Cetaceans in the Northern Adriatic Sea : past, present and future

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The regular cetacean fauna of the Northern Adriatic Sea, currently represented by a single dolphin species, the bottlenose dolphin (*Tursiops truncatus*), is notably reduced with respect to the Mediterranean Sea, where the number of cetacean species regularly occurring is already reduced in comparison to most Atlantic regions (NOTARBARTOLO DI SCIARA, 1992).

By contrast, a review of the scientific literature reveals that, in addition to bottlenose dolphins (GIGLIOLI, 1880; TROIS, 1894; NINNI, 1901; VATOVA, 1932; DULIC and TORTIC, 1960; PILLERI and GIHR, 1977), the cetacean fauna of the Northern Adriatic Sea is composed by a greater number of species, including: a) deep water cetaceans such as fin whales, *Balaenoptera physalus* (CAPELLINI, 1877; TROIS, 1894; NINNI, 1901; DULIC and TORTIC, 1960; PILLERI and GIHR, 1977), sperm whales, *Physeter catodon* (NARDO, 1853; TROIS, 1894; NINNI, 1901; DULIC and TORTIC, 1960), false killer whales, *Pseudorca crassidens* (NOTARBARTOLO di SCIARA, 1992), pilot whales, *Globicephala melas* (HIRTZ, 1922; DULIC and TORTIC, 1960), Risso's dolphins, *Grampus griseus* (GIGLIOLI, 1880; TROIS, 1894; VALLE, 1900; NINNI, 1901; DULIC and TORTIC, 1960) and common dolphins, *Delphinus delphis* (NARDO, 1853; TROIS, 1894; NINNI, 1901; VATOVA, 1932; DULIC and TORTIC, 1960; PILLERI and GIHR, 1977); and b) species now known or presumed to have been misidentified, such as blue whales, *Balaenoptera musculus* (DULIC and TORTIC, 1960), minke whales, *B. acutorostrata* (RALLO, 1979), white-beaked dolphins, *Lagenorhynchus albirostris* (DATHE, 1972), and harbour porpoises, *Phocoena phocoena* (NARDO, 1853; RALLO, 1979). In addition, striped dolphins (*Stenella coeruleoalba*), which have recently become the commonest pelagic cetaceans thoughout the Mediterranean, occasionally stray into the area and stand along the Italian shores (CENTRO STUDI CETACEI, 1990).

A critical analysis of all these reports, however, suggests that the occurrence of most of these deep-water species must be considered an exceptional event in the Northern Adriatic Sea. Until recently only two cetaceans were regularly seen in this region: the common dolphin and the bottlenose dolphin (VATOVA, 1932; PILLERI and GIHR, 1977). In the past decade, however, unknown reasons caused common dolphins to almost completely disappear from all the seas surrounding the Italian peninsula and islands, including the Northern Adriatic (NOTARBARTOLO di SCIARA, 1992), leaving bottlenose dolphins the sole cetacean species resident in the area (NOTARBARTOLO di SCIARA *et al.*, 1990).

A sighting of a group of four adult common dolphins, made by us in the waters adjacent to the island Losinj (44° 33' N, 014° 30' E) on 2 August 1991, was therefore rather surprising.

The low cetacean diversity of the Northern Adriatic Sea certainly reflects the peculiar environmental conditions of this region (shallowness and extreme ranges of physical-chemical properties), which also correspond to the habitat requirements of bottlenose dolphins, but might also be influenced by the negative effects of human activities. Are cetaceans going to disappear entirely from this part of the Mediterranean? Reports exist concerning the general unhealthy condition of bottlenose dolphins found on the Italian side of the Adriatic (GREENWOOD and TAYLOR, 1978), although recent field studies on the Croatian side point to the opposite (BEARZI *et al.*, in press). Dolphins are long-lived top predators, and as such are excellent bioaccumulators of xenobiotic, potentially noxious substances. A monitoring of botllenose dolphin populations trends and ecology in this region is thus important not only to enhance our understanding of the general ecological mechanisms regulating this delicate marine environment, but also for the conservation of the last existing cetacean in the Northern Adriatic Sea.

REFERENCES

BEARZI G., NOTARBARTOLO DI SCIARA G., & BONOMI L. - Bottlenose dolphins off Croatia: a socio-ecological study. *European Research on Cetaceans*, 6 (in press).

CAPELLINI G., 1877. - Sulla Balenottera di Mondini: Rorqual de la Mer Adriatique di G. Cuvier. *Mem. R. Acad. Sci. Ist. Bologna*, 7(3):413-448.

CENTRO STUDI CETACEI, 1990. - Cetacei spiaggiati lungo le coste italiane. III. Rendiconto 1988. *Atti Soc. Ital. Sci. Nat. Museo Civ. St. Nat.*, Milano, 130(21):269-287.

DATHE H., 1972. - Zum Vorkommen von Delphinen im Mittelmeer. *Zool. Garten N.F.*, Leipzig, 42(34):204.

DULIC B., & TORTIC M., 1960. - Verzeichnis der Saugetiere Jugoslawiens. *Saugetierk. Mitt.*, 8: 1-12.

GIGLIOLI E.H., 1880. - Elenco dei mammiferi, degli uccelli e dei rettili ittiofagi appartenenti alla fauna italica, e catalogo degli anfibi e dei pesci italiani. Firenze, pp. 1-55.

