



THESSALONIKI 2024

**EUROPEAN
ELASMOBRANCH
ASSOCIATION
CONFERENCE**

BOOK OF ABSTRACTS

Thessaloniki, 2024

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ABOUT THE EUROPEAN ELASMOBRANCH ASSOCIATION



The European Elasmobranch Association (EEA) is a non-profit umbrella organisation of European organisations dedicated to the study, management and conservation of sharks, skates, rays and chimaeras (cartilaginous fishes or chondrichthyans).

The objectives of the EEA are to coordinate the regional and international activities of its member organisations to advance research, sustainable management, conservation and education on cartilaginous fishes throughout Europe. The EEA was established in 1996 as a share-holding organisation. It is an association of organisations, not individuals and each country is represented by one member.

The EEA is run by a Board of Directors (one EEA delegate from each of its member organisations), which appoints a President, Secretary, Treasurer, and other officers. The board formally meets at the EEA Annual Scientific Meeting and holds the Annual General Meeting (AGM) concurrently. This provides opportunities to discuss business and policy issues and report back on activities over the previous year.

The EEA holds Annual Scientific Meetings, which are attended by international researchers, non-governmental organisation (NGO) representatives, students and interested members of the public, offering high-profile discussions and a presentation forum in the marine science and conservation context. In recent years, both the Annual General Meeting and Annual Scientific Meeting, have been combined and are the highlight of European elasmobranch activities.



Contents

Foreword

Programme & Sessions

Keynote speakers

Abstracts Oral presentations

Session 1 Biology and ecology of chondrichthyans

Session 2 Fisheries

Session 3 Flat sharks

Session 4 New technologies

Session 5 Policy and conservation

Session 6 Threatened species

Session 7 Biology and ecology of chondrichthyans II

Abstracts Posters

Acknowledgements





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ORAL PRESENTATIONS

Session 1: Biology and ecology of chondrichthyans

Diet Composition and Niche Partitioning of three skate species, *Raja clavata*, *R. brachyura*, and *R. montagui*, in the Northeast Atlantic.

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Diet composition and feeding strategy were investigated for the thornback skate, *Raja clavata* (n = 210), blonde skate, *Raja brachyura* (n = 113) and the spotted skate, *Raja montagui* (n = 89) using individuals from the North Sea and the English Channel. Total length (LT) of all individuals ranged from 14.0 to 103.7 cm. Skates were grouped into 10 cm size classes where variations in diet were compared using the prey-specific index of relative importance (%PSIRI). All species showed an ontogenetic shift in diet. Smaller individuals (<35 cm, LT) showed a specialised feeding strategy consuming more shrimp species (>63% PSIRI) for all species. As the size of the individuals increased, diets became more generalised with higher prey diversity. Clear niche partitioning is observed between all species as adults (>55 cm, LT) which consume different prey types. *R. clavata* consumed more decapod species (36-85% PSIRI), *R. brachyura* consumed more teleost species (65-93% PSIRI) and *R. montagui* consumed similar amounts of decapod and teleost species (25-38% and 34-56% PSIRI, respectively). These results provide insights into the impact of these sympatric predators on the ecosystem and how they interact for shared resources. Consequently, this study raises questions of how and why these differences in foraging behaviour evolved, and their potential in facilitating coexistence.

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Insight on trophic ecology of two commercial skates from the North East Atlantic

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Feeding ecology studies are an essential tool to enhance trophic ecosystem models leading to ecosystem-based fishery management advice. They provide crucial species-specific data to understand, trophic networks intra- and interspecific relationships and even sometimes, spatial distribution. Following a need for detailed dietary information on the exploited elasmobranch, this study aims to determine and compare the feeding ecology of two important commercial skates of the North East Atlantic, the blonde ray *Raja brachyura* and the spotted ray *Raja montagui*. They represent the most abundant skates landed on mixed fisheries of the western English Channel and the Bristol Channel areas, suggesting potential shared feeding habitats and trophic competition. In this study, we used stomach content to describe diet composition and stable isotope analyses to determine their trophic position and estimated the contributions of different prey to the isotope composition of skates. Then, we investigated potential interspecific diet overlap and the possible size, sex and maturity-related variability in diet. Based on the stomach content description, *R. brachyura* mainly feeds on teleost whereas *R. montagui* principally feeds on crustaceans. Although the two species demonstrated closed trophic positions with similar $\delta^{15}\text{N}$ levels, our results clearly showed differences in $\delta^{13}\text{C}$ sources contributing to their isotope composition. Yet, isotopic composition and diet varied according to length class or sex depending on the species. Those results contribute to improving general knowledge about the life history of elasmobranch and provide useful species-specific data essential to building appropriate fishery management approaches and conservation assessment.

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Does the use of new isotope tracers (CSIA) question the paradigm of ontogenetic diet change in the great white shark in North-East Pacific Ocean?

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Great white sharks from the northeastern Pacific Ocean are known to be born on the west coast of Mexico and migrate to Guadalupe Island when they reach at least 2 meters in length. In Guadalupe, these juveniles are known to feed on fish but not yet on marine mammals such as elephant seals. It is known from other populations that after reaching an average size of 3 to 3.5 meters, white sharks are all able to feed on marine mammals and so their trophic positions increase. However, recent studies using stable isotopes (δ N and δ C), and fatty acid analysis, have found no differences between the tissue composition and diet of adult and juvenile white sharks. In this study, we use a compound specific isotope analysis method to analyze in more detail the isotopic structure of great white sharks as a function of their size, as well as that of their prey. Our results suggest that there is greater variability in feeding behavior in juveniles than in sub-adults and adults. We can detect, thanks to mixing models, a signal of an increase in the proportion of elephant seals in the diet of sub-adults and adults compared with juveniles, and an increase in offshore squid in the diet of sexually mature adults compared with sub-adults. Furthermore, the decrease of phenylalanine δ N with ontogeny, which is a proxy of the baseline, suggests an increase in offshore migration for adults, reinforcing the hypothesis that the famous white shark café is indeed a breeding ground.

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The secret life of grey reef sharks: a dive into the drivers of activity and emergence of foraging associations

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Many tropical reef sharks are nocturnal foragers but little is known about the factors driving the spatiotemporal variations in hunting strategies. We investigated the abiotic and biotic factors driving activity patterns in a large aggregation of grey reef sharks (*Carcharhinus amblyrhynchos*) in a channel at Fakarava, French Polynesia. We determined how shark activity varied spatiotemporally, the degree of individual variability, and the emergence of social associations. Using acoustic telemetry and accelerometers, we monitored 38 individuals over a year in a dynamic energy seascape. We found that they used a larger space during nighttime and were more active at night and during outgoing currents. Shark activity also peaked during the full and new moons. The dynamic energyscape may promote the emergence of discrete behavioural strategies in reef sharks that use the channel of Fakarava for resting and foraging, and generate spatiotemporal heterogeneity in the distribution of predation pressure. Further investigations revealed that there was a high level of individual variability leading to behavioural clusters differing in level of activity and space use in this dense aggregation. Social network analyses also revealed a non-random social structure where sharks may assort with other individuals based on mutual foraging strategies. This channel represents a field experimental arena which has revealed many secrets on shark's behavioural complexity.

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New insights into the population genomic structure of the blue shark, *Prionace glauca*, in the North East Atlantic and within the Mediterranean Sea

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The definition of the population genetic structure and the delineation of stocks of highly vagile shark species is a challenging task, and sometimes the results can be difficult to interpret. Here we present the case of the blue shark, *Prionace glauca* (L. 1758), in the North East Atlantic Ocean and the Mediterranean Sea. Conservation and management of Mediterranean blue shark have been characterized by a precautionary approach due to lack of knowledge on population structure and connectivity dynamics with adjacent northeast Atlantic contingents. Here, we report the estimated genetic diversity and differentiation of >200 blue sharks sampled along the Mediterranean Sea and the adjacent northeast Atlantic Ocean, based on >14,000 ddRAD-derived single nucleotide polymorphisms (SNPs). Population genomic analyses revealed low overall genetic differentiation for this large pelagic vagrant, but significant values of the fixation index, F_{st} , between Mediterranean and Atlantic, and between the western and eastern Mediterranean Sea, suggesting the presence of subtle but significant genetic structure across the North-eastern Atlantic and the Mediterranean. This significant genetic differentiation implies the existence of independent demographic processes between the North East Atlantic Ocean and the Mediterranean Sea. The results also suggest that the Mediterranean blue shark population, despite faint but significant F_{st} differentiation, can be considered a separate stock composed by at least two different populations, within the western and eastern Mediterranean Sea. Overall, these results emphasise the need for revising management delineations applied to these critically endangered sharks.

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Elasmobranch vulnerability to global warming: insights from bioenergetic modelling of catsharks under climate scenarios

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Ectotherms are species highly vulnerable to global warming due to their sensitivity to temperature fluctuations which directly affect metabolic processes, survival rates, and reproductive success. Elasmobranchs, characterised by slow life histories and low reproductive rates, may face heightened risks. In this study, we investigated two catshark species with distinct life history traits and distribution ranges. In the Northeast Atlantic, *Scyliorhinus canicula* females mature earlier and produce three to six times more eggs than *S. stellaris*, which is mainly distributed along the British coast. We used bioenergetic models to analyse variations in growth, sexual maturity, offspring production, and population dynamics under two future climate scenarios for 2100: SSP2-4.5, a 'Middle of the Road' pathway, and SSP5-8.5, a 'Fossil-fueled Development' pathway. These were compared to historical temperature data from 1995-2014. While the SSP2 scenario showed moderate impacts on the survival rate of both species, rising temperatures under SSP5 significantly reduced survival rates during early life stages, declining dramatically to 33% for *S. canicula* and 23% for *S. stellaris*. There was no growth differences observed under SSP2 compared to historical temperatures for *S. canicula*, whereas *S. stellaris* exhibited marginal differences. Under SSP5, reduced growth rates and altered reproduction and survival rates lead to decreased population growth and extended generation times, resulting in *S. stellaris*'s population crashing. These results highlight the contrasting effects of climate change on closely related species, potentially leading to the extinction of the species with the latest maturity, lowest fecundity, and more restricted distribution.

