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Sighting of Risso's dolphin (*Grampus griseus*) during scientific research of the Calabrian Southern Ionian Sea (Central Eastern Mediterranean)

Maria Assunta Menniti [1], Adriana Vella [2*]

[1] Centro Studi e Ricerca Ambiente Marino CESRAM, Guardavalle (CZ), Italy.

[2] Conservation Biology Research Group, Department of Biology, University of Malta, Msida, Malta

Abstract

The presence of Risso's dolphins (*Grampus griseus*) in Southern Calabrian waters of the Ionian Sea is poorly known. During dedicated cetacean research started in the summer of 2019 in the stretch of Calabrian waters between Brancaleone and Botricello, a pod of Risso's dolphins was recorded for the first time. This observation occurred of Siderno and Locri at about 8.3 km from the shore where the sea depth is 720 m, a bathymetric feature that is in line with the known deeper water habitat preference of the species. This Risso's dolphin pod was composed of at least 14 individuals. The latter were photo-identified. One individual showed signs of a serious injury due to a probable vessel accident that severed partly into its back behind its dorsal fin. Most of the individuals observed were mature to old with their frontal area already light grey to white. This scientific report contributes new knowledge on the distribution of the species in the Central Mediterranean Sea which may better address effective conservation management efforts for the species. Further monitoring and management are needed for this endangered species, especially in a geographic area that was previously unstudied for an extended period, despite past stranding events and citizen sightings of cetaceans being recorded occasionally.

Keywords:
Grampus griseus, distribution, presence, photo-identification, Calabrian Ionian Sea

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[*]*Corresponding Author: Adriana VELLA, E-mail*: *adriana.vella@um.edu.mt*

Introduction

Risso's dolphin *Grampus griseus* (G. Cuvier, 1812) is distributed worldwide in tropical and temperate seas in both hemispheres (Baird, 2009). The species favors waters over steep slopes, canyons, and seamounts and prefers offshore habitats where these bathymetric features are found (Azzellino et al., 2008; Bearzi et al., 2011; Hartman, 2018). The Calabrian Ionian Sea area is known for increasing human activities, such as habitat deterioration and fragmentation, chemical pollution, by-catch, and climate change. However, this area also needs to be studied for its biodiversity and conservation needs. In this context, the study of the presence and distribution of cetaceans is very important for the set-up of marine protected areas and to achieve the Good Environmental Status of the EU marine ecosystems according to the Marine Strategy Framework Directive, too. It is therefore fundamental to have baseline data, such as abundance, distribution, and habitat preferences of cetaceans that may play an essential role in achieving effective monitoring and management for conservation at local and regional scales (Parra et al., 2006). The Risso's dolphin's conservation status was classified as Data Deficient in the Mediterranean Sea according to the IUCN Red List (Gaspari & Natoli 2012) but has recently been updated to Endangered (Lanfredi et al., 2021; ACCOBAMS, 2021) therefore any new knowledge about its presence and distribution in this region is even more essential.

A high degree of residency and site fidelity have been reported for Risso's dolphins in different study areas concerning the ecology and behavior of the species and food resource availability (Remonato et al., 2013; Hartman et al., 2015; Maglietta et al., 2018). Its group sizes have been described as varying between regions: 6-12 individuals around the British Isles (Evans et al., 2003; Evans, 2008), 10-25 individuals in Spain (Cañadas & Sagarminaga, 1997; Cañadas et al., 2005; Gómez de Segura et al., 2008) and 10-40 individuals in the Ligurian Sea (Airoldi et al., 2000; Azzellino et al., 2008), 1- 30 individuals, with an average of 6 of the Maltese Islands (Vella, 2018), 2-20 individuals, with an average of 9.7 in offshore waters of Linosa Island (Corriasi et al., 2021).

Group size, depth, and group composition variables were compared between activity states by Cipriano et al. (2022) in the north Ionian Sea. Results highlight that both the group size and the several variables considered varied significantly depending on the activity state. The group size ranged between 2 and 42 individuals with a mean value of 19 ± 9SD which was significantly smaller during feeding than resting and travelling. These numbers contrast with the large groups of some thousand individuals encountered in the eastern Pacific (Kruse et al., 1999). The adults are easily recognized from the white marks (scarification) that accumulate on their bodies over time as a result of intra-specific interactions. This aspect facilitates species identification at sea and recognition of individuals by photo-identification techniques (Würsig & Jefferson, 1990, Hartman et al., 2008).

