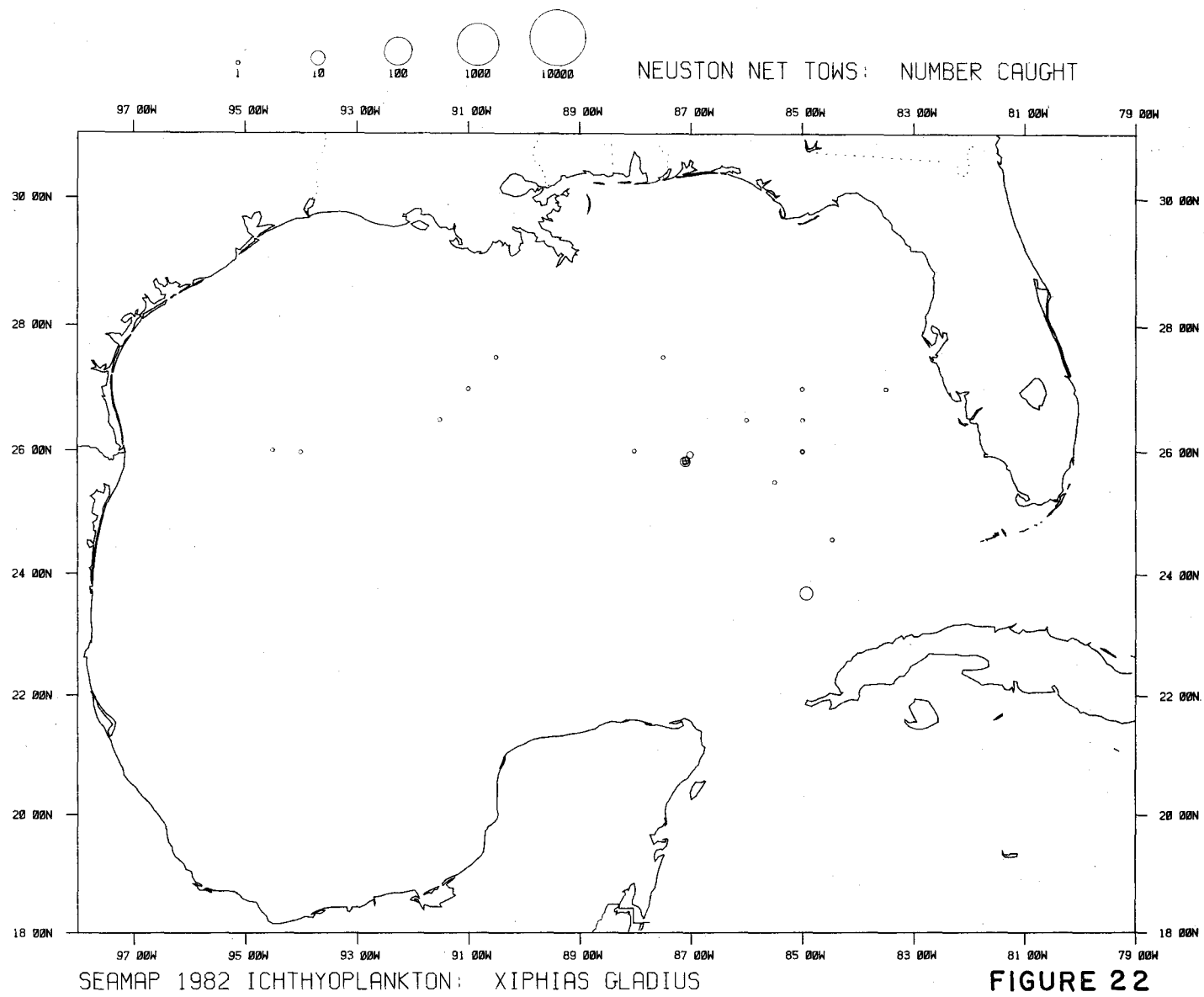
SEAMAP 1982 ICHTHYOPLANKTON: ISTIOPHORIDAE

