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Research Article

An ancient shark tale: bridging knowledge gaps on the Galapagos shark (*Carcharhinus galapagensis*) and other elasmobranch species using traditional and local ecological knowledge in remote Rapa Nui

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ABSTRACT. Sharks play a crucial ecological role as apex predators, yet many species remain poorly understood, particularly in remote oceanic regions. This study provides the first comprehensive assessment of the historical and contemporary occurrence of the Galapagos shark (*Carcharhinus galapagensis*) and other elasmobranchs around Rapa Nui (Easter Island), using Local and Traditional Ecological Knowledge (LEK/TEK) from artisanal fishers and divers. Through 25 semi-structured interviews, we documented species occurrence, abundance trends, spatial patterns, and cultural significance. The Galapagos shark was consistently identified as the most common and locally resident shark species. Respondents described clear ontogenetic habitat segregation: juveniles and neonates occur in shallow southern coastal areas, while larger individuals are found offshore. Nearly half of participants perceived population declines since the 1980s, attributing these to historical overfishing, habitat degradation, and reduced prey availability. Twelve additional elasmobranch species were reported, including pelagic taxa such as *Isurus oxyrinchus* and *Alopias* spp., as well as deep-sea forms possibly representing undescribed species (*Squalus* cf. *mitsukurii*). Sharks hold cultural importance in Rapanui tradition, symbolizing ancestral protection and ecological balance, though much of this heritage is being lost. Our findings highlight southern Rapa Nui as a potential nursery area for *C. galapagensis* and underscore the need for local management actions, including spatial protection within the Rapa Nui Multiple Use Marine Protected Area. Integrating LEK and TEK with scientific research can significantly enhance conservation outcomes in data-limited, isolated ecosystems.

Keywords: traditional ecological knowledge; marine conservation; sharks; Pacific islands; artisanal fisheries; cultural significance

INTRODUCTION

As apex predators, sharks are crucial for maintaining marine ecosystem stability, regulating both the abundance and behavior of their prey (Stevens et al. 2000, Heupel et al. 2014, Afonso & Hazin 2015, Roff et al. 2016, Alves et al. 2023). Yet, despite their ecological importance, they remain one of the most threatened marine groups globally, experiencing severe population declines driven primarily by overfishing and habitat degradation (Dulvy et al. 2021). Protecting them effectively relies on precise, high-resolution spatial and temporal data (Almojil 2021). However, we still face a major information gap: comprehensive empirical data are severely lacking for remote or understudied regions, which ultimately hinders the design of successful conservation measures (Carabelli et al. 2025).

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The Galapagos shark *Carcharhinus galapagensis* (Snodgrass & Heller, 1905) is a large-bodied coastal species with a broad but fragmented distribution across tropical and subtropical oceanic islands (Ebert et al. 2021). While capable of long-distance movements (Kohler et al. 1998), the species often displays high site fidelity, particularly around insular habitats (Meyer et al. 2010). Despite being currently classified as Least Concern by the International Union for Conservation of Nature (IUCN) due to its apparent global stability, local declines have been documented in some regions subjected to varying levels of fishing activities (Kyne et al. 2019). For instance, the species was once considered locally extinct in Rapa Nui due to historical overfishing (Friedlander et al. 2013). However, recent research has confirmed its continued presence in the area, particularly along the southeastern coast, indicating that remnant populations persist despite past exploitation (Morales et al. 2019).

Although at least 10 shark species have been documented in Rapa Nui (Morales & Hermoso 2023), the Galapagos shark appears to be the area's only resident shark species (Morales et al. 2019), highlighting its role as an apex predator within the island marine ecosystem (Morales 2020). Despite this ecological significance, most records are restricted to taxonomic inventories and occurrence reports, with only a few studies examining fundamental aspects of its ecology, such as habitat use and spatial distribution. Consequently, critical knowledge gaps persist regarding long-term residency patterns, abundance trends, and population structure.

Within this context, Traditional Ecological Knowledge (TEK) and Local Ecological Knowledge (LEK) have emerged as invaluable sources of baseline information (Alagona et al. 2012, Bonfil et al. 2018, Leeney et al. 2018). By incorporating intergenerational observations from local communities, LEK has successfully documented drastic reductions in shark size, abundance, and historical catches, bridging critical gaps where standardized data are missing (Seidu et al. 2022, Shaff et al. 2023). These participatory approaches have also elucidated the spatial contraction of elasmobranch hotspots in the Caribbean (Hübner et al. 2025) and helped reconstruct historical abundance trends in heavily exploited areas like the Mediterranean, exposing shifting baselines where previously common species are now functionally extinct (Colloca et al. 2020, De Santis et al. 2025). Integrating this knowledge helps quantify the true magnitude of species declines and directly link these ecological shifts to anthropogenic pressures, such as habitat degradation, expanded gear use, and market demands (Temple et al. 2024).