The Mediterranean sub-population status trend is limited due to the scarcity of abundance data (Gaspari & Natoli, 2012). Long-term research in the Central Mediterranean has however repeatedly recorded the presence of this species, often also found in association with fishing activities (Vella 1999a,b; Aissi & Vella, 2015; Vella, 2018). Long research periods provide a higher number of sightings, such as, in the northern Ionian Sea during standardized vessel-based surveys carried out from 2013 to 2018 in the Gulf of Taranto (Carlucci et al., 2020). This research revealed a residency pattern and site fidelity of Risso's dolphin in the area.

The seasonal movements of the species have been investigated in the Ligurian Sea (north-western Mediterranean Sea), where groups seem to follow a preferential route to the west, frequenting the same sites from year to year (Azzellino et al., 2008). Similar work and results were also reported for waters around Linosa Island (Corriasi et al., 2021).

This research paper provides new information on the presence of Risso's dolphins in the Calabrian Ionian Sea area, in the Central Eastern Mediterranean region.

Materıal and Methods

A dedicated scientific cetacean study was conducted involving field surveys in the Calabrian Ionian Sea from 2019 to 2021, with a total of 46 surveys and 3900 km of track effort. The study area covered the region between Brancaleone and Botricello. The region is characterized by a deep bathymetry relatively close to the shore and there are different canyons and pits found as well. This facilitates the study of deep-diving cetaceans as well. This study was possible through the regional operational program 2014-2020, 6.5.a.1- sub-action 2 "Conserving, restoring and protecting habitats and species of the Natura 2000".

The boat surveys were undertaken in good marine weather conditions (Beaufort ≤ 1) and good visibility (≥ 2 km). The observation arc of 360° was divided into two equal sectors, each of which was scanned by an observer with the naked eye and using 7 × 50 binoculars. The sampling effort was set at about 8h/day along 130 km. Speed was maintained at 10 to13 km/h and was reduced during the sightings and off-effort. The scientific team onboard included two researchers/photographers and two observers. A minimum distance of about 100 m was maintained to avoid the crossing of the cetacean's path unless the cetaceans approached the vessel themselves. Images and videos useful to the photo-identification were collected using a Nikon D750 digital camera equipped with Nikon AF–S Nikkor 28–300 mm 1:3.5-5.6 G lens and were taken perpendicular to the longitudinal axis of the animal (Würsig & Jefferson, 1990).

During the cetacean encounters, the following were recorded: time of the sighting, GPS location, depth, best estimate of group size and composition, and initial behavioral activity. The group size was estimated by visual counts defined as min-max and best estimation. A group was defined as all the dolphins that interacted socially and/or showed coordinated behavior (Smolker

et al., 1992). The number of adults, juveniles, and calvesof Risso's dolphin was counted according to the criteria of Hartman et al. (2008; 2016) based on skin appearance.

Activity patterns were recorded according to Altman (1974) and Shane (1990) as "traveling", "foraging", "socializing" and "resting". Surface behaviors (breaching, lob-tailing, spy-hops, tail and flipper slaps) (Kruse et al., 1999; Evans, 2008) were also noted.

Results

In the study area, four species of cetaceans were sighted during the whole study period: *Stenella coeruleaolba*, *Grampus griseus*, *Tursiops truncatus*, and *Delphinus delphis*. The first sighting of the Risso's dolphin took place on the 27th of July 2019 during a boat survey in front of the Siderno and Locri area at 8.3 km from the shore and at a bathymetry between 520 and 730 m. The date, sea-weather condition, geographic coordinates, depth (m), time of start and end of sighting, and group size (number of individuals) were recorded (Table 1). The behavioral activity observed included "traveling slowly", "bobbing" and "breaching". In the same area on the same day, bottlenose dolphins and striped dolphins were also sighted.

Table 1. Data recorded for the Risso's dolphin sighting

Day	27 July 2019
Sunrise	05:49 (UTC+2)
Sunset	20:10 (UTC+2)
Weather conditions	Good, calm sea
Time at sighting start	07:51 (UTC+2)
Coordinates of sighting start	38°12'300'' N 16°21'539'' E
Time at sighting end	08:59 (UTC+2)
Coordinates of sighting end	38° 13'733'' N 16° 20'963'' E
Estimated size of the pod (min-max)	14-16
Adult	14
Juvenile	0
Calf	0
Group	Compact
Behaviors observed	Traveling slowly, Bobbing, Breaching
Reaction to boat presence	No initial response followed by anapproach to the boat

Refer to Figure 1 – (On-effort track and locations of Risso's dolphin sighting). In this area, there are the presence of seamounts and a cave very close to the shore which may provide important physical features for a cetacean and biodiversity hotspot.