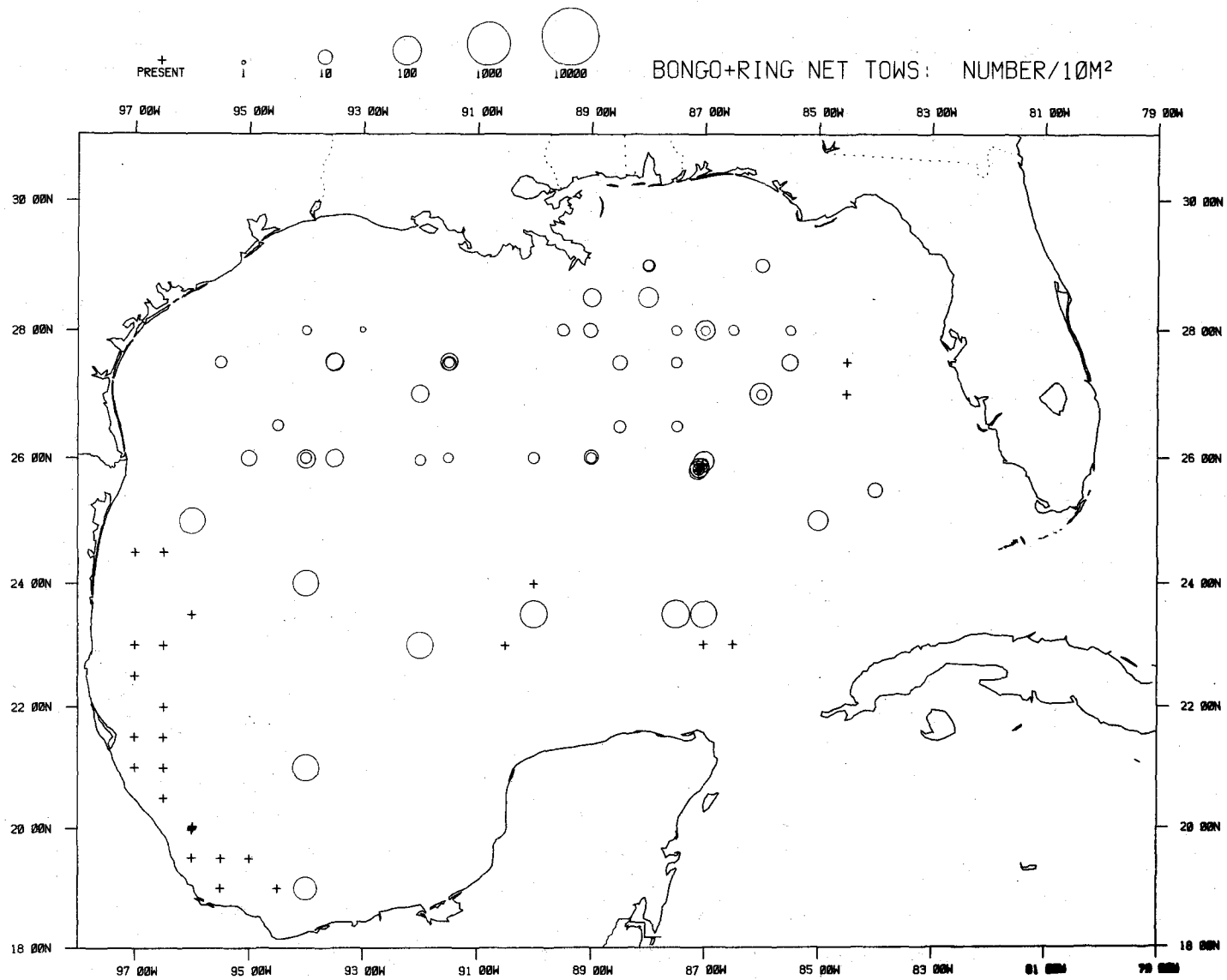
FIGURE 20



SEAMAP 1982 ICHTHYOPLANKTON: XIPHIAS GLADIUS

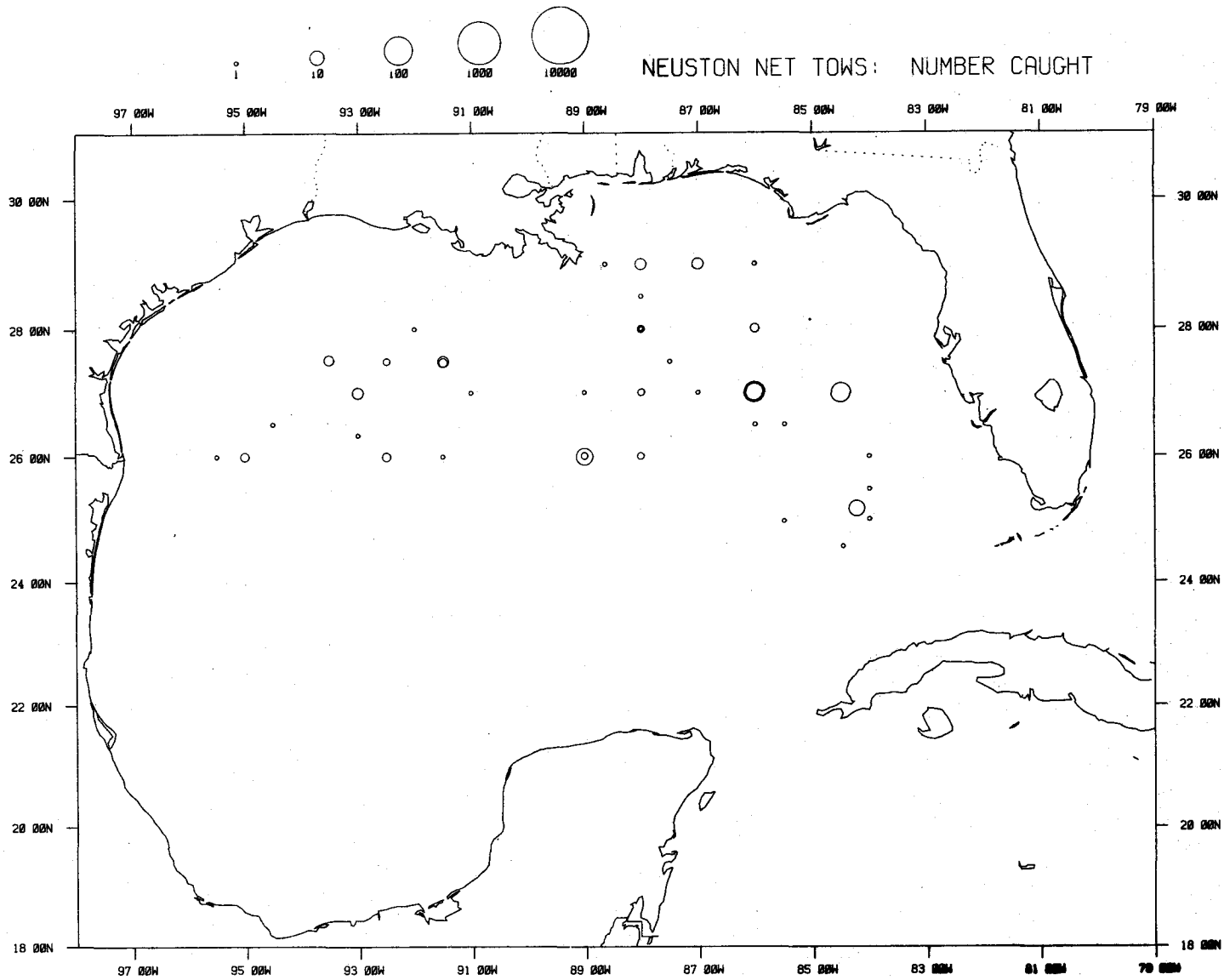
FIGURE 21





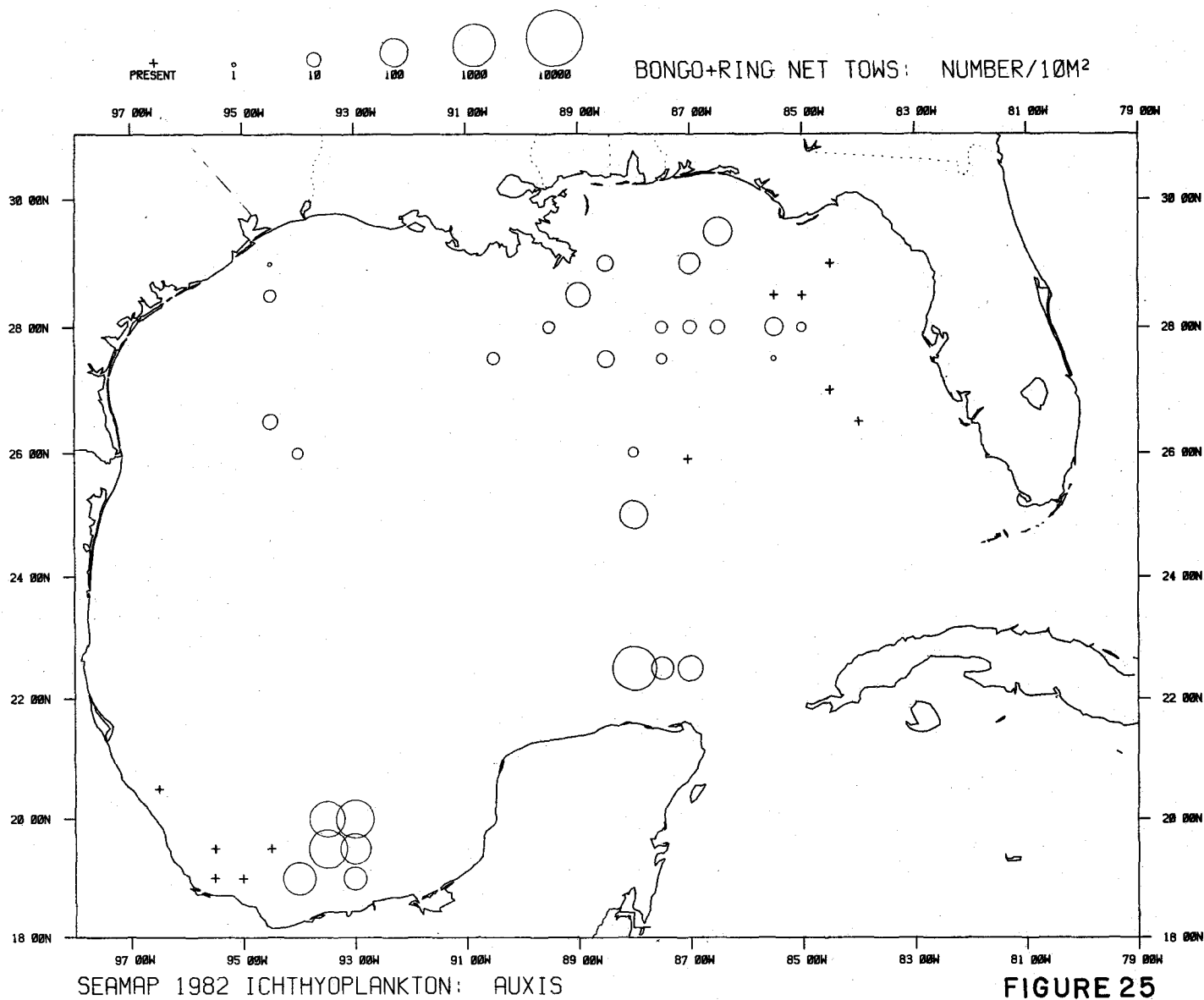
SEAMAP 1982 ICHTHYOPLANKTON: KATSUWONUS PELAMIS