To address these challenges, this study integrates LEK and TEK to advance the understanding of shark dynamics in Rapa Nui, with a specific focus on the Galapagos shark. Given the scarcity of long-term empirical data from this remote oceanic island, combining LEK and TEK offers a powerful opportunity to reconstruct historical baselines and assess temporal changes in abundance, distribution, habitat use, and human-shark interactions. Through semi-structured interviews with local knowledge holders, we document long-term ecological patterns that would otherwise remain unavailable. Ultimately, this research provides critical insights into both historical and contemporary shark occurrences around the island, perceived population trends, essential habitats, and the cultural significance of these apex predators within the Rapanui community.

MATERIALS AND METHODS

Study area

Rapa Nui (also known as Easter Island) is a remote oceanic island (166 km²) located in the southeastern Pacific Ocean, ~3,770 km southwest of mainland Chile (Fig. 1). Polynesian navigators originally settled the island. It remains the easternmost inhabited island of the Polynesian Triangle, retaining a strong cultural and historical connection to Polynesia (Castilla et al. 2014). Despite its subtropical location, the island hosts the southeasternmost coral reef ecosystem in the Pacific (Randall & Cea 2010, Friedlander et al. 2013, Arana 2014).

While the island features five distinct fishing coves, Hanga Piko and Hanga Roa collectively account for approximately 80% of all local landings (Castilla et al. 2014). Historically, the Rapa Nui people engaged in small-scale subsistence fishing using a diverse array of traditional gears, including nets, snares, and spears (Arana 2014). Today, all fishing efforts around the island remain strictly artisanal, as industrial fleets are prohibited from operating in the surrounding waters (Castilla et al. 2014).

Rapa Nui fishing sector

Current fishing activities are predominantly coastal, with nanue (*Kyphosus sandwicensis*) representing one of the primary target species. In contrast, offshore trips are less frequent, typically extending between 5 and 25 nm from the coast to target pelagic species such as yellowfin tuna (*Thunnus albacares*) (Morales-Serrano, unpubl. data). Despite industrial exclusions, illegal, unreported, and unregulated (IUU) pelagic fishing has

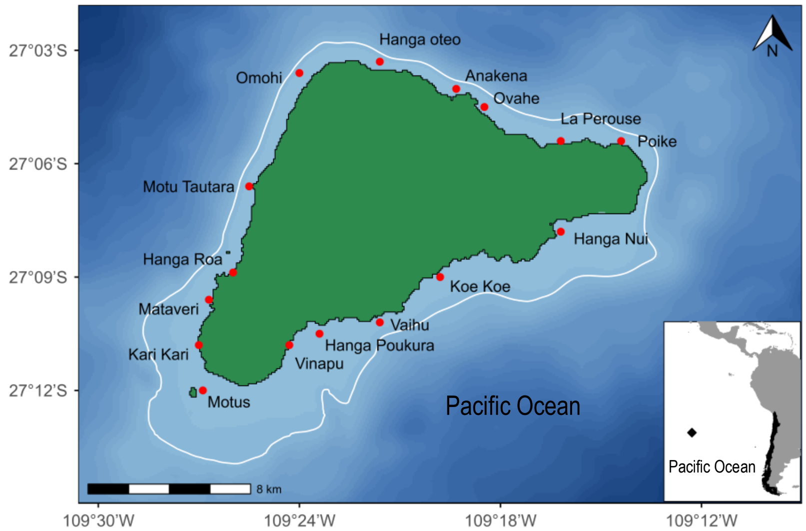

Figure 1. Map of Rapa Nui Island with locations (red points) of Galapagos shark (*C. galapagensis*) sightings by local fishers. The 180 m depth isobath is shown (white line), and the inset map indicates the location of Rapa Nui (diamond) relative to mainland Chile and South America.

historically occurred in the offshore waters surrounding the island (Zylich et al. 2014), exerting considerable pressure on apex predators and highly migratory stocks (Friedlander et al. 2013). Furthermore, the introduction of modern fishing gear, combined with an increasing demand for local seafood driven by tourism, has likely intensified the strain on coastal resources in recent decades (Randall & Cea 2010, Zylich et al. 2014). Although local fishers do not directly target sharks, they are frequently captured as bycatch in both coastal and offshore artisanal operations (Morales 2020). Consequently, this cumulative impact has likely driven a substantial downturn in shark abundance, largely through incidental mortality and prey depletion (Zylich et al. 2014).

