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BRIEF COMMUNICATION

Opportunistic predation on juvenile angelsharks *Squatina squatina*: The greater amberjack *Seriola dumerili* as a potential threat

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Abstract

The first documented case of predation on a juvenile critically endangered angelshark *Squatina squatina* by a greater amberjack *Seriola dumerili* was observed in 2024 at Las Teresitas Beach, Tenerife, Canary Islands. The sequence shows a roughtail stingray *Bathytoshia centroura* initially attempting to predate on *S. squatina*, which briefly escaped before being captured by *S. dumerili*. This observation provides new insights into predator–prey dynamics of *S. squatina*, highlighting the critical role of these interactions in shaping conservation strategies for critically endangered species.

KEYWORDS
angelsharks, Canary Islands, juvenile survival, predator–prey interaction, *Seriola dumerili*, *Squatina squatina*

Juvenile sharks play a crucial role in ecosystem function, acting as both predators and prey, influencing population dynamics and community structure (Heupel et al., 2007). Their survival is essential for population sustainability, with survival rates and age at maturity significantly influencing population growth (Cortés, 2002; Mucientes et al., 2023). Elasmobranch nursery areas provide refuge and support growth in juveniles, especially in shallow waters that offer protection from larger predators (Hussey et al., 2017; Jiménez-Alvarado et al., 2020).

For critically endangered species like the angelshark *Squatina squatina* (Linnaeus 1758), which has experienced a population decline of over 80% in 45 years due to fishing pressure and habitat loss (Barker et al., 2016; Gordon et al., 2017; Lawson et al., 2020; Morey et al., 2019), identifying and protecting nursery areas is critical (Barker et al., 2016; Jiménez-Alvarado et al., 2020; Meyers et al., 2017). Although the species was once common in the Northeast Atlantic and Mediterranean Sea (Ebert & Stehmann, 2013), one of its largest-known strongholds is now in the Canary Islands, where frequent sightings provide unique research opportunities for conservation (Barker et al., 2016; Mead et al., 2023; Meyers et al., 2017). An improved knowledge of predator–prey interactions, and their impacts on population dynamics, in these nursery areas is important for developing conservation strategies that maintain ecological balance and support *S. squatina* recovery.

The critically endangered status of *S. squatina* is exacerbated by its k-selected biological traits, including slow growth, late maturity and

low fecundity, making it highly vulnerable to overexploitation and habitat disturbances (Capapé et al., 1990; Dulvy et al., 2014). *S. squatina* use their large pectoral fins to bury themselves in soft sediment, providing both ambush opportunities and protection (Ebert & Stehmann, 2013; Jiménez-Alvarado et al., 2020). Adult individuals typically exceed 100 cm in total length (L_T), whereas juveniles, particularly those under 60 cm L_T, are more vulnerable to predation due to their smaller size and limited defensive mechanisms (Jiménez-Alvarado et al., 2020; Meyers et al., 2017). At birth, individuals measure between 24 and 30 cm L_T (Ebert & Stehmann, 2013).

Current knowledge on natural predation of *S. squatina* is limited. Nevertheless, documented cases indicate that juvenile *S. squatina* are preyed upon by the roughtail stingray *Bathytoshia centroura* (Mitchill 1815), spiny butterfly ray *Gymnura altavela* (Linnaeus 1758) and white skate *Rostroraja alba* (Lacepède 1803) (Toledo-Padilla, H., personal communication, November 2024; Jimenez-Alvarado, D., personal communication, June 2020, April 2022). Habitat overlap between *S. squatina* and *G. altavela* has been confirmed through scientific surveys (Espino-Ruano et al., 2023), further suggesting the potential for predator–prey interactions. Additionally, the greater amberjack *Seriola dumerili* (Risso 1810), a large predatory fish, has been observed sharing habitat with juvenile *S. squatina* (Jimenez-Alvarado, D., personal communication, April 2022). Prior research had not identified *S. dumerili* as a predator of *S. squatina*, highlighting a significant knowledge gap. This study presents the first documented case of this interaction, emphasising its novelty and the need for further investigation into predator–prey dynamics and trophic interactions within these ecologically important nursery areas.

S. dumerili, known for its aggressive behaviour and broad prey spectrum, primarily feeds on a range of small to medium-sized pelagic fish, squid and crustaceans (Andaloro & Pipitone, 1997; Matallanas et al., 1995; Sley et al., 2016; Wei et al., 2025). Benthic prey is consumed in small proportions, and demersal fish have only been observed occasionally in the stomachs of *S. dumerili*, with elasmobranchs reported in their diet only occasionally (Andaloro & Pipitone, 1997). As opportunistic feeders, *S. dumerili* adapt their diet based on their size and prey availability (Andaloro & Pipitone, 1997; Auster et al., 2009; Manooch & Haimovici, 1983). This study documents the first recorded instance of *S. dumerili* preying upon *S. squatina*.