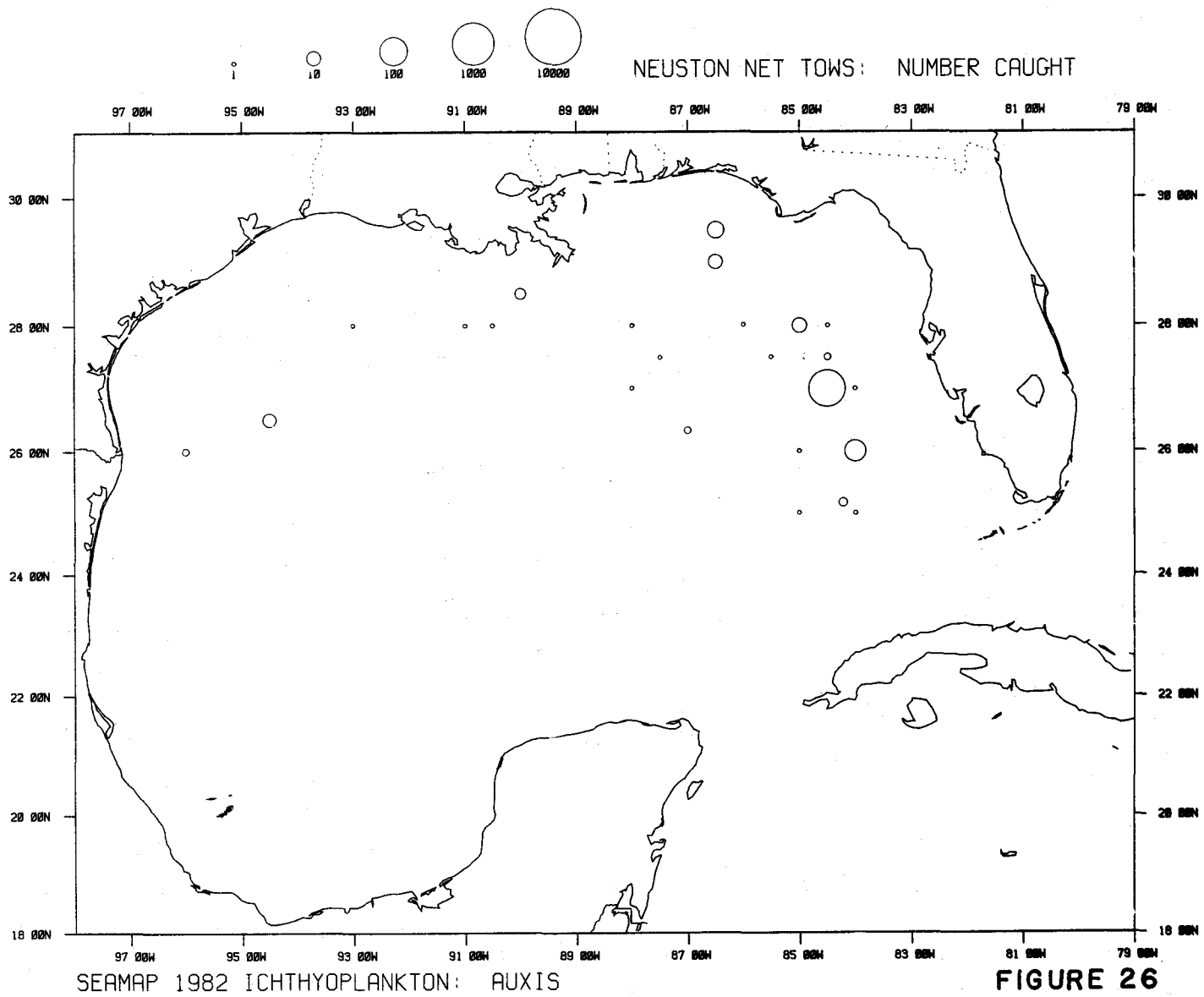
FIGURE 23

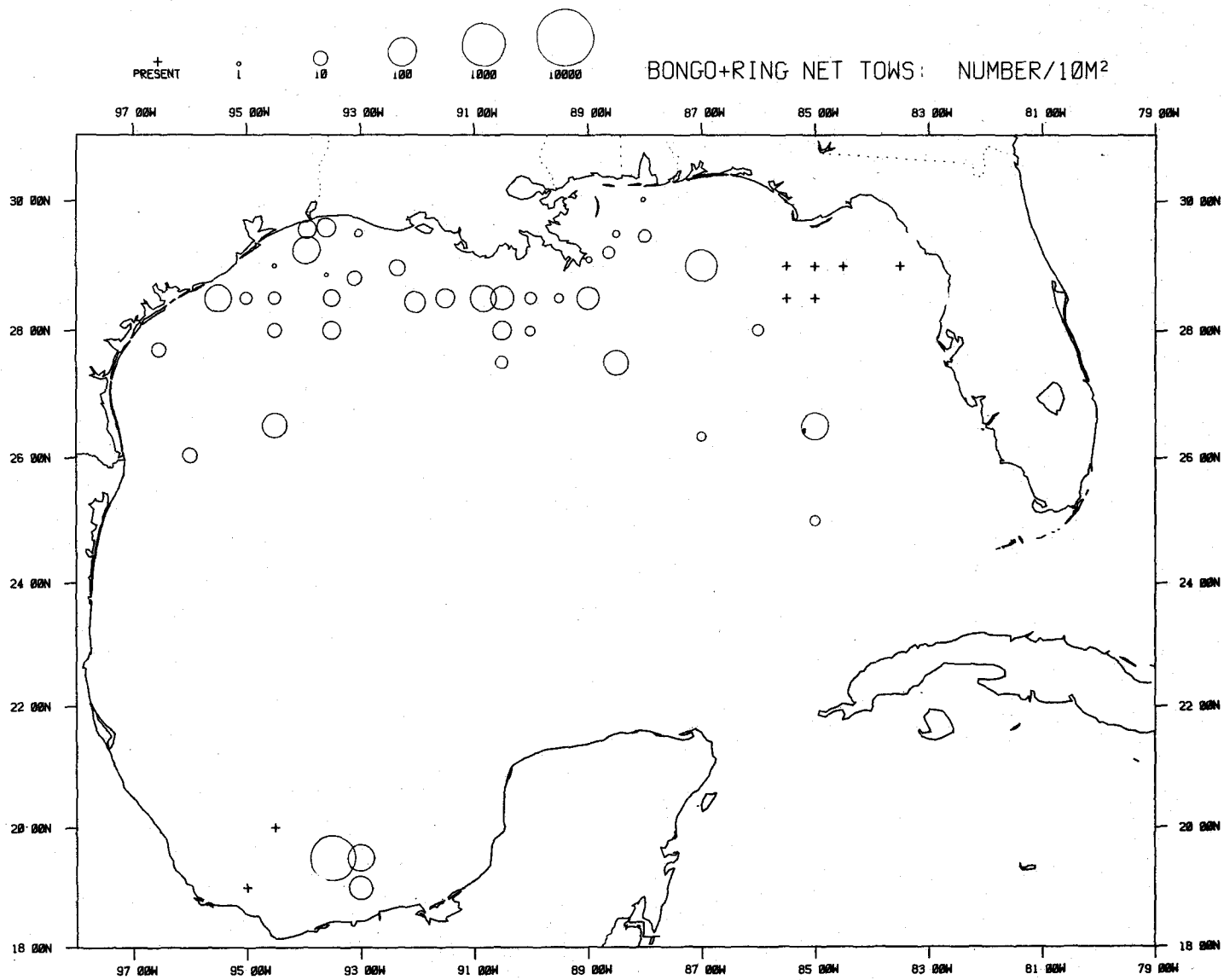


SEAMAP 1982 ICHTHYOPLANKTON: KATSUWONUS PELAMIS

FIGURE 24

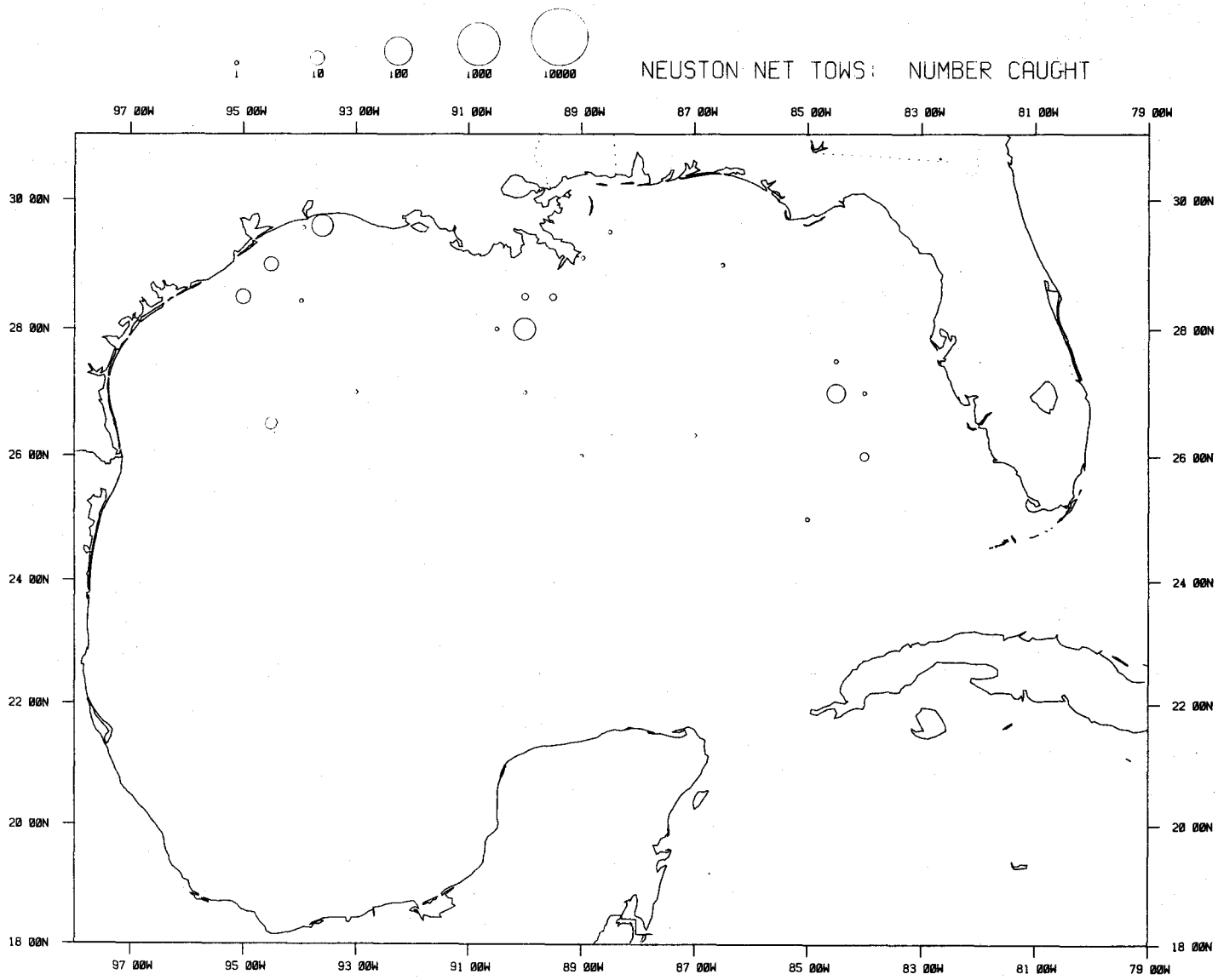






