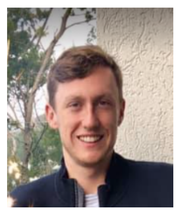
Critical Habitat Identification of Small Cetaceans in the South Adriatic Sea



Clark

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Introduction

Critical habitats form the essential base for the Marine Protected Areas (MPAs) implementation. While MPAs known as the strongest conservation strategies, they cover almost 6% of the Adriatic with a single MPA of Karaburun Sazani in Southern Adriatic. The Adriatic Sea, identified as a cetacean hotspot, is under the pressure of human activities, from illegal fishing practices, tourism to seismic, each of which causing short and/or long term effects on the species. Current study runs dedicated cetacean research effort to collect the missing baseline knowledge and to identify critical habitats in South Adriatic.

SURVEY SITES: MONTENEGRO & ALBANIA

Figure 1: Montenegro Survey Coverage

Figure 2: Albania Survey Coverage

Figure 3: Stranding Survey Locations

Methodology

Surveys were carried in Montenegro and Albania. Spatial and temporal distribution of small cetaceans and marine traffic, behavioural patterns and alterations, photo- identification data were recorded since September 2016 in Montenegro and December 2018 in Albania.

LAND SURVEYS

Theodolite stations have been set for Montenegro and Albania, in 5 and 3 locations respectively (Figure 1,2). Vertical and horizontal angles of cetaceans and marine traffic were transferred into geographical positions through Pythagoras software.

BOAT SURVEYS

Boat surveys were conducted in Montenegro following 3 routes ; Bar to Utjeha, Budva to Kotor, Herceg Novi to Deep Seas (Figure 1). Survey route and dolphin sightings were recorded in Logger 2010. Photograph of each individual dolphins were taken for photo- identification.

STRANDING SURVEYS

Stranding surveys were started on 31.11.2018, covering 9 different beaches from North to South in Montenegro (Figure 3).

Results

MONTENEGRO

Year	Boat Surveys	Land Surveys	Total Effort
2016	8	43	51
2017	31	161	192
2018	36	117	153
2019	3	24	27
Total	78	345	423

Table 1.

423 surveys between 15.09.2016 and 31.03.2019 (Table 1).
Two species were encountered;

Bottlenose dolphins (Tursiops truncatus)

- 244 groups in 153 sightings.
- Mean group size is 3.6±2 ind.
- Encounter rate was found 4 groups /100 km.
- Diving and traveling were the dominant behaviour (Table 2).
- Surface-feeding, socialising and resting significantly increased in colder months (Figure 3)
- Season had no significant effect on sightings with 36% sighting success each season.
- Northern Montenegro has the significantly highest sighting success (49%).
- 72 individuals were identified with 60% re-sightings
- Critical habitats identified the entrance of Boka Kotorsko and coastal waters of Katic, Bar, Utjeha and Ulcinj (Figure 4).

Striped dolphins *(Stenella coeruleoalba)*

- 15 groups in 11 sightings. Mean group size is 19±11 ind.
- Diving and traveling were the dominant behaviour (Table 3).
- Potential critical habitats identified in the offshore waters of Platamuni (Figure 5).

Striped Dolphin Potential Critical Habitats

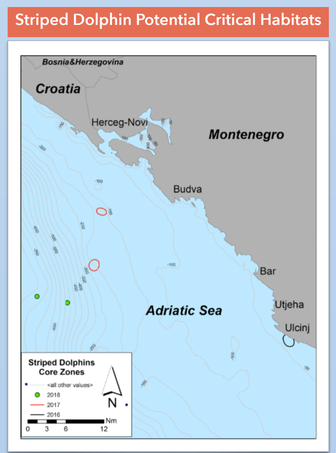


Figure 5.

Bottlenose Dolphin Critical Habitats

Figure 4.

Year	DV	TR	TR-DV	SU-FE	MI	RE	SOC	Total
2016	45	51	23	17	3	3	19	161
2017	164	192	129	23	13	53	22	596
2018	211	127	55	37	4	8	33	475
Total	410	370	207	77	20	64	74	1222

Table 2. Behavioural variations of bottlenose dolphins

Year	DV	TR	TR-DV	SU-FE	MI	RE	SOC	Total
2016	13	11	10	6	1	0	6	47
2017	10	6	9	2	2	3	9	41
2018	1	1	0	3	0	0	0	5
Total	24	18	19	11	3	3	15	93

Table 3. Behavioural variations of striped dolphins

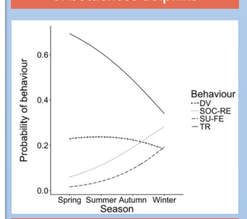


Figure 3. Behavioural probabilities for season

ALBANIA

- 15 surveys between 5.11.2016 and 31.03.2019.
- Two species were encountered; bottlenose and striped dolphins
- A mixed group association between bottlenose and striped dolphins were documented
- Bottlenose dolphins were sighted in 8 groups under 4 survey days. Average group size was 3.8 ±2.7
- Foraging, followed by diving were the dominant behaviour (Table 4).
- Relatively high sightings in Cape of Rodon (Figure 6).