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Vulnerability of Eastern Tropical Pacific chondrichthyan fish to climate change

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Climate change is an environmental emergency threatening ecosystems globally. Oceans have absorbed about 90% of anthropogenic heat and 20-30% of the carbon emissions, resulting in ocean warming, acidification, deoxygenation, changes in ocean stratification and nutrient availability, and more severe extreme events. Given predictions of further changes, there is a critical need to understand how marine species will be affected. Here, we used an Integrated Risk Assessment Framework to evaluate the vulnerability of 132 chondrichthyans in the Eastern Tropical Pacific (ETP) to the impacts of climate change. Taking a precautionary view, we found that almost a quarter (23%) of the species evaluated were highly vulnerable to climate change, and much of the rest (76%) were moderately vulnerable. Most of the highly vulnerable species are batoids (77%), and a large proportion (90%) are coastal or pelagic species that use coastal habitats as nurseries. This assessment indicates that coastal species, particularly those relying on inshore nursery areas are the most vulnerable to climate change. This climate-related vulnerability is compounded by other anthropogenic factors, such as overfishing and habitat degradation already occurring in the region. Mitigating the impacts of climate change on ETP chondrichthyans involves a range of approaches that include addressing habitat degradation, sustainability of exploitation, and species-specific actions may be required for species at higher risk. The assessment also highlighted the need to further understand climate change's impacts on key ETP habitats and processes and identified knowledge gaps on ETP chondrichthyan species.

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Session 2: Fisheries

“I don’t think it means what you think it means”

Why it is important to use the right terminology when discussing shark and ray fisheries and management

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Accurate terminology is crucial in discussions shark and ray fisheries and management. Miscommunication or misunderstanding of terms can even lead to significant ecological and regulatory consequences. Understanding the right term to use helps clarify the nature of the fishing activity, the level of threat to different species, and the required conservation measures, which is essential for the implementation of effective management practices. Misusing terms can result in miscommunication, leading to inappropriate regulatory measures. For example, confusing terms like "bycatch" (differentiating between unintended or intended) and "target catch" can skew data and hinder conservation efforts. Additionally, terms such as "unsustainable fishing" and "overfishing" must be clearly defined and correctly applied to develop accurate assessments of fishery impacts and to formulate appropriate responses. Without clear definitions, efforts to protect these vulnerable species can be undermined by loopholes and ambiguities in legislation. Clear and accurate language is also essential in educating the public and raising awareness about the threats to sharks and rays and their conservation status. Using terms such as "finning" or "protected" in the wrong context can lead to misinformed actions that have the potential to hamper conservation action. Effective communication is key to ensuring conservation measures address the threats that need to be mitigated. This presentation will highlight the most frequently misused and misunderstood terminology and will offer a clear guidance for the future.

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Evaluating Circle Hooks to Reduce Bycatch in Cyprus' Surface Longline Fisheries

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The LIFE ELIFE project (LIFE18 NAT/IT/000846), co-funded by the LIFE programme of the European Commission, aims to reduce the bycatch and related mortality of elasmobranchs in the Mediterranean Sea. Here we explore innovative gear modifications to mitigate bycatch and post-release mortality in Cyprus' surface longline fisheries, focusing on the efficacy of circle hooks. Our study, conducted between April and June during the swordfish season, involved 14 fishing trials, using about 450 circle and 450 traditional J-hooks in each trial. The trials targeted both commercial species and bycatch, particularly elasmobranchs. Initial results indicate little difference in catch rates between the hook types, with 55% of shark bycatch captured on J-hooks. Of the sharks caught, 60% were *Alopias superciliosus*, 30% *Prionace glauca*, and 10% *Isurus oxyrinchus*. The commercial catches were similar for both hook types. Furthermore, four sharks were equipped with satellite telemetry tags to monitor post-release behaviour and survival, providing critical data for species previously under-studied in the Eastern Mediterranean. Preliminary findings highlight a significant interaction with endangered elasmobranchs, underscoring the need for continued trials and increased sample sizes. Future efforts will include tagging an additional three sharks and conducting additional trials with circle hooks to enhance the robustness of our data. This research contributes our understanding of the efficacy of circle hooks in reducing bycatch and mortality among sharks in surface longline fisheries, focusing on an understudied environment and species.

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Preliminary Pathological Findings in Post-Capture Angular Roughshark (*Oxynotus centrina*) in the Mediterranean Sea

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The angular roughshark (*Oxynotus centrina*) is a deep-sea species, considered Critically Endangered in the Mediterranean by the IUCN. Their primary threat is incidental capture in large, offshore bottom trawl fisheries, with high discard mortality. In the Valencian Community, local trawl fisheries report incidental captures to the Fundació Oceanogràfic. Typically, these sharks exhibit buoyancy issues, a face-up posture, reduced movement, and increased respiratory rate upon capture. Eleven angular roughsharks were transported to the Oceanogràfic facilities and placed in isolated tanks with cold seawater (17° C) and darkness, where a multidisciplinary team attempted their rehabilitation. Despite treatment, the sharks continued to display buoyancy issues, abnormal swimming behaviour, and fin necrosis. All captured sharks died within one week of admission, with some requiring euthanasia due to protruding hepatic lobes through distended coelomic pores. Necropsy findings included macroscopic lesions such as dilated coelomic pores, fin necrosis, and coronary vessel distention. Histologically, lesions included vessel distention, interstitial nephritis and branchitis with lamellar fusion. Interestingly, the presence of non-identified globular eosinophilic structures were observed in the spleen, gills, kidneys, Leydig organ, and liver. Electron microscopy identified them as protein accumulations forming globular structures both inside cells and as free structures. These findings highlight the need for further research to understand the pathophysiology of deep-sea sharks affected by by-catch. The animals remained alive for days after capture, with some appearing to improve before eventually dying. Post-capture survival studies should consider that animal death may occur long after release by fishermen.

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Remote monitoring of the bycatch of demersal chondrichthyans using video imagery: a case study from a Portuguese deep-water crustacean trawler

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Effective monitoring and reporting of fisheries are crucial for successful management and are typically done by on-board observers and fishers, respectively. However, this system can produce biased information due to economic and social limitations. Electronic monitoring and reporting systems (EMR) are becoming more prevalent and seen as a solution to combat illegal, unreported, and unregulated fishing. The present study aimed to test the effectiveness of an integrated EMR in identifying demersal and deep-sea sharks, skates and chimaeras (hereafter chondrichthyans) which are bycatch in the Portuguese crustacean bottom trawl fishery. Forty-two hours of footage were thoroughly examined and provided identification of 2182 individuals representing 11 taxa, the majority up to genus level and some, even at species level. Only 0.9% of chondrichthyans could not be identified. Furthermore, the highest bycatch rates of chondrichthyans were from the genus *Etmopterus* and *Galeus*. The technology limitations are discussed and suggestions for improvement are made to enhance future research proposals and improve the system's overall design. However, the successful implementation of the EMR in this study and other case studies worldwide, demonstrates its upscaling potential to the entire Portuguese fleet and contributes significantly to more sustainable fishing practices and better management of marine resources.

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Bycatch of threatened sharks and rays in Amvrakikos Wetlands National Park, Greece

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The paucity of fishery-related data for several regions of the Mediterranean Sea is hampering conservation of elasmobranchs. To effectively improve the conservation status of these species, robust data collection is crucial to understand biodiversity in the different regions and the degree of interactions with human-related activities. The ByElasmoCatch Project is focusing on Amvrakikos Gulf, a shallow and semi-enclosed embayment in northwest Greece. The area is delineated as an Important Shark and Ray Area (ISRA), particularly as an Important Reproductive Area (parturition and nursery) for the Duckbill Eagle Ray, the Spiny Butterfly Ray and the Common Smoothhound. Only small-scale fishing vessels are operating in the gulf, using set-nets and longlines, seasonally targeting *Mustelus mustelus* and Myliobatidae. From 2022, 1149 fishing operations have been monitored through interviews (1081) and onboard surveys (68). A total of 2021 elasmobranchs have been recorded interacting with fishing activities, and biological measures were obtained for 1313 individuals. Among the 10 elasmobranch species present, 2 Critically Endangered (Mediterranean Region assessment) species, *Aetomylaeus bovinus* and *Gymnura altavela*, were commonly caught (23.6 % of recorded elasmobranchs). Within the gulf, 4 main areas have been shown to be bycatch hotspots. Trammel nets targeting cuttlefish and bony fishes have higher bycatch in comparison to the other nets. Future steps include short- and long-term post release mortality studies, habitat use studies, and testing of mitigation measures (e.g., gear modifications), with the ultimate goal of identifying the best management strategy, producing a regional Action Plan and engaging local and national stakeholders for its implementation.

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Elasmobranchs in UK Fisheries Review: Stories from Data

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Accurate fisheries landings and discards data are required to inform sustainable management of elasmobranch populations. Publicly available data for elasmobranch fisheries is often difficult to access and interpret. This project investigated fisheries data reported to UK fishing authorities by UK vessels and foreign vessels landing into UK ports between 2018 and 2022. The purpose of this project is to frame fisheries data in an easy to interpret format. This was achieved by using an interactive mapping platform to aid pattern recognition and assist in discovering trends which can be used to direct conservation action. Analysis on a local, regional, and national scale revealed changes in elasmobranch landings across the UK in terms of species composition, tonnage of landings, and percentage of elasmobranch landings compared to total landings. Total elasmobranch landings in the dataset and landings specifically into the UK have decreased year-on-year between 2019 and 2022. Some ports have consistent landings in terms of weight and composition over the 5-year data series whereas others differ vastly between years. Possible explanations for these changes are explored. This project has developed a framework for the inclusion of subsequent years of data as they become available. Outputs of this review are designed to influence UK domestic conservation policy through targeted engagement with policymakers.

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Trends and explanations in the mislabelling of elasmobranchs in Maltese fisheries

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The removal of elasmobranchs through fishing, both incidental and purposeful, has increased significantly over the last century. This escalation combined with their life history characteristics; long gestation, low fecundity and slow growth rates, infers a high risk of extinction. This fishing pressure is especially high in the Mediterranean, with over half of all shark and ray species in the region categorised vulnerable, endangered or critically endangered by the IUCN Mediterranean Red List. Despite the introduction of several species-specific regulations and protections in an attempt to help conserve species, elasmobranchs are still frequently caught across the region. Evidence of elasmobranch mislabelling in Greek and Italian fisheries hinders the accuracy of catch data and thus the effectiveness of conservation efforts. In this study, we investigate the scale of mislabelling of elasmobranch species occurring at Malta's major wholesale fish market. Here a mislabelled specimen did not possess a label or its species identification by local experts did not match the ID on its label. Approximately 50% of specimens (N=3874) were determined to be mislabelled. Surprisingly, no trend was observed between mislabelling frequency and possible economic incentives, nor were species at greater risk of extinction more likely to be mislabelled. This study demonstrates that despite regulations such as the European Union's Common Fisheries Policy, the mislabelling of fishery landings and the sale of threatened species occurs frequently across the Mediterranean and highlights the need to implement more effective measures to ensure the accurate labelling of elasmobranch species in fish markets.

