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SHORT COMMUNICATION

Record-sized female smooth-hound (*Mustelus* sp.) captured in Corsican waters and preliminary observations on feeding on the invasive blue crab *Callinectes sapidus*

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Abstract: Here we report the capture of a large female smooth-hound, *Mustelus* sp. off Corsica, France, measuring 189 cm TL, which exceeds the previously reported maximum size (170 cm TL) of this genus in the Mediterranean Sea. This specimen, as well as two others captured in Corsican waters, had remains of the invasive blue crab *Callinectes sapidus* in their stomachs. The paper provides preliminary insights into the foraging behaviour of *Mustelus* sp., suggesting a potential regulatory role in controlling the invasive blue crab in Mediterranean estuarine and lagoon ecosystems. If proven, these first aspects of foraging activity could be a strong argument to improve a more stringent conservation of the smooth-hounds in the Mediterranean Sea.
Keywords: smooth-hounds; maximum size; conservation; blue crab; predator-prey interaction; Corsica; NW Mediterranean

Sažetak: ULOV REKORDNO VELIKE ŽENKE MORSKOG PSA MEKUŠA (*MUSTELUS* SP.) U VODAMA KORZIKE I PRELIMINARNA OPAŽANJA O ISHRANI INVAZIVNIM PLAVIM RAKOM *CALLINECTES SAPIDUS*. U ovom radu izvještavamo o ulovu velike ženke morskog psa *Mustelus* sp., ulovljene kod Korzike, Francuska, dužine 189 cm, što nadmašuje najveći dosad zabilježeni primjerak (170 cm TL) ovog roda u Sredozemnom moru. Ovaj primjerak, kao i još dva ulovljena u vodama Korzike, imali su u želudcima ostatke invazivnog plavog raka *Callinectes sapidus*. Ovaj rad pruža preliminarna opažanja o hranidbenom ponašanju vrste *Mustelus* sp., te predlaže moguću regulatornu ulogu u kontroli populacije invazivnog plavog raka u sredozemnim estuarijskim i lagunarnim ekosustavima. Daljnje potvrde ovih preliminarnih opažanja o ishrani, mogle bi predstavljati snažan argument za strožu i sveobuhvatniju zaštitu morskih pasa mekuša u cijelom Sredozemnom moru.
Ključne riječi: morski psi mekuši; maksimalna dužina; očuvanje; plavi rak; odnos predatora i plijena; Korzika; SZ Sredozemno more

INTRODUCTION

Smooth-hound, *Mustelus* spp. (Elasmobranchii: Carcharhiniformes) are durophagous demersal, small to medium-sized sharks (Ebert and Dando, 2020) distributed from the eastern Atlantic to South Africa, and throughout the Mediterranean (Ebert and Dando, 2020; Ebert *et al.*, 2021; De Maddalena, 2024). There, three species occur: the starry smooth-hound, *Mustelus asterias* Cloquet, 1821, the common smooth-hound, *Mustelus mustelus* (Linnaeus, 1758), and the blackspotted smooth-hound, *Mustelus punctulatus* Risso, 1827 (Ebert and Dando, 2020; De Maddalena, 2024). Heavily exploited by Mediterranean fisheries, mainly as bycatch of trawls and longlines (Colloca *et al.*, 2017; Hull *et al.*, 2019), they are currently considered as 'Vulnerable' by the International Union for the Conservation of Nature (IUCN) (Farrell and Dulvy, 2016; Ebert and Dando, 2020). Juvenile and female adult individuals are particularly affected by bycatch, which has led to a collapse of the Mediterranean populations of *Mustelus* spp. after the 1990s (Özcan and Başusta, 2018; Jabado *et al.*, 2021).

On the other hand, the invasive Atlantic blue crab *Callinectes sapidus* Rathbun, 1896, is a highly adaptable species native to the western Atlantic Ocean. Since its first record in Italy in 1949, it has expanded its range throughout the Mediterranean Sea (Marchessaux *et al*., 2023a), where its presence raises ecological concerns, including potential impacts on local fisheries, benthic communities, and ecosystem functioning (Marchessaux *et al*., 2023a).