Surveys and data collection

A semi-structured questionnaire (see Supplementary Material) incorporating both open- and closed-ended questions was designed based on methodologies from similar studies (e.g. Bonfil et al. 2018, Leeney et al. 2018, López-Angarita et al. 2021). The survey was conducted in November 2024 with local fishers and divers across the three main coves of Rapa Nui: Hanga Roa, Hanga Piko, and Hanga Nui.

Interviews were conducted individually. A convenience sampling approach was used, where participants were interviewed according to their availability and willingness to participate. The questionnaire was developed in Spanish and structured into four primary sections:

1. Personal information, which collected demographic data including age, years of experience, and main cove of operation.

2. General questions, which required respondents to visually identify the Galapagos shark *C. galapagensis* from reference images (see Supplementary Material), provide associated local names, and specify their primary activity during encounters. Based on this activity, participants were divided into either "Fishers" or "Divers". Both groups were asked to report sighting depths, specific geographical locations, seasonality, estimated mean total lengths (TL), and observation frequencies. For the "Fishers", additional data regarding target species and fishing gear were also recorded.

3. Uses and perceptions, designed to compare historical and recent occurrences of the Galapagos shark. Participants were asked to contrast past and present sightings and catch rates, spatial distributions, and estimated sizes. This section also evaluated local uses of the species, perceived cultural significance, and the respondent's overall perception of the shark (categorized as positive, negative, or neutral).

4. Other species, which assessed encounters with other elasmobranch species. To facilitate accurate taxonomic identification, participants were presented with reference photographs of elasmobranch species previously reported in the area by Randall & Cea (2010) and Morales & Hermoso (2023) (see Supplementary Material). Upon positive visual species confirmation,

respondents were queried regarding estimated individual sizes, observation sites, and the temporal dynamics of the sightings.

Research ethics

All interviews were conducted in accordance with the ethical standards approved by the Ethics Committee of the University of Chile. Before starting the questionnaire, participants provided informed consent highlighting the objectives of the study and the exclusive academic use of the data, ensuring voluntary participation and confidentiality.

Data analysis

Since fishers and divers operate across multiple sites around the island, survey responses were pooled and analyzed for the entire study area rather than by cove. Descriptive statistics (i.e. frequencies) were used to summarize quantitative responses. The relative importance of species was evaluated using the frequency of answers provided by fishers. For each species described by responders, we listed its scientific, common, and local name, period of occurrence, sighting location, and conservation status taken from the IUCN Red List of Threatened Species (Table 1).

Responses from open-ended questions were coded thematically to identify recurring patterns regarding habitat use, temporal changes, perceived abundance trends, and perceived causes of these changes. All quantitative analyses were performed in R version 4.3.0 (R Core Team 2024), using the package "ggplot2" for visualization.

RESULTS

A total of 25 interviews were conducted: 16 with artisanal fishers (64%) and 9 with local recreational divers (36%). Participants' ages ranged from 32 to 80 years. Of the 23 participants who reported their years of fishing experience, the average was 31.6 years, with four individuals reporting more than 55 years of experience. All respondents recognized the Galapagos shark as the most common shark species around Rapa Nui. However, local names varied, with interviewees referring to it as "mango″ (in the Rapanui language), "tollo" or "tiburón de orilla" (coastal shark).

Regarding fishing gear used to capture Galapagos sharks, only artisanal fishers (16 participants) were able to provide answers. Most fishers reported employing multiple types of fishing methods, including handlines, inshore set gillnets, and spearfishing, depending on the target species. Interactions with Galapagos sharks were most frequently associated with spearfishing and gillnet fishing (Fig. 2). However, only fishers using handlines and gillnets reported catches as bycatch. At the same time, spearfishers observed the species during dives targeting other reef fish such as nanue (*Kyphosus sandwicensis*), po'o po'o (*Pseudocaranx lugubris*), and toremo (*Seriola lalandi*).