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Angling for Sustainability-Tracking Sharks and Rays within the English Channel

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Sharks, skates, and rays are one of the most valued species for recreational charter boats operating on the South coast of England. They are data-limited, have complex life histories and rely on specific sites for reproduction, which can make them vulnerable to overfishing. The Angling for Sustainability FISP project is a unique collaboration between recreational charter boats, scientists, government advisors and fisheries managers to use acoustic telemetry and local ecological knowledge to inform evidence-based fisheries management.

The University of Plymouth has an extensive acoustic telemetry network of receivers, with >300 receivers located across the English Channel. Collaborating with recreational anglers, 174 Elasmobranchs have been tagged with acoustic transmitter tags including Starry smooth-hound (*Mustelus asterias*), Tope (*Galeorhinus galeus*), Thornback ray (*Raja clavata*), Undulate ray (*Raja undulata*) and Lesser spotted catshark (*Scyliorhinus canicula*). These species have been tagged across various key sites chosen in collaboration with the recreational charter fishers.

To date 55 individuals have been detected within the receiver network and 2 Tope tagged in August 2023 had a period of absence over the winter but then returned in May/June 2024. Thornback rays however have been detected sporadically since they were tagged with one individual travelling 173km in less than a year. Future receiver downloads are planned for Autumn 2024 which will provide more in-depth data. Network analysis will map temporal and spatial trends and connectivity of essential fish habitat. The data will be used to inform future management of these species through local management and regional Fisheries Management Plans.

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Saving the Guilty!! Are the sharks really the villains of this story?

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Elasmobranchs, a diverse group of cartilaginous fishes that includes sharks and rays, have many populations considered threatened species, facing significant threats worldwide due to habitat destruction and overfishing, often as bycatch. Frequently, this accidental capture occurs when sharks attack the target species being hauled to the surface by fishers. This situation has been observed in the Marine Reserve of La Graciosa, north of Lanzarote (Canary Islands) in the Central East Atlantic. Fishers have reported a significant decrease in their catches of target species such as sparids (Red porgy (*Pagrus pagrus*) and *Dentex* spp.), European hake (*Merluccius merluccius*), groupers (*Epinephelus marginatus*), and amberjacks (*Seriola* spp.) due to this negative interaction with sharks over the past few years. Through diligent work involving surveys with fishers, active onboard monitoring of fishing vessel activity, and assessments of climate and catch time series, it appears that the problem may not be the sharks, but rather the impact generated by the fishers themselves. Climatic conditions between 2014 and 2017 favored a high recruitment or spatial concentration of the target species, resulting in greater abundance and/or accessibility to fishing, leading to abnormally high catches for fishers between 2018 and 2021. Likely due to the return of previous climatic conditions, poor fishery management, and overfishing, catches decreased abruptly from 2021 onward. This has resulted in the current situation with much lower catches than before, leading to the ease of blaming the first suspect—in this case, the sharks.

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Session 3: Flat sharks

Citizen Science in Action: 10 Years of Angel Shark Sightings Map

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A decade ago, the Angel Shark Project launched the Angel Shark Sighting Map (ASSM) in the Canary Islands. The sighting map is now managed by the Angel Shark Conservation Network and covers all 24 angel shark species across a broader geographical area. In the Canary Islands, the ASSM is supported by over 140 diving centers, clubs, and water users, who have contributed extensive citizen science data since 2014. This includes more than 3,500 sightings and 5,500 individual angel sharks recorded. This data has provided valuable insights into the seasonal distribution, ecology, movement patterns, and site fidelity of angelsharks (*Squatina squatina*). These insights have been essential for identifying key habitats and defining Relevant Areas for the Conservation of Angelsharks (ARCAs). Notable examples include nursery areas such as Las Teresitas in Tenerife, aggregation sites like Charco del Palo in Lanzarote, and high-density mating zones like Playa Chica in Lanzarote. Citizen science data has been a fundamental pillar in shaping the proposed ARCAs and management measures included in the official draft of the Recovery Plan for Angelsharks in the Canary Islands. The continuous monitoring by the ASSM supports adaptive management, allowing conservation strategies to be updated based on new data. Engaging local stakeholders, such as diving centers and fishers, has further fostered collaboration and support for conservation efforts. This evidence-based approach ensures the implementation of effective measures to protect angel sharks and their habitats in this crucial region.

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The relaunch of the Angel Shark Conservation Network (ASCN)

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The Angel Shark Conservation Network (ASCN) has been working together to protect angel sharks since 2016. The ASCN, along with collaborators, have focused on the development of strategic conservation plans for three species in the NE Atlantic and Mediterranean Sea – Angelshark (*Squatina squatina*), Smoothback Angelshark (*S. oculata*), and Sawback Angelshark (*S. aculeata*). Nine Action Plans have been developed at different geographical scales via multidisciplinary workshops, all of which sit underneath the Eastern Atlantic and Mediterranean Angel Shark Conservation Strategy. The overarching vision is to “aim to identify the key actions needed to overcome major threats to angel sharks in each region.” To deliver these actions, the ASCN facilitates knowledge transfer between projects and relevant partners, bridging the gap between the science and policy interface, as well as enabling the sharing of consistent and clear messaging on angel shark conservation. The ASCN hosts, manages and maintains the Angel Sharks Sightings Map (ASSM) which allows members of the public and scientists to report angel shark sightings. Building on what has been achieved so far, as part of the relaunch of the ASCN, the species focus will expand to cover the 24 angel shark species described to date, the range of the network expanding to reflect this. The ASCN is seeking new members working on any angel shark species.

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Collaboration with artisanal fishers to improve shark and ray knowledge in the Mediterranean Sea

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Sharks and rays are vulnerable species and have been over exploited for many decades, including in the Mediterranean Sea. A lack of knowledge still exists on their distribution and exploitation by industrial and artisanal fisheries, mostly because they are often mislabeled when landed or not reported at all when discarded at sea. To address this gap, local stakeholders have joined efforts to monitor small-scale-fisheries for the past 15 years in Corsica by boarding with fishers, recently joining the European Data Collection Framework. To address the gap of knowledge, we compiled 13 years of small-scale fisheries monitoring data in Corsica (2009 to 2021) and identified species diversity, catch trends and distributions around the island. Data reveal that over the 33 identified species of sharks and rays are caught essentially as bycatch, 8 are classified as Critically endangered (CR), 2 as Endangered (EN) and 4 as Vulnerable (VU) on the IUCN Red List. Among the most frequently caught species, *Scyliorhinus canicula*, *Dasyatis pastinaca* and *Raja clavata* are the three most commonly encountered. Data on the different species are categorized by discards type, spatialized and temporal trends are also analysed. Overall, results indicate that about 98% of caught individuals are found in bottom-set nets, which is the most practiced métier in Corsica, and 2% are found in longlines. The continuous partnership effort between researchers, management stakeholders and fishers over a long term monitoring program allowed the identification of a unique hot spot for sharks and rays in the Mediterranean Sea.

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Angels of Angola: Smoothback Angelshark (*S. oculata*) reemergence

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Smoothback Angelsharks (*Squatina oculata*) of the family Squatinidae are critically endangered globally, facing severe declines in population due to intense fishing pressure, leading to range reductions. Previously considered possibly extinct in Angola since 1964, our study aims to update records of *S. oculata* in the southern fishing zone of Angola, confirming its persistence. We conducted surveys of elasmobranch small-scale fisheries landings in Namibe Province from 2021 to 2023, documenting 1304 specimens of *S. oculata*. Biological data, including total length, sex, and maturity (for males), were collected from 300 individuals. The majority were subadults (42.7%), followed by juveniles (38.7%) and adults (18.7%). This study underscores the paucity of current data on *S. oculata* in the region and highlights the urgent need for species-specific research to enhance understanding of this potentially significant population in southern Angola's waters.

Given the scale of these fisheries, we advocate for the implementation of targeted fisheries management and conservation measures. Immediate action is essential to ensure the sustainability of elasmobranch fisheries while balancing the socioeconomic needs of coastal communities.

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Identifying Potential Critical Angel Shark Areas in Türkiye, Eastern Mediterranean Based on New Records of *Squatina* spp. Identified through Fisher Engagement

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This study presents new records of three Critically Endangered angel shark species (Family: *Squatinidae*) occurring in the Eastern Mediterranean—Smoothback Angelshark *S. oculata* Bonaye, 1840, Sawback Angelshark *S. aculeata* Cuvier, 1829, and Angelshark *S. squatina* (Linnaeus, 1758). The supporting data highlights three potential Critical Angel Shark Areas (CASAs) in Türkiye: Fethiye Bay, Çanakkale Strait (i.e., Dardanelles), and Antalya Bay. This new dataset provides details of 23 *S. squatina* specimens, 52 *S. oculata* specimens, and 5 *S. aculeata* specimens, totalling 80 recent angel shark specimens found in Turkish waters mostly sent to us from small-scale fishers who had incidentally caught angel sharks. Also presented are four capture-induced parturition events in Turkish waters onboard fishing vessels, thus providing details on internal yolk sacs, reproductive habitats, and indications of spawning season. Our dataset presented here spans from 2018 to 2023 and suggests that mature adults of *S. squatina* and *S. oculata* still occur in Turkish waters, in Fethiye Bay and Çanakkale, respectively. Due to elevated chances of fishers encountering Critically Endangered angel sharks in Türkiye, we suggest that fishers are trained in handling and safe-release methods, to ensure reduced incidents of capture-induced parturition, and improved post-release survival. This study demonstrates that bottom set nets set by small-scale fishers pose less risk to mortality for angel sharks as they are almost always encountered alive after a usual 12 h soak time, suggesting that bottom trawling in critical habitats should be better regulated (or phased out) to help improve national angel shark conservation initiatives.

