

Strait of Gibraltar and Gulf of Cadiz Important Marine Mammal Area - IMMA

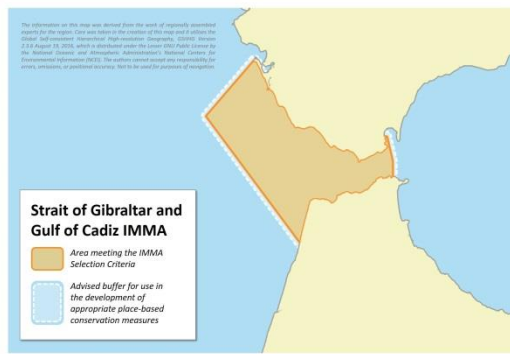
Description of qualifying criteria

Criterion A - Species or Population Vulnerability

The Gulf of Cadiz and Strait of Gibraltar subpopulation of killer whales is considered Vulnerable in the Spanish National Catalogue of Endangered Species (Royal Decree 139/2011). The vulnerability of this subpopulation has been demonstrated in the published peer-reviewed literature, based on its small size, isolation from other Atlantic populations, limited fecundity and low survival of offsprings, and dependency to a depleted main prey, the Bluefin tuna. On May 17th 2017, the Spanish Ministry of Environment issued the Conservation Plan for Iberian killer whales (Order APM/427/2017), identifying critical killer whale habitat in Spanish waters and the necessity to protect it.

Criterion B: Distribution and Abundance Sub-criterion Bi: Small and Resident Populations

This area is seasonally used by a population of 39 killer whales in spring and summer. The same individuals have been re-sighted annually from 1999 to 2016. They belong to 5 social pods, stable over the study period. This is the only area with regular presence of killer whales in the Mediterranean Sea. Annual dedicated vessel surveys were performed from 1999 to 2016, including field observations and photo-identification. Photo-identification allowed the identification of 45 individuals, with an abundance count of 39 individuals in 2011, belonging to 5 stable social pods. Genetic analysis as well as



Area Size

4,538 km²

Qualifying Species and Criteria

Killer whale - *Orcinus orca*

Criterion A; B (i); C (i, ii); D (i)

Marine Mammal Diversity

Criterion D (ii)

[*Tursiops truncatus*, *Stenella coeruleoalba*,
Globicephala melas, *Delphinus delphis*,
Grampus griseus, *Physeter macrocephalus*,
Balaenoptera physalus]

Summary

The Strait of Gibraltar, with the adjacent Gulf of Cadiz, is the only area with a regular presence of killer whales (*Orcinus orca*) in the Mediterranean Sea. During spring and summer this area provides essential feeding and nursing habitat for the small seasonal resident population of killer whales, which is genetically and ecologically distinct from killer whales in the Atlantic Ocean. The Strait of Gibraltar sub-population of killer whales is considered Vulnerable in the Spanish National Catalogue of Endangered Species but may be considered Endangered based upon other monitoring studies.

ecological indicators of stable isotopes and contaminant levels have shown that these individuals are isolated from other Atlantic Ocean killer whales.

Criterion C: Key Life Cycle Activities

Sub-criterion Ci: Reproductive Areas

There is a seasonal presence in spring and summer of killer whales observed from 1999 to 2016. Newborn, calves and juvenile have been observed almost every year. The area is also a feeding ground, providing the nutritional requirements for whales to produce offspring and nurse them.

Criterion C: Key Life Cycle Activities

Sub-criterion Cii: Feeding Areas

The area has been identified to be a seasonal feeding ground in spring and summer of killer whales due to the concentration of their main prey Bluefin tuna. This takes place as the tuna migration towards (in spring) and from (in summer) the Mediterranean Sea through the Strait of Gibraltar. Whales have been observed annually feeding on Bluefin tuna, using two foraging strategies. The first strategy happens in spring and summer and consists in a “chase-exhaustion” technique where the whales actively chase the tuna until its exhaustion. The second strategy happens only in summer and consists in depredating the tuna caught by the drop line Spanish and Moroccan fisheries. Only some of the social groups have exhibited this second strategy. Following the decrease in drop-line fishery catches, no calves have been reported to survive.

The population growth rate was positive at 4% for interacting individuals, and no growth was observed for non-interacting individuals. These differences in demographic parameters could be explained by access to larger tuna through depredation. Consequently, whales would need more tuna to cover their daily energy requirements while actively hunting,

suggesting an effect of artificial food provisioning on their survival and reproductive output.

Criterion D: Special Attributes

Sub-criterion Di: Distinctiveness

The area is the only place in the Mediterranean Sea with a regular presence of killer whales. Genetic analysis as well as ecological indicators (stable isotopes and contaminant levels) have shown that these individuals are isolated from other Atlantic Ocean killer whales. The population is considered Vulnerable in the Spanish Catalogue of Endangered Species.

