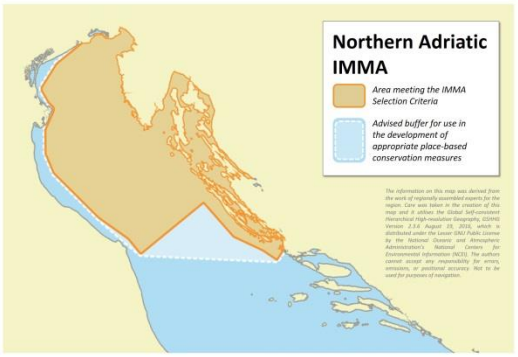
Northern Adriatic Important Marine Mammal Area - IMMA



Area Size

33,437 km^2

Qualifying Species and Criteria

Common bottlenose dolphin - *Tursiops truncatus*
Criterion A; B (ii); C (i); D (i)

Summary

The shallow continental shelf area of the Northern Adriatic hosts an estimated 6,000 Vulnerable Mediterranean common bottlenose dolphins (*Tursiops truncatus*). Genetic evidence reveals a fine-scale genetic structure, with differentiation between north and south-central areas, as well as between the west and east coasts. In addition, the resident local population from the Gulf of Trieste shows significant genetic differentiation from the rest of the Adriatic Sea. Residency patterns have been identified along coastal areas of the eastern Adriatic with at least three distinct local communities across the Gulf of Trieste, the Kvarnerić, and north Dalmatia. Three EU Natura 2000 Special Areas of Conservation have been designated for common bottlenose dolphins in Croatian waters.

Description

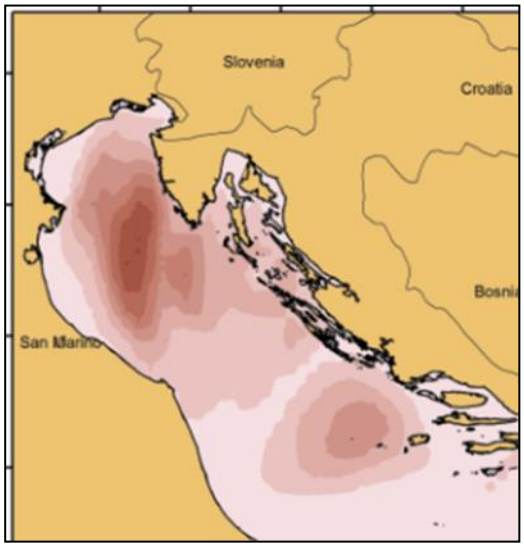
The northern Adriatic is a shallow basin with the bottom sloping gently to the south and reaching a maximum of about 100 m, with an average depth of 35 m. This sub-basin is strongly influenced by the Po river plumes, with low salinity, low water temperature and high productivity (Cushman-Rosin et al., 2001; and others). Contrary to that, the water between Croatian islands is oligotrophic with relatively low levels of pollution and high transparency. The sea bed generally comprises mainly muddy and sandy substrates with outcrops of rocky substrate and seagrass (*Posidonia oceanica*) meadows in its shallower parts, particularly along the eastern coast. The area is subject to significant use by humans including recreational and professional fisheries and highly developed nautical tourism resulting in a significant increase in boat traffic during the summer months (Genov et al., 2008; Rako and Vilibić, 2013; Rako et al., 2013a; Rako et al., 2013b). The entire area is under severe anthropogenic pressure due to high fishing effort, maritime traffic, tourism and pollution.

The IMMA covers the majority of the northern Adriatic, following the bathymetric contour of approximately 15 m along Italian coast, the coast of Istrian peninsula, extending in the same direction and encompassing the islands on the north-eastern Adriatic coast. The area encompasses Slovenian, Croatian and Italian territorial and waters of the EEZ. Within the shallow continental shelf area of northern Adriatic the estimated abundance of *Tursiops truncatus* based on 2010 aerial survey was 6,577 (CV 20,3%; 95% CI 4,412-9,805). In general, animals show genetic differentiation to those from central and southern part. Based on mitochondrial (mtDNA) and nuclear DNA from skin samples of 63 Adriatic common bottlenose dolphins, Gaspari et al. (2015a)

found that the Adriatic population cannot be considered as a single 'unit-to-conserve'. In particular, the Adriatic common bottlenose dolphins reveal a fine-scale genetic structure showing a differentiation between north and central-south sub-basins (mtDNA), as well as between the western and eastern coasts (nuclear DNA). In addition, genetic evidence suggests that the resident local population within the Gulf of Trieste and adjacent waters is a distinct unit, with significant genetic differentiation from the rest of the Adriatic (Gaspari et al., 2015b).

