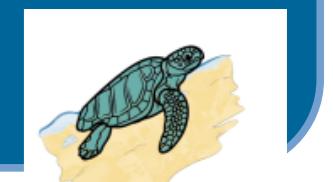


Explorers and residents: two types of nesting and internesting behaviour of loggerhead sea turtles colonising the western Mediterranean

Belda, EJ¹, Abalo-Morla, S², Cardona, L³, Abella, E⁴, Belda, L¹, Feliu-Tena, B.^{1,5}, Pascual, M³, Carreras, C³ and Tomás, J.⁵



Institut per a la Investigació i Gestió de Zones Costaneres (IGIC), Universitat Politècnica de València, C/Paranimf nº 1, 46730, Gandia, València, Spain; 2.-Instituto Español de Oceanografía, Centro Oceanográfico de Vigo (COV-IEO), CSIC, Subida a Radio Faro, 50-52, 36390, Vigo, Pontevedra, Spain; 3- Departament de Biologia Gaireva Evolutiva, Ecología i Ciències Ambientals, Universitat de Barcelona, Barcelona, Spain; 4. BETA Technological-Centre(Uvic-UCC), Ctra. De Roda, 70, 08500 Vic, Barcelona, Spain; 5 - Instituto Español de Oceanografía (IEO-CSIC), C.O. Murcia, C/el Varadero 1, Lo Pagan, 30740 Murcia, Spain



edbelpe@upv.es



BACKGROUND



Increase of the detected nesting events of loggerhead sea turtle in the Mediterranean Spanish coast, particularly since 2014, with several nesting events recorded every year (ranging 1 -29).



Females nesting in the western Mediterranean come from distant rookeries. For a philopatric species, colonising distant beaches is challenging



Lack of information about the nesting behaviour of these females. This information is crucial for managing and conserving what seems to be a new-growing loggerhead turtle nesting population in the western Mediterranean.

METHODS



Satellite tracking of 13 females found nesting at beaches of the Spanish coast (Western Mediterranean)

