

LARVAL DISTRIBUTIONS OF SCOMBRIDS (OTHER THAN BLUEFIN TUNA) AND SWORDFISH
IN THE GULF OF MEXICO IN THE SPRING OF 1977 AND 1978

W. J. Richards, T. Potthoff

SUMMARY

Based on ichthyoplankton surveys conducted in the Gulf of Mexico in the spring of 1977 and 1978, larval distributions for the following taxa are given: Thunnus spp., Auxis spp., Katsuwonus pelamis, Euthynnus alletteratus, Thunnus atlanticus, and Xiphias gladius. K. pelamis and T. atlanticus larvae were the most abundant in these cruises which took place at the end of April and May in 1977 and in May of 1978. Both bongo nets and neuston nets were employed. Larvae were most abundant in the eastern Gulf and no Xiphias gladius larvae were taken in the western Gulf.

RESUME

Des études sur l'ichtyoplancton menées au printemps dans le golfe du Mexique en 1977 et 1978 ont permis d'établir la distribution des larves des groupes taxonomiques suivants: Thunnus spp., Auxis spp., Katsuwonus pelamis, Euthynnus alletteratus, Thunnus atlanticus et Xiphias gladius. Les larves les plus abondantes observées au cours de ces croisières (fin avril-mai 1977 et mai 1978) sont celles du Katsuwonus pelamis

et du Thunnus atlanticus. Des filets bongo et neuston ont été utilisés. Les larves abondaient surtout dans la partie orientale du golfe; aucune larve de Xiphias gladius n'a été prise dans la zone ouest du golfe.

RESUMEN

Basado sobre prospecciones de ictioplancton llevadas a cabo en el Golfo de México en la primavera de 1977 y 1978, fueron dadas distribuciones larvarias para las siguientes especies: Thunnus spp., Auxis spp., Katsuwonus pelamis, Euthynnus alletteratus, Thunnus atlanticus, y Xiphias gladius. Las larvas de K. pelamis y T. atlanticus fueron las más abundantes en esas campañas, las cuales tuvieron lugar a finales de Abril y Mayo en 1977 y Mayo 1978. Se emplearon redes bongo y neuston. Las larvas fueron más abundantes en el Este del Golfo y no se recogieron larvas del Xiphias gladius en la zona Oeste.

INTRODUCTION

In another paper in this series (Richards and Potthoff, 1980), we presented findings on the distribution and abundance of Thunnus thynnus larvae in the Gulf of Mexico based on ichthyoplankton surveys conducted in 1977 and 1978. The purpose of this paper is to report on the distribution of other scombrids and swordfish which were taken in these same surveys. The additional scombrids found were Katsuwonus pelamis, Thunnus atlanticus, Euthynnus alletteratus, Auxis spp. and Thunnus spp. Other billfish were taken but only the swordfish, Xiphias gladius, is reported here.

METHODS

The ichthyoplankton surveys were conducted from the FRV OREGON II on cruises 7705 and 8703. Both 61 cm bongo nets and 1 x 2 m neuston nets were towed at each station. Methodology is fully described in Richards and Potthoff (1980). The taxa Thunnus spp. is probably composed of T. atlanticus and T. albacares, but positive identifications cannot be made in some larvae for sizes less than 6 mm standard length when ventral tail pigment is lacking (Potthoff, 1974; Richards and Potthoff, 1974). The species of Auxis are not clearly understood thus their larvae are not identified below the generic level (Potthoff and Richards, 1970).

RESULTS AND DISCUSSION

Distribution and abundances for Katsuwonus pelamis are given in Figures 1-4, for Thunnus atlanticus in Figs. 5-8, for Thunnus spp. in Figs. 9-12, for Auxis spp. in Figs. 13-16, for Euthynnus alletteratus in Figs.

17-20, and for Xiphias gladius in Figs. 21-23. Fecundities, length of spawning season or larval ages are not known for some of these species, and consequently estimates of spawning stock sizes were not made.

Since small tunas are becoming more important commercially, this information is presented to give some indication of the abundance of these species. During our 1977 and 1978 cruises, larvae of K. pelamis were distributed over the entire Gulf of Mexico and were more abundant in the eastern Gulf in 1978 (Figs. 1 to 4). K. pelamis larvae were not abundant in the eastern Gulf during any cruises reported on by Houde et al. (1979) because the species spawns offshore outside the 200 m isobath and not many stations were outside the 200 m isobath in Houde et al. (1979) cruises. T. atlanticus larvae were also distributed over the entire Gulf of Mexico during our two cruises similar to K. pelamis but in greater numbers (Figs. 5 to 8). Houde et al. (1979) found T. atlanticus larvae in the eastern Gulf to be very abundant in August and to occur less abundantly in June and July. T. atlanticus spawned offshore as well as closer to shore than K. pelamis. Most larvae of T. atlanticus were found by Houde et al. (1979) outside the 50 m isobath with some occurring outside the 10 m isobath. We believe that most of our Thunnus spp. larvae were T. albacares and a few T. atlanticus, which were sparsely distributed over the entire Gulf of Mexico during our 1977 and 1978 cruises (Figs. 9 to 12). Auxis spp. larvae also were sparsely distributed over the entire Gulf during our two cruises (Figs. 13 to 16). Houde et al. 1979 found Auxis spp. larvae to be most abundant in August with some occurrences in January, February, May, June, and July. They are similarly distributed as T. atlanticus with most larvae occurring outside the 50 m isobath and some Auxis spp. larvae

occurring up to the 10 m isobath. Euthynnus alletteratus larvae were not abundant on our cruises because our sampling did not extend close to shore (Figs. 17 to 20). On Houde et al. (1979) cruises to the eastern Gulf of Mexico, most E. alletteratus larvae were found inside the 200 m isobath distributed up to the 10 m isobath. During those cruises larvae were abundant in August with few occurrences in February, May, June and July. Xiphias gladius larvae were not abundant on our cruises (Figs. 21 to 24) and none were caught in the Bongo nets in 1977. The Neuston net captured more Xiphias larvae on considerably more stations than the Bongo net in 1978. This indicates that Xiphias occurs very close to the surface in the upper 0.5 m layer. Xiphias larvae were found only in the eastern Gulf of Mexico and the Straits of Florida. No Xiphias larvae were found by Houde et al. (1979) in the eastern Gulf of Mexico probably because their sampling was too close to shore.

Juarez (1976) found Auxis, E. alletteratus, and K. pelamis in the central Gulf of Mexico in April and May; during August and September she found larvae of T. atlanticus, Auxis, E. alletteratus, and K. pelamis distributed over the entire Gulf of Mexico. During October and November she found a few T. atlanticus, Auxis spp., E. alletteratus, and K. pelamis distributed principally in the western Gulf. From these other studies it is apparent that the larval distribution of these species is widespread in time and space, but that specific tendencies for spawning time and area are becoming evident.

ACKNOWLEDGMENTS

We thank the following who assisted in sorting and enumerating this material: K. Clark, J. Javech, S. Kelley, S. Loher, and R. Smith. Mrs. P. Fisher typed the manuscript, and J. Ramsay prepared the photographs. We also thank the Captain and crew of the FRV OREGON II for their interest in our work and their cooperation.

LITERATURE CITED

- Houde, E.D., J.C. Leak, C.E. Dowd, S.A. Berkeley, and W.J. Richards. 1979. Ichthyoplankton abundance and diversity in the eastern Gulf of Mexico. Report to the Bureau of Land Management. 546 p.
- Juarez, M. (1976) Distribucion de las formas larvarias de algunas especies de la familia Scombridae en aguas del Golfo de Mexico. Rev. Invest., INP, 2(1):33-65.
- Potthoff, T. 1974. Osteological development and variation in young tunas, genus Thunnus (Pisces, Scombridae, from the Atlantic Ocean. Fishery Bull. U.S. 72(2):563-588.
- Potthoff, T. and W.J. Richards. 1970. Juvenile bluefin tuna Thunnus thynnus (Linnaeus), and other scombrids taken by terns in the Dry Tortugas, Florida. Bull. mar. Sci. 20(2):389-413.
- Richards, W.J. and T. Potthoff. 1974. Analysis of the taxonomic characters of young scombrid fishes, Genus Thunnus. Pages 623-648 in Blaxter, J.H.S. (ed.) The Early Life History of Fish. Springer-Verlag, Berlin.
- Richards, W.J. and T. Potthoff. 1980. Distribution and abundance of bluefin tuna larvae in the Gulf of Mexico in 1977 and 1978. International Commission for the Conservation of Atlantic Tunas. Collective Volume of Scientific Papers. 9(2).