The Canary Islands, an archipelago in the Central East Atlantic near northwest Africa, provides diverse marine habitats critical for the conservation of threatened elasmobranchs, including *S. squatina*, with the region providing an important refuge for both adults and juveniles (Barker et al., 2016; Meyers et al., 2017).

Las Teresitas Beach, situated on the northeastern coast of Tenerife, is the largest-known nursery area for *S. squatina* (Figure 1) (Escánez et al., 2016; Jiménez-Alvarado et al., 2020; Meyers et al., 2017). This artificial sandy beach, protected by a breakwater, features shallow waters that gradually reach depths of around 10 m, providing an ideal habitat where juvenile *S. squatina* can find shelter within soft sediments (Escánez et al., 2016). The calm, protected

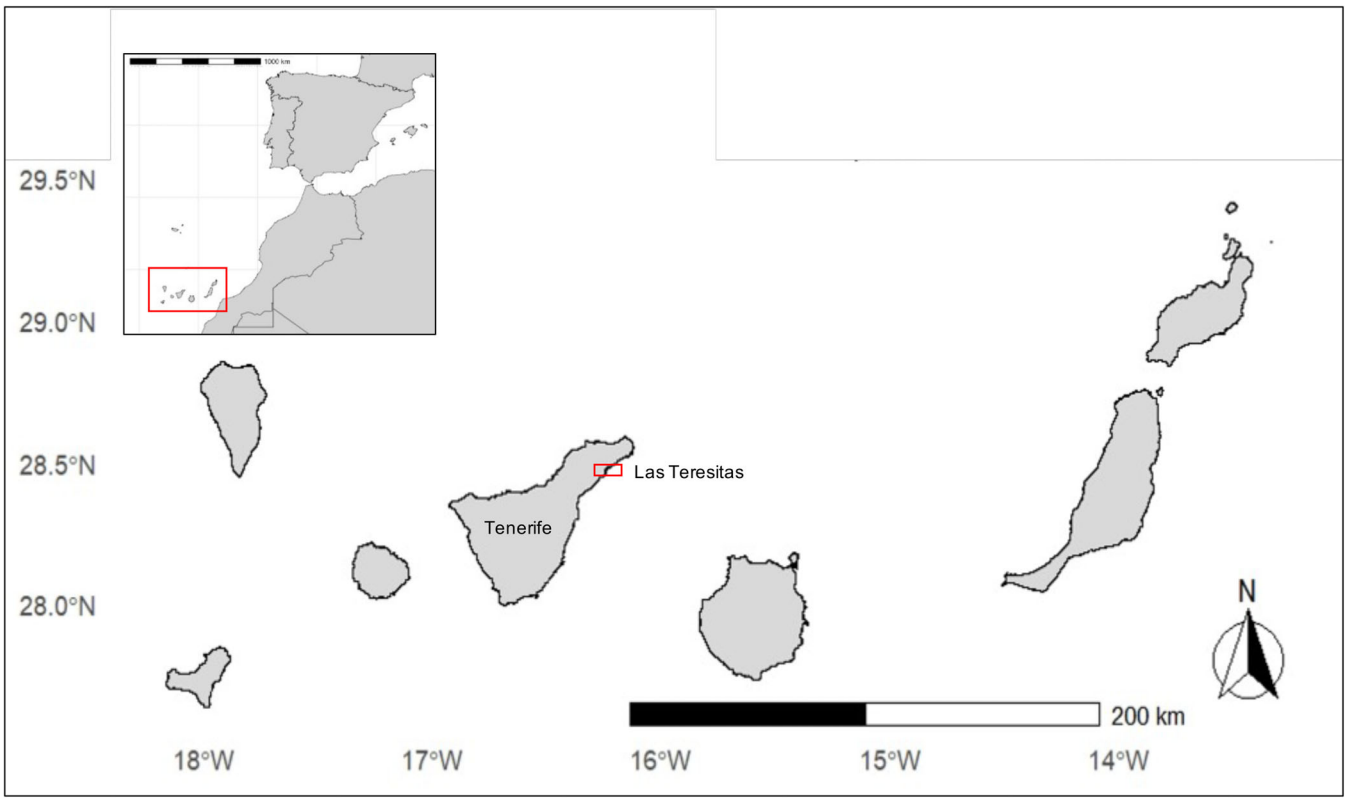

FIGURE 1 Map of the Canary Islands, highlighting Las Teresitas Beach on Tenerife's northeastern coast, the largest identified nursery area for *Squatina squatina*, and the location of the documented predation event involving a juvenile *S. squatina* by a *Seriola dumerili*.

waters and rich biodiversity of this beach offer favourable conditions for prey availability, growth and protection from potential threats (Escánez et al., 2016).