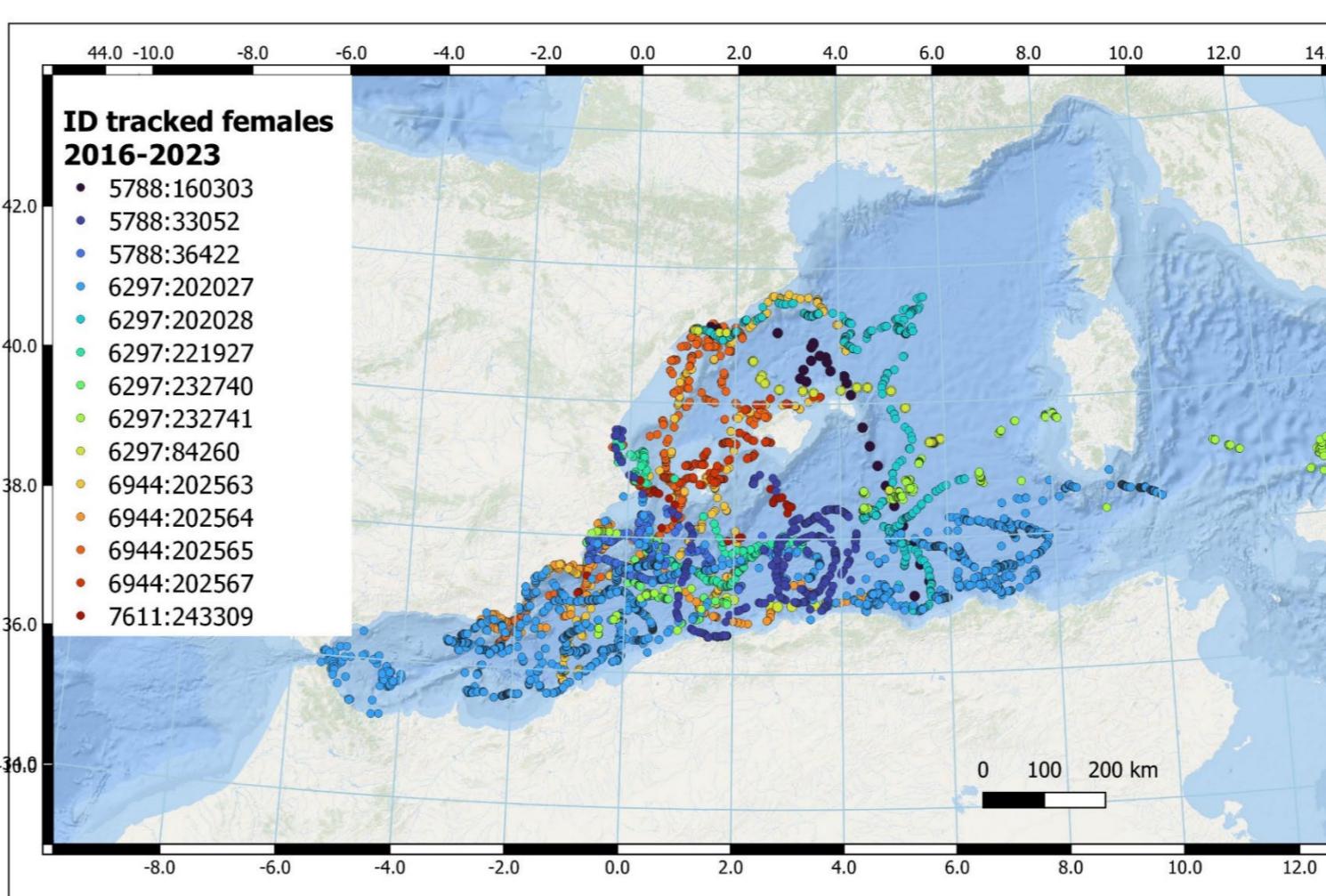


Data collected 2016 – 2023. 14 tracks. Two females tagged in two different years (2016 and 2020; 2018 and 2023)