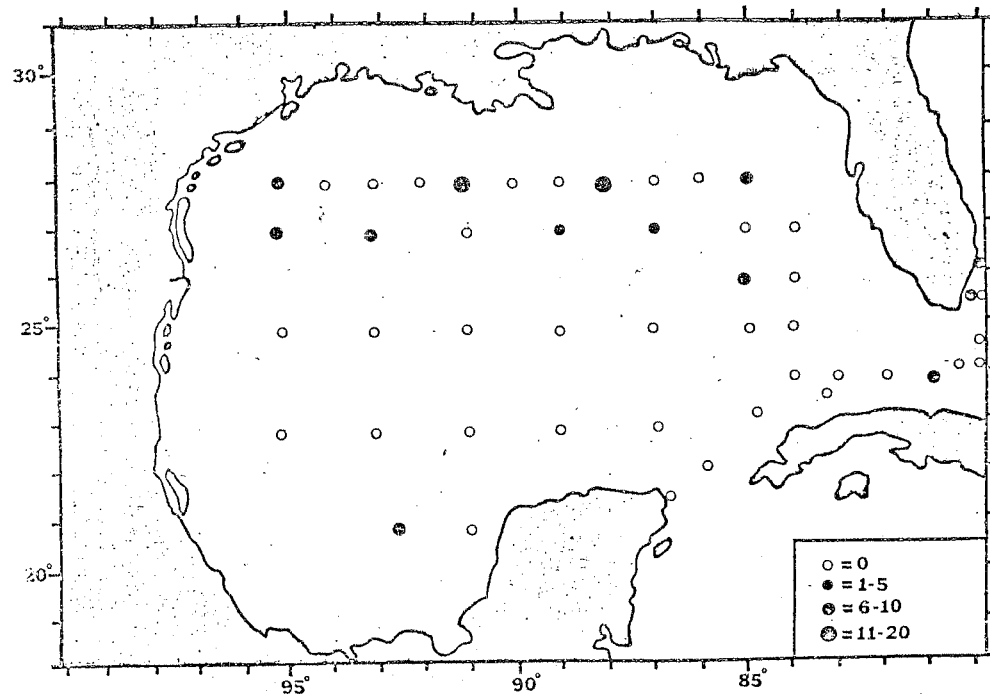


Figure 1 - Distribution and abundance of *Katsuwonus pelamis* larvae taken by bongo nets during OREGON II cruise 7705. Units are numbers of larvae under 10 m² of sea surface.

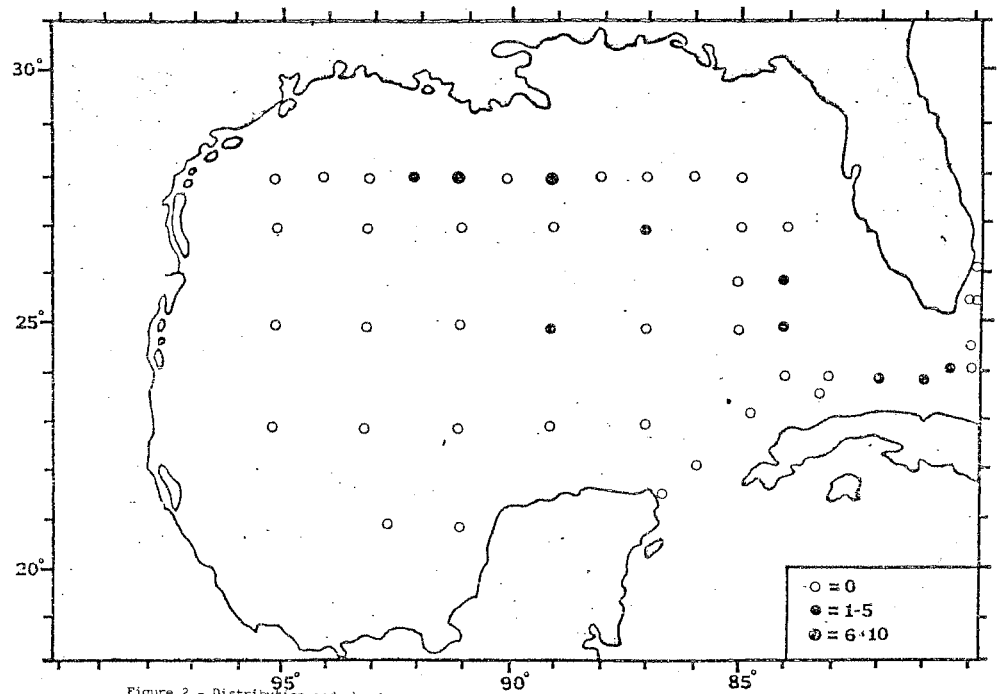


Figure 2 - Distribution and abundance of *Katsuwonus pelamis* larvae taken by neuston nets during OREGON II cruise 7705. Units are numbers of larvae taken per tow.

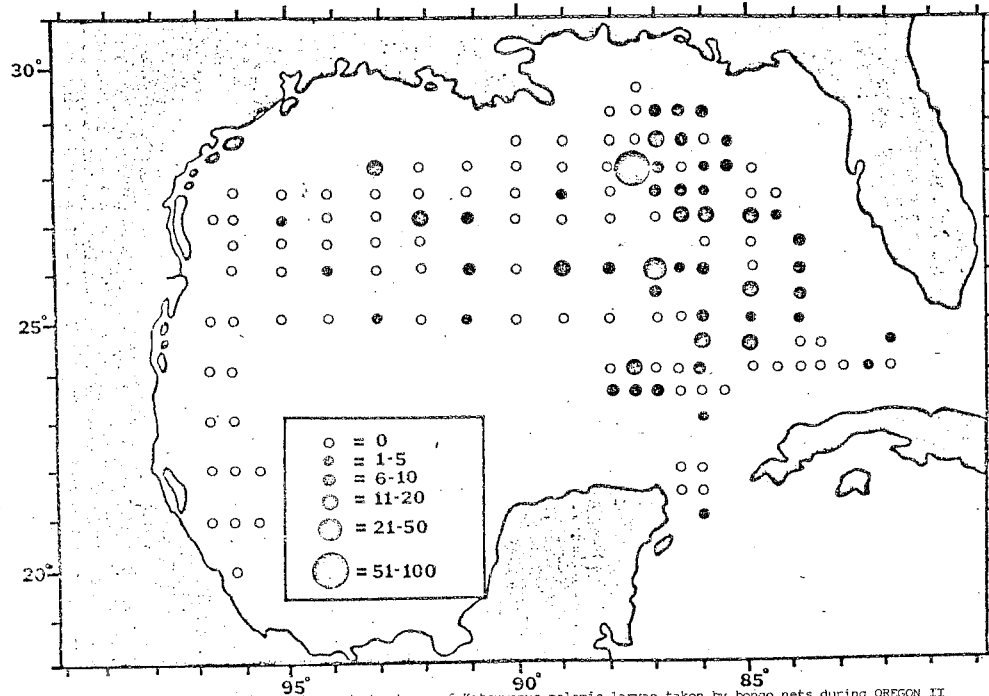


Figure 3 - Distribution and abundance of *Katsuwonus pelamis* larvae taken by bongo nets during OREGON II cruise 7803. Units are numbers of larvae under 10 m of sea surface.

