
 Eni Montenegro BV	Date January 2019	Document n. 250/2019 MD/AM	Page 1 of 4
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Marine Mammal and Sea Turtle Pre-Seismic Monitoring in Blocks 4, 5, 9 and 10

NON-TECHNICAL SUMMARY

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 Eni Montenegro BV	Date January 2019	Document n. 250/2019 MD/AM	Page 2 of 4
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NON-TECHNICAL SUMMARY

The State of Montenegro signed a Concession Contract for the Production of Hydrocarbons (PCC) with Eni Montenegro B.V. and Novatek Montenegro B.V. (hereinafter the “*Concessionaire*”) referred to the area defined by the offshore Blocks 4, 5, 9, and 10 (the PCC area) on September 2016.

An Environmental Impact Assessment (EIA) Study for the 3D geophysical survey in the PCC area has been drafted and submitted 14/09/2017 and subsequently approved by the Agency for Protection of Nature and Environment of Montenegro (MEPA) on 23/07/2018. One of the obligations foreseen by the EIA Study was the execution of a marine mammal and sea turtle monitoring before the commencement of 3D geophysical survey (whose acquisition started on November 18th 2019) and one year later, on the same period.

Golder Associates S.r.l. (Golder), in partnership with Društvo Prirodnjaka Crne Gore¹ (DPCG), was appointed by the Concessionaire to carry out the monitoring activities. The present document represents the **Non-Technical Summary of the Marine Mammal and Sea Turtle Pre-Seismic Monitoring Report**. The Post-Seismic Monitoring will be carried one year after the Pre-Seismic Monitoring (i.e. October 2019), in compliance with the Authority’s requests.

The objective of the survey was to record data on marine mammals and sea turtles populations in the Study Area (PCC area plus a 5-km buffer – Figure 1) before the start of the seismic activities in order to compare them with those that will be collected after the seismic survey.

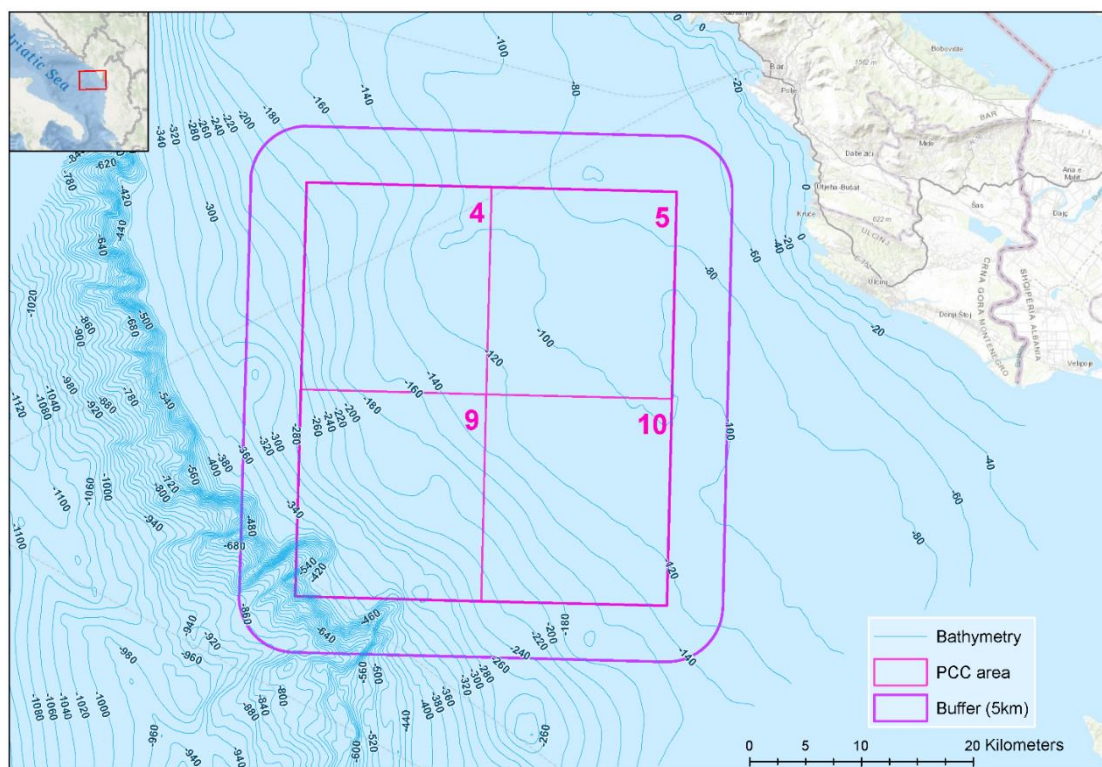



Figure 1: The Study Area for the Marine Mammal and Sea Turtle survey

¹ English translation: Natural History Association of Montenegro.

 Eni Montenegro BV	Date January 2019	Document n. 250/2019 MD/AM	Page 3 of 4
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The pre-seismic has been carried out from October 11th to October 31st, 2018. **The methods of the survey** encompassed visual observations made by Marine Mammal Observers (MMOs)², acoustic detections made by Passive Acoustic Monitoring (PAM) operators³ and the deployment of a Sonobuoy⁴.

