

Area Size

#### Qualifying Species and Criteria

Black Sea bottlenose dolphin – *Tursiops truncatus ponticus* Criteria A, B2, C2, C3 Black Sea common dolphin – *Delphinus delphis ponticus* Criteria A, B2, C2, C3 Black Sea harbour porpoise – *Phocoena phocoena relicta* Criteria A, B2, C2, C3

#### Marine Mammal Diversity

Tursiops truncatus ponticus, Delphinus delphis ponticus, Phocoena phocoena relicta, Stenella coeruleoalba, Tursiops truncatus truncatus, Delphinus delphis delphis, Monachus monachus

#### Summary

The Turkish Straits System, including the Istanbul Strait (Bosphorus), Marmara Sea and Çanakkale Strait (Dardanelles), connects the Black Sea with the Mediterranean Sea. The Prebosphoric area is the extension of the Turkish Straits System into the Black Sea, still under the influence of the Mediterranean waters. The IMMA holds important habitats both for the Mediterranean cetacean subpopulations and Black Sea subspecies of cetaceans:

# Turkish Straits System and Prebosphoric IMMA

## Summary, continued.

Endangered Black Sea harbour porpoise - *Phocoena phocoena relicta*, Endangered Black Sea bottlenose dolphin - *Tursiops truncatus ponticus*, and Vulnerable Black Sea common dolphin - *Delphinus delphis ponticus*. This IMMA is important as a foraging area and migration corridor, connecting the Black Sea and the Mediterranean Sea. All three cetacean species are present year-round and bottlenose dolphins show some residency, especially in the Istanbul Strait. The IMMA contains multiple cetacean subpopulations and subspecies that do not interact anywhere else.

#### Description

The Turkish Straits System, including the Istanbul 11,500 km<sup>2</sup>), and the Canakkale Strait (Dardanelles), connects the Black Sea and the Aegean Sea. The area holds characteristic oceanographic features, with two different layers of water; while the upper layer of brackish water originates from the Black Sea and flows down to the Aegean Sea, the lower layer originates from the Mediterranean, has higher salinity, and flows in the opposite direction. The Marmara Sea and the two narrow straits function as a barrier, a corridor, and an acclimatisation zone for marine species (Öztürk and Öztürk 1996). The Istanbul Strait, specifically, has great socio-economic importance, with 18 million inhabitants, 645,000 people, and roughly 2,500 vessels crossing daily (Birpinar et al., 2009). In addition to all of the above, the region is one of the top fishing grounds in Turkey.

The Prebosphoric area in the Black Sea near the Istanbul Strait, is like a "funnel mouth". At the bottom, salty and oxygen rich water enters with the bottom current from the Sea of Marmara and spreads in a northeast direction following the expansion of the Strait and driven by the bathymetry and then turns westward under the influence of the bathymetry on the eastern flank (Yüce 1990). The Turkish Straits System has been chosen as Cetacean Critical Habitats since 2010 (ACCOBAMS-MOP 2010). As an additional note, the Istanbul Strait has been selected under the "priority areas to research and conserve" by the WWF network.

## Criterion A: Species or Population Vulnerability

In addition to the harbour porpoise, in the Turkish Straits System and Prebosphoric IMMA, both Mediterranean and Black Sea subspecies of bottlenose dolphins and common dolphins are found. The Black Sea subspecies of harbour porpoise and bottlenose dolphin are listed as Endangered (EN), and Black Sea common dolphins as Vulnerable (VU) on the IUCN Red list (Gol'din et al., in press; Öztürk et al., in press; Tonay et al., in press). Common dolphins and bottlenose dolphins in the Mediterranean Sea are listed as Endangered (EN) and Least Concern (LC), respectively (Bearzi et al, in press; Lauriano et al., in press). Further, the Turkish Straits System also holds the northern extent of the eastern Mediterranean monk seal subpopulation, recently downgraded from Critically Endangered (CR) to Endangered (EN) on the IUCN Red List (Karamanlidis et al., 2019). The Turkish Straits System acts as the only connecting corridor between the Mediterranean and Black Sea populations of cetaceans. Moreover, this is the only location in which the Black Sea subspecies of delphinids mix with the Mediterranean subpopulations. The existence of an isolated subpopulation of the harbour porpoise in the Turkish Straits System has been proposed based on genetic studies (Tonay et al., 2017; Uzun et al., 2018).