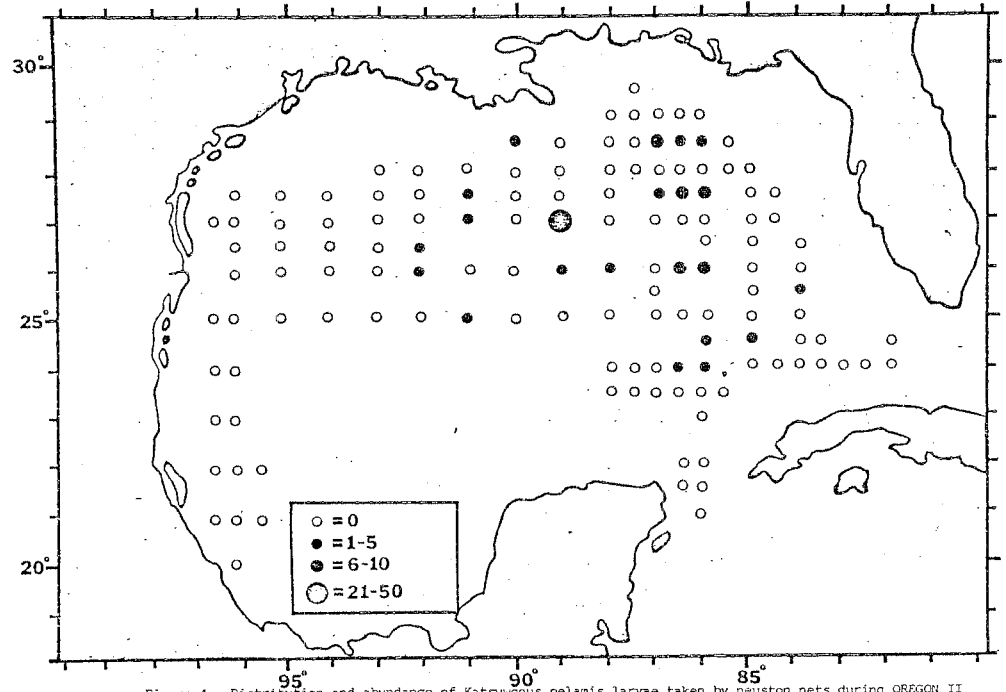


Figure 4 - Distribution and abundance of *Katsuwonus pelamis* larvae taken by neuston nets during OREGON II cruise 8703. Units are numbers of larvae taken per tow.

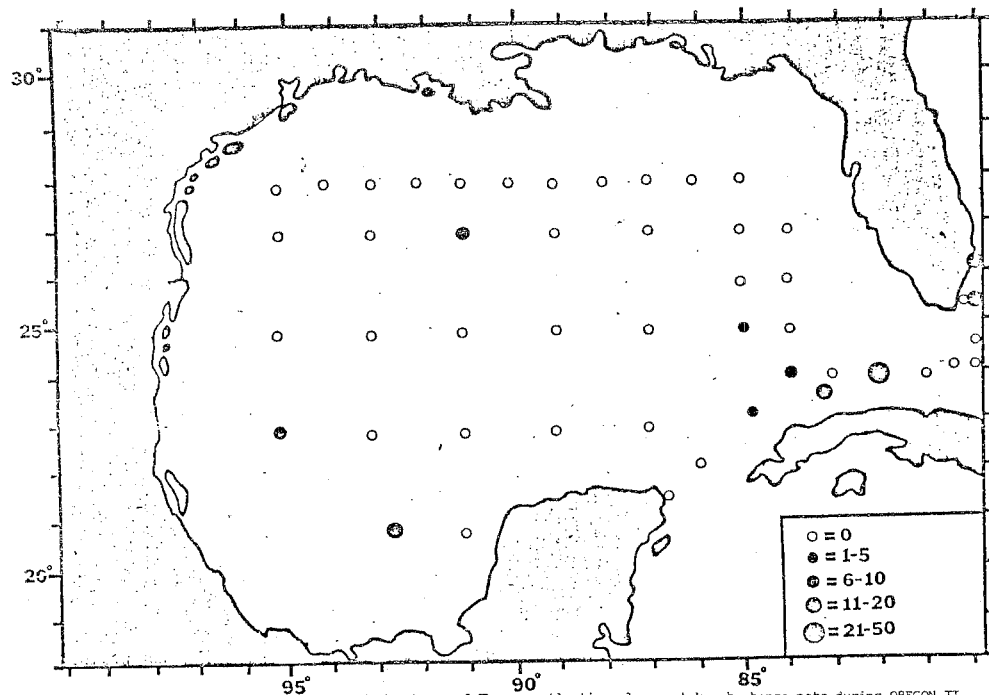


Figure 5 - Distribution and abundance of *Thunnus atlanticus* larvae taken by bongo nets during OREGON II cruise 7705. Units are numbers of larvae under 10 m² of sea surface.