In this study, we report the capture of an exceptionally large specimen of *Mustelus* sp. from northeastern Corsica and provide ecological and life-history data on additional smooth-hound specimens whose stomachs contained blue crab *C. sapidus* remains, suggesting a predator–prey interaction.

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MATERIALS AND METHODS

Three specimens of smooth-hounds *Mustelus* sp. were accidentally caught by the same angler off the Corsican coast and reported in the period between 2024 and 2025 to the Groupe Phocéen d'Étude des Requins (GPER), Marseille, France, a French NGO dedicated to conduct research efforts for the conservation of sharks and their relatives (Fig.1). The bait used to catch the smooth-hounds was a whole mackerel *Scomber scombrus* Linnaeus, 1758.

The total length (TL) of specimen no. 1 was estimated, while the TLs of specimens no. 2 and 3 were measured with a measuring tape to the nearest cm by the angler after landing them on the shore. The total weight body mass (TW) of the individuals was measured to the nearest gram (g) with a handheld balance. All three specimens were dead upon the catch. The angler also did a stomach content analysis for the three caught individuals and investigated the uterus of the specimen no. 2. As no photographic documentation of the stomach contents was obtained, the analysis relied on the angler's description of the material, which consisted predominantly of easily recognizable prey items. Table 1 summarizes the capture data, including the capture date, size, weight, and other relevant information.

RESULTS AND DISCUSSION

Stomach content analyses reported by the angler highlight that the only identifiable prey remains belonged to large decapod crabs, namely invasive blue crab *Callinectes sapidus*. Remains of the *C. sapidus* were found either dismembered or nearly whole in the stomachs of the three sharks. The species and sex of the decapods were identified using the description by Marchessaux *et al.* (2023a). Specimen no.1 yielded one whole 13 cm large adult male blue crab. Stomach content reported for specimen no. 2 comprised one whole and two partially dismembered blue crabs: one whole 13-15 cm large adult male *C. sapidus*, part of an adult male, and a large adult female blue crab, both measuring approximately 10 cm. In the stomach of the specimen no. 3, angler reported the presence of a whole orange-blue claw identified as belonging to an adult female *C. sapidus*, and a 13 cm long pink shrimp that could not be identified.

Mustelus is a genus of bottom-dwelling species, inhabiting sandy and muddy bottoms up to 150 m deep, with a limited home range of about 34 km² (Özcan and Başusta, 2018; Hull *et al.*, 2019). Since the only potential distinguishing morphological character observable from the photos in this study, namely the absence of black spots on the body, is not sufficient to reliably differentiate between *M. mustelus* and *M. punctulatus*, we classified the specimens as *Mustelus* sp. as a precaution (Marino *et al.*, 2017). The largest specimen of the genus *Mustelus* recorded in the Mediterranean Sea measured 170 cm in total length and belonged to the species *M. mustelus* (Boscolo Palo *et al.,* 2022). However, the maximum total length (TL) of *M. mustelus* has been reported as 200 cm in the historical and contemporary literature (e.g., Ninni, 1923; Reiner, 1996; Ebert and Dando, 2020; Ebert *et al.*, 2021), but most reliable measurements fall well below this value. Such discrepancies may reflect the impact of fishing pressure, which is known to reduce maximum attainable body sizes and contribute to the "shifting baseline syndrome" (Pauly, 1995), in which historical size records are increasingly perceived as anomalous. Nevertheless, the TL of the specimen no. 2 in our study was measured at 189 cm (Fig. 2B), representing the largest documented specimen of this genus in the Mediterranean Sea.

