

INVESTIGATION OF FIN WHALES (*BALAENOPTERA PHYSALUS*) DISTRIBUTION INFERRED FROM SATELLITE TRACKING AND STABLE ISOTOPES : CONSERVATION IMPLICATIONS

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Abstract

We provide the first evidence from satellite telemetry and stable isotope techniques that a small portion of the fin whale population occurring in the north western Mediterranean Sea during summer migrates to Atlantic foraging areas.

Keywords : Cetacea, Western Mediterranean, Circulation.

Fin whales (*Balaenoptera physalus*) are the largest marine predator in the Mediterranean Sea, where they feed exclusively on the zooplankton *Meganyctiphanes norvegica*. An estimated 1500 to 3500 individuals concentrate during summer in the northern occidental basin and are heavily exposed to shipping collision [1]. Mediterranean fin whales are genetically distinct from North Atlantic populations and the prevailing hypothesis that these stocks are also geographically isolated [1].

The summer distribution of fin whales was investigated using geostatistics [2]. Fin whales movements were monitored using Argos satellite telemetry and by measuring carbon stable isotope ratio variation along baleen plates indicative of feeding areas. Whale baleen plates grow continuously and thus provide a record of stable isotope variation. Furthermore the year round variation in abundance and distribution in the western Mediterranean sea is currently investigated from ship-surveys conducted along the Dyfamed transects between Marseille and Algeria. The fin whales sightings data base merges data coming from a broad range of organizations and associations and cover the period 1993 to 2001. And fin whale were found to be more likely encountered over 2 main areas centred about 43° S, 8° 10' E and 42° 40 S and 5° 30'. The main oceanographic process taking place in the area is associated with the sinking of denser (i.e. saltier) surface water [3] inducing intense spring bloom which in turns allows the development and growth of *M. norvegica*. These areas of sinking dense waters also induce the creation of cyclonic gyres in locations roughly similar from year to year [3]. The summer distribution of fin whales probably mirror the spatial recurrence of these features while the Northern Current could also play an active role in the transportation and in concentrating the preys.

11 fin whales were tagged in August 2003 with Argos satellite tags, which supplied useful locations for up to 301 days from 8 individuals. The resultant tracks documented 13.356 km of travel and provided the first evidence of a summering Mediterranean fin whale traveling into the Atlantic. Seven whales remained in the northwestern Mediterranean for their entire tracking periods. Stable isotope ratios provided useful information of migration patterns and trophic levels. The $\delta^{13}\text{C}$ was measured every centimeter from base (the most recent growth) to tip (the oldest part) of individual baleen plates from 8 whales stranded along the French Mediterranean. The longitudinal record of $\delta^{13}\text{C}$ values in baleen for all individuals, except one male killed in a ship strike in the northwestern Mediterranean, had similar $\delta^{13}\text{C}$ variation patterns. This lone individual exhibited large cyclic variation of $\delta^{13}\text{C}$ fluctuating consistent with the higher enrichment in $\delta^{13}\text{C}$ typical of both the northwestern Mediterranean and Atlantic, suggesting that this individual undertook migrations between the Mediterranean sea and the Atlantic. The $\delta^{15}\text{N}$ values are consistent with fin whales feeding mainly on *M. norvegica* both in the Mediterranean and in the Atlantic.

The survey initiated in summer 2006 confirmed that fin whales were most commonly observed in the northwestern Mediterranean sea but could be seen in the southwestern part of the Mediterranean sea in fall. This study show for the first time that most Mediterranean fin whales are resident and foraged mainly in the northwestern part through summer and fall and tended to disperse more widely later in fall. This study also show that

a small proportion of the population migrates to the Atlantic. From a conservation perspective, the whales remaining in the northwestern basin during fall and early winter are exposed to more shipping than previously thought.

References

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