Multiple lines of evidence, including genetics, photo ID, and stable isotope analyses suggest that the mechanism maintaining the population structure observed is fidelity to the local areas and physiography of the sea, rather than prey specialization (Gaspari et al., 2015a.) Ranging patterns have not been fully explored, hence the substructure is still unknown, but several year-round long-term photo ID studies in the Gulf of Trieste, along the western coast of Istria, in Kvarnerić and north Dalmatia confirm presence of local resident populations. The best available mark-recapture estimate of abundance for the Gulf of Trieste was 74 animals (95 % CI = 57–90, Genov, 2011). However, in years 2013–2016, around 100–150 individuals were encountered annualy, indicating that this may be the maximum annual abundance in this area (Genov, pers.com). In Kvarnerić within the area of approximately 1,600 km^2, the estimated number of animals in 2011 was 242 (95%Ci 215–293; CV 0.10) (Pleslić et al., 2015). In the neighbouring north Dalmatia archipelago in the area of about 4,000 km^2, photo ID data indicate the presence of another resident community estimated at 334 animals in 2015 (Ci 245-530; CV 0.13, Pleslić, pers.com). Catalogue matching within the research sites indicate no exchange between Gulf of Trieste sub-population and other two (Genov et al., 2009), while there is only limited exchange between neighbouring areas of Kvarnerić and North Dalmatia. Even less individual exchange was identified when matching catalogues of animals from central Adriatic coastal areas, likely due to the physiographic characteristics of the Jabuka pit, separating the two areas. Photo ID matching (live animal matched to stranded) indicate the possibility of east–west movement within the area (Genov et al., 2016). Furthermore, genetic analysis revealed a pattern of gene flow from west to east (Gaspari et al., 2015a).

The entire area is under severe anthropogenic pressure due to high fishing effort, maritime traffic, tourism and pollution (see below). In Croatia, three Natura 2000 sites for common bottlenose dolphins have been designated within areas of known or predicted resident coastal populations.



Lower 95% CI for the predicted abundance of common bottlenose dolphin in the northern Adriatic based on Adriatic aerial surveys in 2010 and 2013 (BWI unpublished)

Criterion A - Species or Population Vulnerability

The common bottlenose dolphin Mediterranean subpopulation is classified as VU on IUCN Red list. Animals live in a region of high anthropogenic use. Continental shelf of the northern Adriatic is one of the most heavily exploited areas for fisheries (trawling, shell dredging, pelagic trawling and purse-seining, set nets, longlines), heavy shipping (major ports) and is subject to substantial pollution (through river Po discharge in particular). High organochlorine levels have been detected in northern Adriatic bottlenose dolphins (Herceg-Romanić et al., 2014; Jepson et al., 2016). In addition, the northern Adriatic

Sea is a major touristic region with recreational boat traffic increasing exponentially during summer months causing physical disturbance and increased noise levels.

Criterion B: Distribution and Abundance
Sub-criterion Bii: Aggregations

The area hosts a major population of common bottlenose dolphins of the Mediterranean Sea. Aerial surveys in summers of 2010 and 2013 produced high estimates of abundance. Estimated abundance based on 2010 aerial survey corrected for availability and perception bias (group size, time on surface) in the shallow continental shelf area of the northern Adriatic was 6,577 (CV 20,3%; 95% CI 4,412-9,805) (Fortuna et al., 2011). The high abundance has been further confirmed with predicted abundance using surface density model (BWI, unpublished, see supporting figures).

Criterion C: Key Life Cycle Activities
Sub-criterion Ci: Reproductive Areas

The common bottlenose dolphin is present year-round in the region and is not undertaking migrations, hence reproduction takes place within the area. Apart from aerial surveys and dedicated long-term photo-identification studies, confirming regular observations of offsprings, year-round monitoring of bycatch in midwater pair trawling fleet of Italy, operating in the northern Adriatic between 2006-2013, produced thousands of observations of different group sizes of *T. truncatus* in the entire northern Adriatic basin throughout the year (Fortuna et al., 2013). Numerous observations of newborns, calves and juvenile animals confirm that further.

Criterion C: Key Life Cycle Activities
Sub-criterion Cii: Feeding Areas

The species is present year-round in the area and is not undertaking migrations, hence feeding takes place within the area. Regular field observations of feeding behaviour in various areas (Bearzi et al., 1997; Genov et al., 2008) further confirms this.

Criterion D: Special Attributes
Sub-criterion Di: Distinctiveness

Tursiops truncatus seems almost uniformly distributed throughout the Adriatic basin; however, genetic evidence rejected the hypothesis of a single stock (Gaspari et al., 2015a). Pairwise estimates of genetic differentiation at 17 microsatellite loci, and mitochondrial DNA (entire control region, 920bp), revealed diverse levels of genetic differentiation among the Adriatic Sea. The results suggest that the bottlenose dolphin exhibits population structures that correspond well to the main Adriatic basins, and that the genetic differentiation is not correlated to geographic distances. At a nuclear level, analyses revealed a fine-scale genetic structure, showing a differentiation between north and central-south areas, as well as between the west and east coast. In addition, individuals from the Gulf of Trieste seem to belong to a group of animals significantly differentiated from the rest of the Adriatic Sea (Gaspari et al., 2015b).

Supporting Information

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PDF made available for download at https://www.marinemammalhabitat.org/portfolio-item/northern-adriatic/

Annex I

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
Tursiops truncatus	Common bottlenose dolphin	Mediterranean Subpopulation	Vulnerable

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
NA	NA	NA	NA