

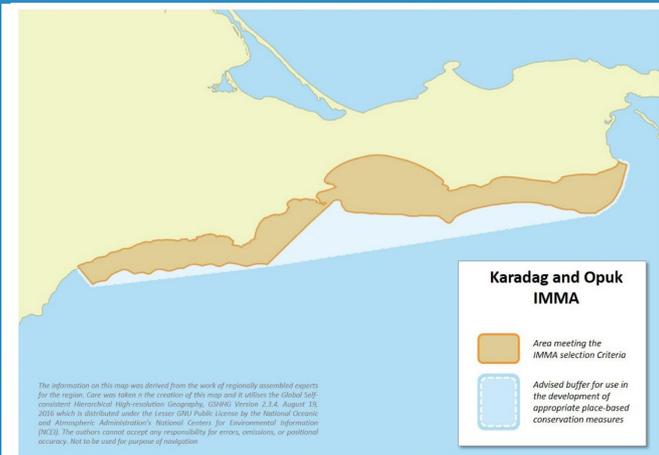
Karadag and Opuk IMMA

Description

The Karadag (Karadağ) and Opuk IMMA is located in open coastal waters between the Sotera Cape and the Takyl Cape in the northern part of the Black Sea. Both the Karadag Nature Reserve and the Opuk Nature Reserve are located within the IMMA. Proximity to the Kerch Strait causes lower salinity and colder winter temperature in the inshore waters (4-7 °C or, at minimum, 1 °C). The sea floor of the IMMA hosts a number of fish species that are staples in the diet of all three Black Sea cetaceans. The coastline along the Kerch Peninsula and the seafloor in this part of the IMMA is slightly sloping and the predominantly sandy. This topography creates favourable conditions for specific foraging strategies (i.e. beaching) demonstrated by the Black Sea bottlenose dolphins during mullet migrations through the area (Gladilina, 2018). Sprat trawling is common in the area during the warm season and foraging bottlenose and common dolphins are regularly observed interacting with the trawlers (Gladilina, 2012b). Also, this area is an important migration corridor for herrings and anchovies, which are important prey species for harbour porpoises (Tsalkin, 1940). Numerous porpoise bycatch and stranding cases are recorded from this area (Vishnyakova et al., 2013; Vishnyakova, 2017).

Criterion A: Species or Population Vulnerability

The Karadag and Opuk IMMA is an important habitat for the endangered Black Sea bottlenose dolphin (*Tursiops truncatus ponticus*) (Fig. 2). Two other Black Sea cetaceans, the Endangered harbour porpoise (*Phocoena phocoena relicta*) and the vulnerable common dolphin (*Delphinus delphis ponticus*) also extensively use this area (Birkun, 2002; Mikhalev, 2005a; 2005b; Birkun and Krivokhizhin, 2011; Birkun et al., 2014; Krivokhizhin et al., 2012; Gol'din et al., in press; Öztürk et al., in press).



Area Size

2,079 km²

Qualifying Species and Criteria

Black Sea bottlenose dolphin –

Tursiops truncatus ponticus

Criteria A, B2, C1, C2, D1

Marine Mammal Diversity

Tursiops truncatus ponticus, *Phocoena phocoena relicta*, *Delphinus delphis ponticus*

Summary

The Karadag and Opuk IMMA is located in the coastal waters of the southeastern and eastern Crimea, between the Sotera and the Takyl Capes. The IMMA contains habitat from the coast to the 200 m depth contour in the southwest, and follows the 40m depth contour in the northeast. All three Black Sea cetacean species inhabit the area: the bottlenose dolphin (*Tursiops truncatus ponticus*), the common dolphin (*Delphinus delphis ponticus*) and the harbour porpoise (*Phocoena phocoena relicta*). The IMMA is particularly important for bottlenose dolphins, where they occur in at least two large aggregations and at the highest density in the Black Sea. The IMMA is an important bottlenose dolphin nursing and feeding area. Bottlenose dolphins in these local populations show distinct morphological and behavioural features.