On 29 April 2024, at 12:30 hours, the first documented case of predation on a juvenile *S. squatina* by *S. dumerili* was recorded during a recreational snorkelling activity. The event took place at a depth of approximately 6 m within Las Teresitas nursery area and was captured on a GoPro12 Black camera in 4 K resolution at 30 frames per second, with a linear field of view and an approximate distance of 4 to 6 m from the prey. The recording was conducted with the observer floating at the surface.

The video (see supplementary information in Video S1) shows *B. centroura* foraging along the sandy seabed, closely followed by an adult *S. dumerili*. As *B. centroura* searched the bottom for prey, *S. dumerili* shadowed its movements. Although this interaction was visible in the video for approximately 15 s, the videographer – Francisco Reyes, one of the co-authors of this study – reported that it lasted between 7 and 10 min. This behaviour aligns with observations of mixed-species foraging, where *S. dumerili* has been documented associating with demersal predators to increase feeding opportunities by capitalising on prey disturbed from the seafloor (Auster et al., 2009).

At one point, *B. centroura* attempted to capture a juvenile *S. squatina* partially buried in the sediment (Figure 2a). *B. centroura* used its pectoral disc to generate suction, lifting the sediment and exposing the juvenile *S. squatina* (Figure 2b). The capture attempt was unsuccessful, as the juvenile swiftly moved away (Figure 2c), allowing *S. dumerili* to opportunistically predate it shortly afterwards (Figure 2c,d).

B. centroura was identified by its distinct morphological features, including a large, thorny tail and widely spaced mid-dorsal bucklers, with mature individuals displaying prominent tubercles on the outer parts of their discs (Espino et al., 2019; Manuel-Moreno &

