PRELIMINARY NOTE ON TUNA LARVAE IN SAMPLES FROM THE COASTS OF THE SOUTHERN-CENTRAL MEDITERRANEAN SEA COLLECTED BY THE MV ARCTIC SUNRISE IN JUNE/JULY 2008

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SUMMARY

This document presents the results of the cruise conducted by the Greenpeace vessel MV Arctic Sunrise along the coasts of the southern Mediterranean Sea in June and July, 2008. A total of 51 samples were taken in 26 stations off the coasts of Crete, Malta, Libya and Tunisia. Results indicate that a spawning area for Thunnus thynnus appears to be located off the Tunisian coast.

RÉSUMÉ

Ce document présente les résultats de la campagne menée par le navire de Greenpeace MV Arctic Sunrise le long des côtes du Sud de la mer Méditerranée en juin et juillet 2008. Un total de 51 échantillons a été prélevé dans 26 stations des côtes de la Crète, de Malte, de Libye et de Tunisie. Les résultats indiquent qu’une zone de ponte de Thunnus thynnus pourrait être localisée le long des côtes tunisiennes.

RESUMEN

Este documento presenta los resultados de la marea llevada a cabo por el buque de Greenpeace MV Arctic Sunrise a lo largo de las costas del Mar Mediterráneo meridional en junio y julio de 2008. Se tomaron en total 51 muestras en 26 ubicaciones en aguas de Creta, Malta, Libia y Túnez. Los resultados indican que en aguas de las costas tunecinas parece estar situada una zona de desove de Thunnus thynnus.

KEYWORDS

Larval surveys, spawning grounds, eastern Atlantic and Mediterranean bluefin tuna

1. Introduction

The biology of northern bluefin tuna (Thunnus thynnus), and of other tuna species along the coasts of the Southern Mediterranean sea remains poorly understood. For example, Garcia et al. (2005), Oray and Karakulak (2005) and Oray et al. (2005) all note that specific studies on the occurrence of tuna larvae are rare from this area while El Tawil et al., 2004 and Hattour, 2003a, 2003b and 2005, note that other studies on tuna species are also rare. Accordingly, the presence of Greenpeace vessel the MV Arctic Sunrise in the area in June and July 2008 provided a unique opportunity to collect data on the presence/absence of tuna larvae in these waters.

A total of 51 samples were taken in 26 stations off the coasts of Crete, Malta Libya and Tunisia as indicated in Figure 1 (please note twin nearby 5-5b and 7-7b stations).

1 ISPRRA formerly ICRAM, Rome.
2. Materials and methods and results

A bongo net assembly comprised of a pair of nets of 60 cm diameter and of mesh sizes 335 and 500 microns was used to make double oblique hauls at the stations indicated in Figure 1. The nets were towed at a constant speed through the water of around two knots from the surface to a depth of about 50 m. At the majority of stations sampled, this resulted in samples being derived from a constant volume of water. Horizontal tows as used in some previous studies (Garcia et al., 2005; Oray and Karakulak, 2005) were not used. Zooplankton samples were preserved in 4% formalin and the fish larvae later examined under a binocular at low magnification.

Analysis of the samples obtained revealed a total of 147 larval or pre-larval stage of tuna species from 17 of the locations sampled. 55 of the larval fish were those of bullet tuna, (Auxis rochei), 47 were those of albacore (Thunnus alalunga), 6 were larvae of T. thynnus. Four larvae of Atlantic bonito (Sarda sarda) were identified as well as four larvae identified as those of little tunny (Euthynnus alletteratus). Identification of pre-larval fish is more difficult but the majority of those present in the samples were of T. alalunga.

In the 27 ichthyoplanktonic samples in which tuna and other scombrid larvae or prelarvae have been found, eggs of T. alalunga were sometimes fairly abundant. Eggs of other tuna species (more difficult to identify at species level) were rare. Analysis of the tuna larvae, in relation to other planktonic species present, in the 27 samples showed that T. alalunga larvae were mostly associated with larvae from species/taxa characteristic of deep waters (e.g. Myctophidae) while larvae of A. rochei were associated with those of more littoral species (e.g. Gobiidae or Sparidae). The 6 larvae of T. thynnus were all found in the sample from station 20, off Tunisia which also included 46 larvae of A. rochei.

In a number of the 51 samples collected, Thaliacea or other gelatinous zooplankters were present in significant numbers. It is possible that further analysis of such taxa could provide useful information on their correlation with the presence of eggs or larval of fish species.

Surface sea temperature data recorded during the sampling campaign show that at the stations between Crete and Cyrenaica temperature was lower than the others: at stations from 1 to 13 the range was from 24.0 to 25.6°C (8 records), while at stations 14 to 24 temperature ranged from 25.9 to 27.0°C (11 records).