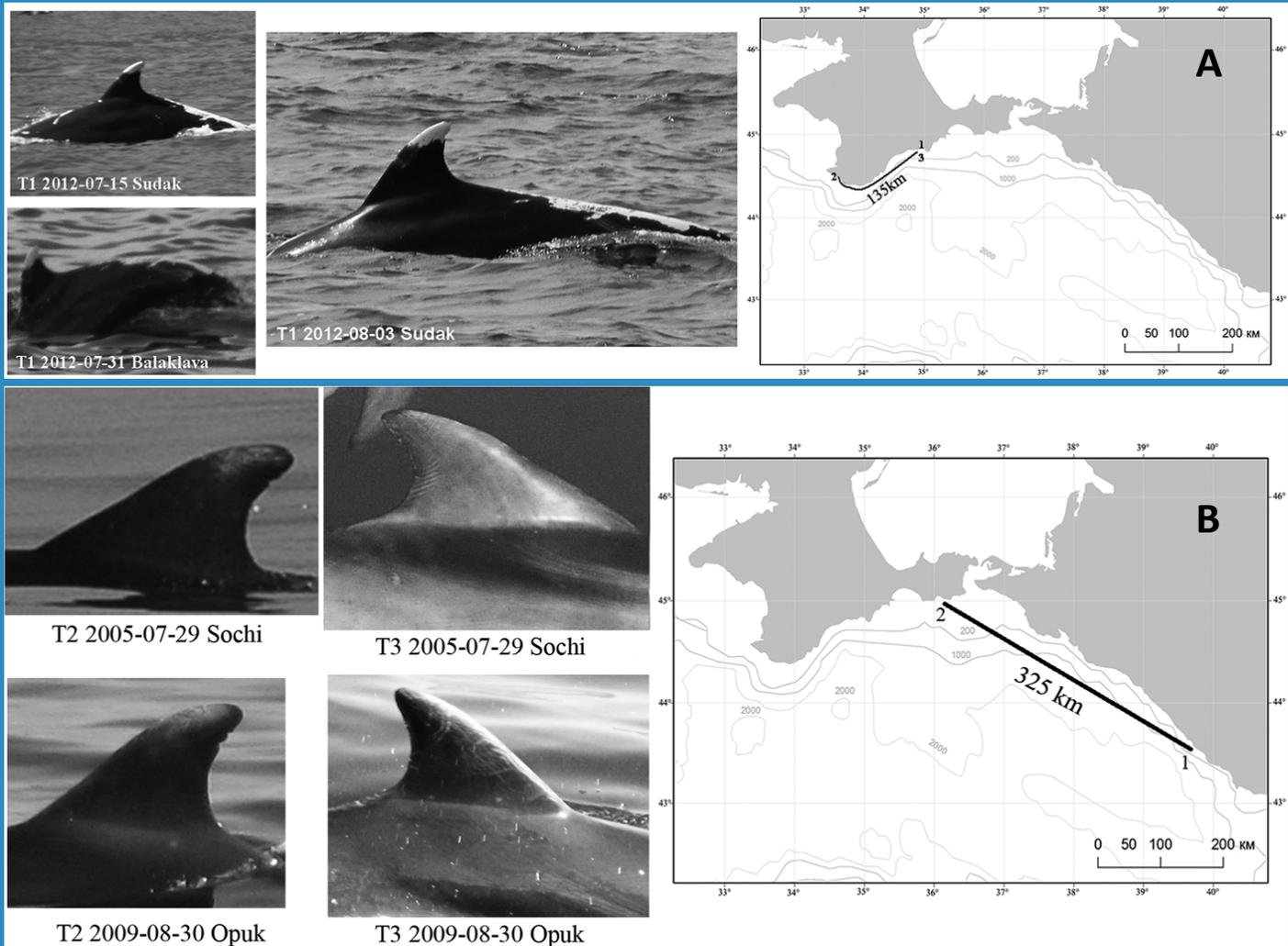


Figure 1: **A)** Lateral view of the bottlenose dolphin T1 which was recorded near Sudak and Balaklava. The records of a bottlenose dolphin individual observed across the different regions are joined with a line, and the distance between the records are indicated below the line. 1, Balaklava; 2, Sudak; 3, Opuk Cape. **B)** Dorsal fins of dolphins T2, T3 which were recorded near Sochi and Opuk. 1, Balaklava; 2, Opuk Cape. From: Gladilina et al., 2018.

