The cetacean opportunistic predation in the Messina Strait: preliminary analysis of the interaction between cetacean and flying squid (*Todarodes sagittatus*) fishing activity in the South zone of Messina Strait

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INTRODUCTION

The competitiveness between fishermen and cetacean, especially in some fishing areas, it is a phenomenon that is verified always, also in past, in different parts of the world but currently an increasing malcontent is recorded from the operators of the sector because of a greater marine mammals interference with the fishing activity. The existence of a "opportunistic" predation operated by the cetacean against the fishing activity it is particularly a great deal a diffused phenomenon along the Italian coasts in those southern. The causes of the increase of this phenomenon are not well clear: from a side, the diminution of the sea resources induces some dolphins species to decrease the energetic waste exploiting the human activity, from the other the economy decrease of the small handicraft fishing makes the most sensitive fishermen to the loss of the catch. The phenomenon has mainly interested always the fishing with the gill nets (trammel and "monoparete") and the impact was assembled particularly on some species seasonally fished (*Maena smaris, Mullus barbatus* and *M. surmuletus, Diplodus spp.*) that they guaranteed a sure income. To the purpose to understand the causes and the possible solutions in past studies they have been effected in different areas what the archipelago of the Egadi, the Catania's Gulf, the Eolie Archipelago and in some areas of Sardinia. During the projects data were picked up on the damage to the fishing gear, to the catch and with the purpose to limit the interaction among cetacean and fishing activity it was tried to experiment pinger with discontinuous results. In the last years in some navies the interaction is recorded with another type of fishing: the fishing of the flying squid (*Todarodes sagittatus*). Such phenomenon is more evident in the Eolie Archipelago , in some Palermo's navies and in the south areas and north of the Messina Strait.

MATERIALS and METHODS

The study is developed in the south zone of the Messina Strait, particularly in the navies of Giampilieri, Nizza di Sicilia, Scaletta Zanclea and Santa Teresa di Riva (Fig.1). In these navies the fishermen have been complaining for different time heavy interferences between the cetacean and the fishing to the flying squid (*T. sagittatus*) with consequent catch subtraction and impediment to the regular activity course.

The same fishermen, supported by the associations of category they pushed us to interest us in the problem. You decided at the end of 2002 to begin the phenomenon study. The flying squid fishing effects him in the night time hours using some fishing-lines furnished of a particular fishing gear "totanara" with a bright source that the prey attracts hooking.

The collected data are related to the 2003/2005. during the study three monthly exits have been effected on board of a boat that regularly developed her own activity for a total of 108 days of survey equal to 486 hours. In every exit they have been collected relative data the catch (weight and individual number), the batymetry, the exits duration, the cetacean presence (species and individual number). The surveys obviously foresaw the listening with hydrophones and in the case of dolphins presence acoustic recordings have been effected.

FIG.1: Area study object

RESULTS

From the data analysis an increase of the predatory activity and a consequent cetacean habit he 's found to the pinger. The species mostly presents have been: *Tursiops truncatus*, *Stenella coeruleoalba* and *Delphinus delphis*, followed by *Globicephala melas* and *Grampus griseus*. (Figure 2,3,4,)

The species that have mostly interacted with the activity have been: *T. truncatus* and *S. coeruleoalba*. Surely an interesting datum emerges analyzing the behaviour of *S. coeruleoalba, D. delphis* and *G. melas*, animals from the strong pelagic characteristic, that in association with *T. truncatus* has widened their predatory activity modifying of fact their predation system and therefore more opportunists becoming.

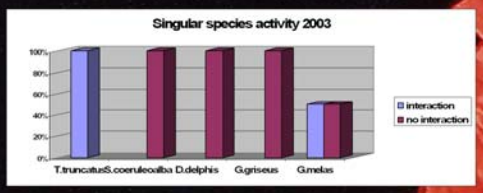

FIG.2 : Percentage singular species activity during the year 2003

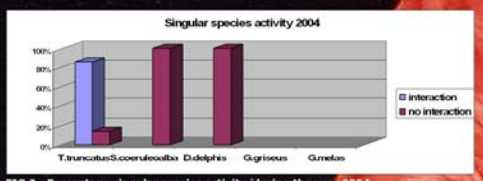

FIG.3 : Percentage singular species activity during the year 2004

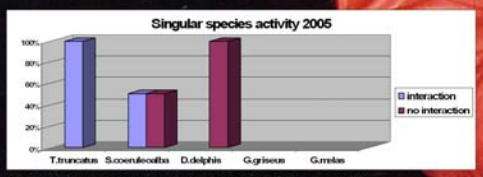

FIG.4 : Percentage singular species activity during the year 2005

From the behavioural analysis data in association to the pinger presence it emerges that while *T. truncatus* doesn't modify her own opportunistic activity, showing the strong ability to interact, the other species when not in association with *T. truncatus* es surely appear you disturb and in the almost cases totalities quickly get further. From the diagram as *T. truncatus* appears is the most active species and you represent an example for the others that overcome of the in her presence "barriers" that in normal cases they would avoid them to interact with the anthropics activities. (Fig. 5,6,7)