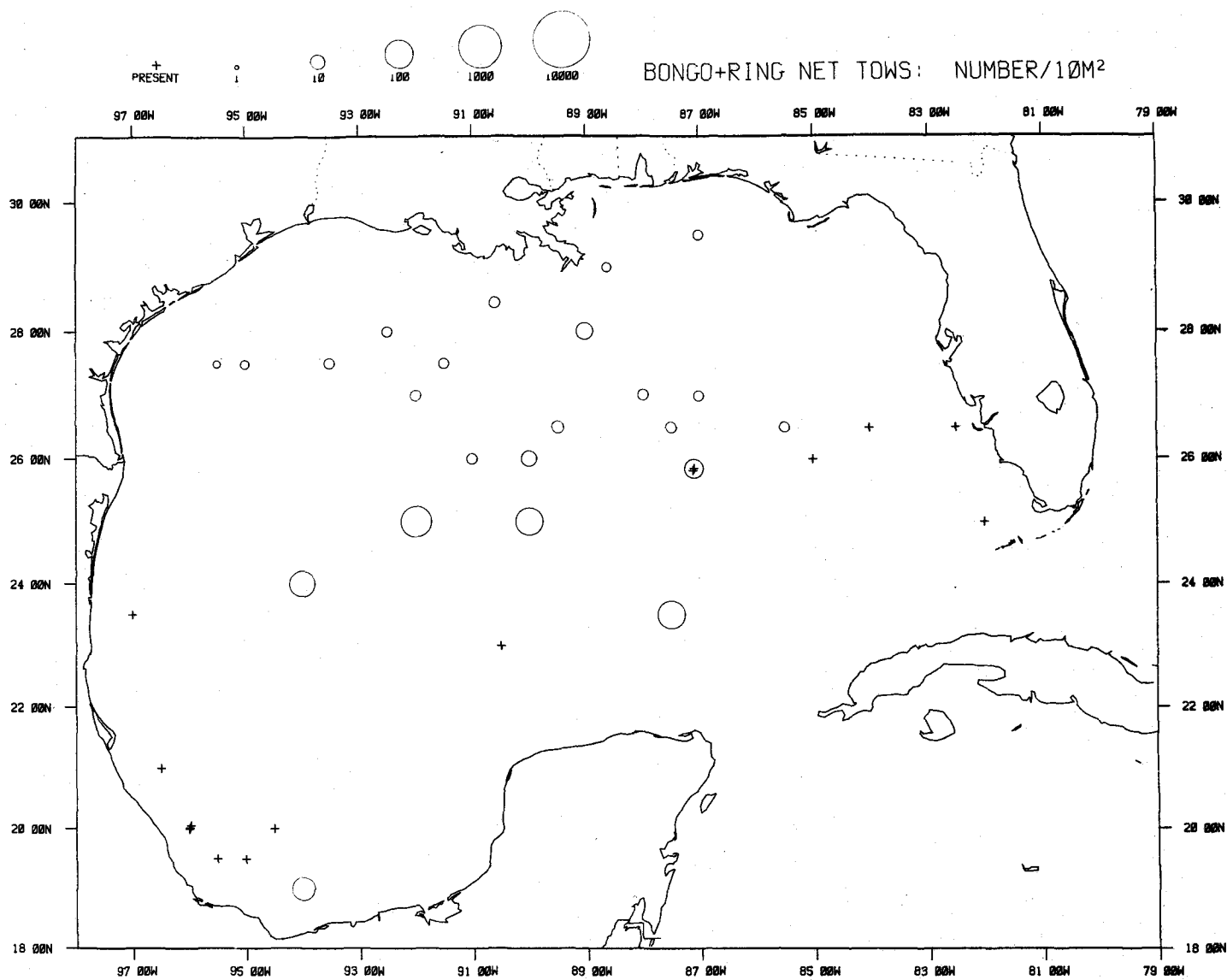
SEAMAP 1982 ICHTHYOPLANKTON: EUTHYNNUS ALLETTERATUS

FIGURE 27



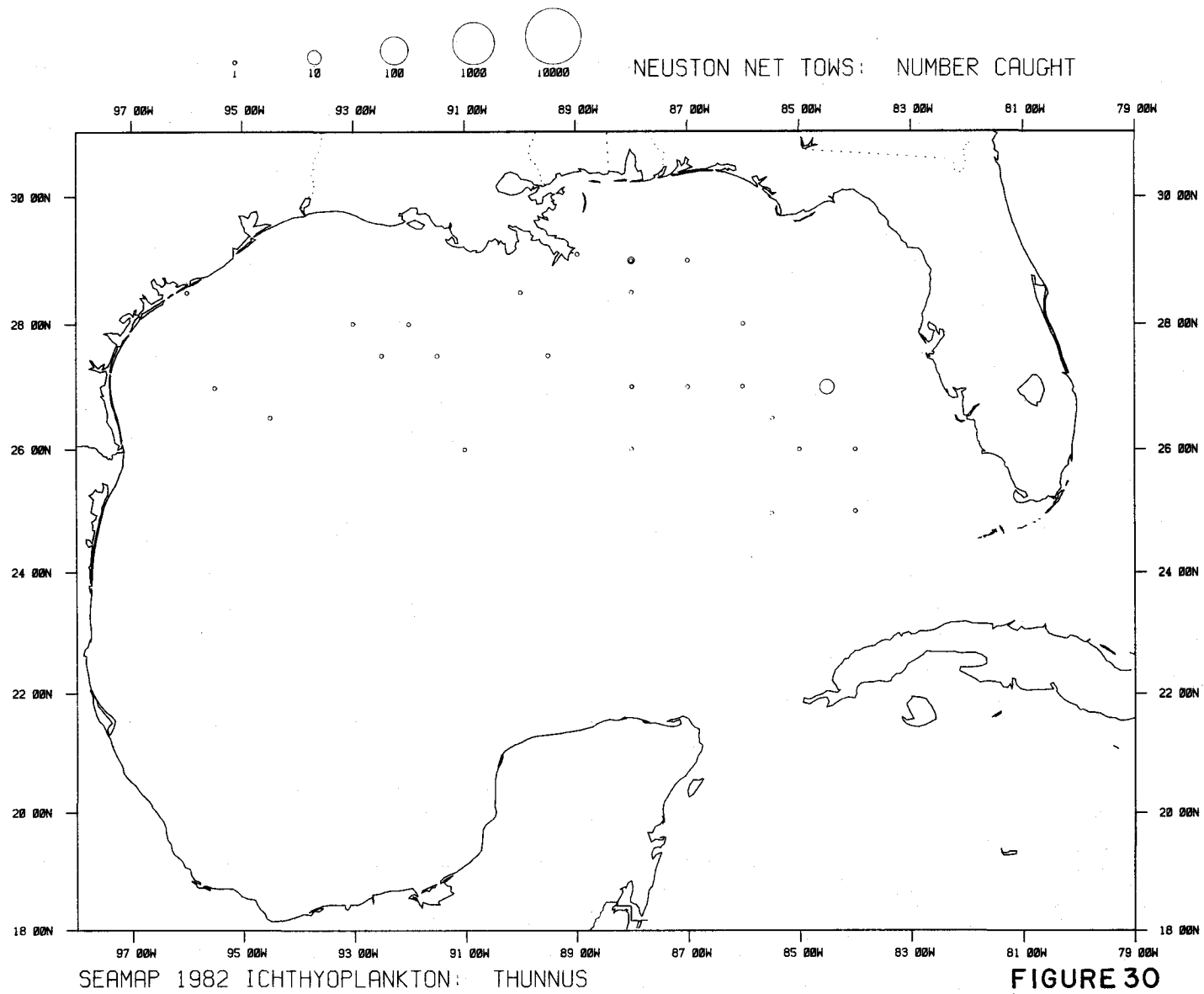
SEAMAP 1982 ICHTHYOPLANKTON: EUTHYNNUS ALLETTERATUS

