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Bottlenose dolphins in the western Mediterranean Sea: abundance and interactions with fisheries

Aixa Morata
aixa@asociacionanse.org

ANSE
ASOCIACIÓN DE NATURALISTAS DEL SURESTE

Aixa Morata[1]; Philippe Verborgh[1,2]; José Luis Murcia[1]; Ruth Esteban[2]; Marina González[3]; Pedro García[1]

1. ANSE (Asociación de Naturalistas del Sureste). Plaza Pintor José María Párraga, nº 11, bajo. 30002 Murcia (Spain)
2. Madeira Whale Museum. Rua Garcia Moniz, 1, 9200-031. Caniçal, Madeira (Portugal)
3. Fundación Azul Marino. Calle L'Anguila s/n, 12594. Oropesa, Castellón (Spain)

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BACKGROUND

The bottlenose dolphin (*Tursiops truncatus*) is listed in Annex II of the EU Habitats Directive (priority species for conservation) and so requires the creation of SACs (Special Areas of Conservation) to ensure their protection. There are no previous abundance estimates for bottlenose dolphin in south-eastern Iberian waters, except for the Alboran Sea (Cañadas & Hammond, 2006). ANSE has been collecting data on bottlenose dolphins in the southeast Iberian peninsula since 2000. In 2021, the photo-identification catalogue included more than 900 individuals.

Interactions between different type of fisheries and bottlenose dolphins are commonplace in the Mediterranean Sea and can lead to negative impacts on both dolphins and fishers (Bearzi, 2002). Over the last decade, the interactions between bottlenose dolphins and fisheries in south-east Spain have been reported to cause economic impact due to depredation and damage on the nets. There are different types of fisheries occurring along the Spanish coast of the western Mediterranean Sea, including trawlers, purse seiners, aquaculture and artisanal fisheries (using mainly trammel nets and gillnets).

MATERIALS AND METHODS

Study area was the south east coast of Spain (**Fig. 1**). To improve the knowledge of dolphin depredation on artisanal fisheries, 69 fishermen in 5 fishing ports were interviewed in 2019.

Seven line transect Distance Sampling surveys were carried out to estimate spatial abundance in 3 different areas between 2017 and 2021.

Photo-identification data (2000-2021) was used in mark-recapture closed population model using MARK 9.0 program to estimate total abundance.

The strength of relationships between bottlenose dolphins observed at least 4 times between 2000 and 2021, was calculated using the "Half-weight Association Index", in SOCPROG 2.9 (Whitehead, 2009).

RESULTS

Ninety three percent of fishers interviewed had depredation events, taking place all year round.

Spatial abundance gave a total of 234 animals (**Fig. 1, Table 1**). Total abundance estimated for 2021 was 779 individuals (95% CI: 591-1065), between Málaga and Santa Pola. There is an increase in the population from previous estimate (2019: 478 individuals (95% CI: 383-612)), but the capture probability was low (less than 0.10), so there is a low reliability.

Social analyses described 5 social groups of a total of 98 dolphins over 114 days between 2000 and 2021 (**Fig. 2**). There are important links between individuals interacting and those who have never been observed interacting. The presence of individuals interacting in all social groups shows a widespread behavior in this population.

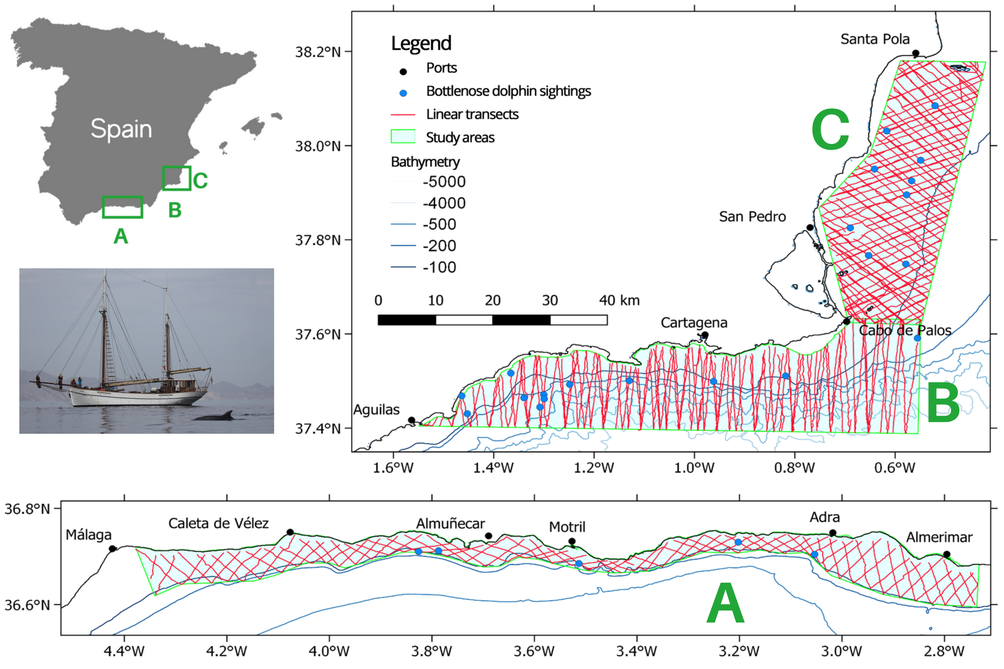

Figure 1. Distance Sampling effort.

SECTION	N.º OBSERV.	DENSITY/ KM²	CV	ABUND.	95% CI	ENCOUNTER RATE/100 KM	YEAR
A	5	0,076	0,49	**73**	29 - 184	0,59	2019
B	10	0,063	0,37	**98**	48 - 200	0,50	2017
C	9	0,058	0,39	**63**	30 - 133	0,46	2019 and 2021

Table 1. Spatial abundance results.

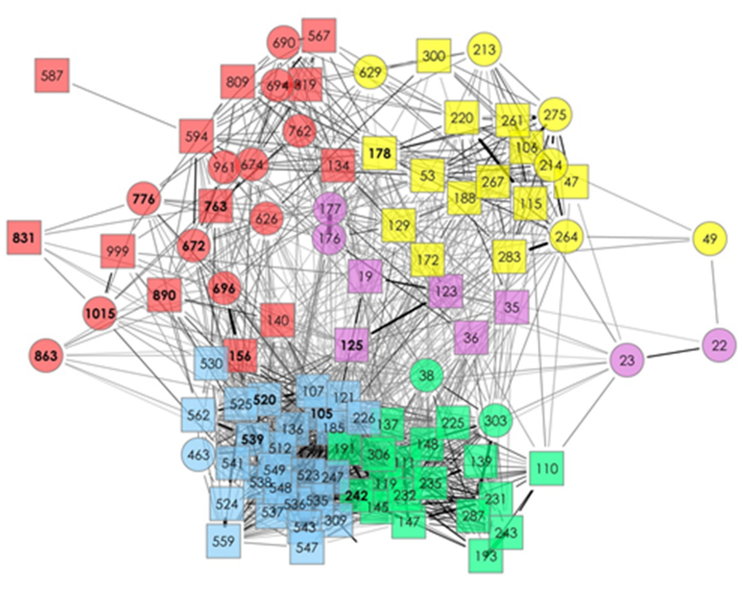

Figure 2. Social network of associations between 98 bottlenose dolphins. Each colour is a different social group. The thickness of the vertex represents the association index between 2 individuals. Squares: individuals interacting with commercial fisheries. Circles: individuals not interacting with commercial fisheries. Bold ID number: individuals interacting with artisanal fisheries.

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