The genus *Mustelus* is known to prey on a variety of prey items, including bony fish and cephalopods. However, their main prey item appears to be crustaceans (Ebert and Dando, 2020; De Maddalena *et al.,* 2001). In Jardas *et al.* (2007), decapod crustaceans were the most abundant prey for *Mustelus* spp. in the Adriatic Sea (%IRI = 63.1), especially for individuals longer than 110 cm TL. Our observations suggest that the diet of the genus in the Mediterranean Sea does not depend only on size, but may also be influenced by other factors such as food availability. However, our insufficient sampling only allows us to suggest future ways of investigation by examining the diet of juvenile and adult common smooth-hounds in the study area over a longer period.

The Atlantic blue crab has been intensively colonizing the waters and the surrounding lagoon area of the Golo Delta and Biguglia lagoon in Corsica (Marchessaux *et al.*, 2024). Both juvenile and large adult TL>160 cm smooth-hounds *Mustelus* spp. were being caught by anglers from the shore in the Golo Delta area over the past two years (D. Santucci, personal communication). These reported observations may suggest a possible overlap of the ecological niche of *Mustelus* spp. as hunting predator and *C. sapidus* as one of their main prey in Southeastern Corsica, where lagoons and estuaries are extensive and may be a key hunting area of smoothounds on blue crabs (Fig. 1).

The blue crab is a highly invasive Mediterranean crustacean (Streftaris and Zenetos, 2006), feeding on a wide range of prey from fish to crustaceans to algae (Ortega Jiménez *et al*., 2023). It exhibits an improved capacity of adaptation to inhabit various aquatic habitats (Marchessaux *et al.*, 2023a, b), and it seems to be more active during the night (Carr *et al.*, 2004). The main predators of *C. sapidus* are not well known (Marchessaux *et al*., 2024). Only scarce recent studies focus on the main natural predators of blue crabs, i.e., in Spanish waters, in-depth researches highlight only *Octopus vulgaris* and Eurasian otters *Lutra lutra* as predators of the blue crabs (Bedmar *et al*., 2024; Prado *et al.*, 2024).

In the northeastern waters of the USA, *Mustelus canis* is one of the main predators of *C. sapidus* and the only elasmobranch species that forages mainly on the