# Criterion B: Distribution and Abundance Sub-criterion B2: Aggregations

Bottlenose dolphins, common dolphins and harbour porpoises (Figs. 1, 2, 3) ) show year-round presence in the Istanbul Strait and are regularly sighted in Marmara Sea and Çanakkale Strait (Dede et al., 2016; Akkaya et al., 2017). Each species shows spatiotemporal segregation within the Turkish Straits System to a certain extent. In general, cetacean sightings peak between May-June and October-



Figure 1: Designated critical habitat for each cetacean species in the Istanbul Strait.

November during the pelagic fish migration (Dede et al., 2016). In the Marmara Sea, all the cetacean species were frequently sighted throughout the year with highest encounters recorded in autumn, followed by spring, with 0.8 and 0.5 sightings per 10nm, respectively (Dede and Öztürk 2007, Öztürk et al., 2009; Altuğ et al., 2011). Seasonal line-transect surveys of cetacean populations in the Turkish Straits System estimated 669 bottlenose dolphins (95% CI: 189-2372) and 1,192 (95% CI: 468-2,592) common dolphins in April 1999 (Dede et al., 2016). In a more recent study, the abundance of bottlenose dolphins was estimated as 1,978 individuals (CV = 55%, 95% CI: 781 – 5011), common dolphins as 702 individuals (CV = 55%, 95% CI: 245 – 2012) and harbour porpoise as 1,940 individuals (CV = 58%, 95% CI: 632 – 5960) in July 2019 (Dede et al., 2022).

Bottlenose dolphins aggregate year-round within the southern and northern entries of the Istanbul Strait, with increased group size in winter seasons. Among

87 bottlenose dolphins photo-identified within the Istanbul Strait, 40 show regular presence within- and between-years, indicating a resident population but with a likely home range that extends beyond the boundaries of the strait (Akkaya Baş et al., 2019). A comparison between photo-identification catalogues revealed the presence of the same individual bottlenose dolphins both in the Istanbul Strait and Black Sea (unpublished data).

The Istanbul Strait is relatively well studied regarding the encounter rate of species. The average encounter rate of cetaceans was reported as 0.76 sightings per 10 km in the Istanbul Strait in 2009 (Öztürk et al., 2009). Another study estimated an average bottlenose dolphin encounter rate of 4 groups (22 individuals) per 10 km, with a peak encounter rate of 11 groups (75 individuals) per 10 km during spring surveys conducted between 2010 and 2014 (Akkaya et al., 2019). A year-round encounter rate of 0.33 groups (2.39 individuals) per 10km was estimated for common dolphins which peaked in summer with an encounter rate of 0.73 groups (4.97 individuals) per 10km (DMAD, unpublished data). In summary, during the pelagic fish migration, in spring and autumn, delphinid aggregation in the Istanbul Strait increases. Harbour porpoises and common dolphins aggregate in the northern entry of the Istanbul Strait, with group sizes reaching 9 and 12 individuals, respectively (Dede et al., 2016; Akkaya Bas et al., 2014; 2019). It is expected that the majority of these are Black Sea subspecies, but it should also be considered that they include individuals from the Mediterranean subpopulations of Tursiops and Delphinus.

# Criterion C: Key Life Cycle Activities Sub-criterion C2: Feeding Areas

The Istanbul Strait and its neighbouring waters in the Black Sea hold one of the most important and intensively exploited fishing grounds in Turkey as a result of seasonal fish migration between the Mediterranean and Black Sea. The area is one of the top three fishing grounds of Turkey. Each of the three cetacean species show foraging behaviour within the Istanbul Strait. During the season of pelagic fish migration in spring and autumn, cetaceans use the Straits as a natural trap for feeding on migratory pelagic fish. Passive acoustic monitoring also suggests that delphinids were mainly feeding or socializing during spring in the Istanbul Strait (Dede et al., 2014; Kameyama et al., 2014). A behavioural study revealed that bottlenose dolphins and common dolphins, engage in foraging in spring and summer seasons at the northern entry, while bottlenose dolphins also forage throughout the year in the southern entry of the Strait and its neighbouring Marmara Sea. By contrast, in winter and summer seasons porpoises were concentrated in relatively smaller locations than bottlenose dolphins at the northern and southern entry of the Strait (Akkaya Bas 2014).