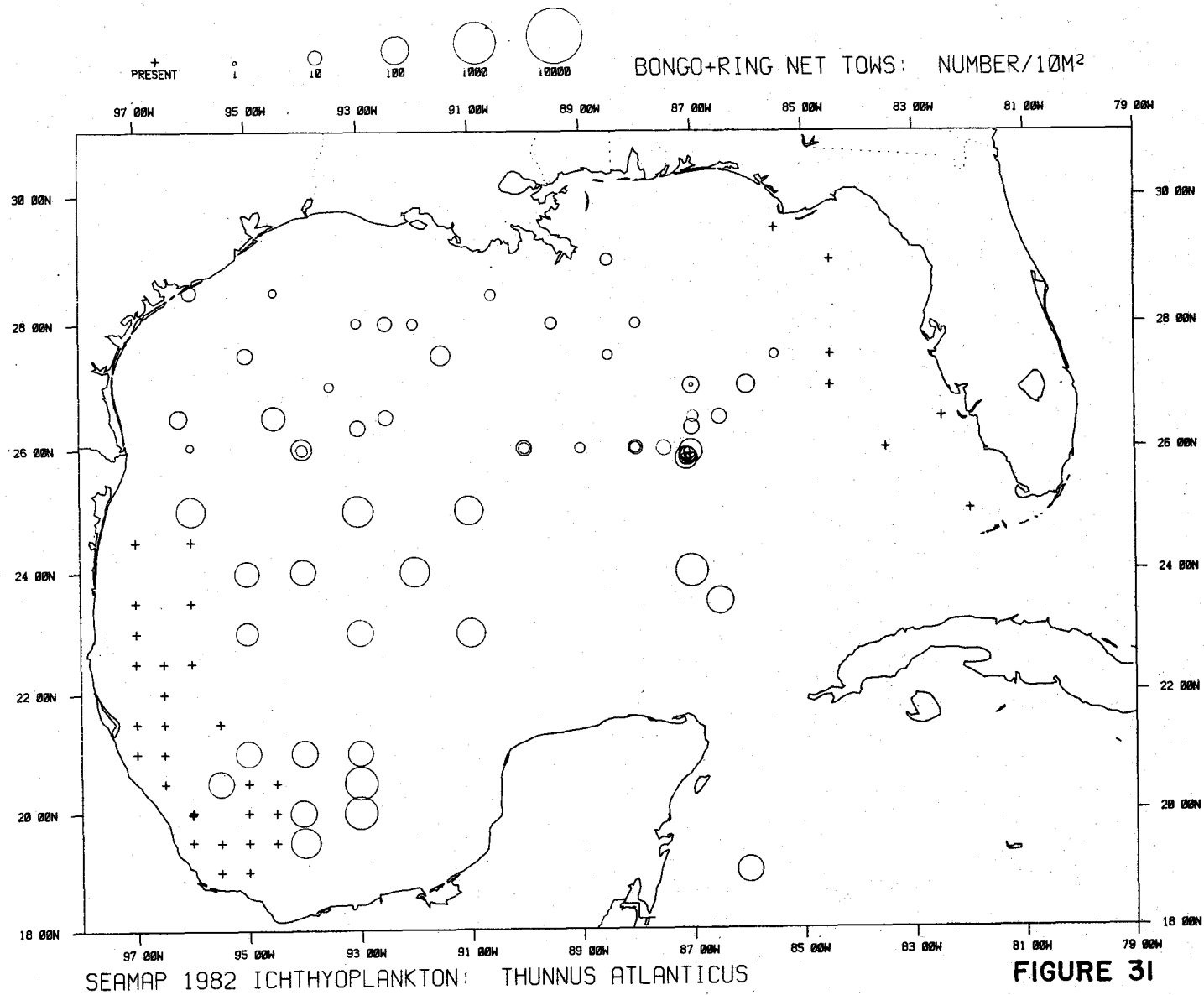
FIGURE 28

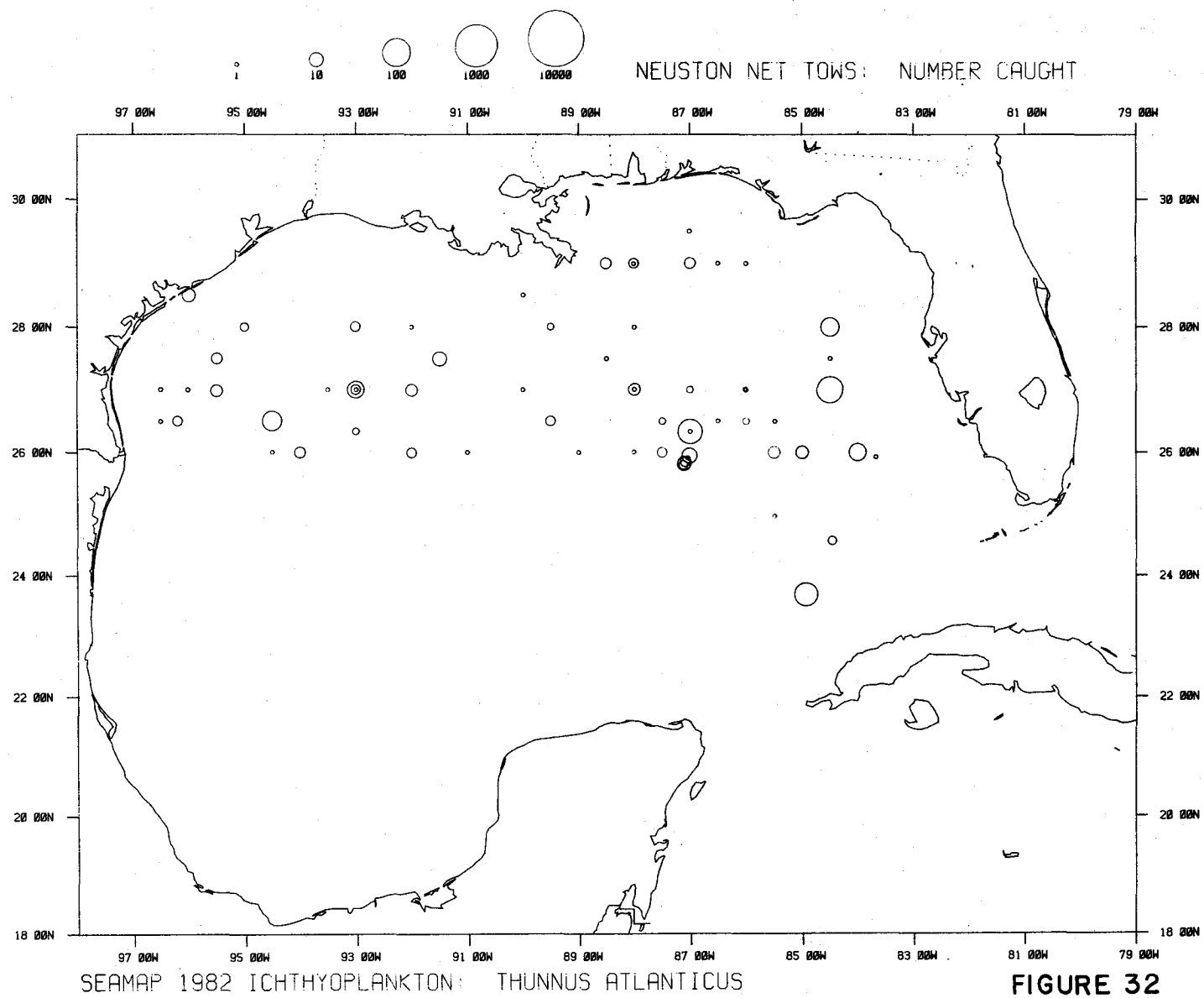


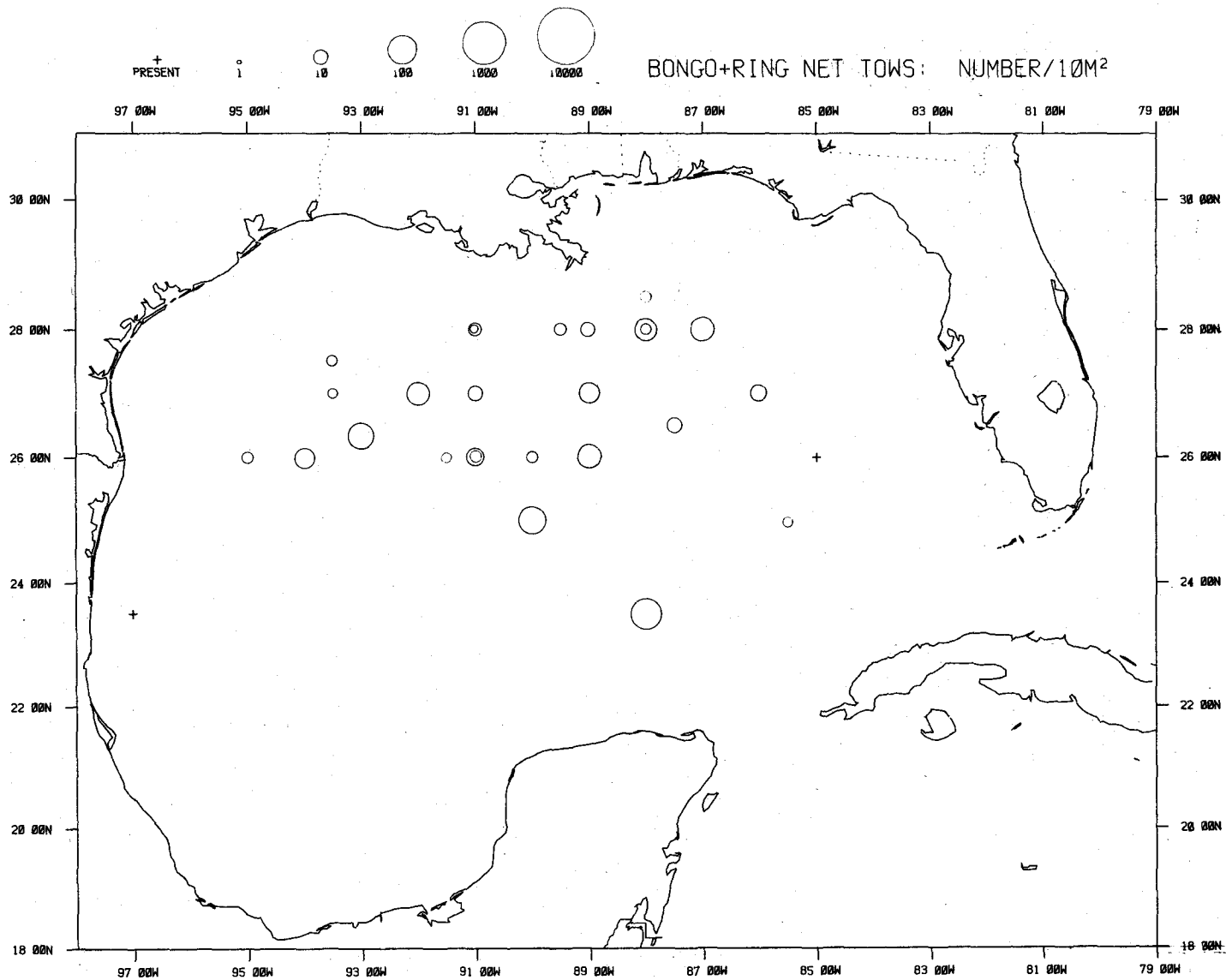
SEAMAP 1982 ICHTHYOPLANKTON: THUNNUS