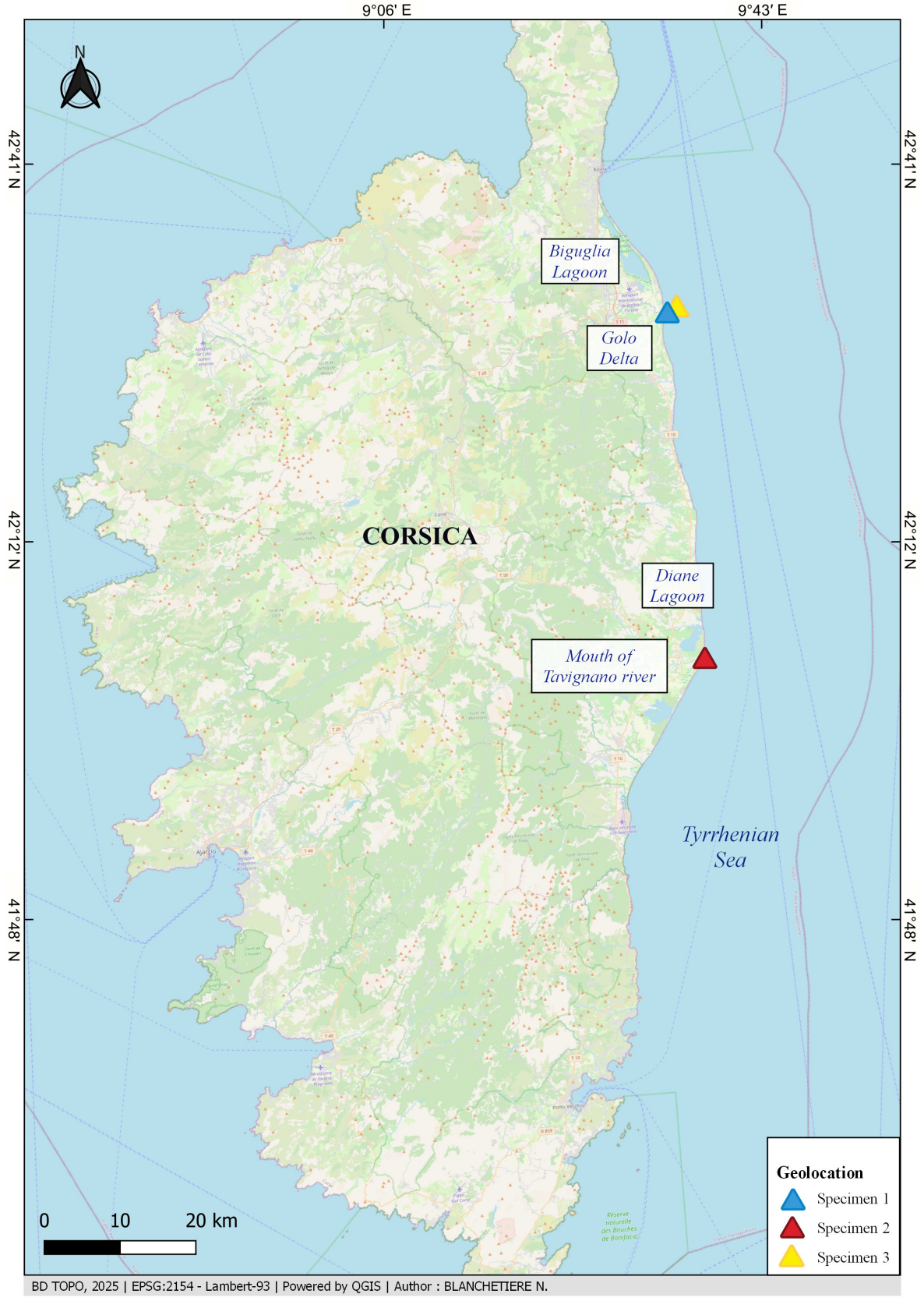

Fig. 1. Geolocation of the three caught smooth-hounds, *Mustelus* sp., in Eastern Corsican waters: specimen no. 1 (blue triangle); specimen no. 2 (red triangle); specimen no. 3 (yellow triangle).

Table 1. Summary of capture events, morphometrics, and causes of death in *Mustelus* sp.

Individual	Date and time of capture	Location (Fig. 1)	TL	TW	Cause of death
Specimen no. 1	05/25/2024 00:00 AM	300 m off the shore of the Golo Delta (Northeastern Corsica, Tyrrhenian Sea)	Estimation: 90 cm	NA	Died after swallowing the hook, which got stuck and pierced its stomach.
Specimen no. 2	01/10/2025 08:30 AM	260 m off the shore of Aleria's Beach	Measured: 189 cm	27 kg	Died on the shore, with the hook embedded in the branchial region.
Specimen no. 3	06/07/2025 11:00 PM	450 m off the shore of the Golo Delta (Northeastern Corsica, Tyrrhenian Sea)	Measured: 73.5 cm	1,435 kg	Died during capture after swallowing the hook, which got lodged in the esophagus.

blue crabs (Rountree and Able, 1996). The durophagous feeding ability of *Mustelus* spp. suggests it may act as a natural predator of the invasive blue crab *C. sapidus*, especially given the recent spatial overlap of both species in northeastern Corsican waters. *Mustelus* spp. are viviparous shark species giving birth from 2 to 28 pups *per* litter (Ebert and Dando, 2020; De Maddalena, 2024) and are important mesopredators, playing an essential role in balancing and sustaining ecosystems (Gül and Demirel, 2021). In our study, specimen no. 2 was captured pregnant, and 15 pups were released alive in the sea after the capture (Fig. 2). We highlight that with adequate regulation and effective conservation measures, Mediterranean populations of *Mustelus* spp. could recover and serve potentially as natural bioregulators of invasive blue crab populations. A better understanding of the predatory capacity of *Mustelus* spp. could inform biocontrol strategies, and reinforces the need for stricter conservation measures for these endangered sharks in the Mediterranean Sea. In addition to fishing pressure, other current global critical threats to the Mediterranean *Mustelus* spp. populations are climate change (Santos *et al.*, 2021), plastic pollution (Kabasakal *et al.*, 2025), and heavy metals contamination (Storelli *et al.,* 2011).