Spatial and seasonal patterns

Galapagos sharks were reported around the entire island (Fig. 1), though higher concentrations were noted along the western coastline from Mataveri to Hanga Nui, particularly within 5 m from the shoreline. Respondents noted spatial variation in shark size and group behavior. In the Mataveri-Vinapu area and near Hanga Nui, individuals were typically small (50-80 cm TL) and appeared in groups of 6-10 ind. In contrast, larger (100-300 cm TL) and solitary sharks were observed off the northeastern coast (e.g. La Perouse, Ovahe, Anakena) and oceanic seamounts such as the Apolo peak (27.23°S; 109.48°W). Divers reported sightings mainly off Anakena, Ovahe, and Vinapu, with fewer observations on the western coast (e.g. Omohi).

Most respondents (44%) stated that Galapagos sharks are caught mainly during the austral summer (December-March). However, some (28%) noted that sharks can be captured year-round (Fig. 3). Two interviewees reported observing large individuals with swollen abdomens (presumably "pregnant females") nearshore during this season. These potential "pregnant females" are no longer observed after March, suggesting that parturition may occur around late summer or early autumn. Small individuals were reportedly seen year-round, with one fisher noting the presence of neonates with visible birth marks during both summer and winter, especially between Mataveri and Vinapu.

Long-term trends in abundance

Forty-eight percent of participants perceived a decline in the Galapagos shark abundance since the 1980s (Fig. 4a). One fisher recounted previously catching up to 40 small individuals per trip in Mataveri using gillnets, compared to a current maximum of seven. A different participant recalled that small sharks were once "so abundant" that they were easily observed within the coves. Regarding trends in size, some participants (n = 4) noted a general reduction in shark size over time. One fisher described frequent sightings of larger sharks (>350 cm TL) in the area between Anakena and La Perouse. These sharks were locally referred to as "*aviones*"

Table 1. List of species reported by the 25 participants to occur around Rapa Nui. The number of appearances within the interviewees sorts species. The conservation status of each species was taken from the International Union for Conservation of Nature (IUCN) Red List of Threatened Species. Toka: fishing points, NI: no information, Haka no nonga: coastal seamounts. **Oceanic seamount.

Scientific name	Common name	Local name	Number of mentions	Period	Location	Conservation status
Carcharhinus galapagensis	Galapagos shark	Mango	25	All year-round	Southeast coast, Mataveri, Anakena, Poike	Least Concern
Isurus oxyrinchus	Shortfin Mako	Mako	15	All year-round / summer	Vaihu, Poike, Haka no nonga, Motus, Pukao**	Endangered
Alopias sp.	Thresher shark	Kavé´u	14	All year-round / summer	Vaihu, Hanga Nui, Haka no nonga, Hanga Oteo, Motus, Apolo**	Endangered or Vulnerable
Prionace glauca	Blue shark	Mango moana	8	Summer and Spring	Toka, Pukao, Omohi, off Anakena, Vaihu	Near Threatened
Rajidae	Deepsea skate	NI	7	No information	Apolo**, La Perouse	-
Galeocerdo cuvier	Tiger shark	Mango tore tore / niuhi	6	All year-round, summer	Los Motus, Koe Koe, Hanga Poukura, Hanga Oteo	Near Threatened
Squalus cf. *mitsukurii*	Juan Fernández dogfish	Mango otara	5	No information	Motus, Apolo**, Hanga Nui	Endangered
Hexanchus griseus	Bluntnose sixgill shark	Mango vai	5	All year-round	Vaihu, Motu Tautara, off Hanga Roa Otei	Near Threatened
Mobula sp.	Mantaray	NI	4	No information	Apolo**	Endangered or Vulnerable
Rhincodon typus	Whale shark	Mamatua niuhi	4	Summer	Motus, west coast, Omohi	Endangered
Triaenodon obesus	Whitetip reef shark	NI	4	Summer - Spring	Hanga Roa, Vaihu, Motu Tautara	Vulnerable
Aetobatus ocellatus	Spotted eagle ray	hihimanu	1	Summer	Open water	Endangered
Carcharodon carcharias	White shark	NI	1	No information	No information	Vulnerable

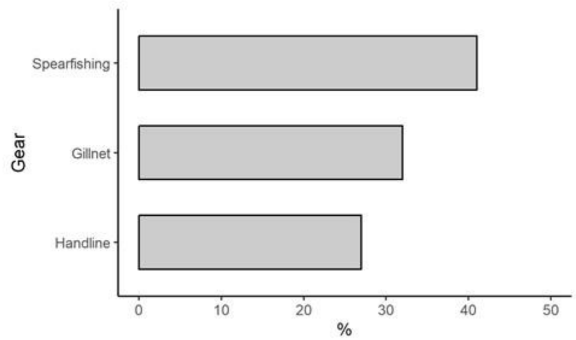

Figure 2. Most common fishing gear while interacting with the Galapagos sharks (n = 22).