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Utilizing human-wildlife Interaction data: A game-changer for guitarfish conservation

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Human-wildlife interactions are crucial in shaping our understanding of nature and can significantly impact efforts to conserve endangered species and their habitats. As human activities continue to expand in the marine environment, encounters between humans and marine wildlife are expected to rise. Addressing and incorporating these interactions into conservation plans can provide valuable insights and bolster conservation efforts. In this study, we utilized the Marxan software to analyze data from the MECO citizen science project, focusing on two guitarfish species, the blackchin guitarfish (*Glaucostegus cemiculus*) and the common guitarfish (*Rhinobatos rhinobatos*), along the Mediterranean coast of Israel. Our objective was to identify areas of high probability for human encounters with guitarfish species while considering the specific activities conducted during these interactions. Our findings revealed that human activities varied across different areas during guitarfish encounters. By incorporating human activities as conservation targets in the Marxan analysis, in addition to guitarfish distribution data, we observed no significant shifts in the location of areas marked for conservation. However, the total area of these conservation zones increased significantly. This approach demonstrates how incorporating data on human-wildlife interactions can enhance conservation modeling efforts. Moreover, our study highlights the significance of including a social dimension in conservation planning, offering a fresh perspective on the process. By integrating human-wildlife interaction data, conservation strategies can be better tailored to specific locations and activities, facilitating more effective protection for guitarfish species and their habitats.

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Integrating fishers' knowledge and scientific research for guitarfish conservation in Cyprus

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The Critically Endangered guitarfish have faced decades of exploitation, resulting in significant population declines and localized extinctions across their range. In Cyprus, two species are currently found: the common guitarfish (*Rhinobatos rhinobatos*) and the blackchin guitarfish (*Glaucostegus cemiculus*). The latter has experienced an alarming population decline of over 80% in the past 50 years and is now nearly absent from the northern Mediterranean, with only small numbers remaining in the south. Historical fishing pressure, driven by demand for their meat and fins, along with coastal development and tourism, exacerbates the challenges faced by this species, which already has low population numbers. Although guitarfish aggregations have been observed in a few Mediterranean locations, including Cyprus, the overlap between reproductive and nursery grounds and active fishing areas highlights the need for comprehensive data to inform effective management strategies. Addressing these concerns, citizen science initiatives have become invaluable for bridging knowledge gaps and promoting conservation efforts. By engaging local communities, fishers, and sea users in data collection and monitoring, these initiatives are crucial for both protecting guitarfish and advancing our scientific understanding of their populations, movements, and behaviors. Preliminary scientific surveys, including tagging campaigns in collaboration with recreational fishers and the use of Local Ecological Knowledge (LEK), have revealed important aggregation sites and distribution patterns. Together, these efforts have identified Cyprus as a critical hotspot for guitarfish, hosting some of the few remaining nursery grounds of the species in the Mediterranean Sea.

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Characterising a potential nearshore nursery ground for the blackchin guitarfish (*Glaucostegus cemiculus*) in Ma'agan Michael, Israel

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Along a particular eastern Mediterranean coast in Israel, Ma'agan Michael, fishermen have reported annual observations of juvenile guitarfish between June to November for the last forty years. Based on these citizen-based observations the main research objective is to establish whether Ma'agan Michael fulfils all three criteria from the literature by Dr Michelle Heupel, allowing it to be acknowledged as a nursery ground for *G. cemiculus*. The methodology built for this objective integrates biological characteristics data with the identification of a recurrent seasonal distribution. Visual surveys exhibited a significantly higher abundance in Ma'agan Michael when compared to an adjacent area (Caesarea), with 2,096 recorded observations overall. Additionally, using a species-specific modified Catch and Release protocol, a total of 492 juveniles were captured with a beach seine net. During these capturing events, individuals were morphometrically measured and sampled for future genetic analyses. Out of these, 327 specimens were also fitted for PIT tags to track recaptures in subsequent captures. The highest abundance of neonates was caught from August to September each year (2017–2019), and all individuals captured during this study were identified in the field as *G. cemiculus*, ranging from 20–35 cm in length (85% of captures). Many specimens had an umbilical cord scar (n = 88), with a large percentage possessing visual remains of the yolk sac. For the first time, this study provides an inter-year description of the species *G. cemiculus* present along the Israeli shoreline.

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First tagging campaign for the study of the blackchin guitarfish (*Glaucostegus cemiculus*) in the gulf of Cadiz (south Spain, North East Atlantic)

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The populations of blackchin guitarfish (*Glaucostegus cemiculus*) in Western Europe have suffered a decline and many local extinctions in the past four decades. In June 2022 a team of researchers confirmed the presence of the species in the National Park of Doñana (Cadiz region, south Spain), suggesting the existence of a remaining population in western Europe. Through local ecological knowledge surveys and citizen science collaboration we determined the possible areas of distribution and daily movement patterns to design the first tagging campaign to study this population. In July 2024, working in the gulf of Cadiz (Valdelagrana beach, Natural Park Los Toruños) with the help of local recreational anglers trained for this campaign, we were able to capture 18 individuals in 3 days. Circular hooks without barb were used to reduce the harm during the catching event. The sample included 12 males (mean TL 126,9cm [106-149]) and 6 females (mean TL 115,2cm [106-128]). All individuals were sexed, measured and weighted, tagged with a visual *spaguetti* tag and a DNA sample was taken before release. Handling mean time was 5 minutes. The angling was conducted during the rising tide and with winds that increased the turbidity of the waters, conditions that we suspected favour the species closeness to shore for feeding on invertebrates. Long-term studies in the area are needed to further discuss the species' behaviour and distribution in its different stages. The tagging campaign will continue during October 2024 and in the following years.

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Session 4: New technologies

Quantifying Shark Behavior using Drones and a Modified Application of a Deep Learning Framework (SLEAP)

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Understanding the behavioral ecology of marine species is crucial for conservation and management, but has lagged in the study of elasmobranchs, and particularly sharks, due to their elusive nature. As many shark populations continue to decline, it is essential to enhance our understanding of how sharks interact with each other and their environment. Using Unoccupied Aerial Systems (UAS, or drones) to observe sharks improves detection, minimizes disturbance, reduces costs, and increases efficiency. This study examines the efficacy of fine-scale tracking, quantification, and analysis of near-shore shark behaviors through aerial drone observations. Surveys were conducted in portions of the Rachel Carson Reserve in North Carolina, a coastal estuarine habitat with a multi-species assemblage of juvenile and adult sharks. The DJI Mavic 3 Classic, equipped with a 20-megapixel camera, was used to capture videos at altitudes of 15, 20, 25 and 30 meters in July, August, and September, based on optimal shark and weather conditions. The surveys produced nadir aerial videos that were divided into shorter (10-15 seconds) segments of 1-4 sharks at a time. Behavioral assessments of in-video shark activity were processed with Social LEAP Estimates Animal Poses (SLEAP), a deep-learning based framework for multi-animal pose estimation. SLEAP outputs allowed for calculating velocities and vectors to quantify synchronicity and velocity covariance, where data-driven ethograms of shark movements can be parsed out using k-means clustering. These analyses provide a new standardized approach for characterizing and quantifying the behavior of nearshore sharks in isolation and aggregation using drones and video-based behavioral analysis.

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Tagging Spiny butterfly rays in the Canary Islands: a novel methodology to evaluate endangered species

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The decline in elasmobranch populations and the challenges in accessing these species have posed significant obstacles for researchers. Consequently, innovative techniques have been developed to enhance our understanding of sharks and rays in their marine habitats.

Our focus is on the Spiny Butterfly Ray, a species that displays benthic behavior and spends part of its life cycle near coastal shore areas. Utilizing this behavior, we have internally tagged 133 Spiny Butterfly Rays between 2020 and 2024 in Gran Canaria and Tenerife. This tagging process employed a dual methodology: acoustic tagging with VEMCO V16 tags and visual tagging with T-bar tags. Additionally, skin, gill, and anal swabs were collected to study the rays' microbiota, and blood samples were taken to analyze stress levels and hormones. Female rays underwent in-situ ultrasounds to check for pregnancy, and various morphometric measurements were recorded for future growth and age studies.

All these procedures were executed simultaneously by sub-teams, ensuring the complete methodology was accomplished in under 8 minutes per individual.

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Development and implementation of drone based multi-sensor data fusion methods for the tracking and characterization of white sharks off the coast of Cape Cod

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Over the last several decades Cape Cod, MA has seen a drastic increase in the local seal population which has in turn led to a significant presence of white sharks. The unique geography of the Cape results in white sharks swimming and hunting in the same areas that have been home to recreational water users for generations. An understanding of nearshore behavior is essential to both risk mitigation and conservation efforts. The large white shark population and relatively shallow waters make Cape Cod an unparalleled location for the study of these animals using drones. Drones were used to track white sharks over the course of four summers from 2019 through 2022. Software was developed to enable conversion of any position on the image sensor to a position in the global coordinate system irrespective of aircraft parameters. Novel correction methods were developed to improve measurement accuracy and extensive tests were conducted to both validate software and understand measurement limitations. This work has yielded quantitative metrics related to nearshore behavior, drone measurement accuracy and drone efficacy in shark detection. These metrics provide novel insights into habitat use that are of interest to both conservationists and those concerned with beach safety. Additionally, the methodologies outlined here have the potential to allow other researchers to optimize drone based studies.

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Metaprobes associated with demersal longline surveys allow monitoring of deep sea fish communities

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Monitoring the status of marine resources is a key activity in biodiversity conservation and fisheries science. However, scientific surveys still largely rely on costly and time-consuming traditional visual and capture-based methods. Recent advances in DNA sequencing allow species identification from trace DNA in the environment - environmental DNA (eDNA), which is becoming a primary source of biodiversity information in various environments. Here we collected samples through a low-cost and low-effort eDNA passive sampler - a hollow perforated spherical probe (the 'metaprobe') filled with gauze rolls - during a deep sea demersal longline survey in the southern Adriatic Sea (depth 900-1147 m). Samples were metabarcoded using an elasmobranch-specific marker (elas02-12S) and data analysis was performed through the OBITools metabarcoding pipeline, assigning taxonomy against a custom-made 12S vertebrate reference database. We were able to molecularly identify 6 elasmobranchs (*Galeus melastomus*, *Mustelus mustelus*, *Etmopterus sp.*, *Raja sp.*, *Dipturus oxyrinchus*, and *Centrophorus cf uyato*) and 20 bony fish taxa at genus/species level. Comparisons with catch data revealed that eDNA metabarcoding correctly reported all the species captured in each of the six hauls and provided an additional biodiversity 'bonus' of species not otherwise catchable, allowing for an overall better qualitative estimation of fish species composition of the deep pelagic environment (e.g., passing swordfish, the layer of myctophids). Further investigation is needed to overcome challenges inherent to the eDNA passive samplers' interaction with longline fishing gears, with the aim of expanding the range of fishing operations that can contribute to next-generation marine ecosystem monitoring.