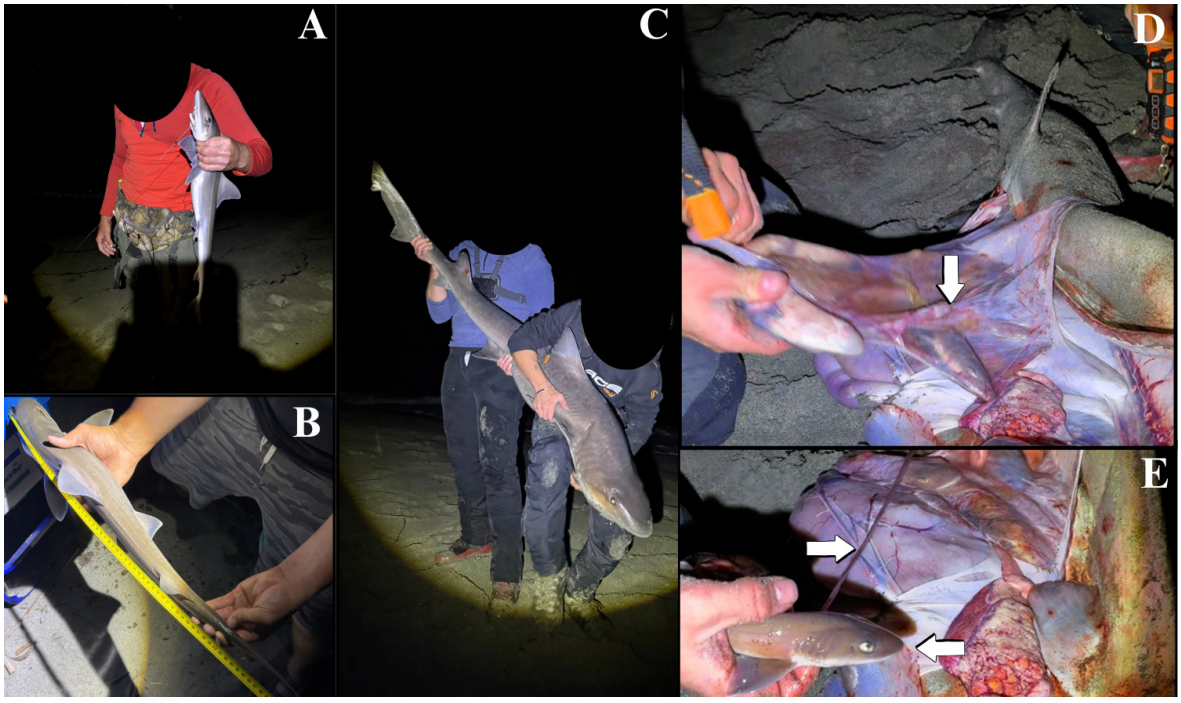

Fig. 2. Captured specimens of the smooth-hounds *Mustelus* sp. reported in this study: specimen no. 1 **(A)**; specimen no. 3 **(B)**; specimen no. 2 **(C)**; internal identification of full-term embryos beneath the uterine connective tissue **(D)**; term embryos and alive neonates before release **(E)**. (Photo credit: D. Santucci).

Our preliminary findings highlight the need for more in-depth ecological research on the life history of *Mustelus* spp. in the Mediterranean Sea. Such knowledge is essential to inform and strengthen conservation efforts and regulatory measures aimed at protecting these species as natural predators of harmful invasive crustaceans like *C. sapidus*.

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