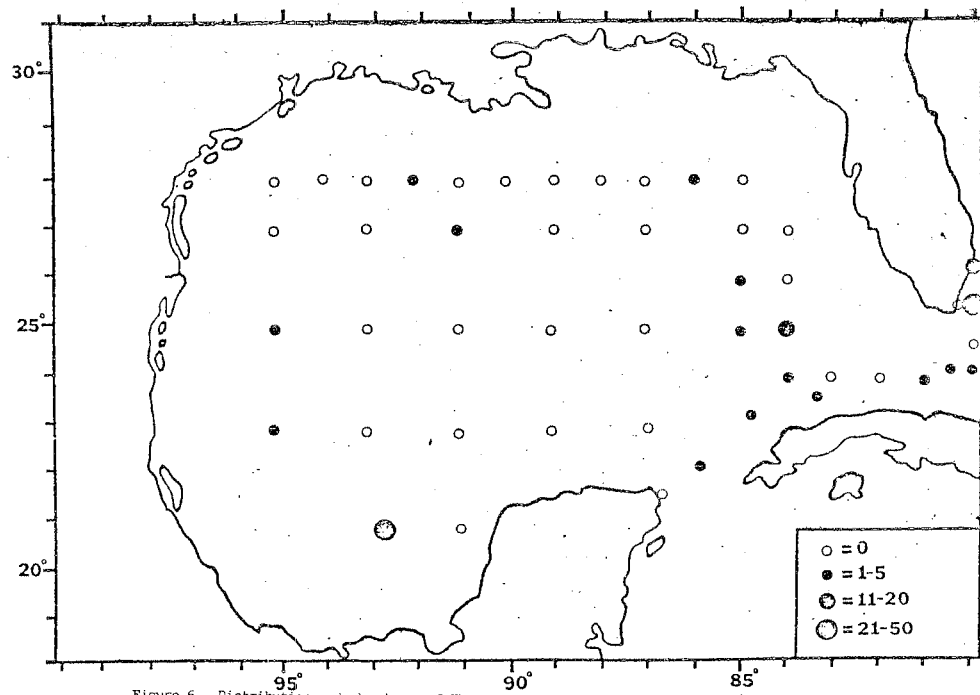
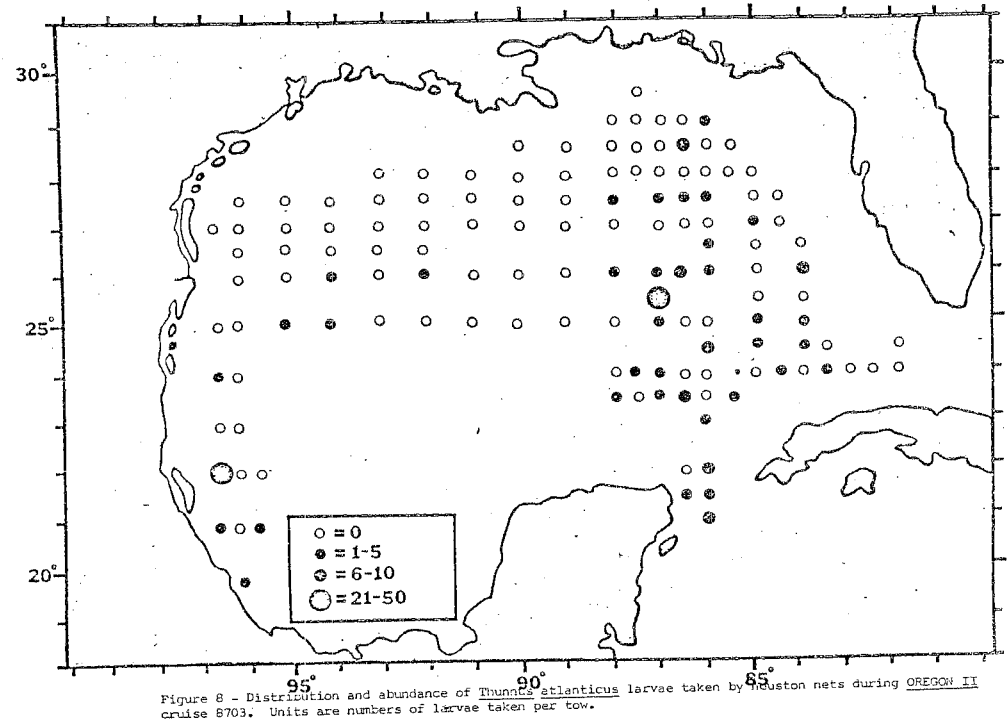
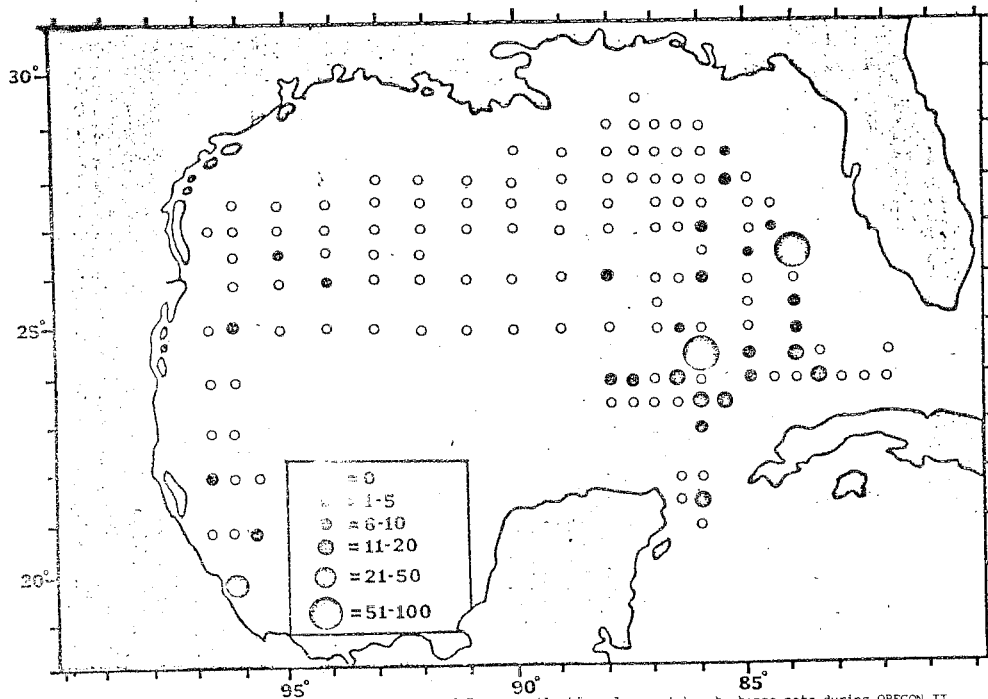


Figure 6 - Distribution and abundance of *Thunnus atlanticus* larvae taken by neuston nets during OREGON II cruise 7705. Units are numbers of larvae taken per tow.



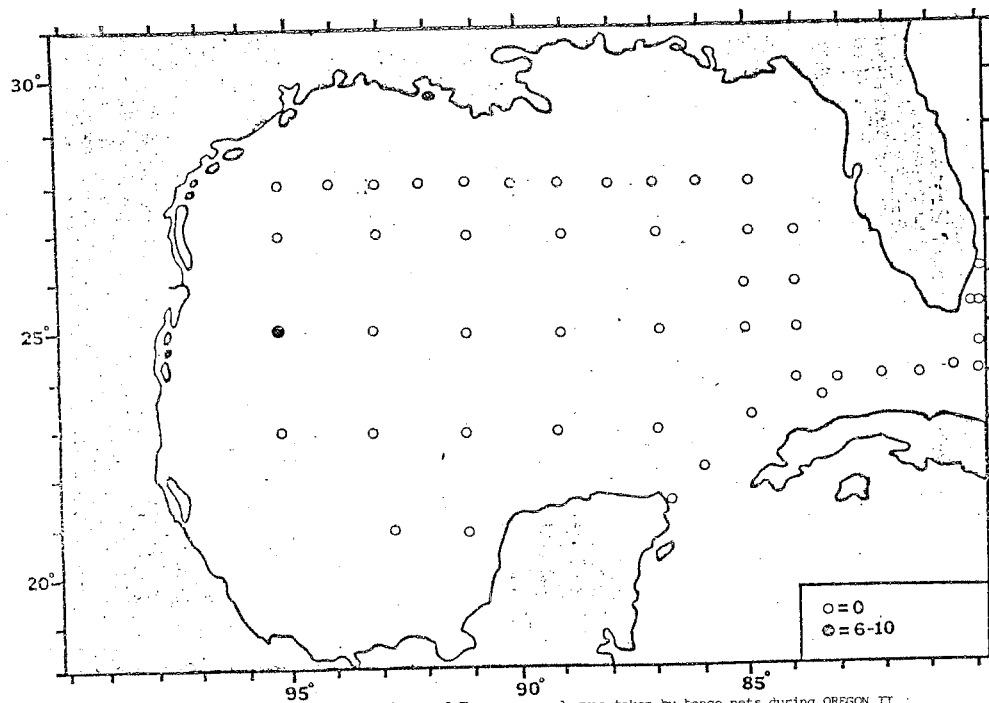


Figure 9 - Distribution and abundance of *Thunnus* spp. larvae taken by bongo nets during OREGON II cruise 7705. Units are numbers of larvae under 10 m² of sea surface.

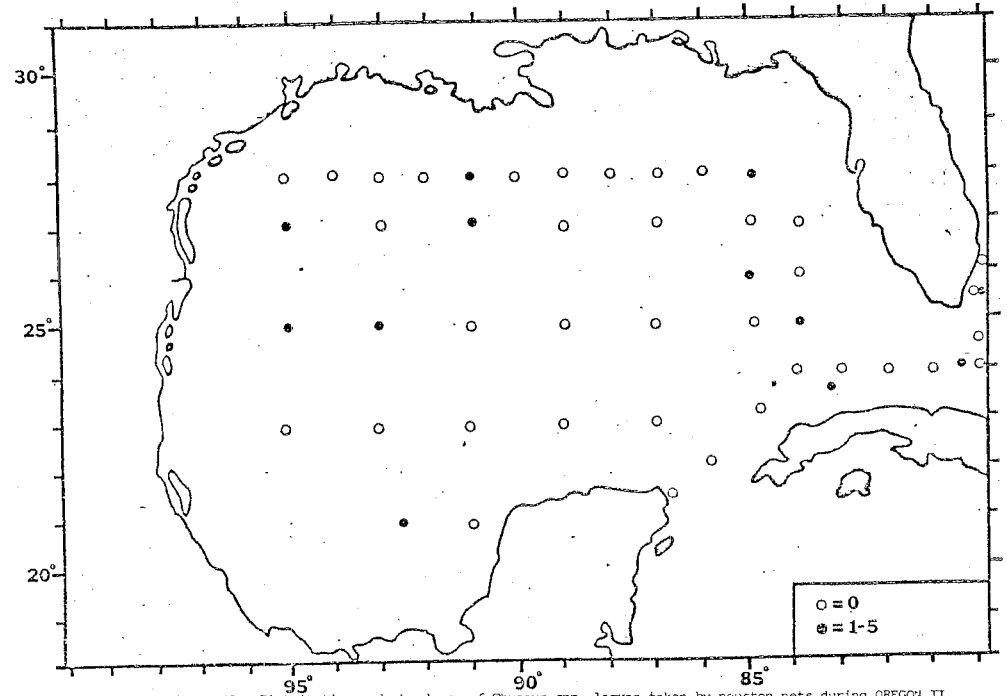


Figure 10 - Distribution and abundance of *Thunnus* spp. larvae taken by neuston nets during OREGON II cruise 7705. Units are numbers of larvae taken per tow.