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Non-invasive methods characterise the world's largest tiger shark aggregation in Fuvahmulah, Maldives

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Tiger sharks are apex predators with a circumglobal tropical and warm-temperate distribution, with a general lack of population data for the central Indian Ocean. In Fuvahmulah, Maldives, tiger sharks display frequent use of the harbour area, attracted by discarded fish waste. We document the population structure, residency, and reproductive characteristics of the world's largest known tiger shark aggregation in a geographically-restricted area. Using non-invasive methods, photo identification and laser photogrammetry, we identified 239 individual tiger sharks over a 7-year study period. The aggregation is female-dominated (84.5%), with both large juveniles and adults present. Adult females were resighted over the entire study period displaying strong inter- and intra-annual site fidelity. Modelled residency using maximum likelihood methods suggests they spent $60.7 \pm \text{S.E. } 7.5$ days in Fuvahmulah, with a larger aggregation size, shorter residence periods and longer absence periods compared to juvenile females. Prolonged abdominal distensions of adult females indicate they likely stay near Fuvahmulah during gestation and reproduce biennially. Fuvahmulah seems to provide suitable conditions for gestation given the year-round provision of food and warm waters, exhibited by strong site fidelity and temporal residency. Our results show indications of a thriving population within the confines of protected waters.

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Genetic Identification of three CITES-listed sharks using a paper-based Lab-on-a-Chip (LOC)

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Threatened shark species are caught in large numbers by artisanal and commercial fisheries and traded globally. Monitoring both which shark species are caught and sold in fisheries, and the export of CITES-restricted products, are essential in reducing illegal fishing. Current methods for species identification rely on visual examination by experts or DNA barcoding techniques requiring specialist laboratory facilities and trained personnel. The need for specialist equipment and/or input from experts means many markets are currently not monitored. We have developed a paper-based Lab-on-a-Chip (LOC) to facilitate identification of three threatened and CITES-listed sharks, bigeye thresher (*Alopias superciliosus*), pelagic thresher (*A. pelagicus*) and shortfin mako shark (*Isurus oxyrinchus*) at market source. DNA was successfully extracted from shark meat and fin samples and combined with DNA amplification and visualisation using Loop Mediated Isothermal Amplification (LAMP) on the LOC. This resulted in the successful identification of the target species of sharks in under an hour, with a working positive and negative control. The LOC provided a simple “yes” or “no” result via a colour change from pink to yellow when one of the target species was present. The LOC serves as proof-of-concept (PoC) for field-based species identification as it does not require specialist facilities. It can be used by non-scientifically trained personnel, especially in areas where there are suspected high frequencies of mislabelling or for the identification of dried shark fins in seizures.

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Project GuitarProtect: A new acoustic telemetry and community science network for the last guitarfishes of the western Mediterranean and other elasmobranchs of southeast Spain

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After being considered extinct in the waters of Spain, France and Italy for over three decades, a remnant reproductive population of Common Guitarfish (*Rhinobatos rhinobatos*) has been detected in the water of Murcia, southeast Spain. Early evidence collected through community science last year led to the declaration of the Murcia Eastern Coast as an Important Shark and Ray Area (ISRA) for this and four other batoid species. This project aims to further investigate the distribution and seasonality of elasmobranch species by incorporating acoustic telemetry and expanding its community science network throughout Murcia (southern coast). Prioritizing conservation efforts for the Common Guitarfish, a network of 20 VR2W (three OP-enabled) was deployed, and V9-2x tags were internally fitted, following the refinement of a protocol for capturing benthic elasmobranchs underwater using SCUBA equipment. Over the next 1.5 years, the collected data will be crucial for establishing their year-round presence and confirming habitat use in known hotspots, thus informing spatial planning and fishing practices. Additionally, each animal was visually tagged and tissue and blood samples were collected for genetic and toxicological analyses. As of this abstract submission, community science sightings have not confirmed guitarfish outside the ISRA, indicating a potentially more concerning situation for this species. However, these efforts have recorded the presence of eight additional elasmobranch species in the area, including three candidates for future ISRA evaluations. These insights are crucial for understanding the role of Marine Protected Areas in the survival of the Common Guitarfish and other species in the area.

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The SCUBA project: A MULTIDISCIPLINARY APPROACH TO STUDY SWIMMING BEHAVIOUR IN THE SCALLOPED HAMMERHEAD SHARK

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Biological rhythms encompass the regular recurrence of physiological, behavioural, and molecular events. Among these, the circadian rhythm evolved in response to the Earth's 24-hour rotational cycle and is governed by a Clock, a molecular and neuronal "timekeeping" mechanism. This clock allows organisms to synchronize with external conditions, following the principle of "doing the right thing at the right time."

However, strict temporal regulation might be detrimental for animals in static environments or those constantly moving, raising the question of whether a circadian clock is advantageous in such cases. Hammerhead sharks (*HH*, *Sphyrnidae*) are pelagic, obligate ram ventilators, and exhibit around-the-clock activity. This perpetual motion demands significant energy. Recent studies have shown that by swimming on their sides, both *Sphyrna mokarran* and *S. lewini* can reduce energy costs by using their dorsal fins as lift-generating surfaces. Both species exhibit consistent rolling swimming behaviour (RSB) and marked diel changes, suggesting an ultradian rhythm.

Analysis of biologging data from wild-caught *S. lewini*, using chronobiological tools, shows that *HH* display circadian behaviour aligned with the 24-hour cycle. The peak of activity (acrophase) occurs at night, with significant anticipation of the photoperiod, indicating an endogenous mechanism. Additionally, sustained rolling rhythmic behaviour occurs primarily during the scotophase, possibly under circadian control, with different rolling behaviour during the day.

These findings suggest the presence of a clock in *HH*. However, questions remain about its regulation, environmental cues for entrainment, and the true function of rolling behaviours. Addressing these will be the focus of the SCUBA project.

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Session 5: Policy and conservation

This research is important for the conservation and management of sharks: A framework for making that actually true

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Many chondrichthyan scientists report that they want to perform conservation-relevant work, but that they do not know how to effectively do this. Here we present advice in the form of survey responses from natural resources managers, environmental advocates, and scientists with experience performing policy-relevant work. We also present a novel, simple checklist for determining if a given research project is indeed relevant to the conservation and management of sharks, and apply that checklist to a corpus of over 200 published papers about threatened species of sharks in United States waters.

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Tracking progress in shark governance in the Mediterranean Sea

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We present national implementation progress on international and regional legal obligations up to 2020 and discuss developments in shark conservation management in the region. This study provides insights into the complexity of implemented measures and actions related to shark conservation and fisheries management, governed by various legal instruments. A total of 208 measures were identified through the review of national reports under relevant legal instruments, and responses to survey questionnaires. The most common types of measures focused on monitoring, the regulation of human activities, and assessments of impacts on sharks. EU countries generally implemented more measures compared to non-EU countries, even after accounting for NGO contribution. Spain was leading in terms of number of actions related to shark governance. However, when considering standardization based on Gross Domestic Product (GDP), Egypt, Morocco, and Algeria had the highest values, putting results into perspective, as countries widely share legal commitments, but do not have the same development status, capacities, and resources. Higher absolute implementation efforts were associated with higher Human Development Index and higher government indicators. Governments were found to lead 63% of measures, particularly related to legal obligations, while NGOs and researchers also made significant contributions, especially in relation to research and conservation measures. The contribution to research on sharks in the region was also not equal and provides further insights into national differences and progress in knowledge on these species across the region.

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Conservation science and policy progress for angel sharks

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Three species of angel shark (*Squatina aculeata*, *Squatina oculata* and *Squatina squatina*) were once more widespread in the Northeast-east Atlantic and Mediterranean Sea, and mostly due to overfishing are now extirpated from half of their range. Coordinated conservation efforts have put a spotlight on these sharks, and multiple conservation plans have been developed to protect and restore their populations. In 2017, the Angel Shark Conservation Network (ASCN) and IUCN SSC Shark Specialist Group, along with a large partnership have published the Eastern Atlantic and Mediterranean Angel Shark Conservation Strategy. This identifies priority threats and geographic regions and includes the development of regional and local action plans. To promote transboundary protection, *Squatina squatina* was listed on Appendices I and II of the Convention of Migratory Species (CMS) in 2017, closely followed in 2018 by Signatories to the CMS Memorandum of Understanding on the Conservation of Migratory Sharks listing it in Annex 1. In 2019, the ASCN developed the Mediterranean Angel Sharks Regional Action Plan (MedRAP) for all three species; then a Single Species Action Plan for the Angelshark (*S. squatina*) in the Mediterranean Sea (SSAP Angelshark Med) was developed and adopted in 2024 by CMS Parties. This case study demonstrates that CMS, a binding policy framework, provides an opportunity to ensure alignment of conservation action at an international level with an opportunity to use a participatory approach, and may thus help bridge the gaps that can exist between science and policy, as well as between fisheries management and nature conservation.

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Bridging Gaps that Hinder Shark Conservation: Acting on the findings of an Atlantic policy analysis

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Elasmobranchs are threatened mainly by overfishing, with international trade as a key driver. Over the last few decades, significant strides toward shark and ray conservation have been made through the Convention on International Trade in Endangered Species (CITES) and the International Commission for Conservation of Atlantic Tunas (ICCAT). The success of international conservation measures relies on proper domestic implementation but – because sharks and rays are considered both commodities and wildlife – governments' approaches toward elasmobranch obligations under fisheries and environment agreements are often misaligned. A 2023 Shark League report documents the performance of ICCAT's 52 Parties and 5 Cooperators (CPCs) with respect to conservation obligations for Atlantic elasmobranch species listed under CITES between 2002 and 2020 and explores problematic gaps between commitments and compliance.