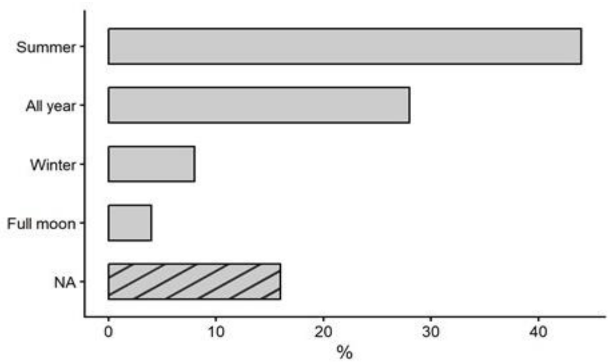

Figure 3. Period of the year when the Galapagos sharks are noted around Rapa Nui, according to survey responses (n = 25). NA represents those who did not provide an answer or lacked information.

(airplanes) by the elders (*Koro*) but are hardly spotted nowadays.

When asked about causes of the perceived decline in abundance, historical overfishing (20%) and reduced prey availability (16%) were cited as the most likely factors, followed by increases in sea surface temperature (SST) (12%) (Fig. 4b). According to interviewees, the increase in fishing pressure beginning in the 1990s was driven by a growing tourism industry linked to the filming of the movie "Rapa Nui", and a subsequent boom in hotel and restaurant development.

Other shark and ray species

Participants identified 12 additional chondrichthyan species (Table 1). Ten of these species were listed in threatened categories on the International Union for the Conservation of Nature Red List of Threatened Species (Table 1). Besides the Galapagos shark, the most frequent species observed by fishers was the shortfin mako shark (*Isurus oxyrinchus*) (n = 15) and the thresher shark (*Alopias* sp.) (n = 14), typically encountered in offshore waters year-round, with greater

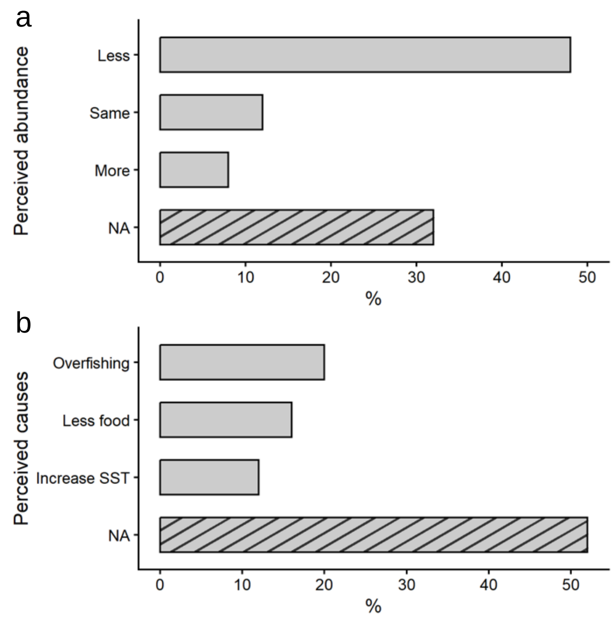

Figure 4. a) Perceived changes (%) in abundance of Galapagos sharks over the course of interviewees' lifetimes/time on the island, and b) causes of changes in local abundance (%) of Galapagos sharks (n = 25). NA indicates participants who did not provide an answer or lacked information. SST: sea surface temperature.

frequency in summer when tuna schools approach the island (n = 2). Fishers also described an unidentified large skate (estimated disc width: 100-150 cm), though further taxonomic clarification is needed. A *Squalus* species, likely *Squalus* cf. *mitsukurii*, was also mentioned (n = 5). This shark is ~100 cm long, with two dorsal spines, and is commonly caught at depths of 250 m.

Divers reported encounters with whale sharks (*Rhincodon typus*, n = 4) and whitetip reef sharks (*Triaenodon obesus*, n = 4). The ocellated eagle ray (*Aetobatus ocellatus*) and the great white shark (*Carcharodon carcharias*) were mentioned by only a single participant each.