FIGURE 29



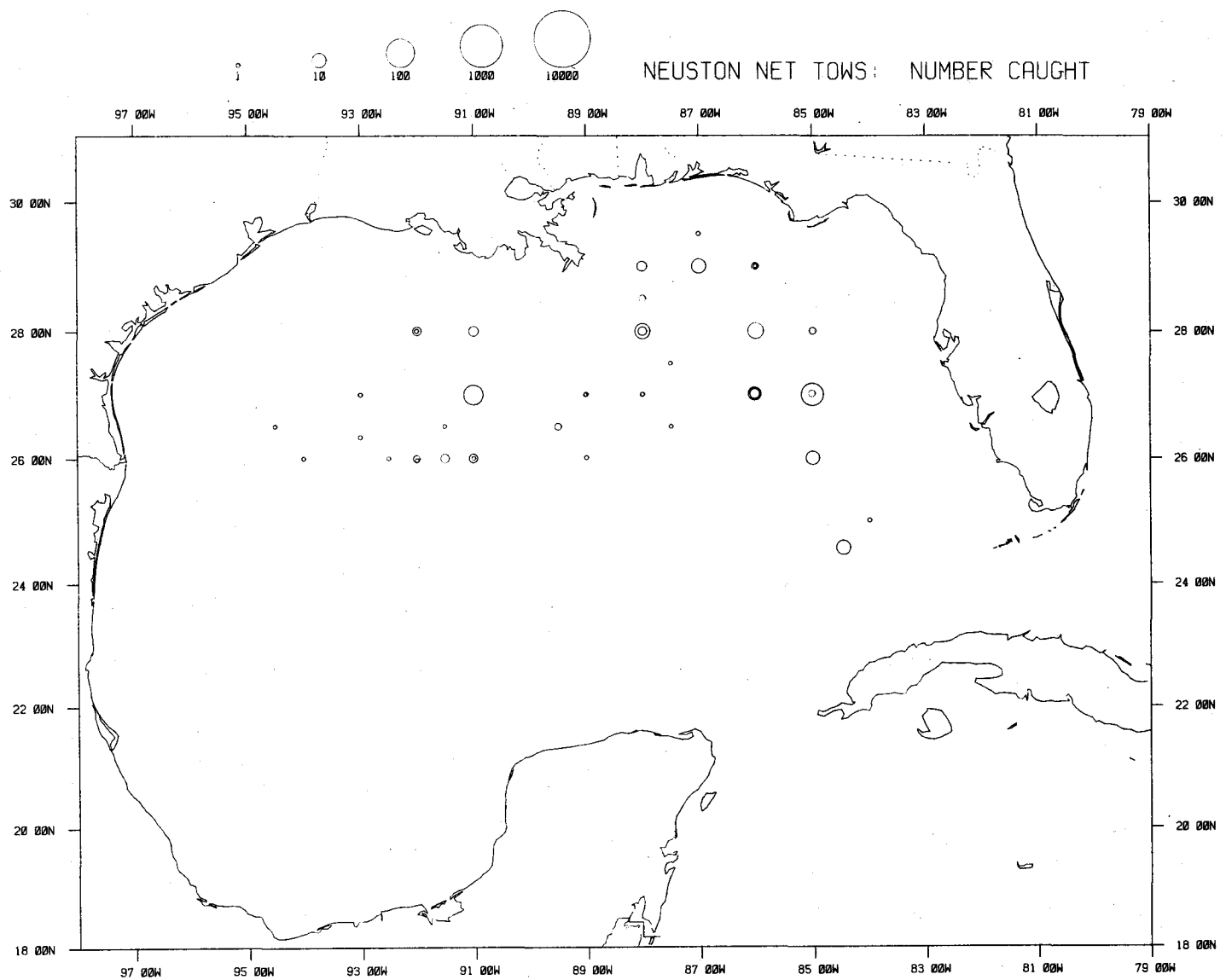






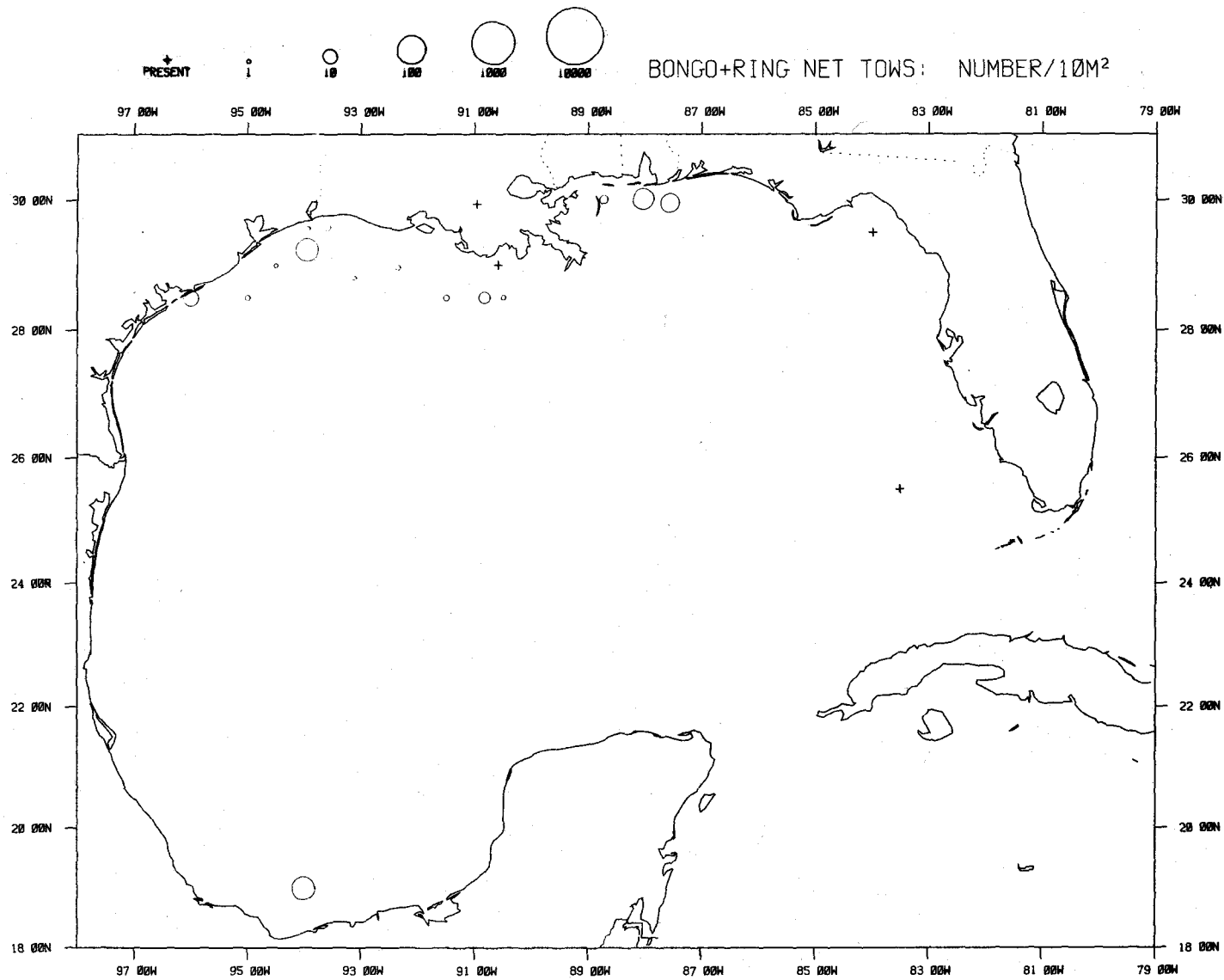
SEAMAP 1982 ICHTHYOPLANKTON: THUNNUS THYNNUS