## Criterion C: Key Life Cycle Activities Sub-criterion C3: Migration Routes

The Turkish Straits System IMMA is the only migration route for cetaceans between the Mediterranean and the Black Seas (Öztürk and Öztürk 1996). Recent studies on population genetics revealed that common dolphins are genetically similar in the Black Sea and Mediterranean Sea, which indicates the importance of the Turkish Straits System to their connectivity. Furthermore, Black Sea harbour porpoises are sighted within the northern Aegean Sea, yet they are absent in the rest of the Mediterranean Sea. Genetic evidence suggests that the Northern Aegean Sea populations of harbour porpoises are highly likely to be dispersed from the Black Sea through the Turkish Straits System (Tonay et al., 2017). Especially for common dolphins, which have high dispersal potential, the protection of narrow seaways like the Turkish Straits System to enhance connectivity is crucial (Tonay et al., 2020).



Figure 2: A Black Sea harbour porpoise in the Turkish Straits System. Photo: Arda Tonay



Figure 3: Black Sea common dolphins breaking the surface in the Turkish Straits System IMMA. Photo: Ayaka Amaha Öztürk

#### **Supporting Information**

Akkaya Bas, A. 2014. Investigation on the Interactions Between Cetaceans and Marine Traffic in the Istanbul Strait (PhD thesis). Istanbul University (in Turkish).

Akkaya Baş, A., Öztürk, A.A. and Öztürk, B. 2014. Selection of critical habitats for bottlenose dolphins (*Tursiops truncatus*) based on behavioural data, in relation to marine traffic in the Istanbul Strait, Turkey. Marine Mammal Science 31: 979–997.

Akkaya Bas, A., Christiansen, F., Amaha Öztürk, A., Öztürk, B. and McIntosh, C. 2017. The effects of marine traffic on the behaviour of Black Sea harbour porpoises (*Phocoena phocoena relicta*) within the Istanbul Strait, Turkey. PLoS ONE 12(3): e0172970.

Akkaya Baş, A., Öztürk, B., and Amaha Öztürk, A. 2019. Encounter rate, residency pattern and site fidelity of bottlenose dolphins (*Tursiops truncatus*) within the Istanbul Strait, Turkey. Journal of the Marine Biological Association of the United Kingdom, 99(4): 1009-1016.

ACCOBAMS-MOP 2010. ACCOBAMS-MOP4/ 2010/Res.4.15.

Bearzi G., Genov T., Natoli A., Gonzalvo J., Pierce G. In press. Common dolphin, *Delphinus delphis* Linnaeus, 1758, Inner Mediterranean subpopulation. The IUCN Red List of Threatened Species. Birpınar, M.E., Talu, G.F. and Gönençgil, B. 2009. Environmental effects of maritime traffic on the İstanbul Strait. Environ Monit Assess 152: 13.

Dede, A., 1999. Investigations on the marine mammal populations living in the Turkish Straits System (Doctoral dissertation, PhD thesis. Istanbul University, Istanbul, Turkey (in Turkish).

Dede, A., Öztürk, A.A., Akamatsu, T., Tonay, A.M., and Öztürk, B. 2014. Long-term passive acoustic monitoring revealed seasonal and diel patterns of cetacean presence in the Istanbul Strait. Journal of the Marine Biological Association of the United Kingdom. 94 (6): 1195-1202.

Dede, A., Tonay, A.M., Öztürk, A.A., and Öztürk, B. 2016. Status of the marine mammal populations of the Sea of Marmara. In: M.N. Çağatay, E.Özsoy, Ne. Balkıs, Nu. Balkıs, B. Öztürk, (Eds). The Sea of Marmara Marine Biodiversity, Fisheries, Conservation and Governance, pp. 863-879. Istanbul: Turkish Marine Research Foundation Publication no: 42.

Dede, A., Özsandıkçı, U., Tonay, A.M., Aytemiz Danyer, I., Danyer, E., and Amaha Öztürk, A. 2022. Abundance estimation of Cetaceans in the Sea of Marmara using line-transect. Proceedings of Marmara Sea 2022 Symposium. TUDAV Publications.

Gol'din, P., Gladilina, E., Öztürk, A. A., Tonay, A.M. In press. *Tursiops truncatus* ssp. *ponticus*. The IUCN Red List of Threatened Species. Inanmaz, Ö., Değirmenci, Ö., and Gücü, A. C. 2014. A new sighting of the Mediterranean monk seal, *Monachus monachus* (Hermann, 1779), in the Marmara Sea (Turkey). Zoology in the Middle East, 60(3): 278-280.

Kameyama, S., Akamatsu, T., Dede, A., Öztürk A.A., and Nobuaki, A. 2014. Acoustic discrimination between harbour porpoises and delphinids by using a simple two band comparison. J. Acoust. Soc. Am. 136 (2): 922-929.

