THE STRIPED DOLPHINS, *STENELLA COERULEOALBA*, OF THE LIGURIAN PELAGIC SANCTUARY : MAIN BIOLOGICAL CHARACTERISTICS.

Orsi Relini L.*, Cima C., Palandri G., Garibaldi F.

Laboratori di Biologia Marina ed Ecologia Animale, DIP.TE.RIS., Università di Genova, Italy - largepel@unige.it

Abstract

Stranding data (1986-1997) were used to assess the population parameters of *Stenella coeruleoalba* in the Ligurian Sea, in comparison with those regarding all Italian coasts. Sizes and growth characteristics resulted similar; male mortality appeared higher; density of population, in particular of young individuals, was remarkable in the Ligurian Sea.

Keywords : Stenella coeruleoalba, stranding, Ligurian Sea, population parameters

Introduction

The Ligurian Sea, the core of a future international Sanctuary (fig.1), represents an area densely populated by Cetaceans : *Stenella coeruleoalba* is the most abundant species, with a density of population estimated at 0.43-0.56 individuals/km^2 (1, 2), that is, in the figured study area (fig. 1), a total of about 16000 dolphins. Many field observations concerning this population are available, but the assessment of the main population parameters in the area is still lacking. In non-harvested populations, stranding is a precious source of information and its use, in Italy, was planned since the eighties. Our aim is to describe some biological parameters of the striped dolphin in the future Sanctuary on the basis of stranding data.

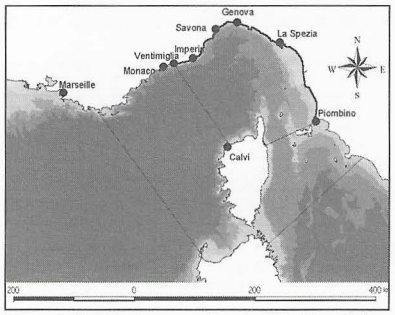

Figure 1. The Ligurian sanctuary and, in the middle, the study area.

Materials and methods

Since the eighties the Centro Studi Cetacei (Società Italiana di Scienze Naturali) established a network along the coasts of Italy to recovery stranded carcasses of Cetaceans for study; from 1986 annual reports are available (3). In the period 1986-1997, an average of about 65 *S. coeruleoalba* per year have been recorded in Italy and in the years 1990 and 1991 this figure raised to 106 and 329, due to a morbillivirus epizootic. In 12 years stranded dolphins were 1054; 908 measures of length without notation of uncertainty are available; 663 individuals were sexed and measured according to a more detailed protocol. More than 200 individuals were collected in our study area. Length was measured in a straight line from the tip of the lower jaw to the caudal notch. Frequency distributions of total length per sex were prepared for : 1) the total obtained on Italian shores; 2) the individuals collected on the Ligurian coast. Stranded specimens were classified as babies (up to 130cm TL), juveniles (131 - 179 cm TL) and adults (from 180cm TL onward).

Results and discussion

The Ligurian sample is composed of 197 individuals, 61 females, 91 males and 45 of unknown sex or imprecise measure (fig. 2a). This yields a male/female ratio of 1.5, with a clear dominance of males. Considering the total stranded along the Italian coast (N = 663), the sex ratio was 1.24. A more relevant mortality affecting males was also recorded in the French Mediterranean (male/female ratio = 1.21 in the GECEM reports) and on the coasts of Valencia (Catalonia) Balearic Islands (4) during the morbillivirus epizootic (1.13). Plotting the sex ratio against size, it was shown that males outnumber females from birth to the size of 210cm TL, where females prevail, given their longevity (5).

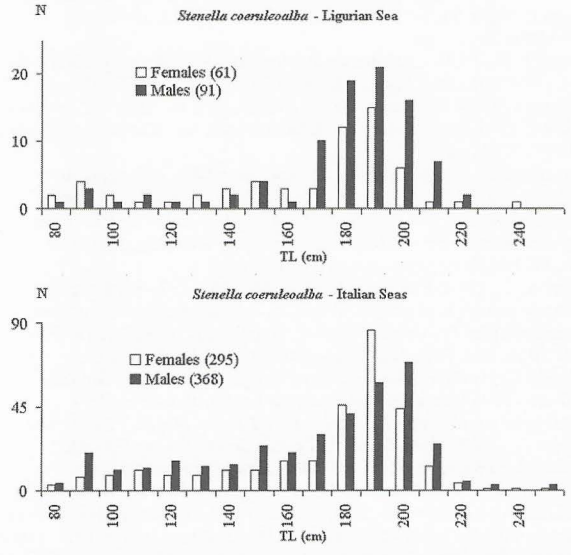

Figure 2. Size/frequency distributions of striped dolphins stranded along the Ligurian and Italian coasts

Why in the Ligurian area the male mortality is so important remains unknown. Probably when a danger occurs, males are more exposed, to protect the weaker members of the group. The Ligurian sample include those years (1986-1990) in which several instances of killing of marine mammals were recorded in relation to the swordfish fishery by gillnets.