Local perception and cultural significance of sharks

Almost 80% of participants consider sharks to fulfill ecosystem function, with over a quarter (28%) of the interviewees rating sharks as ecosystem regulators, while 20% believe sharks help maintain ecological balance. Twelve percent of participants referred to sharks as "bosses of the sea", indicating both ecological and cultural importance. Most participants (84%) expressed positive attitudes toward sharks. Neutral and negative perceptions of sharks were reported by 8 and 4% of respondents, respectively. Negative views were primarily attributed to shark interference with fishing activities, such as damaging gillnets and increasing operational costs.

There is currently no formal market or economic incentive for targeting sharks in Rapa Nui. Nevertheless, several fishers acknowledged the limited use of shark byproducts, though some recalled two or more traditional applications. When incidentally caught, shark meat is mainly used as bait (40%) for more valuable species (e.g. tuna, lobster), followed by liver oil extraction for traditional medicinal use (21%). Hard parts such as vertebrae, teeth, and skin are used in handcrafts, including *moai* eyes and necklaces (16%). One participant recalled using shark meat to feed local pigs during the 1980s. Only mako sharks were reported to be used for direct human consumption (2%). However, five participants mentioned that sharks in general didn't have commercial value, so they were discarded once captured. (Figs. 5-6).

Some participants (n = 5) recalled shark-related oral traditions. For three respondents, sharks were believed to represent ancestral spirits that protect families/tribes. One fisher cited petroglyphs in Taka Tamanes and Papa Vaka as evidence of the cultural reverence of sharks (Fig. 6d). Another participant highlighted the cultural significance of sharks in traditional oral narratives, particularly in the story of the Ariki (king) selection, where candidates were required to swim across shark-infested waters to retrieve the sacred Manutara (*Onychoprion fuscatus*) egg during the bird-man ritual or Tangata Manu.

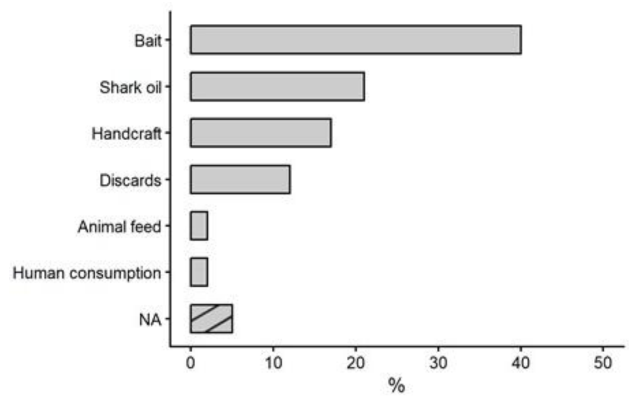

Figure 5. Traditional uses of shark products in the Rapanui culture. Participants could contribute more than one response. NA represents those who did not provide an answer or lacked information.

DISCUSSION

To our knowledge, this study provides the first comprehensive documentation of both historical and contemporary occurrences of elasmobranch species at remote Rapa Nui. Our findings demonstrate how observations given by local communities can complement and extend scientific assessments of species distribution and abundance, offering critical insights for data-limited and remote regions.

Our results confirm that the Galapagos shark is the most common and abundant shark species around the island. Interviewees consistently described a clear ontogenetic segregation in habitat use, with juveniles - including neonates (81 cm Total length; Wetherbee et al. 1996)- being primarily observed in nearshore waters, particularly along the coastline between Mataveri and Hanga Nui, whereas adults are more frequently sighted at deeper and offshore locations around the island. This pattern is consistent with ontogenetic habitat segregation previously documented for the species (Wetherbee et al. 1996). Furthermore, our findings complement those of Vega & Cortés (2005), who reported large pregnant females (>180 LT) in oceanic waters within the Easter Island exclusive economic zone during November 2004. Local observations of large individuals with noticeably swollen abdomens near the coast during summer months further suggest that pregnant females may move closer to shore before parturition, though targeted biological research is required to validate this hypothesis.

Shallow habitats likely enhance survival rates of early-life individuals by providing shelter against predation and greater prey availability (Afonso et al. 2023). The southern coast of Rapa Nui characterized by a wider shelf, supports a higher abundance of species compared to other areas (Morales et al. 2019). Moreover, the same authors suggest this area as a nursery ground for the Galapagos shark given the environmental characteristics and the higher abundance of observed juvenile sharks using Baited Remote Underwater Video Station (BRUVS). The constant presence of newborns and juveniles described by most participants at specific areas along the coast provides new information on the spatiotemporal habitat use of early-life stages of this species, supporting the hypothesis of a local nursery area.