Karamanlidis, A.A., Adamantopoulou, S., Tounta, E. and Dendrinos, P. 2019. *Monachus monachus* (Eastern Mediterranean subpopulation). The IUCN Red List of Threatened Species 2019: e.T120868935A120869697. https://dx.doi.org/10.2305/IUCN.UK.2019-1.RLTS.T120868935A120869697.en. Downloaded on 25 February 2021.

Natoli, A., Genov, T., Kerem, D., Gonzalvo, J., Holcer, D., Labach, H., Marsili, L., Mazzariol, S., Moura, A.E., Öztürk, A.A., Pardalou, A., Tonay, A.M., Verborgh, P., Fortuna, C. In press. Common bottlenose dolphin *Tursiops truncatus* Mediterranean subpopulation. The IUCN Red List of Threatened Species 2021.

Öztürk, B. 1994. Evaluation of the present status and trend of monk seal populations in Turkey. In: Present Status and Trend of the Mediterranean Monk Seal (*Monachus monachus*) Populations. RAC/SPA (UNEP), Tunis, UNEP (OCA)) /MED WG.87/4, p.33.

Öztürk, B. and Öztürk, A.A. 1996. On the biology of the Turkish straits system. Bulletin de l'Institut Océanographique 17: 205–221. Monaco.

Öztürk, A.A., Dede, A., Tonay, A.M., and Öztürk, B. 2009. Cetacean surveys in the Istanbul (Bosphorus) Strait in 2007-2008. 23rd Annual Conf. European Cetacean Society, Istanbul, Turkey.

Öztürk, A.A., Tonay, A.M., Gol'di,n P., Vishnyakova, K. In press. *Phocoena phocoena* ssp. *relicta*. The IUCN Red List of Threatened Species.

Tezel, R. 1958. Dolphins that cannot be seen in the Strait, Fish and Fisheries. Publication of EBK, Vol 6, No 1 (in Turkish). Tonay, A.M., Yazıcı, Ö., Dede, A., Bilgin, S., Danyer, E., Aytemiz, I., Maracı, Ö., Öztürk, A.A., Öztürk, B., and Bilgin, R. 2017. Is there a distinct harbor porpoise subpopulation in the Marmara Sea? Mitochondrial DNA Part A 28(4): 558-564.

Tonay, A.M., Uzun, B., Dede, A., Öztürk A.A., Danyer E., Danyer Aytemiz, I., Bilgin, S., Öztürk, B., and Bilgin, R. 2020. Population genetic structure of the shortbeaked common dolphin from the Black Sea and the Turkish Straits System. Mitochondrial DNA Part A. 31 (6): 257–264.

Tonay A.M., Gol'din P., Öztürk, A.A. In press. Black Sea common dolphin, *Delphinus delphis* ssp. *ponticus*. The IUCN Red List of Threatened Species

Uzun, B., Tonay, A.M., Dede, A., Danyer, E., Danyer Aytemiz, I., Öztürk, Amaha A., Öztürk, B., Bilgin, R. 2018. Genetic investigation on the population structure of the harbour porpoises living in Turkish waters by double digest restriction associated DNA (ddRAD) sequencing. 32. Conference of European Cetacean Society, 6-10 April 2018, La Spezia, Italy. 79pp.

Yüce, H. 1990. Investigation of the Mediterranean water in the Strait of Istanbul (Bosphorus) and the Black Sea. Oceanologica Acta 13 (2): 177-186.

Zaitsev. Y. 2008. An Introduction to the Black Sea Ecology. 228 p. Odessa: Smil Edition and Publishing Agency Ltd. Odessa.

## Acknowledgements

We would like to thank the participants of the 2021 IMMA Regional Expert Workshop for the identification of IMMAs in the Black Sea, Turkish Straits System and Caspian Sea. Funding for the identification of this IMMA was provided by the Global Ocean Biodiversity Initiative funded by the German government's International Climate Initiative (IKI) and the Tethys Research Institute, through a contribution from the MAVA Foundation. Support was also provided by Whale and Dolphin Conservation.



Suggested Citation: IUCN-Marine Mammal Protected Areas Task Force, 2021. Turkish Straits System and Prebosphoric IMMA Factsheet.

https://www.marinemammalhabitat.org/wp- content/ uploads/imma-factsheets/BlackandCaspianSeas/turkishstraits-system-and-prebosphoric-BlackandCaspianSeas.pdf. Downloaded on (day month year).

PDF made available for download at

https://www.marinemammalhabitat.org/wp-content/ uploads/imma-factsheets/ BlackandCaspianSeas/turkishstraits-system-and-prebosphoric-BlackandCaspianSeas.pdf.