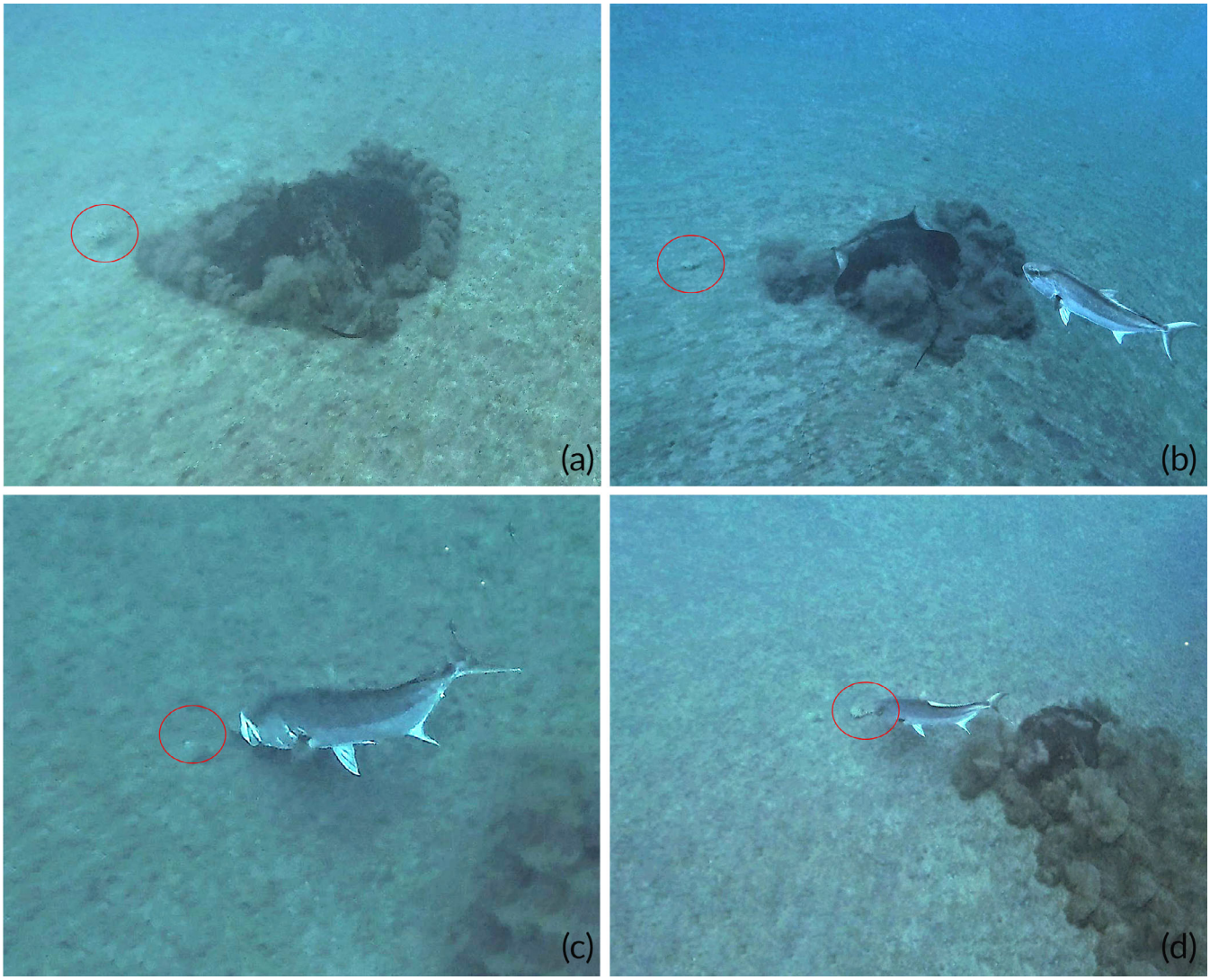

FIGURE 2 Predation sequence involving *Bathytoshia centroura*, a juvenile *Squatina squatina* (highlighted with a red circle) and a *Seriola dumerili*. (a) *B. centroura* attempts to capture a juvenile *S. squatina* that is partially buried in the sediment. (b) *B. centroura* uses its pectoral disc to generate suction and lift the sediment, exposing the juvenile *S. squatina*. (c) The capture attempt fails as the juvenile *S. squatina* swiftly moves to another area. (d) This escape ultimately facilitates the successful predation of the juvenile *S. squatina* by *S. dumerili*.

Lobenstein, 2015). *S. dumerili* was identified by its elongated, slightly compressed body shape, large mouth not extending beyond the eyes and characteristic colouration: grey-ochre on the back, silvery-white flanks and belly, a golden longitudinal band along the flanks and a dark oblique band above the eyes (Espino et al., 2019; Manuel-Moreno & Lobestein, 2015). The observed *S. dumerili* specimen was estimated to be between 150 and 200 cm L_T, consistent with the species' typical size range and considered a large individual within the adult size class (Bauchot, 1987). *S. squatina* was identified in the video based on its behavioural traits and morphology. The observed juvenile *S. squatina* specimen, estimated to be <59 cm L_T based on its size relative to *B. centroura* and *S. dumerili*, was classified as a juvenile and possibly even a young-of-the-year. These size estimates were derived from visual comparisons with known species size ranges and relative proportions observed in the footage.

Our observation of a juvenile *S. squatina* being preyed upon by *S. dumerili* likely represents an opportunistic feeding event facilitated by the ecological role of *B. centroura* as a foraging facilitator. Rays, such as *B. centroura*, indirectly support other species by disturbing benthic habitats, releasing hidden prey into the surrounding environment and making them accessible to predators like *S. dumerili* (Boaden & Kingsford, 2012; Flowers et al., 2020). This commensal relationship highlights the potential for rays to serve as ecological facilitators in predator–prey interactions (Flowers et al., 2020). Although this observation highlights the predator's dietary plasticity, it does not suggest that *S. squatina* constitutes a significant or regular component of *S. dumerili* diet.

However, given the opportunistic nature of *S. dumerili* and its broad diet, further investigation is needed to assess whether predation on demersal elasmobranchs, particularly *S. squatina* within overlapping habitats, occurs more frequently than currently documented and whether rays play a recurring role in this predation. A clearer understanding of *S. dumerili's* role in these predator–prey dynamics could provide critical insights into its ecological impact on elasmobranch populations within nursery areas.

Identifying *S. dumerili* as a predator of *S. squatina* emphasises the need to address knowledge gaps about pressures from potential predators in marine ecosystems. Although previous research has focused on anthropogenic threats to *S. squatina* our observations highlight the need to expand this scope to include potential predators. Understanding predator–prey interactions is also important for comprehensive ecological assessments, as predation may impose undocumented pressures on *S. squatina*, contributing to its natural mortality and influencing population demographics in the longer term.

Collaborative efforts among scientific communities and citizen science programmes are vital for collecting data on *S. squatina* populations, their predators and ecological interactions between species. This study exemplifies the valuable insights that can be derived directly from diver and citizen science observations, underscoring the importance of these programmes and the need to continue supporting their contributions.

In conclusion, this study provides important first insights into the previously undocumented predation of juvenile *S. squatina* by *S. dumerili*. Although this study describes a single observation it directly addresses a knowledge gap related to predator interactions and contributes to improving our understanding of the ecological roles of marine species.

AUTHOR CONTRIBUTIONS

HTP, DJA, and EM conceptualized the article. HTP and EM drafted the manuscript and analysed the video. TBB developed the maps and reviewed the manuscript. FR obtained the audiovisual material. TBB, DJA, JB, LM, DJ, and EM revised the manuscript and provided editorial feedback. All authors reviewed and contributed to the final submitted version.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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