The size composition of the two groups of striped dolphins presented in fig.2 is remarkably similar. A main gaussian group occurs on the right side : these are the adult individuals, with a mode, in the largest sample, at 190cm TL in females and at 200 cm TL in males, a sexual dimorphism typical of those mammalian species in which the male has a defensive role. A small gaussian group occurs on the left at 90cm TL : this point represents the neonatal mortality. A second small mode can be appreciated at 150cm TL. According to the growth models proposed for the Mediterranean, this size corresponds to age 2 (6,5), or to age 3 (7). Therefore it could represent the end of the lactating period or simply the end of the link between the juvenile dolphin and the adults and their protection.

In the Ligurian sample adult females are represented with the same size recorded along the total Italian shores. On the contrary the largest males (200cm TL) are under-represented. The prevalence of young adult males in respect of full grown individuals, suggest the possibility that the rich trophic area of the Ligurian Sea is preferentially left to females and young individuals. In any case the growth model proposed for Italian waters (5) appears to be acceptable for the Ligurian Sea : it is

Males : $L(t) = 200-[(200-90)\ e^{(-0.375\ t)}]$;
Females : $L(t) = 190-[(190-90)\ e^{(-0.430\ t)}]$

In the total measured stranded dolphins (N = 908), 171 individuals were babies and 221 juveniles. The 19% of both these young individuals were found in our study area. If the stranding events would have been evenly distributed the Ligurian coast would have produced, in respect of the total Italian coasts, the 4.5% of stranding. Of course, the causes of such concentration can be of different origin (oceanographical, biological or related to human activities, including the intensity of monitoring the shore). A combination of causes can be also hypothesised. Only during spring the Ligurian percentage of babies (Table 1) is close to that expected. During summer it becomes three times more important, suggesting that the Ligurian Sea is an important calving ground. Newborn babies were collected from July to October, with a maximum during August, in coincidence with the highest annual surface temperatures. The calving period results therefore anticipated in respect to the Spanish coast, where the maximum of births (95%) was located in October (8).

Table 1. Ligurian records of stranded *S. coeruleoalba* as percentage of total Italian records.

	SPRING	SUMMER	FALL	WINTER
Total in Italy (N)	*213*	*406*	*139*	*160*
Ligurian babies (%)	4.9	15.6	50.0	33.3
Ligurian juveniles (%)	14.1	10.1	36.0	38.9
Ligurian adults (%)	20.8	21.3	34.8	22.5

References

1. Notarbartolo di Sciara G., Forcada J., Acquarone M. and Fabbri F., 1993. Population estimates of fin whales and striped dolphins summering in the Corso-Ligurian Basin. *European Research on Cetaceans*, 7 : 135-138.
2. Gannier A., 1998. Une estimation de l'abondance estivale du dauphin bleu et blanc *Stenella coeruleoalba* (Meyen, 1833) dans le future Sanctuaire Marin International de Mediterranée Nord –Occidentale. *Rev. Ecol. (Terre Vie)*, 53 : 255-272.
3. Centro Studi Cetacei, 1987-1998. Cetacei spiaggiati lungo le coste italiane. I-XII Rendiconti 1986-1997. *Atti Soc.ital.Sci.nat.Museo civ.Stor.nat.Milano*, n°128-n°139.
4. Calzada N., Lockyer C. and Aguilar A., 1994. Age and sex composition of the striped dolphin die-off in the Western Mediterranean. *Mar. Mamm. Sci.*, 10 : 299-310.
5. Orsi Relini L., Cima C., Palandri G., Garibaldi F., Relini M. and Torchia G., 2000. Population parameters of the Mediterranean striped dolphin (*Stenella coeruleoalba*) derived by stranding data. European *Research on Cetaceans*, 14 : in press.
6. Calzada N., Aguilar A., Lockyer C. and Grau E., 1997. Patterns of growth and physical maturity in the Western Mediterranean striped dolphin, *Stenella coeruleoalba* (Cetacea : Odontoceti). *Can. J. Zool.*, 75 : 632–637.
7. Monaci F. and Leonzio C., 1997. Elementi in tracce in esemplari di *Stenella coeruleoalba* spiaggiati sulle coste del Mediterraneo. *S.It.E. Atti*, 18 : 453-546.
8. Aguilar A., 1991. Calving and early mortality in the Western Mediterranean striped dolphin, *Stenella coeruleoalba*. *Can. J. Zool.*, 69: 1408–1412.