Criterion B: Distribution and Abundance

Sub-criterion B2: Aggregations

The Karadag and Opuk IMMA is an important habitat for the largest population of bottlenose dolphins in the region. It hosts at least two groups of *T. t. ponticus* that form large and dense aggregations during the warm season, particularly in the western and in the eastern parts of the IMMA. The summer aggregation in the western part of the IMMA numbers between 600 and 1,600 individuals (based on different estimates). There is an estimated density of 4.5 individuals per km² in some local areas near the Sudak Bay, which has the greatest density of bottlenose dolphins throughout the Black Sea (Gladilina and Gol'din, 2016). Abundance estimates are based on the results from photographic mark-recapture surveys conducted between 2009-2013,

and a vessel line-transect survey in 2012 (Gladilina and Gol'din, 2016; Gladilina, 2018; Gladilina et al., 2018). Another large local population of bottlenose dolphins is regularly observed off the Kerch Peninsula, and contains at least a few hundred individuals, as estimated from photographic mark-recapture data (e.g. Fig 1) (Gladilina et al., 2018). Additionally, bottlenose dolphins are known to form large groups of at least 60 individuals in association with trawlers during sprat fisheries season (Gladilina, 2018).

Criterion C: Key Life Cycle Activities

Sub-criterion C1: Reproductive Areas

The IMMA is an important nursing area for bottlenose dolphins during the warm season. Mother and calf associations were seen in at least 50% of groups during the 2011-2014 warm seasons. Several associations were resighted between-years.

Criterion C: Key Life Cycle Activities

Sub-criterion C2: Feeding Areas

This IMMA has a high concentration of fish, including whiting, horse mackerels, sprat, picarel, thornback rays, and red mullets, which are important prey species of bottlenose dolphins (State of Biological Resources, 1995; Gladilina et al., 2012; Gladilina and Gol'din, 2014). The main behavioural activity recorded for bottlenose dolphins in the IMMA was foraging (Gladilina, 2012a; 2018). Also, mixed groups of bottlenose and common dolphins are frequently observed interacting with sprat trawling fisheries in the warm season (Gladilina, 2012b). Spectacular hunting by bottlenose dolphins on mullets is commonly observed in the coastal waters of the IMMA during the mullet migration. This includes beaching, a rare hunting strategy for bottlenose dolphins (Gladilina, 2018).



Figure 2: A group of Black Sea bottlenose dolphins. Photo courtesy Mare Nostrum by Costin Timofte.

Criterion D: Special Attributes

Sub-criterion D1: Distinctiveness

In the Karadag and Opuk IMMA, the Black Sea bottlenose dolphins have distinct external morphology: they exhibit a high prevalence of partially white (piebald) individuals. A total of 11% of bottlenose dolphins in this area are piebald which is the highest reported percentage in a local population of the species. Several partially white dolphins were repeatedly recorded during photo-ID surveys over several years, including one fully white animal which was regularly observed in the Sudak region between 2007 and 2013 (Gladilina et al., 2012; Gladilina et al., 2019). In the eastern part of the IMMA, several (ca. 10) individuals demonstrate beaching during foraging, which is a rare behaviour for *Tursiops* in general and unique for the Black Sea region (Gladilina, 2018). This hunting strategy is shared by several photo-identified individuals seen in the same area during several consecutive years.

Supporting Information

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**MARINE MAMMAL
PROTECTED AREAS
TASK FORCE**

IMMA

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WDC
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