GREENWOOD A.G. & TAYLOR D.C., 1978. - Clinical and pathological findings in dolphins in 1977. *Aquatic Mammals* 6(2):33-38.

HIRTZ M., 1922. - Kit debeloglavac, *Globicephalus melas* (Traill), u vodamna Hrvatske. *Glasnik Hrv. Prirodosl.*, Zagreb, 34:84- 90.

NARDO C.D., 1853. - Notizie sui mammali viventi nel mare Adriatico specialmente sui fisetteri presi in esso nel secolo scorso e nel presente. *Atti Ist. Veneto Sci. Lett. Arti*, 4(2):1-7.

NINNI E, 1901. - Sulle catture di alcuni cetacei nei mare Adriatico ed in particolare sul *Delphinus tursio*, (Fabr.). Neptunia 8:3-9.

NOTARBARTOLO DI SCIARA G., 1992. - I mammiferi marini del Mediterraneo. *Edizioni Atlantis*, Roma, 208 p.

NOTARBARTOLO DI SCIARA G., VENTURINO M.C., ZANARDELLI M., BEARZI G., BORSANI J.F., CAVALLONI B., CUSSINO E., JAHODA. M. & AIROLDI. S., 1990. - Distribution and relative...

Analysis of the fluctuations observed on the landings of the trawling fleet of the Balearic Islands

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A research project on hake (*Merluccius merluccius* L.) and red mullet (*Mullus surmuletus* L.) fisheries has been carried out in Balearic Islands since 1977 and on red shrimp (*Aristeus antennatus* R.) since 1991.

Series of commercial landings [1] (Fig. 1: hake, red mullet and red shrimp) for the period 1940-1991 are also available. These have been studied by ASTUDILLO and CADDY (1986), putting in evidence the fact that fluctuations in the annual landings exists.

Furthermore the dynamic of the popultion of hake in the period 1980-1986 has been analyzed by means of a virtual population analysis (OLIVER, 1990).

Considering these informations, we can observe in first place a negative corre-lation between the hake and red mullet series of annual landings, presenting an approximate period of 12 and 15 years respec-tively. The red shrimp landings also present a periodicity, but with a shorter interval of a 6-8 year period, observed by other authors (TOBAR and SARDA, 1987). (Fig. 1).

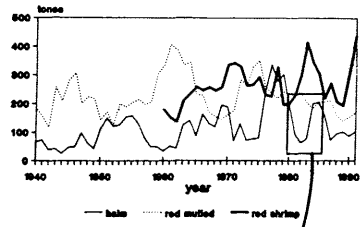

Fig.1 Landings 1940 - 1991
Balearic Islands

The fishing grounds ha-ve extended progressively during the period conside-red between (1940-1991), from the coastal fisheries towards the continental shelf, were red mullet can be considered as the target species, throught deeper fishing grounds, where the target species might be the hake, and finally reaching the deeper slope fishing grounds where the red shrimp is captured.

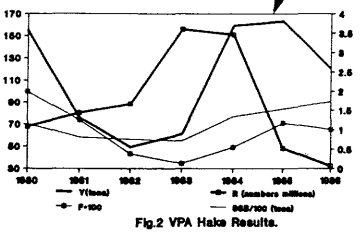

Fig.2 VPA Hake Results.

The results of VPA show a delay of one year, in its fluctuation, of yields (Y), in relation to the ones of recruitment (R), may be caused by the incorporation of the recruits, belonging to age class I, born the year before.

That way the maximum recruitment (age class 0) observed in 1983 is followed by a maximum yield in 1984. (Fig. 2).

In the same way a decreasing fishing mortality (F) can be observed until 1983, possibly due to the progressive lack of interest of the fleet towards the hake, due to the missing catches. This could lead us to think that in certain periods the efforts could be directed in an alternative and major way towards one or another species, depending on the level of catches obtained at that moment. In any case, as it has been shown by other authors (ASTUDILLO and CADDY, 1986), the periodical fluctuations of the landings would be independent of the fishing efforts.

At the same time there is a relative stability of the Spawning Stock Biomass (SSB) observed, anyhow sensible, with a major imbalance towards the fluctuations of the recruitment. This stable minimum level of SSB make the occasional appearance of the rich recruitments possible, which allow the maintainment of the fisheries.

[1] Source of data: Anuarios de Pesca (Estadistica Pesca Oficial) 1940-1969, I.E.O. data 1970-1990.

REFERENCES

ASTUDILLO A. & CADDY J.F., 1986.- Periodiciedad de los desembarcos de Merluza (*Merluccius merluccius* L.) y Salmonete (*Mullus* sp.) en la Isla de Mallorca. *Int. Symp. Long. Term. Changer Mar. Fish. Pop.*, Vigo, 1986.

OLIVER P., GAZA M. & MORILLAS A., 1990.- Aplicacion de un anàlisis de la poblacion virtual al stock de *Merluccius merluccius* de las Islas Baleares. *F.A.O. Rapport sur les pêches*. no 447: pp 119-123.

TOBAR R. & SARDA F., 1987. Analisis de la evolucion de las capturas de gamba rosada, *Aristeus antennatus* (RISSO, 1816) en los ultimos decenios en Cataluna. *Inf. Téc. Inv. Pesq.* 142.

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