Criterion D: Special Attributes

Sub-criterion Dii: Diversity

The eastern part of the area in the Strait of Gibraltar is regularly inhabited by six other cetacean species including pilot whales, resident common bottlenose dolphins, common dolphins, striped dolphins, sperm whales, and a migratory corridor for fin whales. The western part in the Gulf of Cadiz has also a known presence of common bottlenose dolphin, common dolphin, and Risso's dolphin.

Supporting Information

Barón, E., Giménez, J., Verborgh, P. et al. 2015. Bioaccumulation and biomagnification of classical flame retardants, related halogenated natural compounds and alternative flame retardants in three delphinids from Southern European waters. Environmental Pollution, 293:107-115. doi 10.1016/j.envpol.2015.03.041.

Carpinelli, E., Gauffier, P., Verborgh, P. et al. 2011. Assessing sperm whale (Physeter macrocephalus) movements within the Mediterranean Sea through photo-identification. Aquatic Conserv: Mar. Freshw. Ecosyst., 24: 23–30. doi: 10.1002/aqc.2446.

Chico Portillo, C., Giménez, J., Torres, S. et al. 2011. Survival rate, abundance and residency of bottlenose dolphins (*Tursiops truncatus*) in the Strait of Gibraltar. 25th Ann. Meeting European Cetacean Society, Cadiz, Spain, March 2011.

De Stephanis, R., Cornulier, T., Verborgh, P. et al. 2008. Summer spatial distribution of cetaceans in the Strait of Gibraltar in relation to the oceanographic context. *Marine Ecology Progress Series*, 353, 275-288.

De Stephanis, R., Giménez, J., Esteban, R. et al. 2014. Mobbing-like behavior by pilot whales towards killer whales: a response to resource competition or perceived predation risk? *Acta Ethologica*. doi: 10.1007/s10211-014-0189-1.

Esteban, R., Verborgh, P., Gauffier, P. et al. 2016a. Maternal kinship and fisheries interaction influence killer whale social structure. *Behavioral Ecology and Sociobiology*. 70, Issue 1, pp 111–122. DOI: 10.1007/s00265-015-2029-3.

Esteban, R., Verborgh, P., Gauffier, P. 2016b. Dynamics of killer whale, bluefin tuna and human fisheries in the Strait of Gibraltar. *Biological Conservation* 194:31-38.

Esteban, R., Verborgh, P., Gauffier, P. 2016c. Using a multi-disciplinary approach to identify a critically endangered killer whale management unit. *Ecological Indicators* 66, 291-300.

Esteban, R., Verborgh, P., Gauffier, P. 2016d. Conservation Status of Killer Whales, *Orcinus Orca*, in the Strait of Gibraltar. In: G. Notarbartolo di Sciara, M. Podestà, B.E. Curry (Editors), *Mediterranean marine mammal ecology and conservation*. *Advances in Marine Biology* 75:141-172.
<http://dx.doi.org/10.1016/bs.amb.2016.07.001>.

Esteban, R., Verborgh, P., Gauffier, P. 2013. Identifying key habitat and seasonal patterns of a critically endangered population of killer whales. *Journal of the Marine Biological Association of the United Kingdom*. doi:10.1017/S002531541300091X.

Foote, A., Vilstrup, J., De Stephanis, R. et al. 2011. Genetic differentiation among North Atlantic killer whale populations. *Molecular Ecology* 20 (3), 629-641.

Gauffier, P., Verborgh, P., Andreu, E. et al. 2009. An update on fin whales (*Balaenoptera physalus*) migration through intense maritime traffic in the Strait of Gibraltar. *International Whaling Commission document SC/61/BC6*, Madeira, Portugal. 4 pp. Available at <http://iwcoffice.org/>.

Giménez, J. et al. 2012. Abundance of common dolphins in the Bay of Algeciras using mark-recapture data. 26th Ann. Meeting European Cetacean Society, Galway, Ireland, 26-28 March 2012.

Guinet, C., Domenici, P., De Stephanis, R. et al. 2007. Killer whale predation on bluefin tuna: Exploring the hypothesis of the endurance-exhaustion technique. *MEPS*. 347:111-119.

Kaschner, K., et al. 2016. AquaMaps: Predicted range maps for aquatic species. World wide web electronic publication, www.aquamaps.org, Version 08/2016.

Orden APM/427/2017, de 4 de mayo, por la que se aprueban las medidas de protección, y el Plan de Conservación de las orcas del Estrecho y Golfo de Cádiz.
<http://www.boe.es/boe/dias/2017/05/17/pdf/s/BOE-A-2017-5474.pdf>.