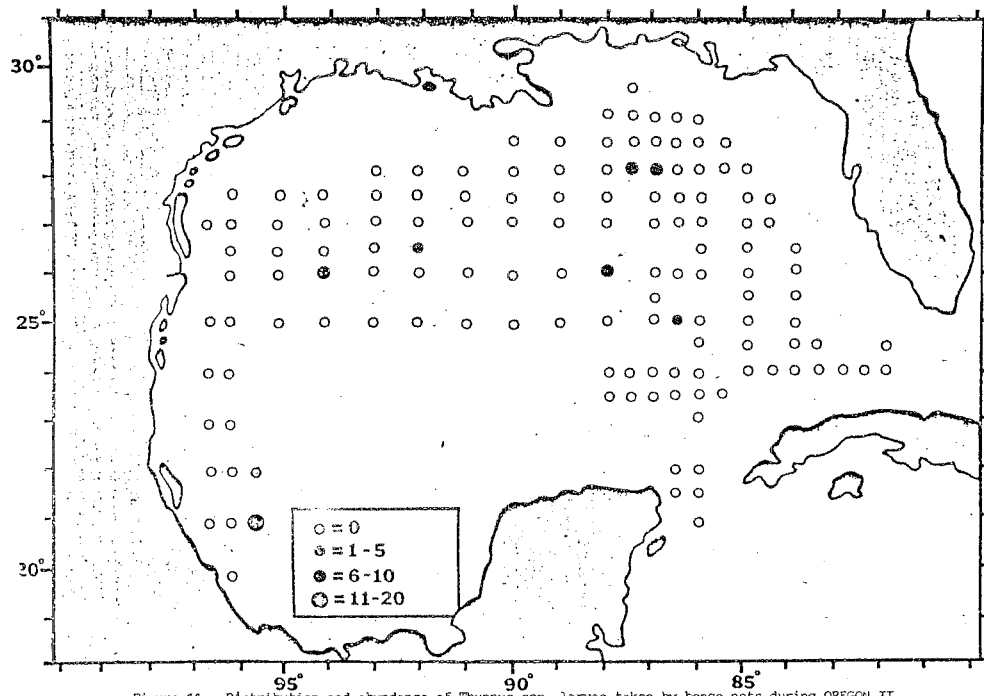


Figure 11 - Distribution and abundance of *Thunnus* spp. larvae taken by bongo nets during OREGON II cruise 8703. Units are numbers of larvae under 10 m² of sea surface.

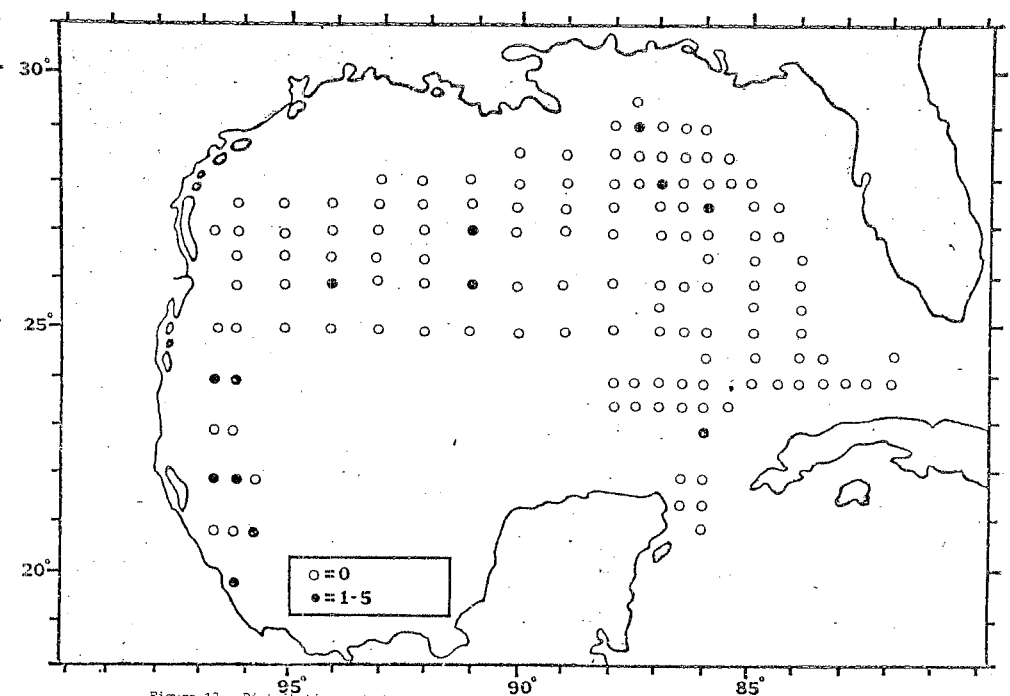


Figure 12 - Distribution and abundance of *Thunnus* spp. larvae taken by neuston nets during OREGON II cruise 8703. Units are numbers of larvae taken per tow.

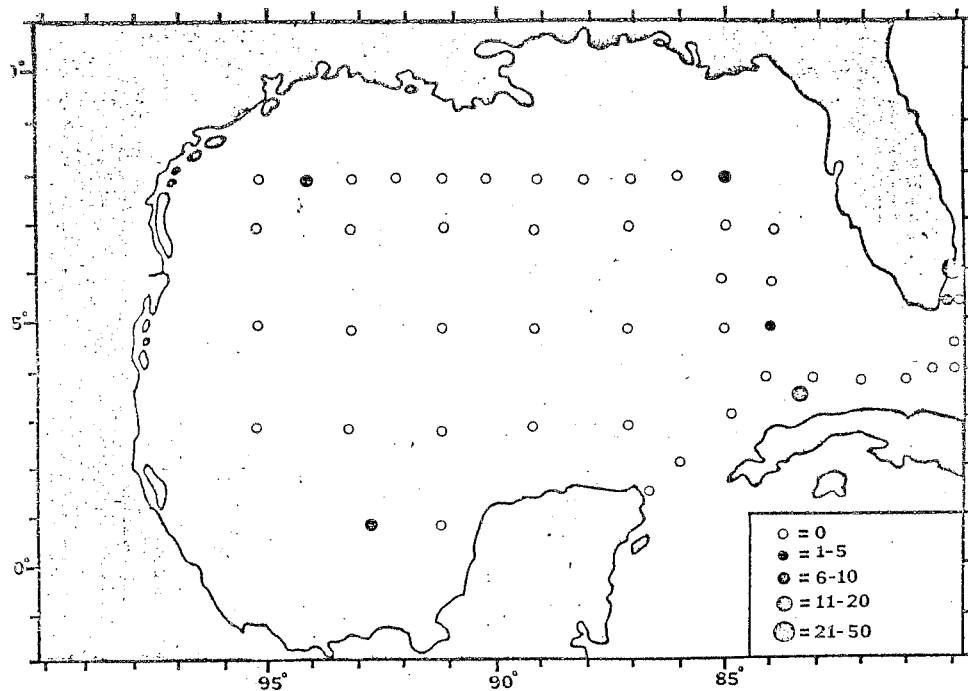


Figure 13 - Distribution and abundance of *Auxis* spp. larvae taken by bongo nets during OREGON II cruise 7705. Units are numbers of larvae under 10 m² of sea surface.