Traditional ecological knowledge and long-term trends

Participants reported declines in the abundance of the Galapagos shark over recent decades. Most interviewees recognized the negative impact of certain fishing practices (e.g. gillnets) and changing environmental conditions on the survival and recovery of local

Figure 6. Traditional shark byproducts in Rapa Nui: a) liver oil extraction, b) vertebrae used for handcraft, and c) juvenile Galapagos shark used as bait for lobsters, d) petroglyph of some shark and tuna species in Papa Vaka. Photos by Jaime Aburto, Mikaela Pakarati, and Naití Morales-Serrano.

shark populations. These perceptions are consistent with Friedlander et al. (2013), who highlighted the historical impact of fishing on apex predator abundance around Rapa Nui. Similarly, Castilla et al. (2014) reported that local fishers perceived a general decline in marine resources and fisheries around the island, reinforcing the notion that reductions in shark abundance may be part of broader ecosystem-wide changes.

Similar patterns have been documented in other data-poor fisheries worldwide, where TEK and LEK have successfully identified population declines, shifts in species distribution, and signs of overexploitation that were later corroborated by scientific assessments (Colloca et al. 2020, Seidu et al. 2022, Temple et al. 2024, De Santis et al. 2025, Hübner et al. 2025, Udyawer et al. 2025). In this context, the perceptions reported by Rapanui knowledge holders regarding changes in shark abundance are consistent with the growing body of evidence demonstrating the value of LEK and TEK for reconstructing historical baselines and documenting long-term ecological change. Such approaches are particularly valuable in remote regions like Rapa Nui, where the logistical challenges of sustained scientific monitoring have limited our understanding of population trends and ecosystem dynamics over time. Nevertheless, interpreting TEK and LEK as indicators of population change requires careful consideration of potential biases, including Shifting Baseline Syndrome (SBS) and generational effects (Pauly 1995, Soga & Gaston 2018, Almojil 2021). These phenomena can lead younger generations to perceive already degraded ecosystems as pristine, meaning the true magnitude of historical declines is often only apparent through the memories of older, more experienced participants (Almojil 2021). Retrospective studies are also inherently subject to recall bias, and reconstructing long-term trends is frequently challenged by the difficulty of maintaining consistent oral accounts across generations (Bessesen & González-Suárez 2021). Because this study was not specifically designed to quantify SBS, the exact extent of its influence on perceived shark abundance remains uncertain. Interestingly, the strong agreement among participants regarding the timing and scale of shark declines could reflect either independent, parallel observations or the cultural transmission of ecological knowledge within the community. While this collective memory is a core strength of LEK/TEK approaches, it can complicate the distinction between firsthand experience and socially shared perceptions. Applying structured socio-ecological frameworks can help contextualize these qualitative insights, ultimately strengthening their utility for marine conservation planning (Early-Capistrán et al. 2020).

Other elasmobranch species

Among the other elasmobranch species reported by local fishers and divers, the presence of several pelagic and highly migratory sharks (e.g. mako, thresher, blue, whale, and tiger sharks) underscores the ecological importance of Rapa Nui as a potential stepping-stone habitat for wide-ranging predators. Oceanic islands can provide critical foraging, resting, or navigational habitats for migratory species (Morato et al. 2010, Garrigue et al. 2015), and Rapa Nui may therefore contribute to the connectivity and persistence of shark populations across the South Pacific.

In contrast, the presence of less mobile species such as the deep-sea skate, *Squalus* cf. *mitsukurii*, and the bluntnose sixgill shark (*Hexanchus griseus*) suggests the occurrence of additional resident elasmobranch species in the area, besides the Galapagos shark. Given the geographic isolation of Rapa Nui, the unidentified deep-sea skate and *S.* cf. *mitsukurii* recorded in this study may represent endemic taxa. Although *S. mitsukurii* is currently known from the northwestern Pacific, morphologically similar specimens from the Juan Fernández Archipelago have recently been proposed as a distinct species within the genus (Contreras et al. 2025). Consequently, the individuals observed around Rapa Nui could correspond to an undescribed taxon, potentially associated with the Salas y Gómez Ridge. Further taxonomic, genetic, and biogeographic studies are needed to clarify their identity and distribution. Considering the high degree of isolation of Rapa Nui, identifying and protecting potentially endemic elasmobranchs is important for preserving the evolutionary and ecological uniqueness of the southeastern Pacific.