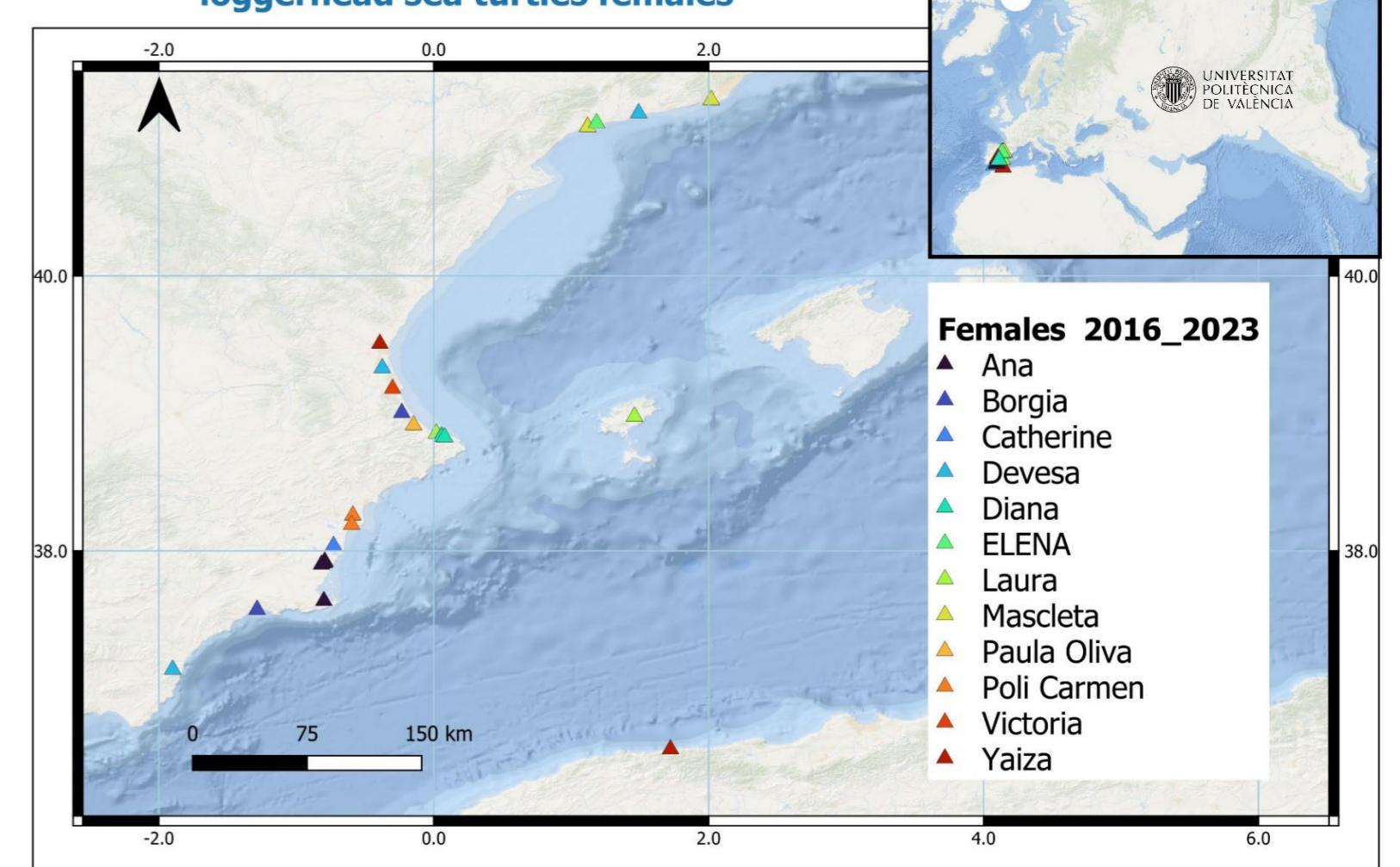
RESULTS

Turtle_ID	Tag_Id	dd/mm/yyyy	Size (CCL)	Tracking period (days) until 31st of August	Internesting period (total days between first and last nest/false crawl)	Nests confirmed	Linear Distance (km) between successive nests or false crawls
Mascleta (2016)	160303	24/06/2016	58	43		1	NA
Mascleta(2020)	84260	16/07/2020	60	47	15	2	0.06
Ana (2018)	36422	08/07/2018		54		0	NA
Ana(2023)	232740	16/06/2023	78	75	3	0	3.4 ; 40.7
Yaiza (2018)	33052	27/06/2018	79	64	11	1?	378
Victoria (2020)	202027	30/07/2020	87	31		1	328; 0.5
Elena (2021)	202028	10/07/2021		52		1	NA
Catherine(2022)	232741	26/07/2022	79	36		1	NA
Diana (2023)	221927	18/06/2023	73	74	33	3	0.03; 0.02
Borgia (2023)	202563	19/06/2023	88	73	14	2	255
PoliCarmen (2023)	202564	26/06/2023	78	66		0	10.6
Devesa (2023)	202565	13/07/2023	90	49	47	3	259; 561
*Laura (2023)	202567	22/06/2023	76	25	19	2	137
PaulaOliva (2023)	243309	21/06/2023	76	71		0	NA