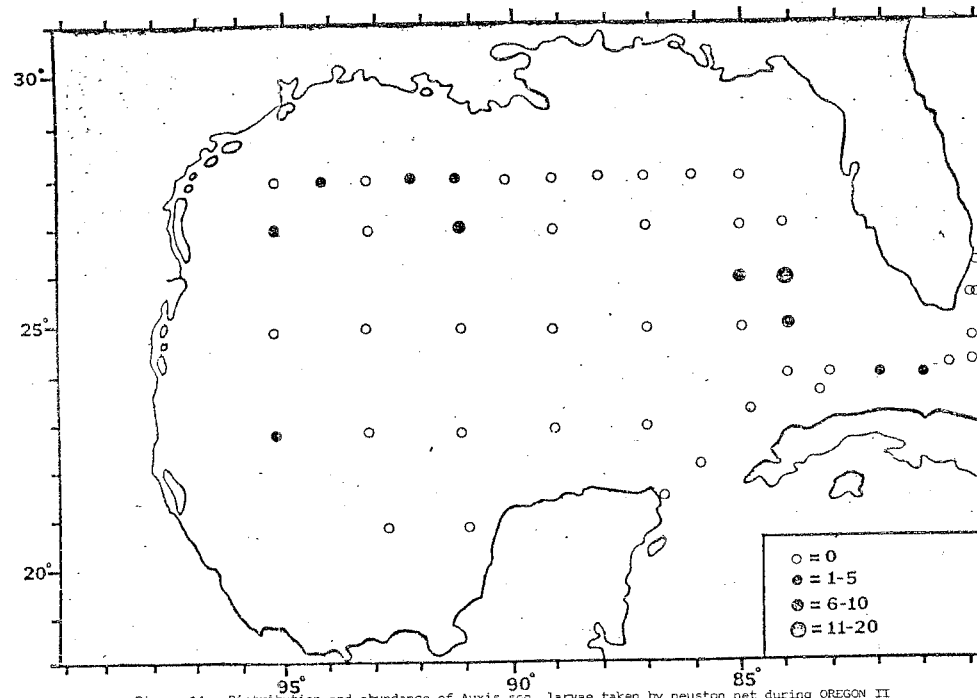


Figure 14 - Distribution and abundance of *Auxis* spp. larvae taken by neuston net during OREGON II cruise 7705. Units are numbers of larvae taken per tow.

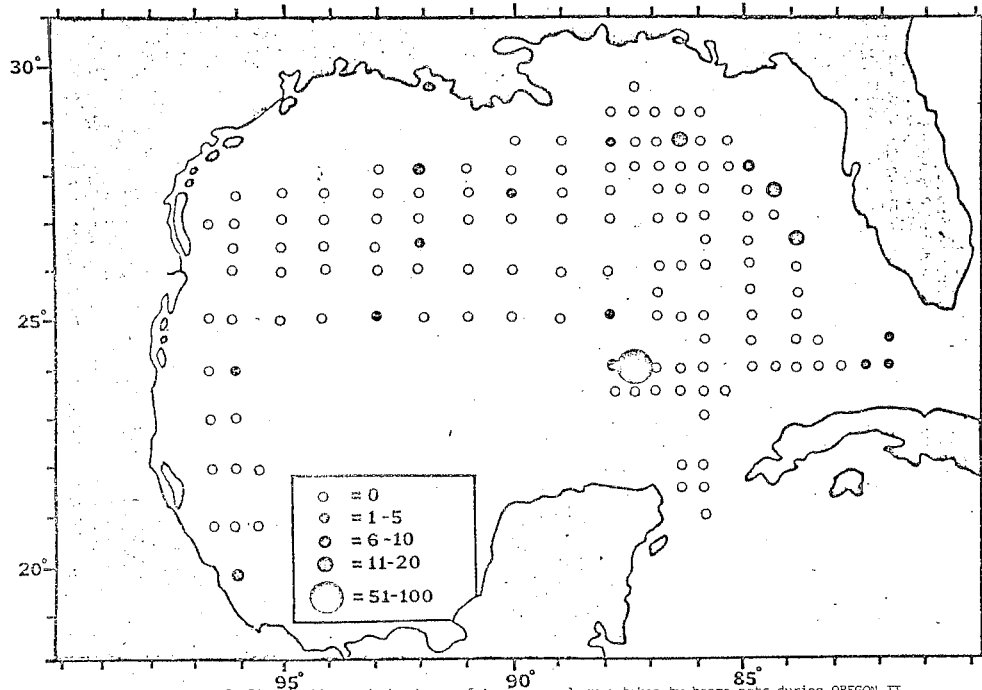


Figure 15. Distribution and abundance of *Auxis* spp. larvae taken by bongo nets during OREGON II cruise 8703. Units are numbers of larvae under 10 m² of sea surface.

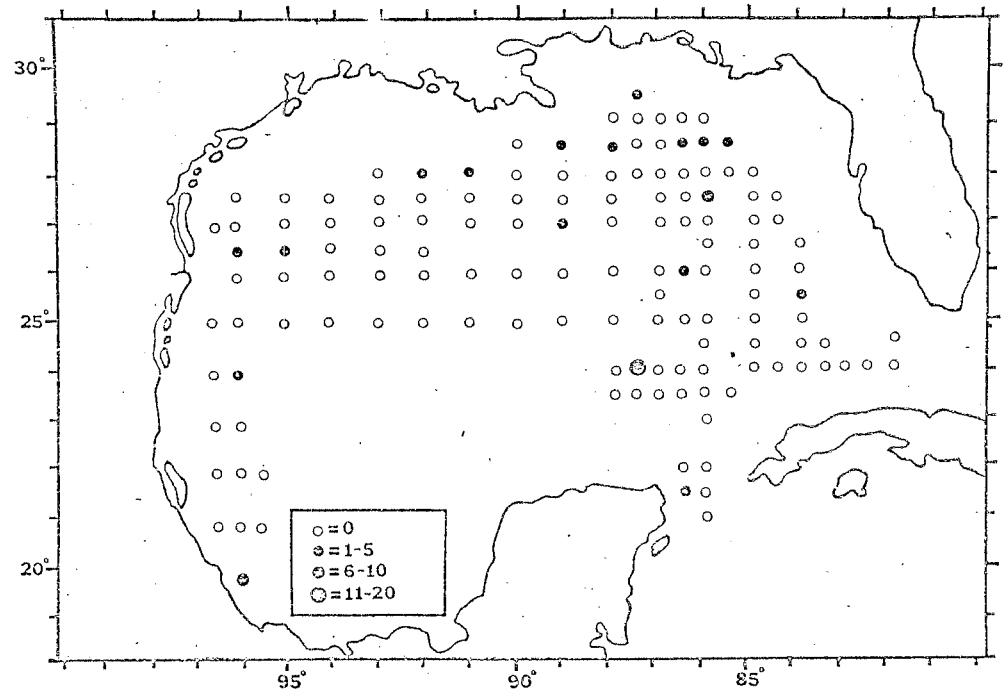


Figure 15 - Distribution and abundance of *Auxis* spp. larvae taken by neuston nets during OREGON II cruise 8703. Units are numbers of larvae taken per tow.