FIGURE 33



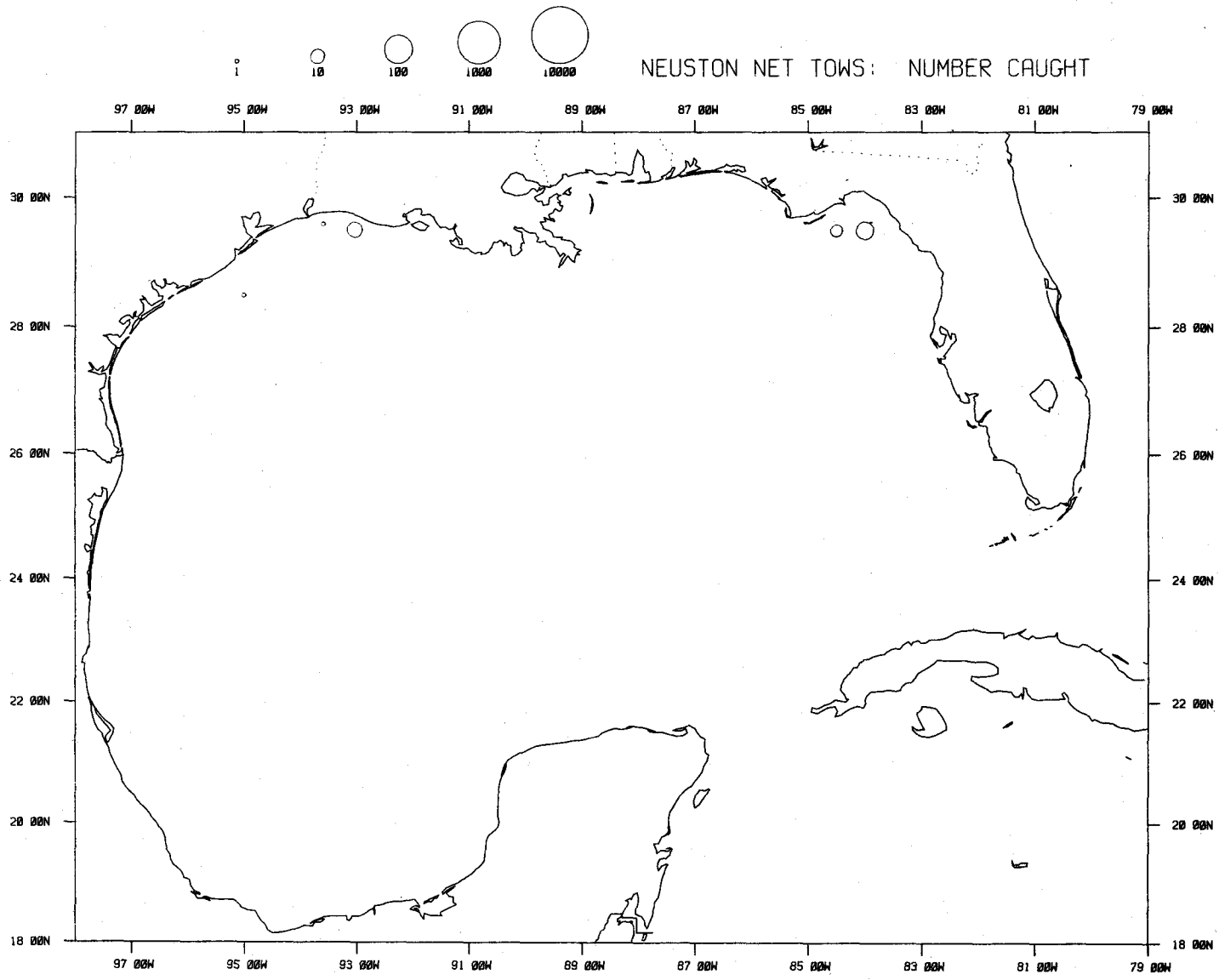
SEAMAP 1982 ICHTHYOPLANKTON: THUNNUS THYNNUS

FIGURE 34



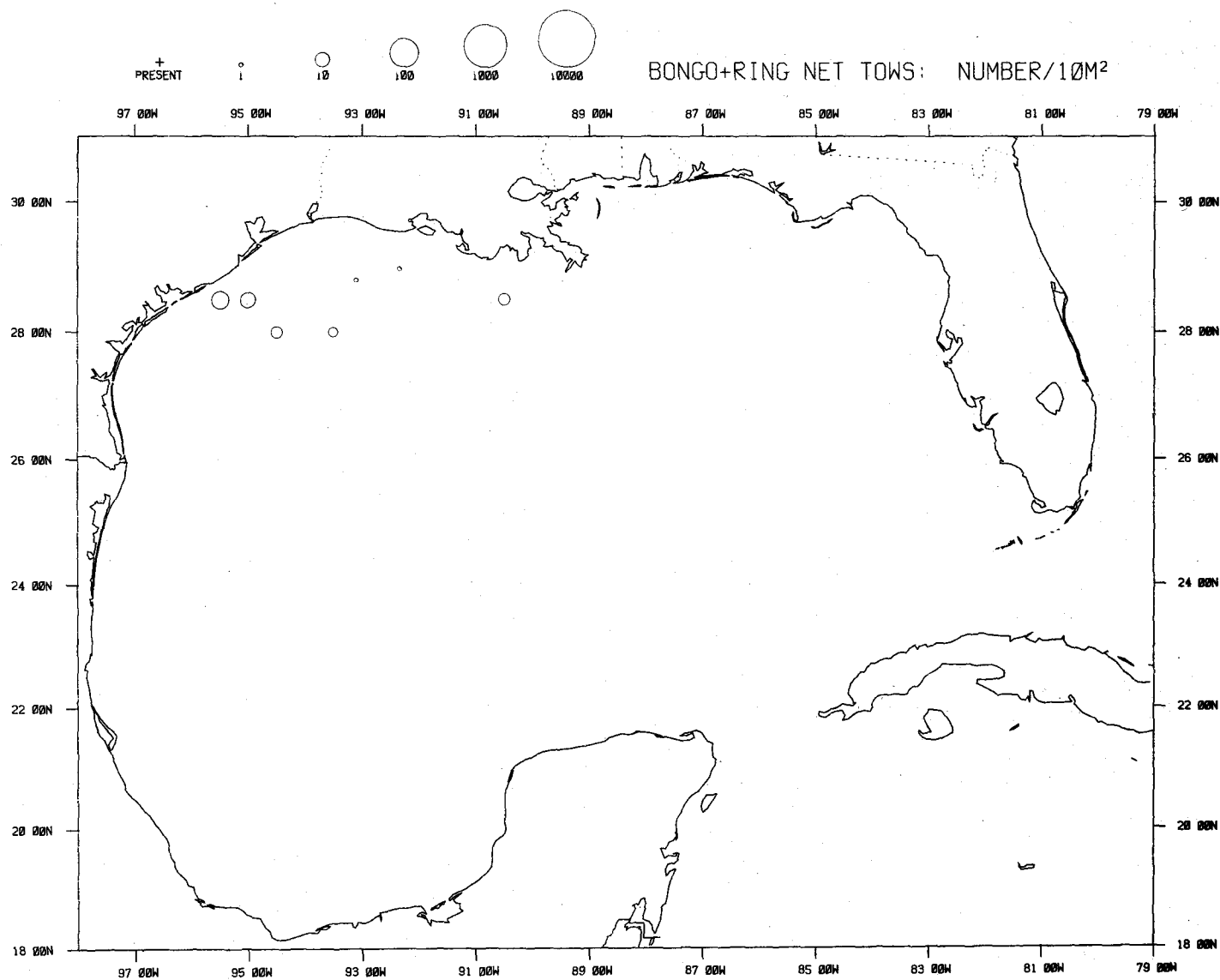
SEAMAP 1982 ICHTHYOPLANKTON: SCOMBEROMORUS MACULATUS

FIGURE 35



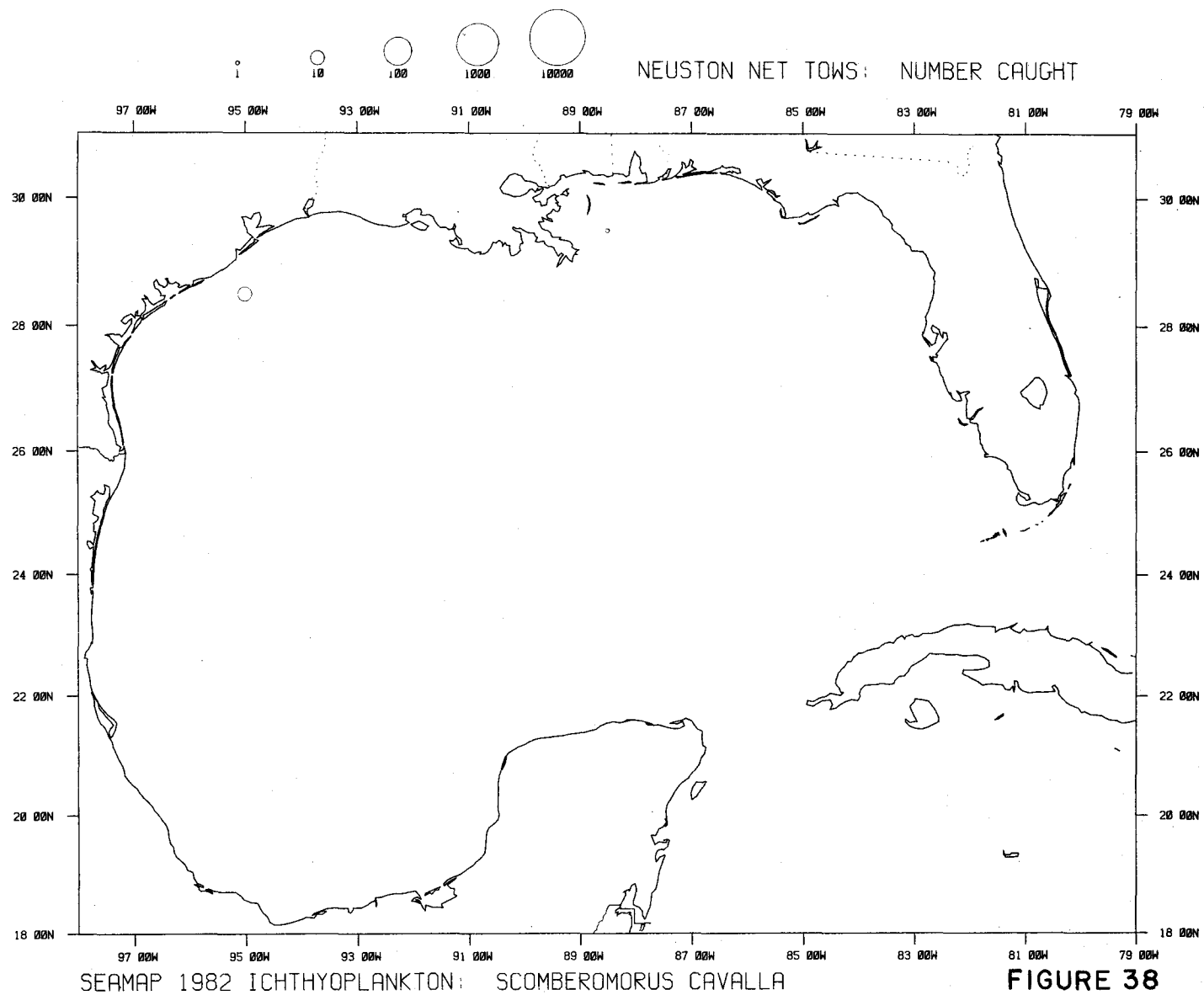
SEAMAP 1982 ICHTHYOPLANKTON: SCOMBEROMORUS MACULATUS