This presentation will focus on progress and plans for delivering on the report's recommendations as the Shark League moves beyond identifying gaps to actively working to bridge them.

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Management strategies for demersal elasmobranchs in the Adriatic Sea: challenges and opportunities

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Developing management strategies for elasmobranchs in the Mediterranean Sea is an urgent but not easy task. Effective management strategies may integrate different approaches, from the release of vulnerable stages to the avoidance of fishing in sensitive areas.

Within the Italian monitoring programs of the Marine Strategy Framework Directive, we investigated the potential of the release of juveniles of commercial species (minimum conservation reference size, MCRS) as management strategy. Through 134 fishing trips using different fishing gears in three areas (northern Adriatic Sea, Ligurian Sea, Strait of Sicily) we evaluated the At-Vessel Mortality (AVM; 4,940 individuals, 22 species) and Short-term post-release mortality (St-PRM; two hours after capture, on board, 1,099 individuals, 17 species). AVM was on average 21.3%, while St-PRM was on average 8%. Individual based population dynamics models were constructed for the most common species to assess the expected recovery of populations according to different MCRS and survival rates.

By combining conventional tagging and acoustic telemetry, in the framework of the MedBycatch project, we are investigating Long-term Post-Release Mortality (Lt-PRM) in the field and the use of space in the northern Adriatic Sea. We tagged 1,972 individuals of 16 species with spaghetti tags, 85 individuals of three species with acoustic tags. The preliminary results for the three most common species, *Mustelus mustelus*, *M. punctulatus* and *Squalus acanthias*, highlighted a seasonal use of space, site fidelity and residency in the high fishing effort area.

These results demonstrate the need of integrating different study approaches to explore feasible management measures.

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Conservation successes and challenges for wide-ranging sharks and rays

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Overfishing is the most significant threat facing sharks and rays. Given the growth in consumption of seafood, combined with the compounding effects of habitat loss, climate change, and pollution, there is a need to identify recovery paths, particularly in poorly managed and poorly monitored fisheries. Here, we document conservation through fisheries management success for 11 coastal sharks in US waters by comparing population trends through a Bayesian state-space model before and after the implementation of the 1993 Fisheries Management Plan for Sharks. We took advantage of the spatial and temporal gradients in fishing exposure and fisheries management in the Western Atlantic to analyze the effect on the Red List status of all 26 wide-ranging coastal sharks and rays. We show that extinction risk was greater where fishing pressure was higher, but this was offset by the strength of management engagement (indicated by strength of National and Regional Plan of Action for sharks and rays). The regional Red List Index (which tracks changes in extinction risk through time) declined in all regions until the 1980s but then improved in the North and Central Atlantic such that the average extinction risk is currently half that in the Southwest. Many sharks and rays are wide ranging, and successful fisheries management in one country can be undone by poorly regulated or unregulated fishing elsewhere. Our study underscores that well-enforced, science-based management of carefully monitored fisheries can achieve conservation success, even for slow-growing species.

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Monitoring Plan for Angelshark Conservation in the Canary Islands: Strategies and Implementation

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The Monitoring Plan (MP) for Angelsharks in the Canary Islands outlines the methods and framework for assessing the implementation of the Recovery Plan (RP) for the Critically Endangered Angelshark (*Squatina squatina*). Developed by the Angel Shark Project: Canary Islands (ASP:CI), the MP specifies direct monitoring actions for 22 Critical Areas across four islands. It presents refined procedures for effective local-scale implementation and provides valuable insights into the population's status.

The MP was developed following a pilot phase conducted over a period of 2 years, during which pilot tests were carried out in six of the Critical Areas to assess sampling methodologies, execution times, required resources, and data collection protocols. This pilot phase allowed for the refinement of the MP, establishing a system for monitoring and evaluating the angelshark population, habitat, and threats. This document serves as a management tool for continuous oversight and preventive control to safeguard population integrity and conservation.

Key elements of the MP, developed following the pilot phase, include detailed sampling methodologies, identification of success indicators, threat analysis, and an outline of the timeline, budget, required resources, and reporting protocols. Emphasis was placed on the systematisation and analysis of data during the pilot phase to support long-term conservation efforts.

Operating within the broader RP for Angelsharks in the Canary Islands, the MP provides guidelines for monitoring the Critical Areas. This vital document lays the foundation for a robust monitoring programme aimed at ensuring the survival and recovery of this endangered species in the Canary Islands.

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Stories from the Mediterranean and beyond: boosting conservation potential by increasing access to knowledge

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The inaccessibility of knowledge can be one of the fundamental barriers to conservation action. Effective resource development has the potential to advance knowledge, awareness and action, by increasing accessibility to and interpretability of, species information, best handling practices, and reporting systems. Local case studies from angel shark conservation work in Cyprus, Türkiye and Tunisia are explored, with a focus on multilingual species ID guides, the use of QR codes for simplified reporting processes, and educational animations promoting safe handling practices. Within wider communities, availability of multilingual open access information can increase engagement in shark conservation and awareness. In July 2024, the first elasmobranch-focused Wikimarathon event was hosted as part of the wider project *Tiburones y Rayas*, to improve Wikipedia's content on these species in Spanish language. This initiative not only fostered local and international involvement, but also promoted the development of multilingual resources, ensuring that conservation knowledge transcends language barriers. Finally, the presentation touches on the 'Flat Shark Showcase', exhibited at Fish Forum in 2023, which was used as a platform to engage and inform policymakers, improving the accessibility of shark conservation efforts.

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Changing tides: wins, losses, and emerging challenges for shark and ray conservation in Asia

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Asian cultural practices, such as demand for shark fins and gill-rakers, are often the focus of narratives explaining global shark and ray declines. However, shark conservation in Asia is extremely complex and extends beyond shark fin. We provide an overview of shark and ray conservation in Asia highlighting the diversity of species, fisheries and markets involved, and challenges and opportunities for conservation. The shark fin trade has placed extreme pressure on taxa with high-value fins, however, high incidental catch and demand for shark and ray meat are also significant drivers. Globalisation is also facilitating fishery expansion, leading to increased incidental catch including in fisheries supplying luxury products such as fish maw (swim bladders). There are also diverse socio-cultural values that affect use and interactions. Meanwhile, research continues to uncover conservation opportunities such as identifying freshwater elasmobranch strongholds, rediscovering species once considered extinct, and changing public attitudes towards consuming or catching sharks. Locally driven conservation efforts are also widespread including integrated fisheries research and bycatch monitoring programs; impact media campaigns and education initiatives; eco-tourism programs; incentive programs for conservation behaviours; and conservation games. These initiatives are further enhanced by new knowledge-sharing and collaboration across the region. Importantly, many conservation programs are grounded in a thorough understanding of local contexts, and carefully consider the social, economic, and cultural factors influencing conservation-relevant behaviours. However, there remains an urgent need to increase action-focused and culturally aware social science capacity in Asia, and to prepare for continuous adaptation to rapidly changing social-cultural contexts.

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Session 6: Threatened species

A case study of the Sandbar shark, *Carcharhinus plumbeus* (Nardo, 1827), in Turkiye: Inefficient and futile conservation efforts

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In accordance with national and/or international legislation, Turkiye currently provides adequate protection for the sandbar shark, *Carcharhinus plumbeus* (Nardo, 1827). This is the case, at least legally and on paper. By 2024, a single training project was initiated to boost local awareness about the introduction and conservation of the sandbar shark. Despite conducting 13 studies in the region since 2006, we still lack a definitive process for creating a dedicated management plan for the preservation of this species and its habitat. All strategies for protecting both the species and its habitat currently rely solely on prohibition, with no input from local people due to the absence of a management plan. Furthermore, the lack of such a plan hampers efforts and incentives to gather scientific data on the species. The necessary steps to protect the sandbar shark more effectively include: (i) detailed mapping of critical habitats, (ii) estimating population size with appropriate scientific methods, (iii) accurate understanding of the species' biological characteristics and demands for survival, (iv) developing a comprehensive archive and dataset, (v) establishing strong connections among stakeholders, and (vi) increasing local awareness. We believe that solely relying on prohibition to protect species is not effective. Instead, we need to develop methods that take into account the expectations, stories, and culture of the local people, and contribute to their economy. It's important to remember that we can't protect *C. plumbeus* with the same ineffective protection efforts that have been tried and failed in the past.

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Mediterranean White Shark – For how long?

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It is important to point out that the Mediterranean white shark (*Carcharodon carcharias*) hotspot presents substantial differences from other global hotspots, which are generally linked to important aggregation areas near islands frequented by pinnipeds such as: Gansbaai, False Bay and Mosselbay Islands (South Africa), Neptune Islands (Australia), Guadalupe Island (Mexico), Farallon Island (USA) and Chatham and Stewart Islands (New Zealand). Five attempts to locate and tag a white shark have been made in Italian waters, between 2017 and 2024. Although a significant amount of baiting hours were spent (648 hours in total), including the use of about 1.950 kg of chum, no white sharks were sighted along Italian coasts and not far from the Tunisian coast. Present in the Mediterranean Sea since 3 million years and probably not genetically connected with the Atlantic white shark population, has the white shark passed the threshold of non-recovery in the Mediterranean basin?

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Porbeagle are moving along – some to gain, some to lose

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Pelagic sharks are declining worldwide due, in large part, to conflicts with human activities such as fisheries, and increasingly because of habitat loss and climate change. Highly mobile sharks are more at risk of encountering human activities such as fisheries, putting high bycatch pressure on shark populations. Porbeagle (*Lamna nasus*) in the Northeast Atlantic (NEA) is bycaught in fisheries, yet relatively little is known about its large-scale movements and habitat preferences throughout the entire year, as well as its population dynamics after their stocks collapsed. Today, the NEA stock seems to be in recovery. We here used a variety of data types from surveys, fisheries, dissections, and satellite tagging to decipher the spatial distribution, diet and life history patterns in northern NEA waters. We found that porbeagle move over large parts of the NEA following individual paths, yet some common routes and hotspot areas could be identified from tracking as well as bycatch data. Our dissections and hard structure analyses indicated that the porbeagle's diet is quite varied encompassing mainly fishes, and of those mainly small pelagics, which was confirmed with survey data of those target species. As large-scale movements are both advantageous and dangerous, the next steps will involve resolving their spatio-temporal overlap per fishery and increasing our understanding of how changing environmental conditions might affect porbeagle directly and indirectly.