These findings also highlight the need for a structured long-term monitoring program capable of documenting changes in shark diversity, distribution, and abundance. The integration of complementary approaches, including environmental DNA (eDNA), BRUVS, and citizen science initiatives (like the Range Extension Database & Mapping project [Redmap] in Australia; https://www.redmap.org.au/), could substantially improve species detection and help address current knowledge gaps. Such programs would also facilitate the early detection of range shifts and newly occurring species associated with ongoing climate-driven changes in the Pacific Ocean (Osgood et al. 2021).

Cultural importance

As reported by local knowledge holders, sharks remain a culturally significant group in Rapa Nui and are deeply embedded in the island's ancestral traditions, oral history, and cultural landscape. Historical accounts, legends, and archaeological evidence, including shark-related petroglyphs, suggest that sharks played an important role in the worldview of ancient Rapanui society, possibly as symbolic or protective beings associated with specific locations and social groups. This interpretation is further supported by local historical knowledge. According to the Rapanui historian Cristian Moreno, one of the ancient tribes inhabiting the area where shark petroglyphs are found was known as "Tupahotu o 'oho niuhi", a name that directly references the abundance of large sharks in the area. This cultural connection is also reflected in the island's toponymy, with place names such as "Motu Mango" (shark islet) and "Hare Mango" (house of the shark) highlighting the long-standing relationship between sharks and the Rapanui people (C. Moreno, *pers. comm.*).

The cultural significance attributed to sharks in Rapa Nui is consistent with broader Polynesian traditions, in which sharks are often regarded as ancestral guardians or spiritually significant animals (Nunes 2003, Puniwai 2020). However, references to sharks in Rapanui oral traditions appear less abundant than in other Polynesian societies (e.g. Hawaii), suggesting that part of this cultural heritage may have been lost through time. The concerns expressed by participants regarding the disappearance of traditional stories and ecological knowledge underscore the importance of documenting and preserving TEK, not only as a source of ecological information but also as a valuable component of the island's cultural identity and biocultural heritage.

Management and conservation implications

In Rapa Nui, fishers and divers consistently reported declines in abundance since the 1980s, a perception supported by historical accounts describing a marked reduction in shark sightings following periods of targeted and incidental fishing (Cea 2021). Given the low productivity and limited resilience of shark populations, even moderate levels of exploitation can result in long-term declines, particularly when neonates and juveniles are disproportionately affected (Stevens et al. 2000, Cortés 2002). The predominance of early life stages among sharks reported by participants therefore raises concerns about the long-term viability of the local population.

The information generated through this study provides valuable guidance for spatial management within the Rapa Nui Multiple Use Marine Protected Area (MUMPA). Areas along the southern coast between Vaihu and Hanga Nui, as well as the coastline from Mataveri to Kari Kari, were consistently identified as important habitats for neonates and young-of-the-year Galapagos sharks. These areas overlap with locations previously recognized for their ecological importance and potential nursery function (Randall & Cea 2010, Morales et al. 2019, Jabado et al. 2023), highlighting them as priorities for conservation and management actions.

Despite existing national regulations prohibiting the retention of chondrichthyans captured as bycatch (Res. Ex. 2063-2020), shark interactions continue to occur in local fisheries, and available landing statistics likely underestimate their magnitude. According to the most recent fishing records (SERNAPESCA 2024), only the Galapagos shark and the shortfin mako have been reported as landed in Rapa Nui. The persistence of these gaps largely reflects the logistical complexity and high costs of implementing long-term monitoring programs in such a remote oceanic island system, where opportunities for sustained ecological research are inherently constrained. This discrepancy highlights the need to develop alternative low-cost monitoring and reporting systems to improve our understanding of shark bycatch and mortality in artisanal fisheries. Integrating fishers into participatory monitoring programs could provide a practical mechanism to improve data collection and foster local stewardship.

More broadly, our findings demonstrate the value of combining TEK and LEK with scientific approaches to support conservation planning in data-poor and geographically isolated regions. Beyond providing information on shark ecology and population trends, local knowledge contributes to identifying critical habitats, historical baselines, and emerging threats that may otherwise remain undetected. Incorporating these knowledge systems into management frameworks can therefore improve the effectiveness, legitimacy, and long-term success of conservation actions in Rapa Nui.

Credit author contribution

N. Morales-Serrano: conceptualization, validation, methodology, formal analysis, funding acquisition, project administration, writing - review & editing; J.I. Zenteno: conceptualization, validation, methodology, formal analysis, writing - review & editing; N. Adasme: conceptualization, validation, methodology, formal analysis, writing - review & editing. All authors have read and approved the final version of the manuscript.

Conflict of interest

The authors declare no conflicts of interest.

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