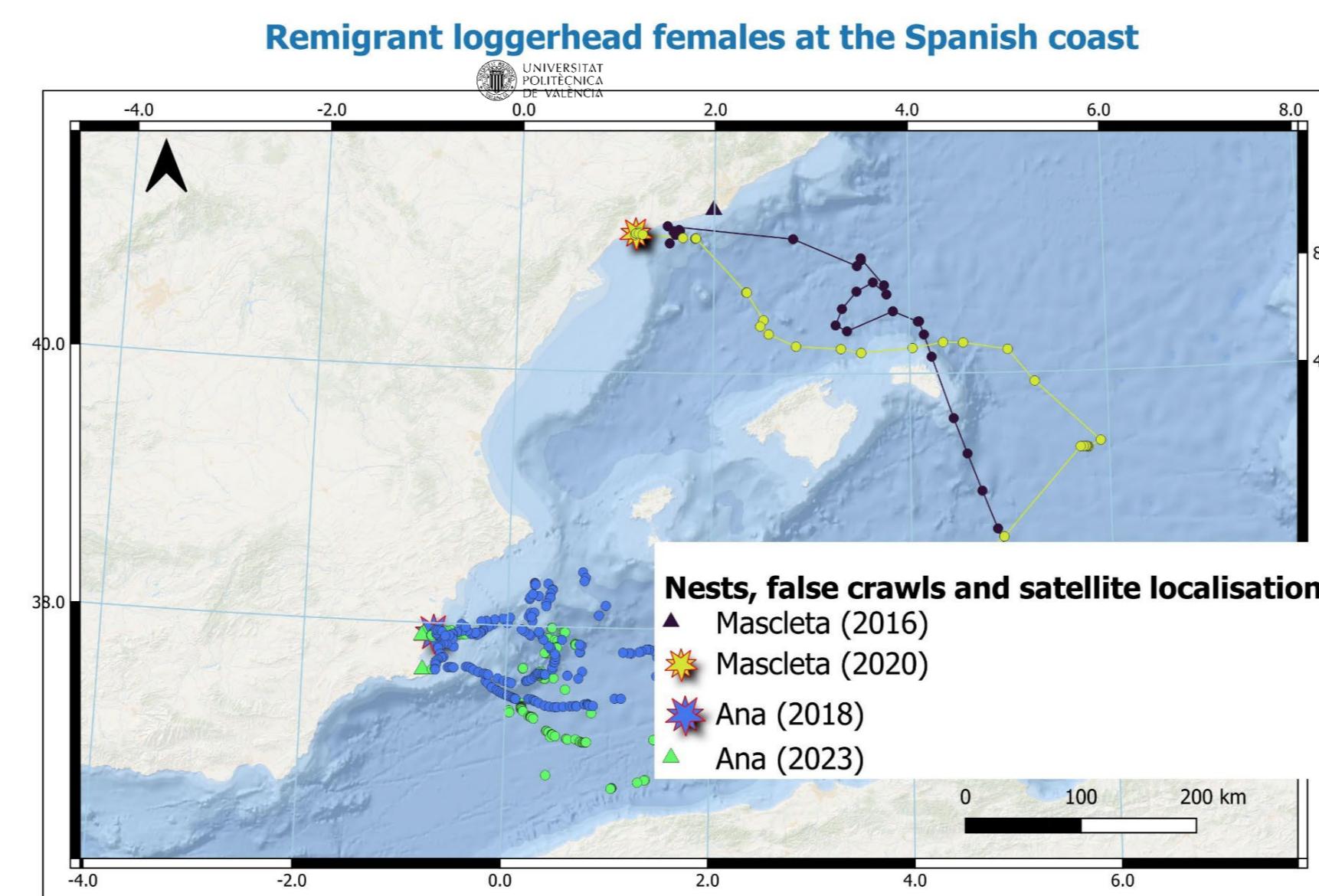
Satellite localisations of nesting loggerhead sea turtles in June-August



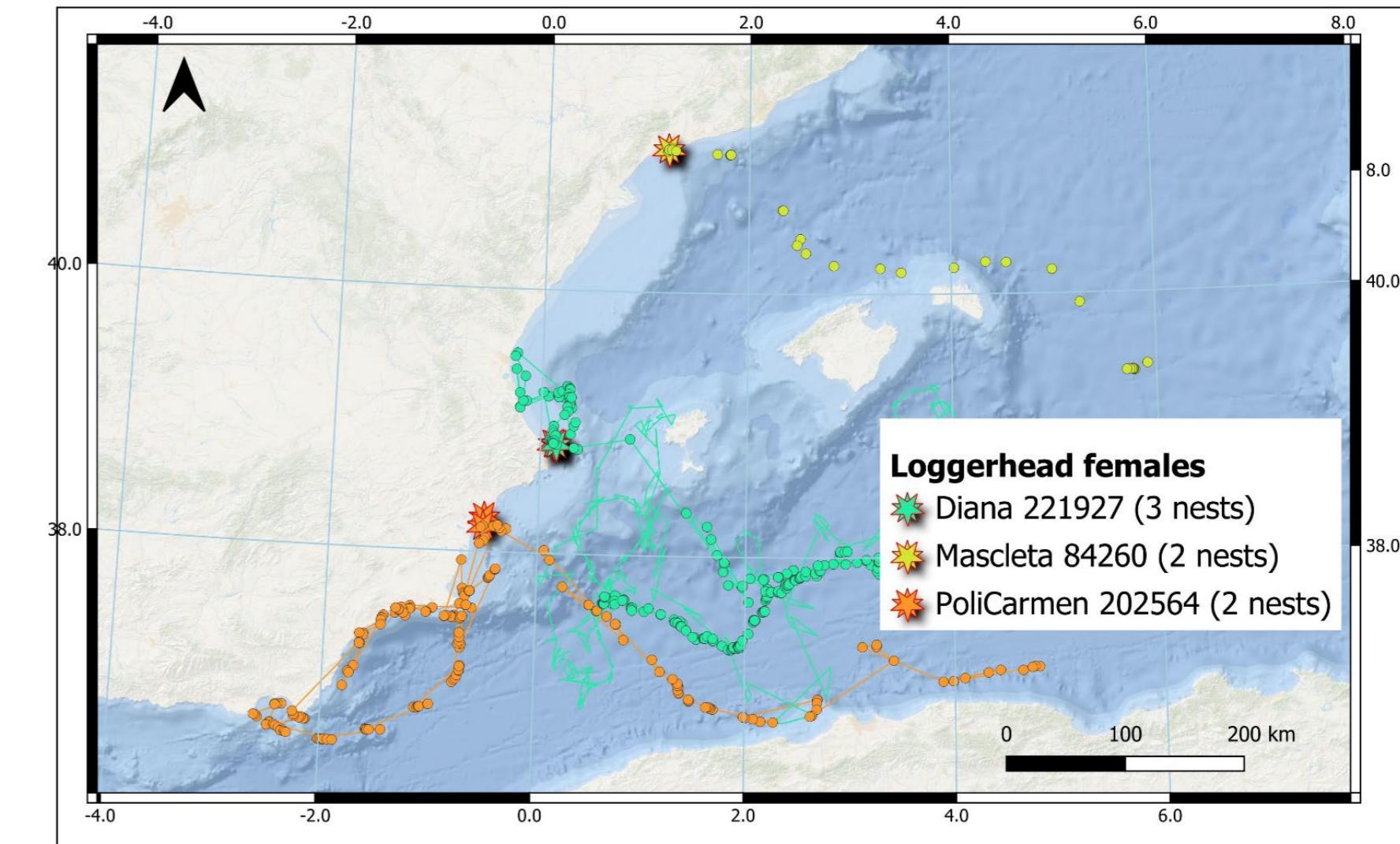
Nests and nesting attempts of satellite tracked loggerhead sea turtles females