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Common Eagle Ray aggregations in the Mediterranean Sea: distribution, characterization and potentiality for conservation

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Many threatened ray species gather in critical habitats to mate, feed or give birth. Identifying areas and periods of batoid aggregations, as well as their overlap with potential threats such as target/incidental fishing or tourism activities, is therefore crucial to informing conservation and management interventions. We conducted underwater video surveys over four years (from 2019 to 2023) to characterize the seasonal aggregation of the Vulnerable common Eagle Ray, *Myliobatis aquila* (Linnaeus, 1758), occurring around Marettimo Island (Egadi Archipelago, Italy) and assess the potential site fidelity of aggregating individuals. In addition, we mined data from popular social network platforms and carried out a literature review to map other potential aggregation spots in the Mediterranean region. We recorded 5,231 sightings of *M. aquila* individuals in Marettimo over the study period, with up to 101 individuals observed simultaneously. The aggregation was predominantly composed of mature males and adult/sub-adult females, with low frequencies of juveniles of both sexes. The sex ratio was unbalanced towards females (1:11). A couple of hundreds of courtship and mating events were observed and documented for the first time for this species, suggesting that the aggregation in Marettimo occurs for reproductive purposes. Evidence of site-fidelity over years was also highlighted for some individuals. Social media analyses confirmed six additional spots with inter-annual recurrences peaking in summer of several individuals, mostly females, suggesting the existence of other aggregation areas for this species in the Western Mediterranean.

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Nursery bays and hidden rays: Fourteen years of Bull Ray (*Aetomylaeus bovinus*) monitoring with insights from the Maltese Archipelago

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This study constitutes a novel, quantitative assessment of bull ray (*Aetomylaeus bovinus*) distribution and species abundance within the Maltese archipelago (MA). Bull rays are Critically Endangered globally and in the Mediterranean according to IUCN red list, therefore a comprehensive understanding of their ecological attributes and behaviours is necessary for adequate conservation measures. Information on batoids around the MA, Central Mediterranean, is poor. Such animals provide key ecosystem services to the area, making the increased decline and extinction risk a concern. Fourteen years of photo-identification data were collected between 2011 and 2024 via Sharklab-Malta in conjunction with the Fly With Bull Rays (FWBR) program. Analysis of temporal and spatial behaviours were analysed alongside population structures and site fidelity. A total of 807 surveys were conducted around the MA, identifying 13 sites of preference. Seasonal patterns and relative abundance were identified for the species. 136 individuals were identified. Approximately 33% of bull rays were re-sighted, with multiple individuals showing high re-sighting rate across lengthy temporal periods and site fidelity. Three specific areas located to the NW, NE and E of Malta represent the greatest species abundance. The population is dominated by younger individuals, defined by disc width, with 99.9% of sightings consisting of sub-adults or juveniles. This data, in tandem with site fidelity, higher abundances in key areas and consistent use of these areas over the fourteen-year period suggests the MA supports a nursery function for bull rays. Anthropogenic pressures are likely to impact key areas, posing a need for conservation measures.

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The Great Eggcase Hunt: navigating insights amidst citizen science data limitations

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The Great Eggcase Hunt (GEH) is the Shark Trust's flagship citizen science project, in which members of the public report eggcases found washed ashore or developing in-situ. This project has been running for 20 years, amassing records of over 500,000 eggcases, from over 30 countries. However, citizen science data (especially from projects that have grown, developed and refined their aims over decades) is often full of data inconsistencies and data limitations. Any analysis and interpretation from such datasets often comes with caveats. Another aspect to consider is the project's lifespan: what are its goals, and at which point can it be determined that sufficient data has been collected to meet these goals?

One of the main limitations for the GEH, especially in the legacy data, is the question of effort. Despite these data limitations, this project and the data collected can have many useful applications. On a social science basis this project provides a great insight into engagement and participation across different communities and cultures, as well as unpicking how a project like this grows. Ecologically, the data can be used to understand broad-scale patterns and correlations (such as species range and the influence of climatic events such as storms), while subsets of the data from regular, reliable citizen scientists can be used to assess patterns and trends over time on a more local scale. With an understanding of the limits of this dataset, the data generated can be analysed and used to inform science, conservation action and policy.

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Horizontal movement phenotypes of the 'coastal' spiny dogfish (*Squalus acanthias*)

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The spiny dogfish, with its antitropical distribution, are often found in coastal areas like fjords. Their reproductive strategy entailing late maturity, long gestation period, and few offspring, results in slow population growth that renders the spiny dogfish vulnerable to bycatch and overfishing. Traditional longline and trawling surveys show that spiny dogfish exhibit sex and size aggregation movement behaviour in which individuals of same sex and similar size move together, which contributes to their catchability and vulnerability to human activities. Given that the Norwegian fisheries of spiny dogfish recently opened up again after the species being protected for more than a decade, knowledge on their habitat use is valuable for ensuring evidence based and sustainable management of the population. To investigate the spatial and temporal habitat use and social aggregation behaviour of the spiny dogfish, a total of 82 spiny dogfish (≥ 70 cm total length) were internally tagged with acoustic transmitters. An extensive receiver array was deployed in a complex fjord system outside of Bergen in western Norway. Preliminary data analysis indicates that most spiny dogfish remain in the fjord system, utilizing different areas of the fjord, with different horizontal phenotype patterns. These results will be important to identify key areas within a complex fjord system that are especially important for the spiny dogfish population, fundamental data that is currently lacking.

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Understanding blue sharks in the Bay of Biscay

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There is an increasing concern about the drastic reduction of elasmobranch populations due to their vulnerability and overexploitation during the last decades. Understanding their biology, dynamics and habitat use is crucial to help create effective management plans and improve existing ones. Blue shark (*Prionace glauca*) is considered one of the most abundant pelagic species worldwide and is distributed in tropical and temperate waters. It is the most captured shark species, as both, target (for commercial and recreational fisheries) and bycatch species (in tuna and swordfish longline fisheries). The Bay of Biscay (BB) is an important area for this species (and for other pelagic shark species), as it is one of the areas with most sightings in the world. To understand their preferences, habitat use and seasonality, we started a study tagging 14 individuals in 2023. Preliminary results showed different migration patterns within the area and movements to French waters and the North Central Atlantic. This season, more satellite and conventional tagging is being conducted. Additionally, the development of an acoustic array is planned, to acoustically tag individuals, increase long-term data and filling the gap of receivers in the area as part of the ETN. The BB lacks acoustic receivers, potentially missing important data on several species that live there or pass through the area in their migrations.

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Modelling chondrichthyan spatial distributions within north-eastern Atlantic waters

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Good knowledge of species distribution is essential for area-based protection. Distribution models enable robust maps of species occurrence probabilities and make it possible to highlight areas of high species concentration. In this study, the spatial distributions of 40 chondrichthyan species were modelled within the North-East Atlantic waters. The study area covers the North Sea, the English Channel, the Celtic Seas, the Bay of Biscay and the Iberian coast. Fisheries-dependent and -independent presence/absence data from 2009 to 2021 were modelled in a multi-species hierarchical Bayesian occupancy framework. This framework was chosen to account for spatial autocorrelation and imperfect detection from different gear types used. Species were grouped according to their position in the water column and their habitat to reduce presence/absence imbalance and to use relevant predictors. Nine environmental variables were considered as potential predictors of species distribution: sea water temperature, sea water salinity, dissolved oxygen, and net primary production at the depth of the species group, depth of the seafloor, slope, bathymetric position index (i.e., features such as ridges, depressions, flats and slopes), distance to the coast and seabed substrate type. The selection of variables integrated in the models was based on a review of the literature and their relevance within the models. Species-specific distribution and richness maps were produced at a resolution of 0.1 x 0.1 decimal degrees. Finally, core areas of chondrichthyan distribution are identified and their location compared to existing Marine Protected Areas (MPAs) to understand whether or not MPAs could be of relevance for chondrichthyan conservation.

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Session 7: Biology and ecology of chondrichthyans

Distribution of Chondrichthyan in Greece

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The Greek seas are known to host a diversity of chondrichthyan, whose presence has been documented since the time of Aristotle. However, only the last two decades systematic scientific research is taking place concerning chondrichthyan. This gradually closes the gap of knowledge concerning the ecology and biology of these species. Information concerning their spatial distribution though, is still scarce with a limited number of studies providing such data and mostly focusing on biological and fisheries related parameters with low taxonomic and/or spatial resolution. This study aims to reconstruct the distribution of extant species in the three Geographical Subareas (GSAs) of the Eastern Ionian Sea, the Aegean Sea and Crete, using multiple data sources for the period from 1940 to 2023. Specifically, data sources that were examined included: i) published literature, ii) grey bibliography, iii) Social and Mass Media, iv) Biodiversity databases, v) Citizen Science, vi) official government reports and data and vii) research projects. In the context of the study, the spatial presence of all the chondrichthyan species recorded in the Mediterranean was examined resulting in 4540 records of occurrence with spatial reference for 33 shark species, 29 batoids and 1 chimaera, of which almost 55% referred to unpublished records, with Citizen Science records having a 20% overall contribution. The records are presented in a species-specific level and enrich the existing knowledge concerning threatened and data deficient species and could be used as baseline for future analysis for seasonality, distribution models as well as a guide on where to focus future research efforts.

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Filling the chondrichthyan-related gap in a developing country: a case study of Montenegro

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Montenegro is located in the south-eastern part of the Adriatic Sea and occupies about 5% of the total surface area of its basin, which includes its territorial waters and the continental shelf area. Since Montenegro is a developing country facing various environmental challenges, scientific research on chondrichthyans was initially poorly developed until only a few years ago. There have been noticeable improvements in the field of chondrichthyan conservation in the recent years, largely due to the introduction of citizen science as a data-collection method. The local citizen science network has been established in 2016 and grew over the years, becoming part of the regional MECO project in 2019. So far, the citizen science dataset for Montenegrin waters contains over 1700 chondrichthyan individuals of 27 species. The citizen science effort has made a significant contribution to documenting records of rare and endangered species, and has also positively improved local attitudes towards sharks and rays. The research resulted in the compilation of the first chondrichthyan checklist for Montenegro and provided the first insight into the bycatch composition of endangered species in the area. Additionally, the data showed the ratio of juvenile and adult individuals in the bycatch of some endangered species (e.g., blue shark and shortfin mako). The collected data have already contributed to relevant regional initiatives and represent the foundation for further work on chondrichthyan conservation in Montenegro.