The monitoring involved a team of experts from DPCG, composed by a total of 3 experienced MMOs and one PAM operator with the use of a sonobuoy to record the presence of cetaceans in deep waters, during the day and night.

The visual surveys by MMOs was carried out during daylight hours on twenty-one 40 km long transects parallel to the Blocks sides (oriented North-South) and separated 2 km from each other, keeping a navigation speed of 6-7 kn. Two MMOs were located at the highest point of the boat to scan the sea surface and the horizon in search of marine mammals and sea turtles by both the naked eye and binoculars. The JNCC⁵ Sighting and Effort forms were filled in at every animal encounter, change of transect or change of the environmental conditions. Visual efforts were stopped at high wind conditions (i.e., higher than 4 Beaufort) since, beyond these conditions, the observation of marine mammals and in particular sea turtles becomes challenging and increase the probability of missing animals.

The acoustic monitoring (through PAM) has been carried out using a fully integrated system composed of a towed hydrophone array linked to a 300 m cable and deployed from the boat's back deck. The signal was processed during live detection of animals. Acoustic detections were coupled, when possible, with visual observations for the species identification. When acoustic detections occurred with no coupled visual observations, the signal was post-analysed in light of the recordings which occurred concurrently with visual observations in order to dress sound features of each species vocalization. In addition, in order to investigate the nocturnal behavioural of the animals, 3 night transects were added to cover the 3 depth habitats of the area (shallow-water, mid-depth and deep-water).

To provide a day-round overview of the acoustic environment of about 15 days, a sonobuoy was deployed on October 11th at about 320 m of depth in Block 9. The location was chosen because it was close enough to the continental shelf slope, which is known to be the potential zone with the highest density/diversity of cetaceans according to the literature.


The results of the survey show that the most frequently encountered species was the striped dolphin (*Stenella coeruleoalba*, 8 sightings), followed by the loggerhead turtle (*Caretta caretta*, 6 sightings) and the bottlenose dolphin (*Tursiops truncatus*, 3 sightings). As for the two dolphin species, the mean number of individuals spotted during sightings was 5 for the striped dolphin and 3 for the bottlenose dolphin. Group sizes were considerably low compared to other parts of the Mediterranean Sea, especially for the striped dolphin, which is normally found in groups counting from 10-30 individuals to hundreds of individuals. In addition, a potential acoustic detection of Cuvier's beaked whale (*Ziphius cavirostris*) occurred at 800 m depth.

² Professional experts in whales and dolphins who are in charge of checking the presence/absence of marine mammals in the surroundings of the operating vessel. They are usually employed in the Oil & Gas industry or other activities generating man-made underwater noise and for which environmental regulations or agreements exist (e.g., ACCOBAMS, JNCC, etc.). MMOs, as well as PAM operators (see next footnote), have the duty of detecting sensitive wildlife marine species and monitoring the compliance to the environmental regulations.

³ Professional experts in bioacoustics in charge of detecting cetaceans with hydrophones by their vocalization sounds. PAM operators co-work with MMOs to detect elusive or deep-diver species and in case of scarce visibility (e.g., at night).

⁴ A hydrophone recording continuously underwater noises and marine mammal vocalizations for several days. It is deployed on the sea bottom and linked to a series of buoys and a release system in order to be easily recovered.

⁵ Joint Nature Conservation Committee, the public body that advises the UK Government and devolved administrations on UK-wide and international nature conservation. It produces internationally accepted guidance to mitigation of impacts associated to underwater noise.

 Eni Montenegro BV	Date January 2019	Document n. 250/2019 MD/AM	Page 4 of 4
--	----------------------	-------------------------------	----------------

Block 9 seemed to be the most frequented by striped dolphins and sea turtles. Sea turtles only haunted Block 10, whereas Blocks 4 and 5 had a very low sighting rate either by dolphins or turtles. Bottlenose dolphins seemed to frequent only Blocks 4 and 5, characterized by lower depths. In addition, a depth-related distribution of cetaceans and turtles was observed, with striped dolphins occurring generally at depths higher than 200 m, which is in agreement with literature information. On the other hand, all bottlenose dolphin and sea turtle sightings occurred at lower depths: 60-298 m and 130-360 m, respectively.

Most sightings and acoustic detections occurred early in the morning, in the evening or at night. Indeed, most cetaceans are more active at night, hunting for prey. Several cetacean feeding vocalizations were recorded suggesting that striped dolphins use the continental slope outside the Blocks to feed.

The results of the sonobuoy continuous recordings confirms the patterns and trends obtained by the MMO visual observations and the PAM acoustic detections. In addition, the continuous recordings indicate an almost constant presence of dolphins, which are more acoustically active at night.

The main conclusion of the Pre-Seismic Survey is that the Study Area is frequented by dolphins, especially at night and along the margins of the continental shelf and on the slope. Also loggerhead turtles appeared to frequent the area in the surveyed period.

The Post-Seismic Monitoring will be carried in October 2019 with the aim of making a comparison between data on marine mammal and sea turtle species abundance, distribution and spatial use from the two campaigns. At the end of the Post-Seismic Monitoring campaign, data from the Pre-Seismic survey will be merged and analysed together with the new data in order to have a comparison as accurate as possible.