3. Preliminary comments

The dominance of A. rochei and T. alalunga, and the scarce number of T. thynnus found are consistent with data obtained from other studies, (Piccinetti and Piccinetti-Manfrin, 1994; Garcia et al., 2005) where the first two species were reported to comprise around 90% of tuna larvae recorded. Other studies (Oray and Karakulak, 2005) have reported a larger percentage of T. thynnus larvae (121 T. thynnus larvae to 94 of A. rochei and 22 of E. alletteratus). In this case, however, sampling was more intense in areas known to be “bluefin tuna rich”; data from this study also appear to point to a link between the presence of larvae of T. thynnus and those of A. rochei. A relatively large number of T. thynnus larvae were also found by Garcia et al. (2003 and 2005) with respectively 265 and 588 larvae found in waters off Menorca. In this case the T. thynnus larvae were concentrated around 4-5 closely located stations whilst A. rochei larvae were the commonest finding in the other (about 200) stations around the Balearic Archipelago.

Garcia et al. (2003) note that (sub)surface temperatures around 23-25°C are more favorable for T. thynnus spawning. Similar data were reported in Garcia et al. (2005) where sea surface temperatures above 23°C were associated with bluefin tuna spawning off SE Sicily. These data seem to confirm findings from Tsuji et al. (1997) and Nishida et al. (1998) which reported high numbers of T. thynnus larvae in summer 1994 off the western Sicilian coast and South of Malta. It appears, therefore, that data collected by the “MV Arctic Sunrise” are in good agreement (although numbers are smaller than reports from the Balearic Islands and other areas) with the literature. This agreement extends also to the relative locations of the larvae of different species found and highlights the apparent importance of the prevailing water circulation patterns as a determinant of larval distribution. Most positive stations are located in “channel areas” (as between the North African coast and Sicily or Crete).

In relation to the possible presence of a T. thynnus spawning area in the sampled areas, we note the good match with A. rochei larvae (see also Piccinetti and Piccinetti-Manfrin, 1994) which suggests, in turn, that the locations sampled around station 20 could be favorable for the spawning of T. thynnus. Although the evidence is somewhat inconclusive at present similar field data were used by Garcia et al. (2005) to confirm findings from
previous authors (Tsuji et al. 1997; Nishida et al., 1998) that the northern coasts of the Sicilian Channel host an important *T. thynnus* spawning area.

Garcia *et al.* (2003 and 2005) showed that the distribution of fishing areas for tuna seiners around the Balearic Islands did not correspond with the presence of *T. thynnus* larvae. Nonetheless, given that many traditional tuna traps have been active in the past in Tunisian waters (Hattour, 2005), it is possible that these same waters may prove interesting for further studies of bluefin tuna reproduction and the distribution of its larval stages. Landings of bluefin tuna from tuna seiners in Sfax in the summer of 2001 (Hattour, 2003a) confirm that the majority of catches were specimens bigger than 25 kg (120 cm FL), which is the approximate size at which this species first reproduces (Medina *et al.*, 2002; Corriero *et al.*, 2003; Karakulak *et al.*, 2005). The gonado-somatic index of females sampled in May-June in southern Tunisia (Hattour, 2003b) also shows that bluefin tuna reproduction is likely to occur off the Tunisian coasts.

Considering the available data (e.g. Hattour, 2003b), Karakulak *et al.* (2004) and Oray and Karakulak (2005) it seems that bluefin tuna generally spawn in the Southern Mediterranean Sea about one month before the sampling conducted by the “MV Arctic Sunrise”. In the samples taken during this work, in which tuna larvae were present, a fairly large number of eggs and of young larvae of the round sardinella (*Sardinella aurita*) were found. By contrast eggs of anchovies (*Engraulis encrasicolus*) were almost absent and larvae were comparatively large-sized. These two species spawn in similar areas but anchovies spawn first at lower sea temperatures. The presence of *S. aurita* eggs and larvae suggests that temperature of the upper water stratum may have been too high for bluefin tuna to spawn.

4. Conclusions

From the data collected by the “MV Arctic Sunrise”, a spawning area for *T. thynnus* appears to be located off the Tunisian coasts. At this stage, it is not possible to confirm whether this area is equivalent in importance to the main areas of bluefin spawning so far identified around the Mediterranean: the Balearic Islands, the Southern Tyrrenian and the SW Ionian Sea (Corriero *et al.*, 2003).

5. Bibliography


Figure 1. Locations sampled by the MV Arctic Sunrise in the southern Mediterranean in June /July 2008.