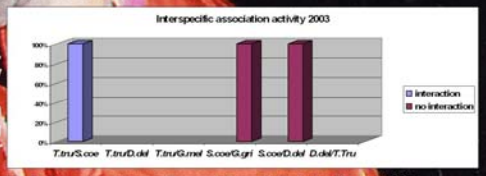

FIG.5: Percentage interspecific association activity during the year 2003

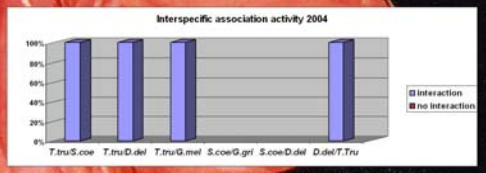

FIG.6: Percentage interspecific association activity during the year 2004

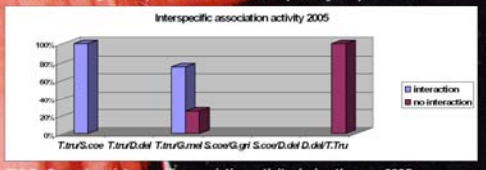

FIG.7: Percentage interspecific association activity during the year 2005

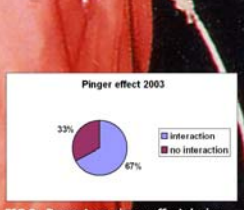

FIG.8: Percentage pinger effect during the year 2003

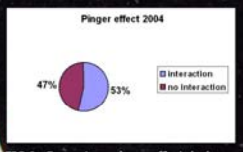

FIG.9: Percentage pinger effect during the year 2004

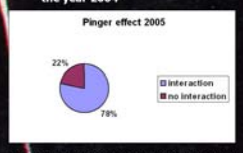

FIG.10: Percentage pinger effect during the year 2005

During the experimentation the pinger has been put in water 63 times and only in 21 cases he is shown effective preventing the predation, in the remainders 42 cases the pinger results ineffective this it is visible not only analyzing the damage of some individuals of *T. sagittatus* but since he has prevented the normal fishing activity (FIG. 8,9,10). In fact in 2005 (year of greater interaction) the hours devoted to the fishing activity have been 140,20 hours against the 166,25 hours in 2004 and 179,15 hours in 2003.

CONCLUSIONS

During the three years a constant habit is recorded to the pinger, such phenomenon has not only resolved the problems of the fishermen but he has done so that the pinger it acted from call helping the cetacean producing the association issue pinger/presence preys.

The catch diminution since 2003 to 2005 results equal to 35%. Besides the percentage of the damaged cephalopods is increased and therefore not marketable that is passed by 2003 the 2% to 2005 the 8%.

It is important to underline that during the three years, in the month of August interaction is not recorded and that the quantity of the catch is increased notably stopping by 48,8 Kg mediates of August in comparison to the average of the other months equal to 26,6 Kg.

The middle weight of the individuals of *T. sagittatus* has passed by 322 gr. in 2003 to 219 gr. in 2005, probably such datum is not imputable to the predation from the cetacean but it is more likely to believe that is a course produced by the collecting of the fishing activity. For what it concerns the species observed during the survey it appears clear that the pelagic species as *S. coeruleoalba, D. delphis, G. melas*, when in association with *T. truncatus* take the same habits also feeding itself during the issue of the pinger. *G. griseus* has been observed alone only twice in 2003 in a case and in the other in association with *S. coeruleoalba* and in the moment of the pinger issue, in both cases he has quickly gotten further.


FIG.11 : Aquamark 200 e 210

In conclusion despite the scarce gotten results using the pinger, the NECTON MARINE RESEARCH SOCIETY s.c. is continuing the sampling in regular way, both in the same area and in the area of the Eolie islands using different models of pinger (Aquamark 200 and 210 - Fig.11) with formality of issue and frequency different also alternating them during the same session with the purpose to understand if an alternate use of different tools can slow down the process of habit assuring so a valid dissuasive system that cannot only help the fishing in this area. For the good result the Necton is to the search of partner that can collaborate to the project dealing himself with the relative part the realization of pinger from the different characteristics from those used until now in the Mediterranean basin.

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