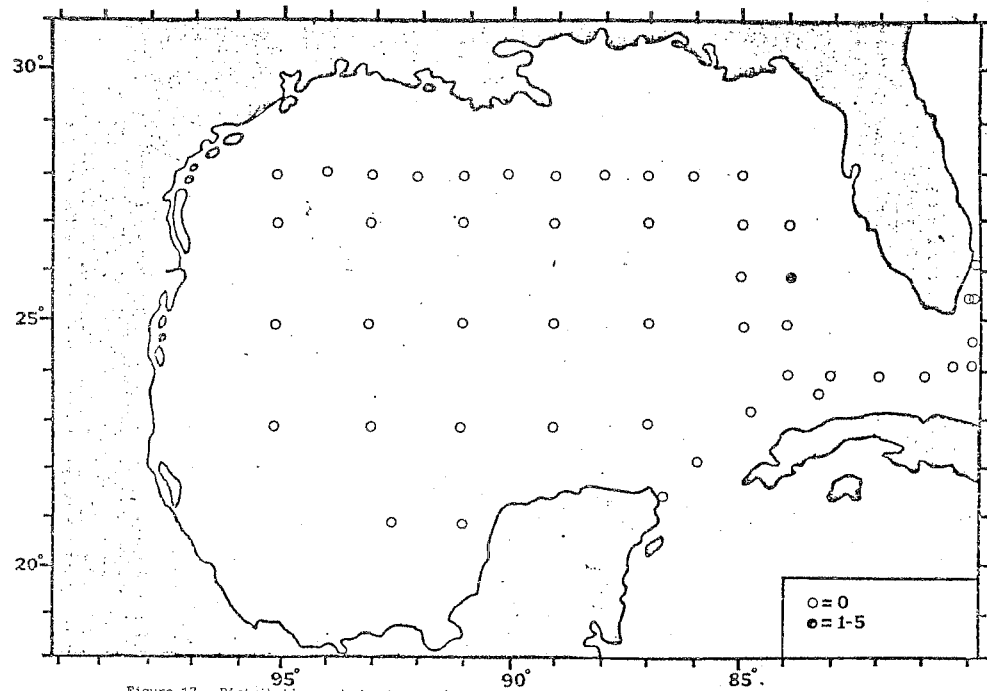


Figure 17. Distribution and abundance of *Euthynnus alletteratus* larvae taken by bongo nets during OREGON II cruise 7705. Units are numbers of larvae under 10 m² of sea surface.

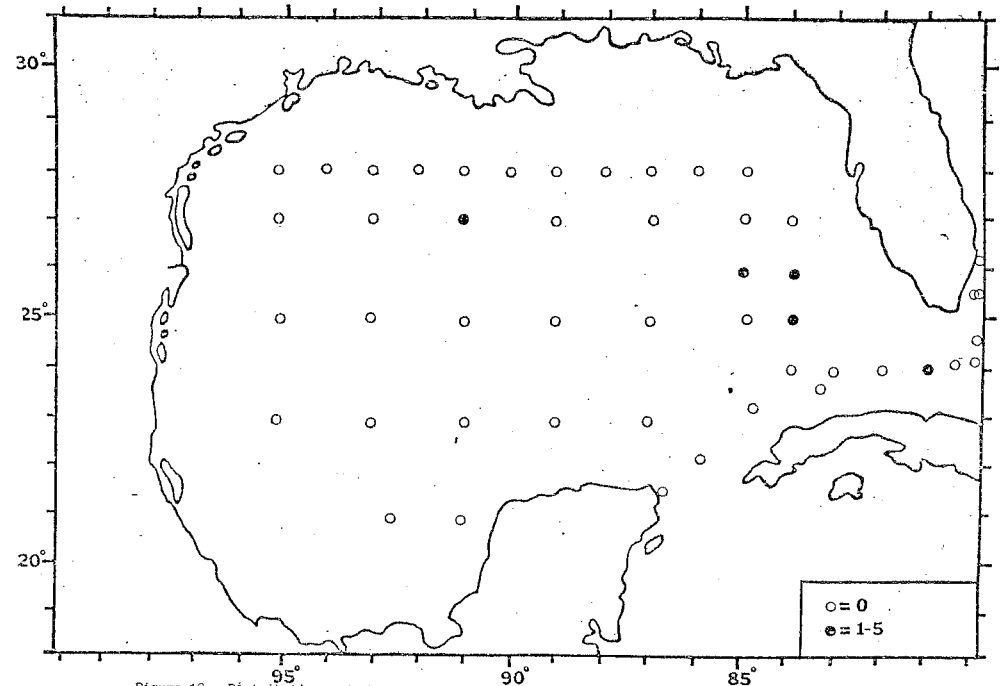


Figure 18 - Distribution and abundance of *Euthynnus alletteratus* larvae taken by neuston nets during OREGON II cruise 7705. Units are numbers of larvae taken per tow.

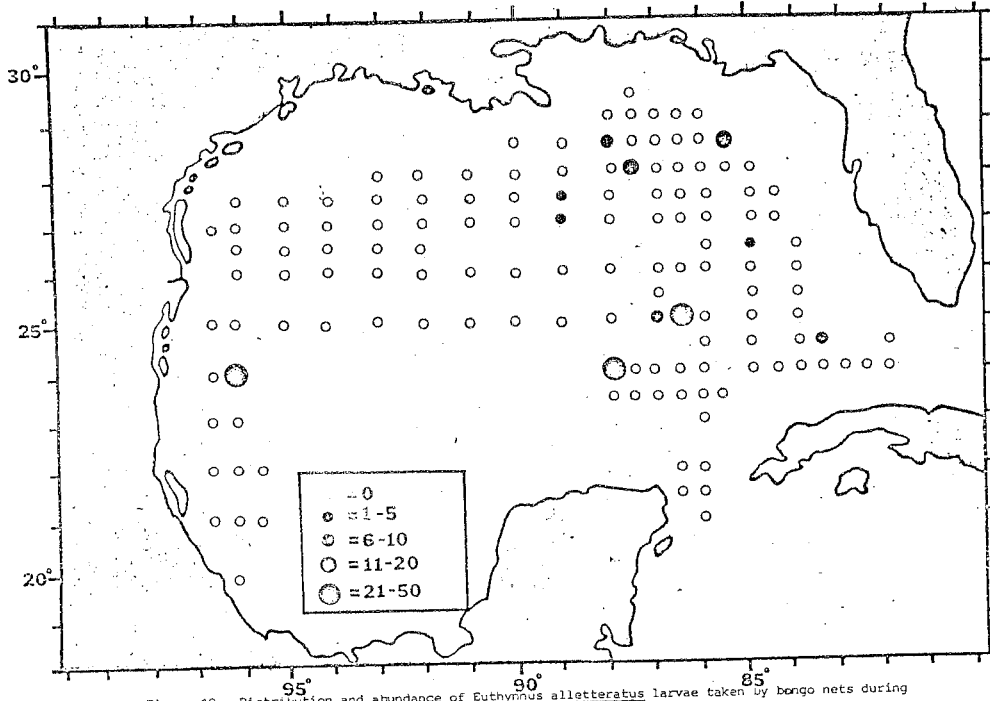


Figure 19 - Distribution and abundance of *Euthyrinus alletteratus* larvae taken by bongo nets during OREGON II cruise 8703. Units are numbers of larvae under 10 m² of sea surface.

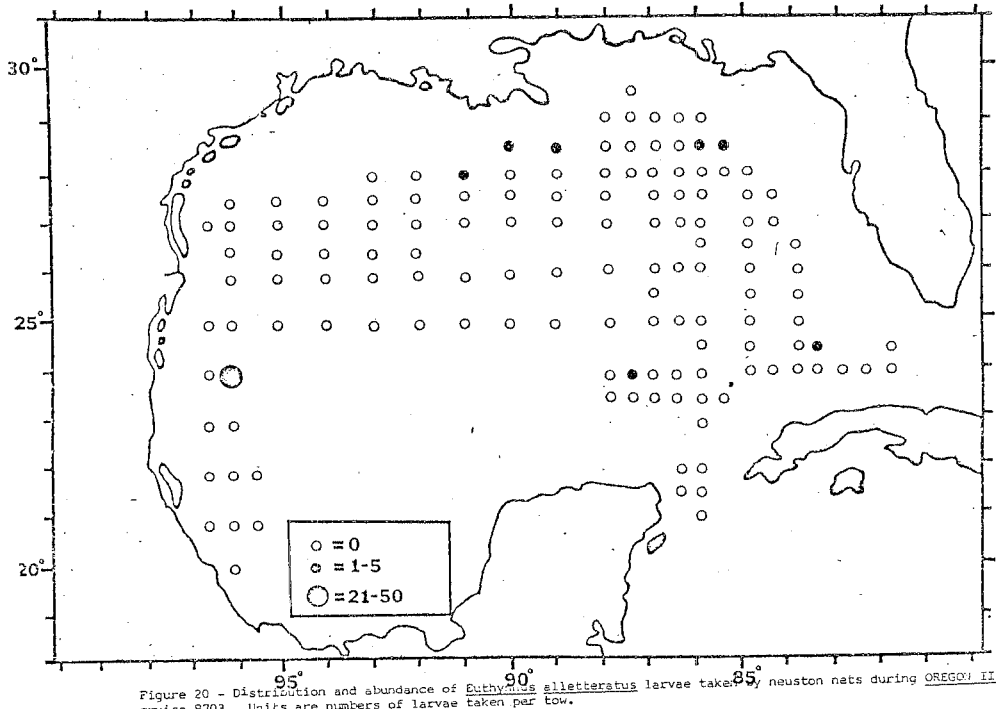


Figure 20 - Distribution and abundance of *Euthyrinus alletteratus* larvae taken by neuston nets during OREGON II cruise 8703. Units are numbers of larvae taken per tow.