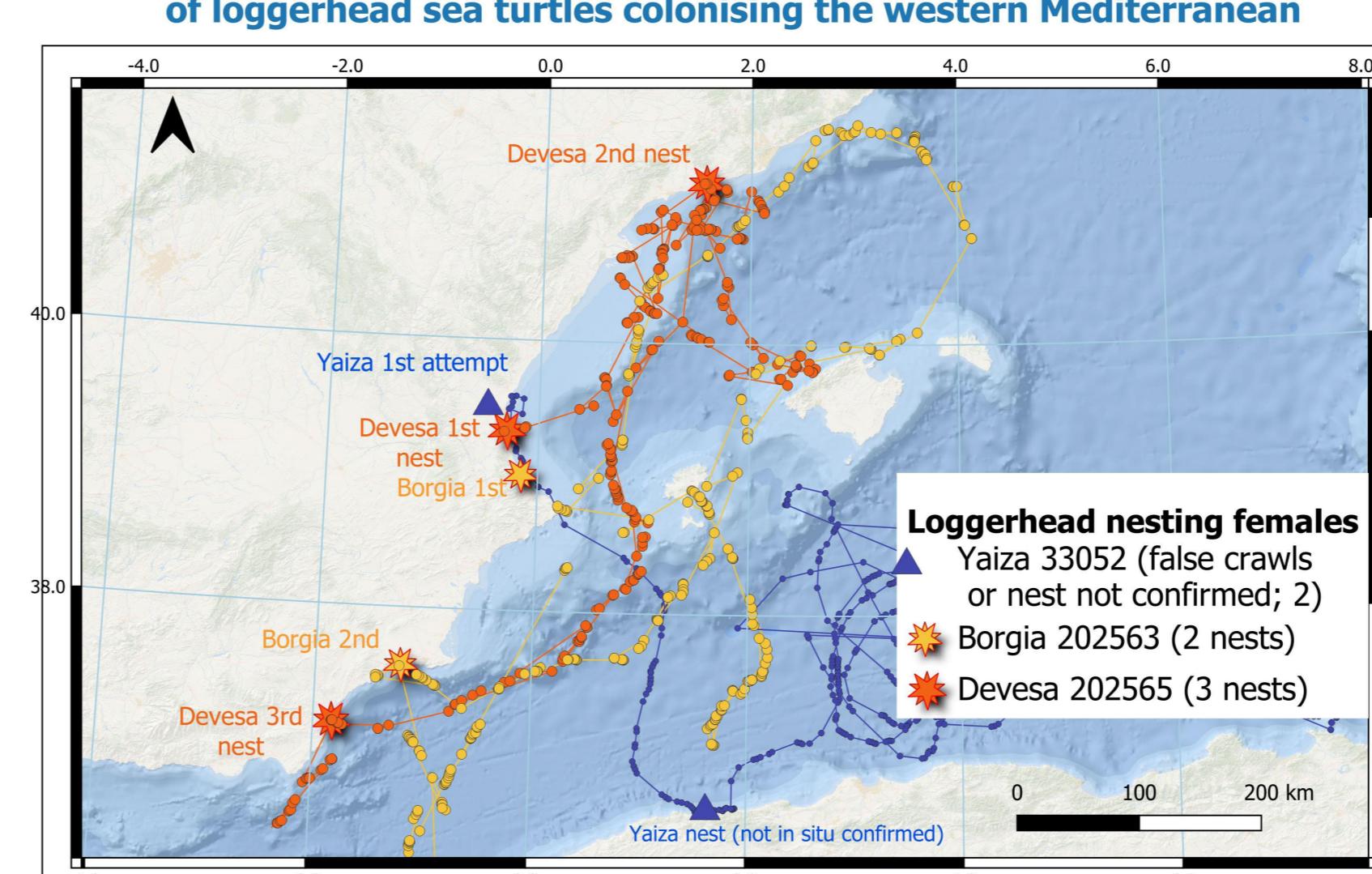
Examples of different behaviours of loggerhead females showing nest site fidelity



