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REPORT

Results obtained from aerial surveys for the monitoring of loggerhead sea turtles (*Caretta caretta*) distribution in the Valencia region (East Spain) during the period 2010-2021

PROJECT LIFE-MEDTURTLES
(LIFE18 NAT/IT/000103)

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JANUARY 2023

Collective actions for improving the conservation status of the EU sea turtle populations: bordering areas (LIFE18NAT/IT/000103). Project is carried out with the assistance of LIFE financial instrument of the European Union / **info@medturtles.eu**

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INTRODUCTION

Estimates of abundance and distribution of sea turtle's population are prerequisites for effective management and to implement conservation measures (Lauriano et al., 2011; Fortuna et al., 2018; DiMatteo et al., 2022). The university of Valencia has conducted line transect surveys in the Spanish Mediterranean since 2000, following distance sampling protocols for estimating loggerhead sea turtle's abundance and distribution and to identify high-density areas of interest for their conservation (Gómez de Segura et al., 2006).

Data obtained from aerial surveys for the period 2010-2018 by the UVEG team have been analysed within the framework of the LIFE-MEDTURTLES project (Actions C3-D3 *to determine Marine hot-spot areas for sea turtles: dynamic fishery management*), to generate maps of loggerhead sea turtle's distribution along the Valencia region coastal waters. The present report shows the main results obtained from these analyses.

MATERIALS AND METHODS

Seasonal aerial surveys were conducted following the transect line methodology (Buckland et al., 2001), from 2010 to March 2018 (Table 1). Seasons were determined by means of water temperature: Winter (January–March), spring (April–June), summer (July–September) and autumn (October–December).

A fixed kernel density was estimated for sea turtle's distributions and to compare turtle's distribution areas in different seasons. Core-use areas were identified using fixed kernel density estimations (KDE; Worton, 1989). Density distributions were represented on the maps by the 95% utilisation distribution (UD) contours. The 50% KDE was used to represent the core area of sea turtle's distributions.

RESULTS AND DISCUSSION

Three hundred and twenty-nine loggerhead sea turtle's sightings were recorded during sampling effort between 2010 and 2018 (annual mean ± SD: 52.7 ± 44.3; range: 7-119). The effort and the number of sightings of the different surveys are listed in Table 1, and the distribution of the turtles observed during all the surveys is illustrated in Figure 1. The spatial distribution of sightings in the study area determined by KDE over the aerial surveys records indicated that turtles are distributed along the coast but the highest turtle's densities occurred along the waters of Alicante province, with core density area located

to the south of Cape La Nao (Figure 2). Seasonal changes in the 50% KDE area are presented. Estimates show moderate sighting densities at the north of the region in autumn and spring and an isolated cluster also occurs in coastal waters in winter (Figure 3). These changes in density distribution would result in different overlaps with the fishing fleets in the region that would result in different conservation guidelines.

Table 1. Data obtained during aerial surveys in the period 2010 - 2018. Only data with complete distance and group size data are shown.

	2010-2011	**2013**	**2015**	**2013-2015**	**2017-2018**
Area (km^2)	23119	23119	23119	23119	23119
Effort (km)	2555	2809	1127	3937	4580
C. caretta individuals	34	47	8	55	185

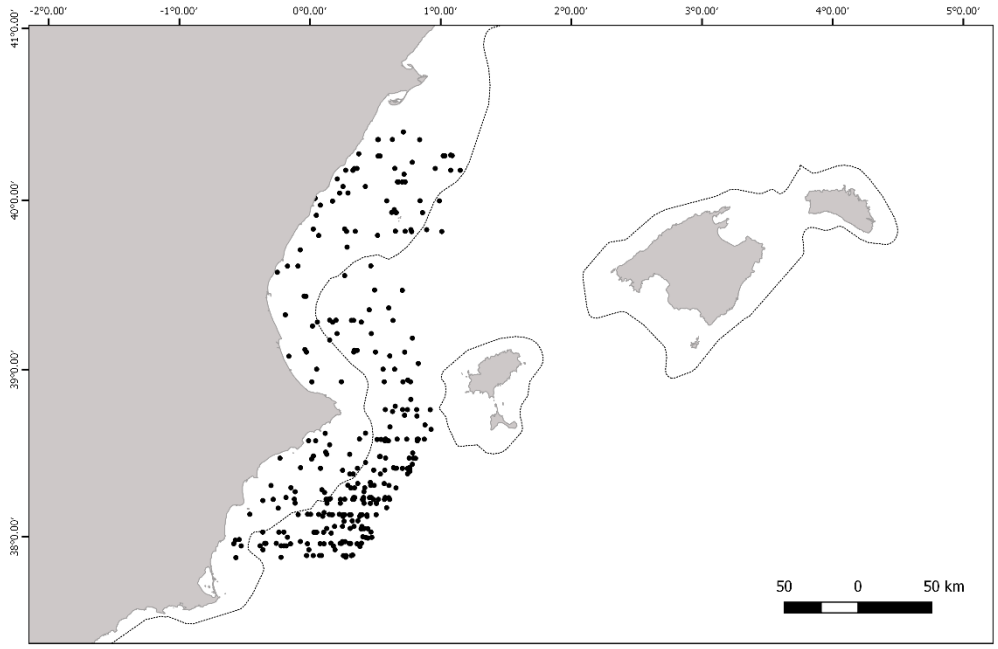

Figure 1. Distribution of loggerhead turtles observed in the surveys conducted in the Valencia region during 2010- 2018. The 200m isobaths is shown.

