

Preliminary data about nursery survey of Nursehound, Scyliorhinus stellaris (Linnaeus, 1758), around the peninsula of Monte Argentario (Tuscany, Italy) using a new tool: Poseidon R.O.V. (Remote Operative Vehicle)

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Abstract

The Nursehound, *Scyliorhinus stellaris* (Linnaeus, 1758), is a benthic catshark distributed in the Northeast and Eastern central Atlantic and throughout the Mediterranean. In the Mediterranean, the available data on exploitation is limited, while sharks' decline has been indicated. In 2018 a new project was activated to locate, around the Monte Argentario Peninsula in Tuscany (Italy), the presence of Nursehound Nurseries using a new tool, Poseidon R.O.V. (Remote Operative Vehicle). The project, partially funded by the Tuscany Region (Go Green 2018), will allow it to identify egg-spawning areas. The first 3 years of observations, from 2018 to 2020, are presented here.

Introduction

Nursehound, *Scyliorhinus stellaris* (Linnaeus, 1758), is distributed inshore and offshore in the Northeast and Eastern central Atlantic, over the continental shelf between southern Scandinavia and Senegal, and it is also distributed throughout the Mediterranean. This species is fished by bottom trawls, gill nets, bottom set long lines, handlines and fixed bottom nets, and

occasionally by pelagic trawls. Although limited data is available on the abundance exploitation and trends, decline has been indicated in the Mediterranean Sea, particularly around the Balearic Islands and in the Northwest Mediterranean (Serena, 2005). The capacity for resilience of this species is affected by a low level of interconnectivity between isolated populations around islands far from the continental coast. Little information is available on its biology (Micarelli et al., 2006, 2007, 2016); however, we know that it is a large bodied species and it is likely more vulnerable to population depletion than the Smallspotted Catshark (*Scyliorhinus canicula*), which also occurs in this region. Given its large size, patchy distribution and evidence of decline in the Mediterranean Sea, an assessment of at least Near Threatened is warranted (IUCN Red List, 2009). In 2018, the Sharks Studies Center-Scientific Institute activated a new project aimed at locating, around the Monte Argentario peninsula in Tuscany (Italy), the presence of Nursehound nurseries using a new tool, Poseidon R.O.V. (Remote Operative Vehicle), an underwater drone that can operate up to 120 meters deep with 5 hours of autonomy. The project, partially funded by the Tuscany Region (Go Green 2018), will allow it to identify egg-spawning areas. In past decades, several divers' sightings indicated the presence of nursery areas between 30 and 40 meters deep in the violescent sea-whip (*Paramuricea clavata*) meadows. The results of the first 3 years of observations, carried out between 2018 and 2020, are presented here.

Material and Methods

Study area

Monte Argentario, an almost completely hilly peninsula connected to the mainland by three strips of land, is located in the central Tyrrhenian Sea, along the Tuscan coast (Fig. 1). The coast, characterized by cliffs, landslides and small beaches, is mainly rocky and degrades rapidly, reaching, in certain locations, even 100 meters of depth. The seabed displays the typical Mediterranean coastal flora and fauna characterized, up to 50 meters, by *Posidonia oceanica* meadows, while along the rocky ridges from 10-15 meters in depth, there are important aggregations of gorgonians of the genus *Eunicella* and *Paramuricea* (Micarelli et al. 2005). In the presence of *Paramuricea clavata*, it is possible to observe at certain times of the year, the presence of Nursehound eggs *Scyliorhinus stellaris* (comm. Pers. Micarelli).

Data collection

In order to use the Poseidon R.O.V. (Fig. 2), the following sampling program was followed: vertical monitoring transects were organized defining a distance, from both sides, of about