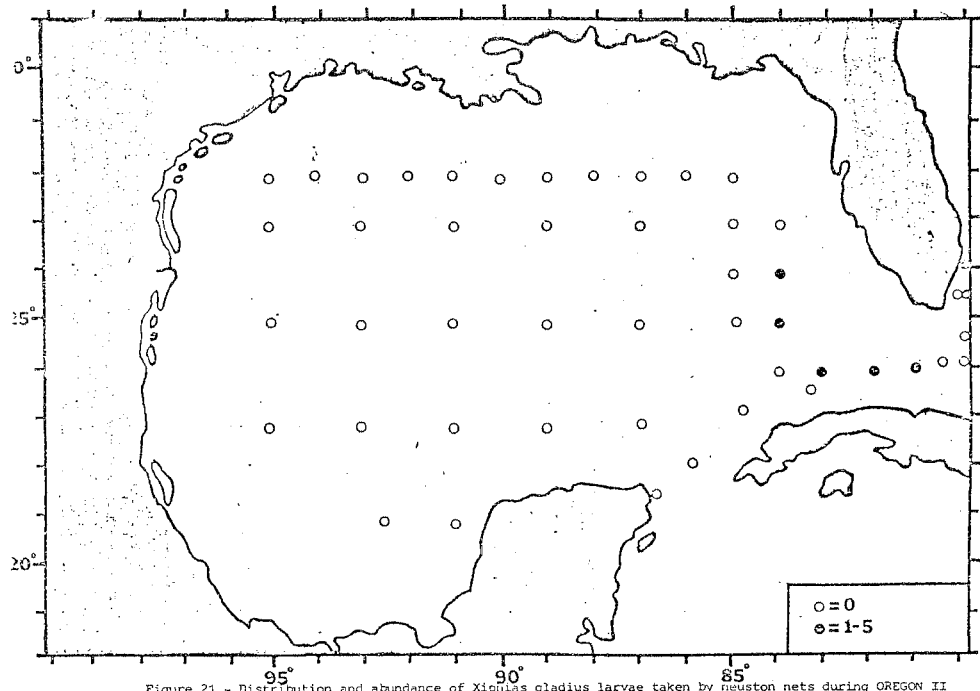


Figure 21 - Distribution and abundance of Xiphias gladius larvae taken by neuston nets during OREGON II cruise 7705. Units are numbers of larvae taken per tow.

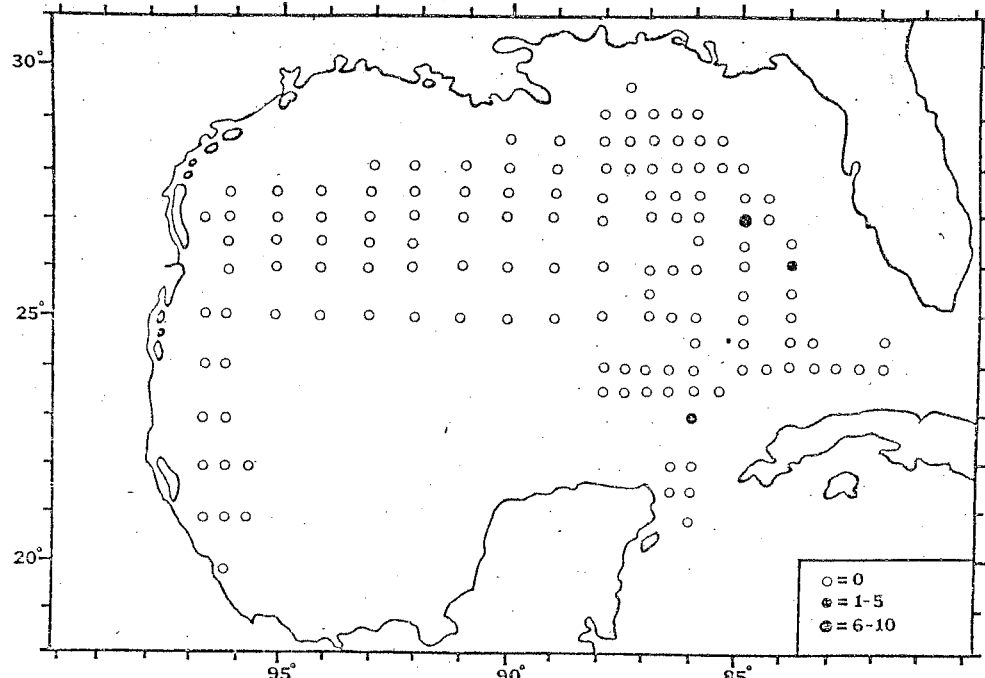


Figure 22 - Distribution and abundance of Xiphias gladius larvae taken by bongo nets during OREGON II cruise 8703. Units are numbers of larvae under 10 m² of sea surface.

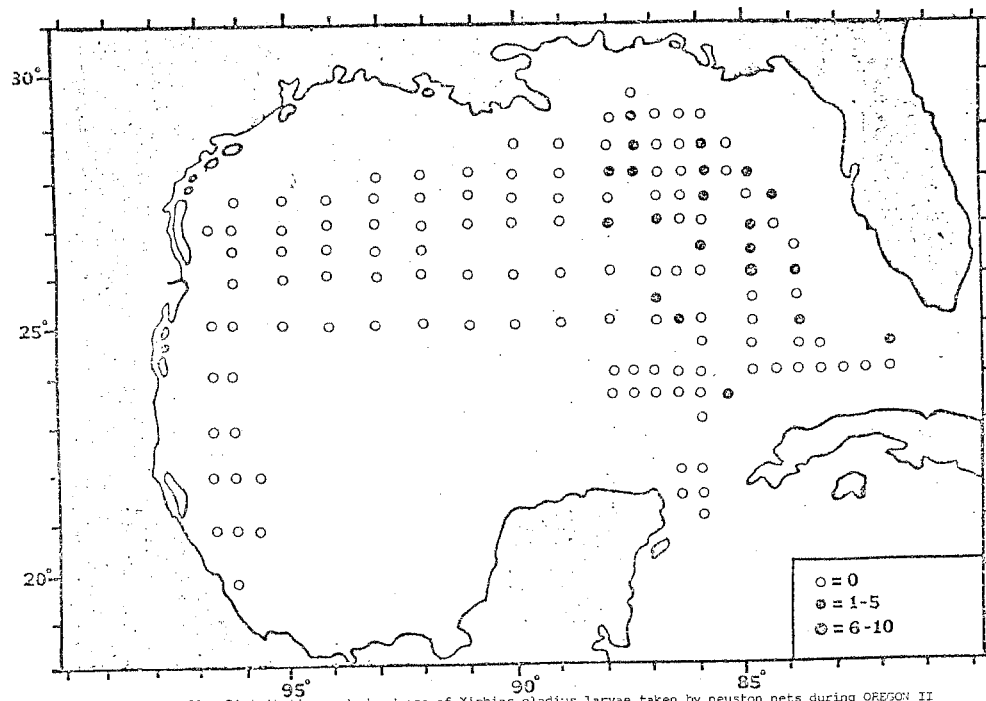


Figure 23 - Distribution and abundance of *Xiphias gladius* larvae taken by neuston nets during OREGON II cruise 8703. Units are numbers of larvae taken per tow.