Examples of behaviours showing nest site fidelity of loggerhead sea turtles colonising the western Mediterranean



Examples of different behaviours of loggerhead females without site fidelity



These results suggest two types of female behaviour among the breeders in Spain:

EXPLORERS, the ones wandering throughout the coast and

RESIDENTS are the ones with nest site fidelity

These two alternative behaviours have been previously observed in well-established nesting rookeries (e.g. Hart et al. 2013 , but distances between consecutive nesting events recorded in the present study almost double previous recorded distances elsewhere.

Hypothesis: this dichotomous behaviour could be explained as follows:

EXPLORER females would be those from distant nesting populations that may remain in the western Mediterranean foraging grounds after reaching sexual maturity and, under suitable conditions, explore beaches nearby to nest.

RESIDENT females may proceed from undetected nests laid in western Mediterranean countries years ago that returned to reproduce to the natal beach due to philopatry.

Nonetheless, we cannot discard that the so-called residents may be explorers from distant populations who find a suitable nesting beach and use it for consecutive nesting events..

Further research is needed since this information is crucial for managing and conserving what seems to be a new-growing loggerhead turtle nesting population in the western Mediterranean.

ACKNOWLEDGEMENTS

Satellite tags, satellite tracking, field work in 2023 and these results have been carried out within the framework of the InGeNi-Caretta Project (Ref. I123). The project is supported by the Biodiversity Foundation of the Ministry for the Ecological Transition and the Demographic Challenge (MITECO) of the Government of Spain, within the framework of the Recovery, Transformation and Resilience Plan (PRTR), funded by the European Union - NextGenerationEU. Research in previous years was supported by the Biodiversity Foundation in the framework of LIFE 15 IP E05012 INTEMARES and project LIFE MedTurtles to Universitat de València, Fundació oceanogràfica provided one of the tags in 2018 and the cost of ARGOS was funded by the UPV. Works conducted with the support of the Servei de Vida Silvestre i Vida Marina de la Generalitat Valenciana and from the generalitat de Catalunya. This work could not have been possible without the help of volunteers. Tagging authorisations DIV/BDM/AUTSPR/43/2021, V/SGBTM/BDM/AUTSPR/43/2021, V/SGBTM/BDM/AUTSPR/38/2017, SGPMBDM/AUTSPR/26/2019 SGPMBDM/AUTSPR/23/2020, SGBTM/BDM/AUTSPR/44/2022.

References: Agalo-Morla, S., E. J. Belda, D. March, O. Revuelta, L. Cardona, S. Giralt, J. L. Crespo-Prieto, S. Hochscheid, A. Marco, M. Marchán, R. Sagarriga, Y. Swimmer & J. Tomás (2021) Assessing the use of marine protected areas by loggerhead sea turtles Caretta caretta tracked from the western Mediterranean. *Global Ecology and Conservation*, 38. <https://doi.org/10.1016/j.geco.2021.100959>

Hart, K. M., J. M. Lemon, A. R. Sartain, I. Fujisaki & B. S. Stephens (2013) Movements and habitat use of loggerhead sea turtles in the northern Gulf of Mexico during the reproductive period. *PLoS One*, 8, e66921, 10.1371/journal.pone.0066921. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3680333/>