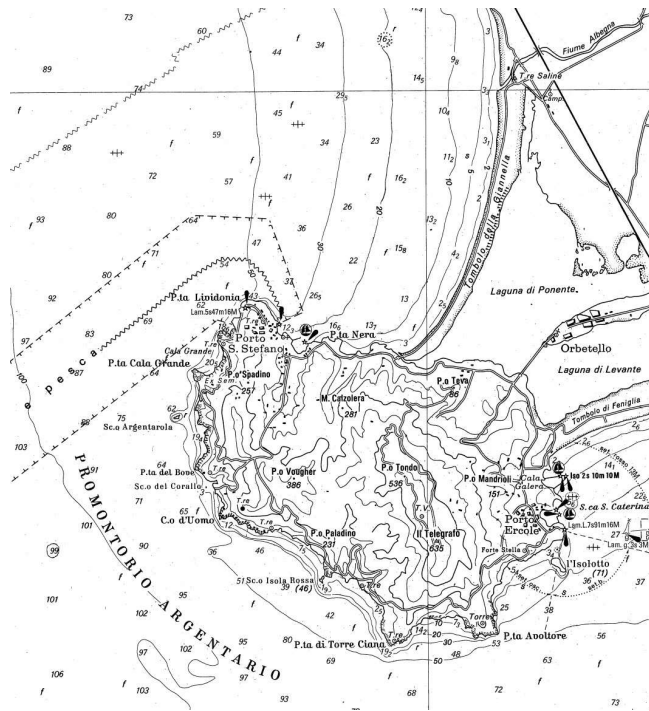


Fig. 1. Monte Argentario map (from culturamarinara.com)

50 meters from the anchor point, indicated as *zero point*, with the coordinates in Table 1, for a total straight line of 100 meters horizontally and 50 meters max in depth to completely cover the presence of gorgonians on the precipitous rocky ridges. The Sharks Studies Center-Scientific Institute used its 2 Poseidon R.O.V.s to record the presence of eggs spawned by Nursehound. Equipped with LED lamps, camera, depth gauge, and the ability to operate up to 120 meters deep, they enjoyed a 5-hour operational autonomy thanks to the vehicles' lithium battery. Poseidon R.O.V.s are driven remotely through a joystick connected to a mobile phone with an Android system equipped with a special app, allowing the possibility of following the movements in real time and determining the vehicles' depth. Sites and depth data are available from 2018 to 2020. In 2018 and 2019, between the months of August and November, monitoring was active in the field for 46 and 32 hours in 6 and 4 days, respectively. In 2020, due to the COVID-19 Pandemic, R.O.V.s were not used and only 2 scuba dives were made, up to 39 meters in depth.



Fig. 2. Poseidon R.O.V.

Results and conclusions

In 2018, after 46 hours of survey around the Monte Argentario Peninsula, just 1 empty identified egg was recorded between 15 and 50 meters deep. In 2019, in addition to the areas monitored in 2018 where no eggs were recorded, another one was added (Cala Grande) and at 35 meter deep, 8 eggs were identified, 7 of which were empty (Figure 3). Probably, the juveniles of the 7 empty eggs had just been born, while the remaining one had a juvenile inside about to be born. In 2020, due to the COVID-19 Pandemic, monitoring only occurred in a new area (Argentarola) by scuba diving up to 39 meters deep, and 6 eggs were identified. These first surveys in the Monte Argentario Peninsula showed just 2 possible nursery areas in Cala Grande and Argentarola (8 and 6 eggs), where in close areas, it was possible to record eggs for two years. The project will continue and underwater monitoring will also be carried out in the winter and spring months all along the Monte Argentario Peninsula, even at greater depths. Although sightings of scuba divers in the past might suggest a greater number of spawning areas between 30 and 40 meters deep, a low number of eggs in these first 3 years have been tracked. The low number of eggs and sightings may be linked to an increase of temperatures in the Mediterranean, that could induce female Nursehound to lay eggs in deeper violet sea-whips' meadows to about 50-70 meters deep. Further data will be collected through more

in-depth monitoring than in previous years.



Nursehound empty egg, CSS credit.

SITES	COORDINATES	DEEP (meters)
Isolotto	42° 22' 58.44" N – 11° 12' 37.96" E	15-20
Punta Avvoltore	42° 21' 48.91" N – 11° 11' 23.67" E	30-40
Punta Torre Ciana	42° 21' 44.92" N – 11° 11' 23.67" E	15-20
Capo d'Uomo *	42° 23' 35" N – 11° 05' 82" E	30-50
Grotta del Corallo	42° 23' 59" N – 11° 06' 27" E	18-30
Cala Grande *	42° 26' 879" N - 11° 06' 454" E	30-35
Argentarola*	42° 25' 212" N - 11° 04' 053" E	28-39

Table 1. Monitoring areas and *areas with identified eggs

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