

# SIGHTINGS DISTRIBUTION AND VARIABILITY IN SPECIES COMPOSITION OF CETACEANS IN THE ADRIATIC SEA ECOSYSTEM IN ONE DECADE OF STUDY

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## Abstract

Since 1988 the "Adriatica" shipping company and the R/V *Salvatore Lo Bianco* have carried out cetacean visual surveys in the waters of the Adriatic Sea. Collected data take account of the number of sightings and their geographical and temporal distribution, the number of individuals per sighting, and, finally, the species composition. The data processing points out which areas could be considered at high risk for the abundance of cetaceans, the presence of more than one species, or the sporadic presence of rare species. These areas should be taken in consideration in relation to fishing and other human activities.

**Keywords :** *Adriatic Sea, Cetacean, Sampling methods*

The sightings represent an efficient parameter, if repeated for a relevant number of years such as a decade, to assess the occurrence of cetaceans in a given sea body [1]. Information about the occurrence, the amount, the species composition, and so on, of cetaceans in the Adriatic Sea could aid the management and the conservation of these marine mammals. As a matter of fact several areas of the Adriatic Sea are interested by an intense human activity ranging from fishery to tourism, from oil drilling to maritime trade [2][3]. A certain number of these areas are "hot spots" because they are at high risk for the cetaceans and, therefore, should be particularly cared.

## Material and methods

The data on cetacean sightings in the Adriatic Sea for a period of ten years long, from 1988 to 1998, come from two different sources: the "Adriatica" shipping company and the R/V *Salvatore Lo Bianco*. With regard to the "Adriatica", all the sightings have been performed from the ships in transit on the Adriatic Sea along the commercial routes followed regularly all the year round. The data obtained by R/V *Salvatore Lo Bianco*, instead, were collected during two acoustic surveys carried out each year from 1988, from July to October [4]. During these surveys trained personnel visually monitored the marine mammals. All the data have been processed in a particular geographical context in which the terrestrial coordinates, latitude and longitude, have been translated in Cartesian coordinates, X and Y. Each elementary cell of this raster map is one square mile and the cetacean sightings have been referred to 50 square blocks of 30x30 elementary cells.

## Results and discussion

The geographical distribution of cetacean sightings during the decade 1988-1998 has been analyzed for North Adriatic, South Adriatic, and all Adriatic Sea (Fig. 1) in which they are divided per season only for the species belonging to the Delphinidae Family. Considering the mean number of individuals in a herd, per Delphinidae species, it's possible to highlight that both striped and bottlenose dolphins form larger herds in winter than in summer; on the other hand, the herds of common dolphins are larger during summer period than in winter. Table 1 shows the number of sightings and individuals for each species, also not identified and rare species, visually surveyed all the year round and during summer (May-October) and winter (November-April) period. The next step dealt with the analysis of the trend of the sightings and the number of the individuals in the space of these ten years for North Adriatic Sea, South Adriatic Sea, and, finally, the whole Adriatic Sea (Fig. 2). At the same time, the species composition visually surveyed during each year has been pointed out, once again for the North, South and the whole Adriatic Sea (Fig. 3). Although there is a relevant fluctuation on yearly basis in sightings and individuals' number for North and South Adriatic Sea separately considered, all the Adriatic Sea evidences a fairly constant trend with regard to the sightings with a less emphasized shrinkage between 1991 and 1993, probably due to the civil war in the ex-Yugoslavia. The number of cetaceans is more fluctuating during this decade, but it's an undependable parameter because subject to a lot of mis-

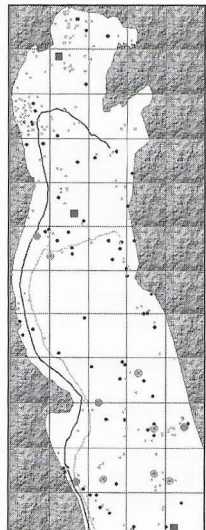


Fig. 1. Geographical distribution of cetacean sightings in all Adriatic sea in the decade 1988-1998.

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Table 1. Number of sightings and individuals for each species during 1988-1998.

Species	Yearly	During summer period (May-October)		During winter period (November-April)		
		Sightings	Individuals	Sightings	Individuals	
Not identified delphinidae	110	1417	100	1118	10	299
Bottlenose dolphin	111	1710	66	969	45	741
Striped dolphin	50	487	31	285	19	202
Common dolphin	17	164	13	136	4	28
Sperm whale	4	16	3	15	1	1
Fin whale	3	15	1	13	2	2
Risso's dolphin	6	19	4	16	2	3
Total	301	3828	218	2552	83	1276

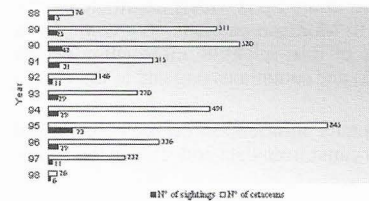


Fig. 2. Trend of sightings and cetacean numbers visually surveyed during the decade 1988-1998 in the whole Adriatic Sea.

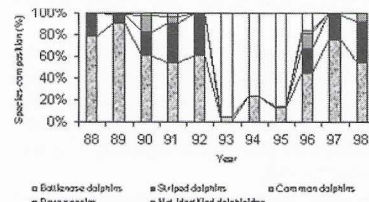


Fig. 3. Trend of species composition visually surveyed during the decade 1988-1998 in the whole Adriatic Sea.

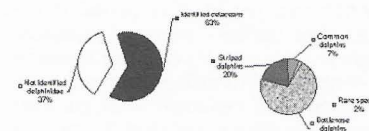


Fig. 4. Species composition of the identified cetaceans fraction.

## Conclusions

A relevant result of this work is that bottlenose dolphin seems to be the most abundant and most variable species, followed by the striped dolphin, considering either separately North or South Adriatic and the whole Adriatic Sea. The bottlenose dolphins move to South Adriatic during winter season, while striped dolphins tend to aggregate into the Central Adriatic in the same season. With respect to the "hot spots", about the 50% of the all analyzed blocks results to be at risk (high or mean) for the yearly or seasonally occurrence either of a significant amount of cetaceans or of more than one species or both of them. In certain cases also the sporadic presence of rare species represents an index of risk for the protection of these mammals.

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