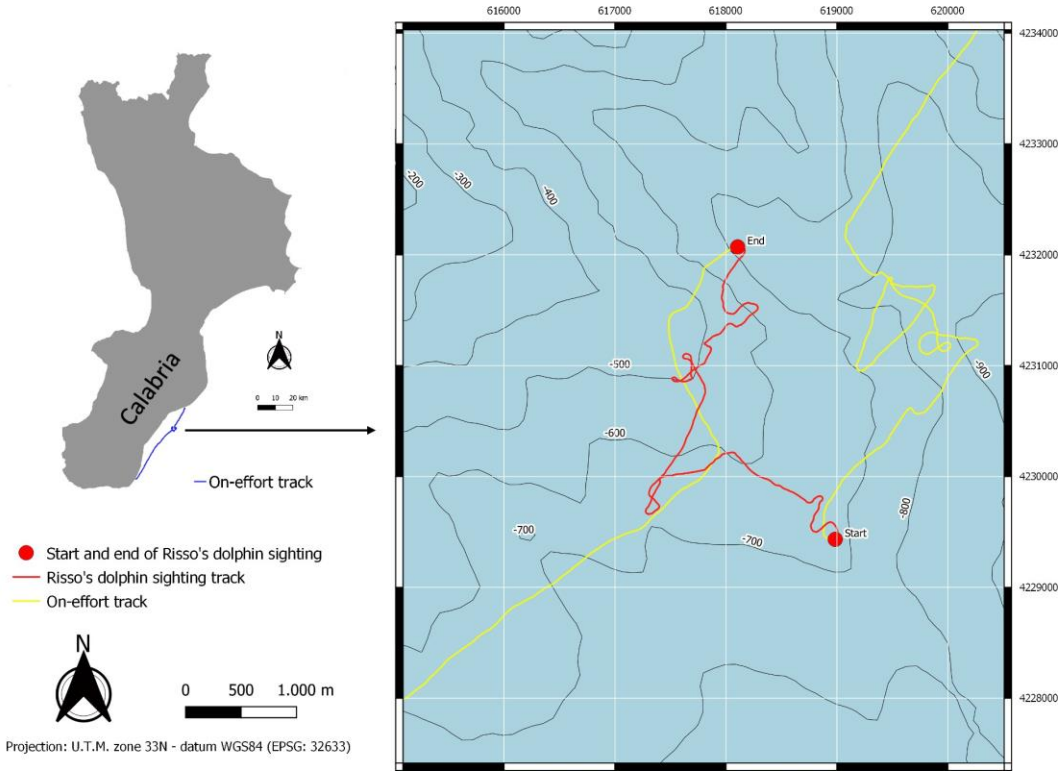

Figure 1. Research transect in the study area – on effort in yellow and observing Risso's dolphins in red

The photo-identification of the Risso's dolphins encountered was carried out according to fin shape and the presence of natural marks on their dorsal fin such as nicks and scars (Würsig & Würsig, 1977; Würsig & Jefferson 1990). 14 individuals were photo-identified. Each distinctive individual was archived in our catalog. The age class of the identified individuals was determined according to Hartman et al. (2016) (refer to Table 1). Photographs were classified into 3 overall quality categories: "good", "moderate" and "poor" - according to the following criteria: exposure, focus, angle, and size of the dorsal fin and part of the body. Individuals were identified by two independent assessors using photographs of the two higher categories.

We observed adults and two individuals had obvious signs of injuries from a probable vessel accident or ship collision (Figure 2).

Figure 2. Two Risso's dolphin individuals with evident signs of a probable ship collision

Discussion

This research reports the first scientifically documented sighting of Risso's dolphins in the coastal waters of Siderno and Locri during summer. This discovery paves the way for more extensive fieldwork to obtain more data on Risso's dolphins in this Calabrian Southern Ionian Sea region. The depths at the sighting location concur with the close affinity of this species for bathymetric ranges between 400 and 1200 m, reported in most Mediterranean regions (Cañadas et al., 2002; Azzellino et al., 2008; Vella, 2018). In the same area and day, we also sighted bottlenose dolphins and striped dolphins. This is further evidence of the importance of this area to cetaceans and points towards scientific research efforts being undertaken during different seasons and including adjacent areas, such as the Gulf of Squillace, to aid the formulation of effective policies and management recommendations for conservation plans. Preliminary comparisons between the photo-IDs of the individuals observed in this study and photo-IDs in other Risso's photo-identification catalogs of adjacent study areas have not provided any similarity. However, further research would allow an understanding of the extent of site fidelity, distribution, or movements of the species and individuals at different times of the year. The observation of the injured individuals reported here also points toward the urgent need for the conservation management of this species in the area.

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Author Contributions

All authors performed all the experiments and drafted the main manuscript text.

Conflict of Interest

The authors declare that they have no conflict of interest.

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