Real Decreto 139/2011, de 4 de febrero, para el desarrollo del Listado de Especies Silvestres en Régimen de Protección Especial y del Catálogo Español de Especies Amenazadas.
<https://www.boe.es/buscar/pdf/2011/BOE-A-2011-3582-consolidado.pdf>.

Stekke, V., Gauffier, P., Verborgh, P. et al. 2011. Abundance and Distribution Of Risso's Dolphin In The Southwest Iberian Peninsula. 25th Ann. Meeting European Cetacean Society, Cadiz, Spain, March 2011.

Verborgh, P., De Stephanis, R., Pérez, S. et al. 2009. Survival rate, abundance, and residency of long-finned pilot whales in the Strait of Gibraltar. *MMS*.

Verborgh, P., Gauffier, P., Esteban, R. et al. 2016. Conservation Status of Long-Finned Pilot Whales, *Globicephala melas*, in the Mediterranean Sea. In: G. Notarbartolo di Sciara, M. Podestà, B.E. Curry (Editors), *Mediterranean marine mammal ecology and conservation. Advances in Marine Biology* 75: 173-203.
<http://dx.doi.org/10.1016/bs.amb.2016.07.004>.

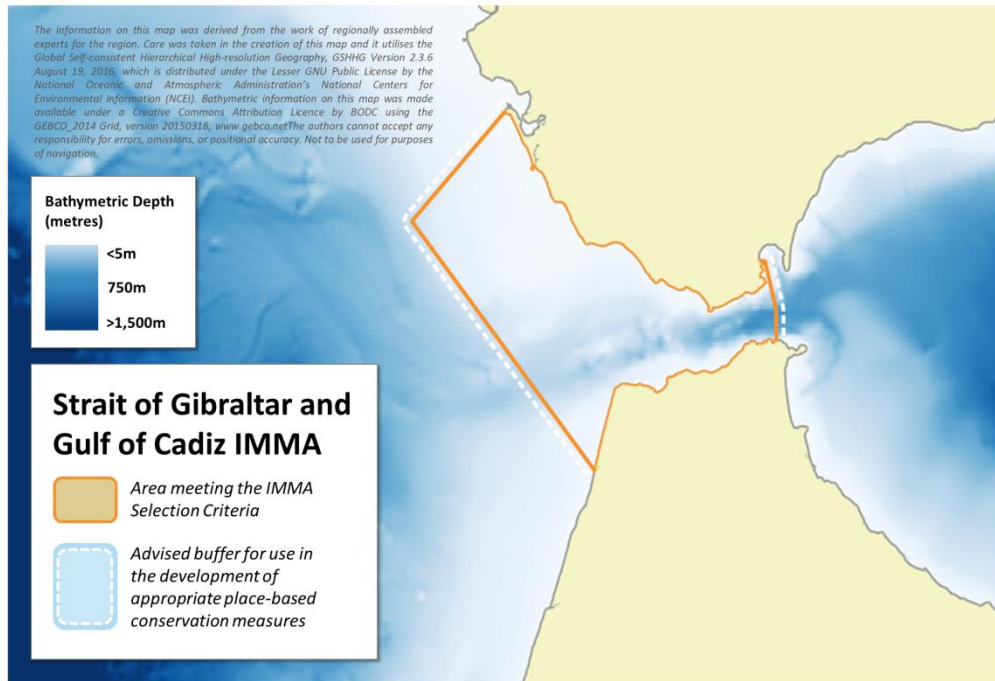
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Annex I

Supplementary Maps



Annex II

List of Primary and Secondary Species

Primary Species – Meet the IMMA Selection Criteria

Scientific Name	Common Name of Species	Population / Subpopulation Name	IUCN Red List Status
<i>Orcinus orca</i>	Killer whale	Strait of Gibraltar killer whale population	‘Vulnerable’ in the Spanish National Catalogue of Endangered Species (Royal Decree 139/2011)

Secondary Species – Do not individually meet the IMMA Selection Criteria but are present within the area

Scientific Name	Common Name of Species	Population / Subpopulation Name	IUCN Red List Status
<i>Delphinus delphis</i>	Common dolphin	Mediterranean Subpopulation	Endangered
<i>Tursiops truncatus</i>	Common bottlenose dolphin	Mediterranean Subpopulation	Vulnerable
<i>Stenella coeruleoalba</i>	Striped dolphin	Mediterranean Subpopulation	Vulnerable
<i>Grampus griseus</i>	Risso’s dolphin	-	Data Deficient
<i>Balaenoptera physalus</i>	Fin whale	Mediterranean Subpopulation	Vulnerable
<i>Globicephala melas</i>	Long-finned pilot whale	-	Data Deficient
<i>Physeter macrocephalus</i>	Sperm whale	Mediterranean Subpopulation	Endangered