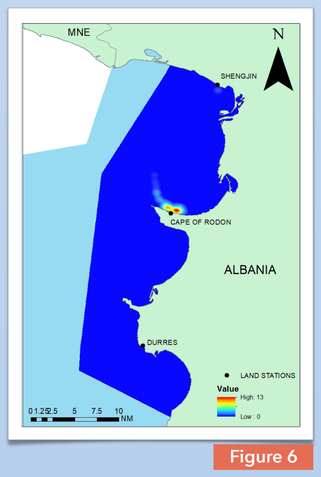


Figure 6

Month/ Year	DV	TR	TR-DV	SU-FE	MI	RE	SOC	TOTAL
Nov-18	6	2	0	8	0	0	0	16
Dec-18	8	6	3	4	0	0	4	25
Feb-19	0	5	2	6	0	0	0	13

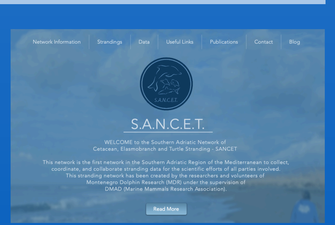
Table 4. Behavioural variations of delphinidaes in Albania

MONTENEGRO STRANDING SURVEYS

One juvenile stranded bottlenose dolphin was recorded on 18th February 2019 in Sveti Nikola. Cause of death was not able to be determined without further lab analysis.

SIGHTING AND STRANDING NETWORKS

CETAZOOM and SANCET networks have been created. Both of the platforms encourages the citizen-science activities (*www.sancet.org*)



Discussion

- Critical habitats for bottlenose dolphins are delineated in the entrance of Boka Kotorsko and coastal waters of Katic, Bar, Utjeha and Ulcinj. Offshore waters of Platamuni may hold critical habitat(s) for striped dolphins, specifically between 300-700m contours.
- Selected critical habitats show a considerable overlap with marine traffic (Figure 7).
- Selected critical habitats show a striking overlap with proposed MPAs in Montenegro, thus highlighting the importance of cetacean research on MPA selection.
- There is a year round presence of bottlenose dolphins, with an encounter rate of 4 groups/100km in Montenegro
- 71 individuals of bottlenose dolphins are identified
- Albania Dolphin Research is in its preliminary stage but frequent dolphin sightings at the Cape of Rodon.

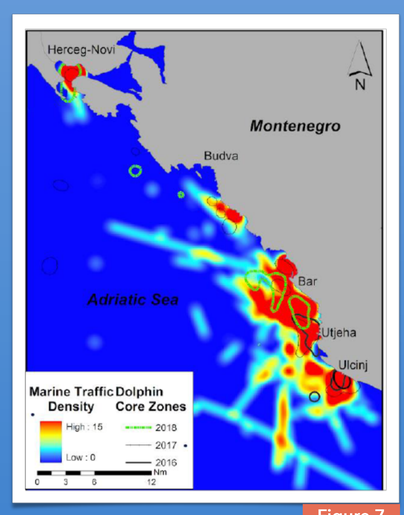


Figure 7

Conclusion

- It is imperative that dedicated survey effort has to continue to fully understand the spatial and temporal variations, behavioural patterns and the effect of threats on small cetaceans of the South Adriatic.
- The collected baseline knowledge with identified critical habitats can contribute the MPA implementations in the South Adriatic by using cetaceans as indicator and flagship species.
- Public awareness plays a key role on in-situ conservation implications. Therefore public outreach programs and citizen-science activities have to increase in numbers for the project sustainability.
- The future of marine biodiversity depends on transboundary collaborations between all stakeholders.

References

Figure 1. : *Clarkson, J., Christiansen, F., Awbery, T., Abbiss, L., Bas, A, A., 2019. Non-targeted tourism affects the behavioural budgets of bottlenose dolphins (Tursiops truncatus) Montenegro, South Adriatic. Manuscript submitted for publication*

Figure 4, Figure 5, Figure 7, Table 2, Table 3: *Awbery, T., Nikpaljevic, N., Clarkson, J., Abbiss, L., van der Pouw Kraan, D., Liebig, P., Todorović, S., Akkaya Baş, A., 2019. Bottlenose and striped dolphins of Montenegro an insight into sighting variations, behavioural patterns, photo-identification, core habitats, marine traffic and conservation initiatives 2017-2018.*