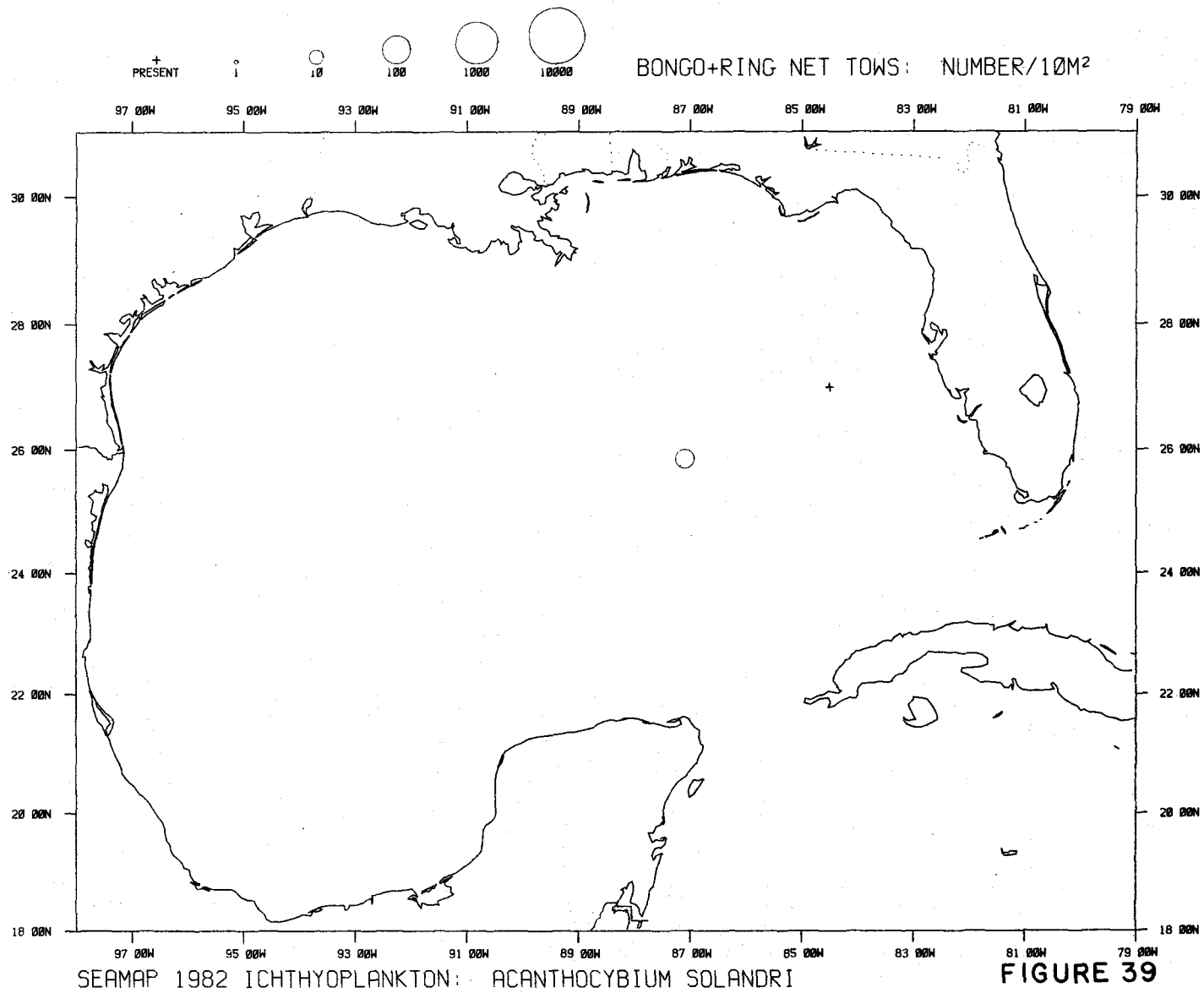
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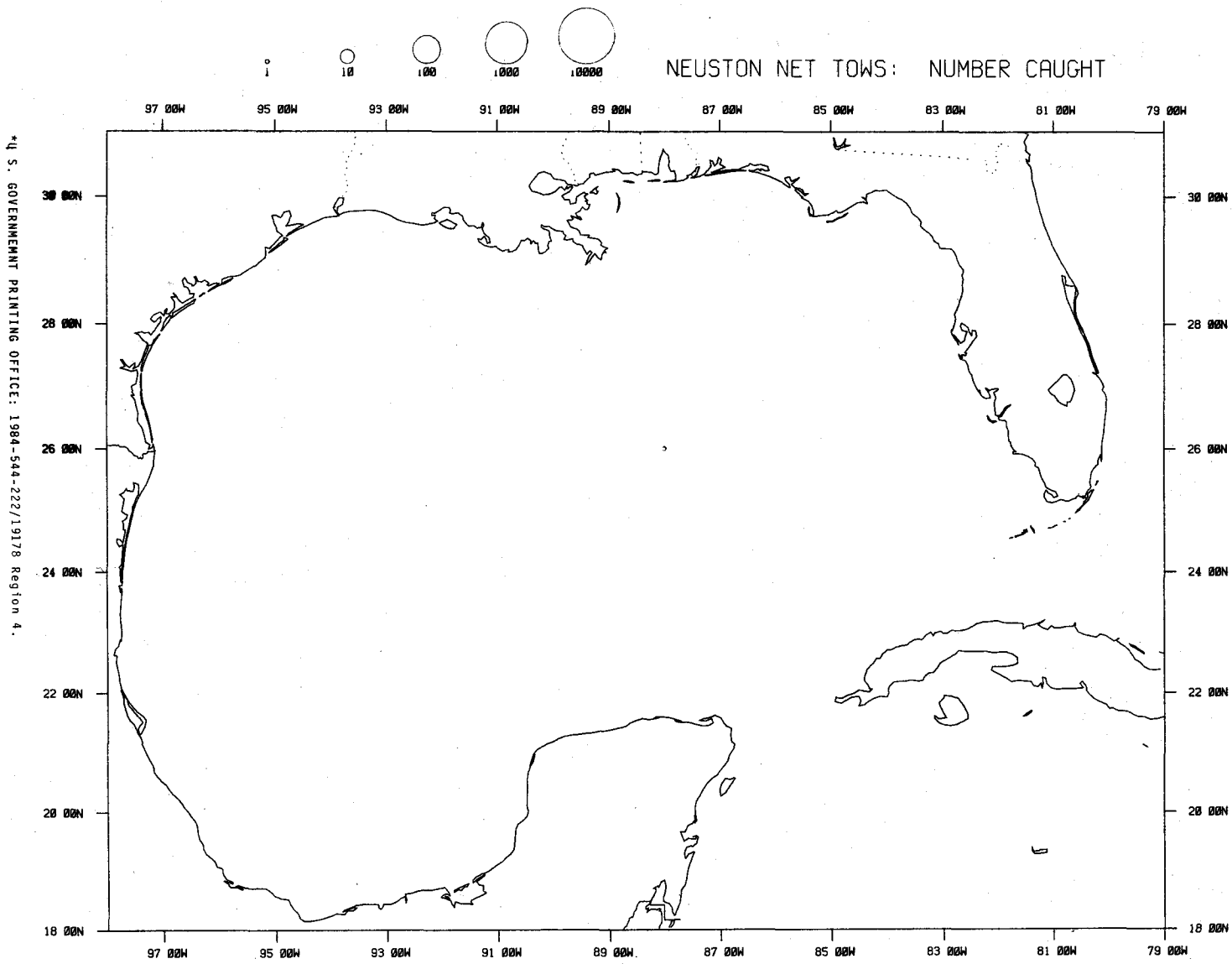


SEAMAP 1982 ICHTHYOPLANKTON: SCOMBEROMORUS CAVALLA

FIGURE 37







*U.S. GOVERNMENT PRINTING OFFICE: 1984-544-222/19178 Region 4.

SEAMAP 1982 ICHTHYOPLANKTON: ACANTHOCYBIUM SOLANDRI

FIGURE 40