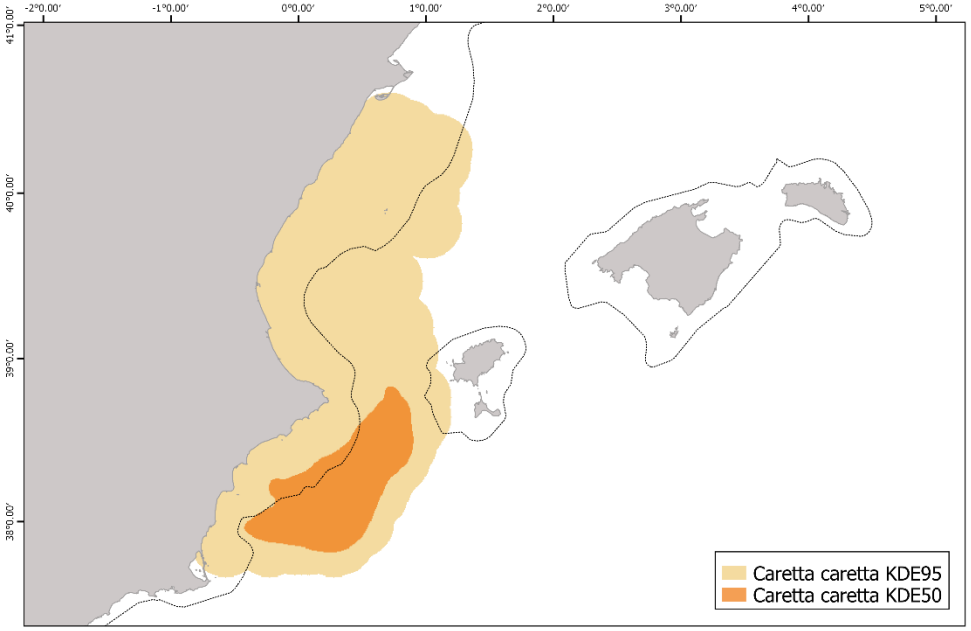

Figure 2. Kernel density map of loggerhead sea turtles observed in the surveys conducted in the Valencia region during 2010 -2018.

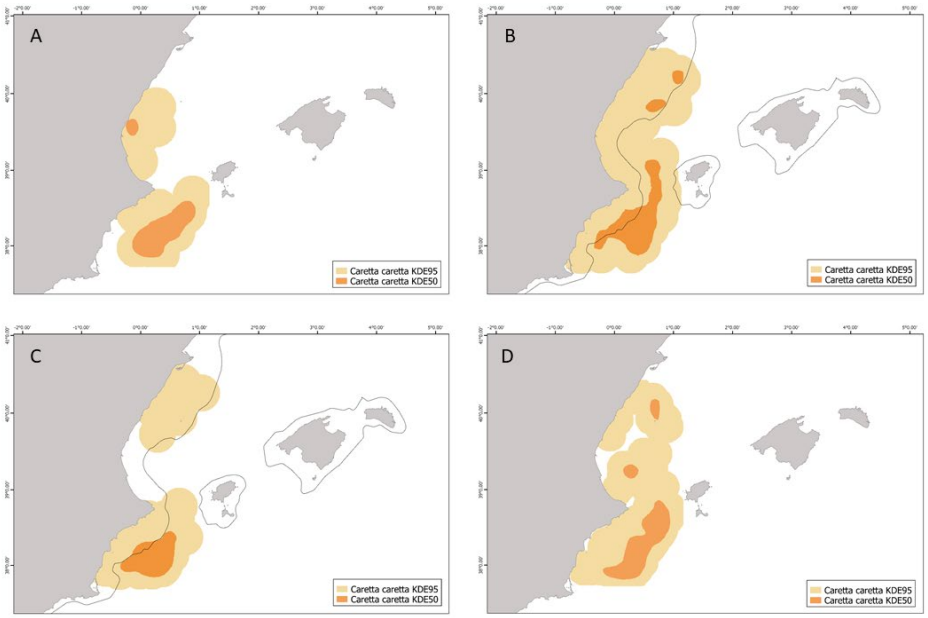

Figure 3. Kernel density maps, showing seasonal distributions of loggerhead sea turtles in the Valencia region for the periods: A) January, February, March, B) April, May, June; C) July, August, September and D) November, October, December. A dashed light grey line: 200 m bathymetric contour.

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