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Endangered Smalltooth Sawfish in south Florida (United States) and Andros (The Bahamas): Population Dynamics, Habitat Use and Factors Affecting Recovery Likelihood

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Smalltooth sawfish (*Pristis pectinata*) are Critically Endangered in the IUCN Red List of Threatened Species and Endangered under the United States Endangered Species Act. The species is restricted to the Atlantic Ocean but has been extirpated through much of its range due to overfishing and habitat loss. Southwest Florida in the U.S. and Andros Island in The Bahamas are among the only known regions with viable smalltooth sawfish populations. Both regions include substantial protected areas that offer critical habitats for sawfish, characterized by extensive mangrove estuaries and proximity to deeper shelf-edge habitats buffered seasonal temperature extremes. Telemetry data suggest there is little movement of sawfish between the countries. We used fishery-independent longline surveys employing identical methods to assess community structure and relative abundances of sawfish and sharks in south Florida (2011-2024) and Andros (2014-2020). Over 5,000 elasmobranchs from 17 species, including more than 120 large smalltooth sawfish, were captured. Whereas catch rates and community structure of coastal sharks were similar between Florida and Andros, relative abundance of smalltooth sawfish was more than 10 times higher in Florida. This pattern may be driven by differences in habitat complexity and productivity, the densities of sawfish prey, competitors, and predators as well as ongoing fishing mortality. Whereas heavily regulated fisheries for sharks exist in the U.S., shark fisheries absent in The Bahamas, however, smalltooth sawfish are protected in the U.S. but are not protected in The Bahamas. We will discuss the implications of these patterns for recovery efforts for this critically endangered species.

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Summarizing nine years of shark tagging long-term research in the easternmost Mediterranean Sea

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The MKMRS is running a shark-tagging long-term research programme in the last 9 years. The tagging focuses at the human-induced seasonal aggregation of Dusky sharks (*Carcharhinus obscurus*) and Sandbar sharks (*Carcharhinus plumbeus*) at the warm outlet of the Hadera power-plants in the Mediterranean-Sea. 115 sharks were tagged so far. 73 females and 1 male Dusky shark and 35 males and 5 females Sandbar sharks. Our holistic tagging approach includes: morphometric measures, sampling for DNA, stable isotopes, blood, microbiome (gills, skin, and cloaca) and reproduction. Sharks are marked individually and tagged acoustically and an array of 10 receivers was placed in the study-site and across the Israeli waters. The study-site functioned as a seasonal (November-May) residency-site for both shark species with surprising differentiation into four genetic lineages clades. Both species were segregated by sex and size and displayed a residency pattern regulated by the temperature. The inter-annual returns were considerably lower for the female Dusky sharks. The microbiome samples were collected over 3 years. The bacterial composition was significantly different between the surrounding seawater and the shark species. Additionally, differences were apparent between all the organs and the seawater, and between the skin and gills. The most dominant groups were Flavobacteriaceae, Moraxellaceae, and Rhodobacteraceae. An unexpected difference in the microbiome profile and diversity between the 2019–2020 and 2021 sampling seasons, revealed an increase in the potential pathogen *Streptococcus*. The fluctuations in the relative abundance of *Streptococcus* between the months of the third sampling season were also reflected in the seawater.

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Interannual monitoring of the Sandbar shark aggregation around Lampione Island and description of unexpected ecological interactions

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The Sandbar shark, *Carcharhinus plumbeus*, is among the most threatened migratory sharks in the Mediterranean Sea, primarily due to overfishing. This species congregates yearly in a few areas of the basin, including Lampione, a small island in the Strait of Sicily (Italy). From 2019 to July 2024, we deployed 247 Baited Remote Underwater Videos (BRUVs) between July and October to monitor this rare phenomenon and elucidate its ecological importance. The aggregation peaked in July every year, with BRUVs recording up to six individuals together (MaxN=6). However, BRUV samplings carried out in July showed that shark abundance and sighting frequency decreased by 89% and 96%, respectively, over 6 years. Conversely, a weak increasing trend for both variables was recorded in September and October surveys from 2019 to 2023, suggesting a change in the aggregation period towards the end of the summer season. During the last years, we also gathered evidence of an undocumented hunting strategy adopted by the blue runner (*Caranx crysos*), an expanding coastal pelagic carangid, which associates with Sandbar sharks to approach prey without being detected. This represents the first documented evidence of shadowing behaviour observed in teleosts associated with larger high-level predators for hunting purposes and highlights the role of shark aggregations in fostering new heterospecific associations. This unique finding adds on evidence regarding the need to implement urgent management measures to preserve Sandbar sharks in their ultimate aggregation sites.

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First evidence of regional movements and habitat usage for gravid *Carcharhinus obscurus* (dusky shark) in the eastern Mediterranean

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Understanding the spatial ecology of apex predators like the dusky shark (*Carcharhinus obscurus*) is crucial for effective conservation management. Here, we present the first evidence of regional movements and habitat usage of *C. obscurus* outside of its known aggregation period in Israel, specifically within the Levant Basin, from April to October. On April 23rd, 2023, the team caught a gravid individual offshore Hadera, Israel. Three fetuses were recorded in the right uterus via ultrasound, with girths measuring approx. 25-30 cm². Then the shark was fitted with a finmount satellite tag (Wildlife Computers, Ltd.), which popped up offshore Gaza, Palestinian Territories, on October 22nd, 2023; a full geo-location track, depth and temperature profiles were produced after this event, with the biochemistry and β -Estradiol (e2; estrogen) profiles providing context. Blood plasma e2 was 0.44 ng/ml, combined with the scan, suggesting an early- to mid-gestational stage at the time of tagging. This is the first reported estrogen level for this species; biochemistry levels were within the normal reference values for this genus. This shark predominantly utilised the coastal shelf (0-60 m depth; temperature range 22-28 °C) from Israel to Egypt, moving further offshore (up to 240 m; range 17-25 °C) from August until late October. Initial results indicate a preference for habitats with complex bathymetric features and proximity to marine protected areas. These insights serve as a baseline for future research and contribute to the growing understanding of the distribution and gestational status of *C. obscurus* in this understudied region.

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Thornback ray habitat use in relation to spatial management measures in the Southwest UK

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Thornback rays (*Raja clavata*) are the most common skate species in inshore UK waters. They are commercially important, targeted both recreationally and commercially, and are caught incidentally in various demersal fisheries. Due to this intense fishing pressure, like many elasmobranch species, *R. clavata* is thought to be facing global population declines. One method for curbing such elasmobranch declines is the implementation of spatial management measures, such as Marine Protected Areas (MPAs) or other effective area-based conservation measures (OECMs). However, both the effective design and evaluation of these strategies, require an understanding of species habitat use. Lyme Bay represents an interesting case study, where a well-established MPA and an offshore mussel farm are co-located within a coastal inlet in the Southwest UK. This poses the opportunity to explore species movement in relation to an MPA, a potential OECM (the mussel farm) and adjacent unprotected natural habitats. In this study, 30 thornback rays were tagged with acoustic transmitters. The skates were tagged across three locations in Lyme Bay. Patterns of movement and residency across the MPA, mussel farm and adjacent unprotected reef sites will be examined to determine 1) the efficacy of the MPA for thornback ray protection, 2) the value of a human-altered reef site offered by the Mussel Farm and 3) the most essential habitats in Lyme Bay for thornback rays. This will provide valuable insight into the value of different spatial conservation strategies for Rajidae species and inform improved spatial management of *R. clavata* in the Southwest UK.

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Genomic Data Reveals Extremely Low Genetic Diversity and Inbreeding Risk in Maldivian Blacktip Reef Sharks (*Carcharhinus melanopterus*)

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Overfishing in the Maldives has led to steep declines in populations of shark resulting in bottlenecks that impact their population demographics. The Maldivian Ministry of Fisheries has now banned fishing for elasmobranchs to prevent further population decline. Currently, the genetic diversity and population viability of the shark species in the archipelago is unknown. To address this, we evaluated the population viability from 24 *Carcharhinus melanopterus* individuals from Baa Atoll, Maldives from full genome sequence data of these individuals. Our analysis of historical effective population size revealed a steep downward trend in the genetic diversity in the population since the mid-to-late Pleistocene. Observing contemporary population demographics, we found evidence indicating inbreeding depression based on low values of various genetic diversity parameters. These metrics expose large ROHs, which are areas of similarity along the stretch of an individual's genome; the larger the ROHs, the more likely a population has experienced a recent bottleneck. Additionally, there is a substantially low current effective population size between 111-118, whose value is on a descent. Furthermore, there is a high degree of haplotype sharing and kinship among the sampled population which further presents a scenario where inbreeding may not only be possible, but rather likely. Importantly, our findings suggest that genetic diversity is waning in this wild shark population, and existing conservation management protocols in the Maldives do support the effective recovery of these populations to an extent.

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The accumulation of Pb and Cd in *Scyliorhinus canicula* (Linnaeus 1758) eggs: Biomonitor calibration and field implementation

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The widespread distribution of the small-spotted catsharks throughout Mediterranean and Northeastern Atlantic waters, along with the philopatric behaviour displayed by female individuals of this species confers it a great potential as a xenobiotic biomonitor. While encouraging results have been obtained from adults, these may still intake pollutants from distinct sources, hindering our ability to identify the source of pollution. These limitations may be overcome by the application of *Scyliorhinus canicula* egg cases, which due to their sessile nature and lack of feeding during their development stage can only accumulate waterborne xenobiotics. Encased embryos (N =75) were exposed via solution to different concentration ranges of these xenobiotics (Cd = 0.05-17.12 and Pb = 3-102.78 mg·Kg⁻¹) for a 2.5 month period. All samples were digested via MAE techniques and analysed via GFAAS. For Pb and Cd accumulation by egg capsules, high linearity was observed between dissolved concentrations of the elements and those found within the egg capsule (r² = 0.98 and 0.96 respectively) with significant differences between trials occurring at higher Cd and Pb exposure concentrations. Egg capsules were found to reach equilibrium analyte concentration equilibrium within the experiments duration. Furthermore, egg capsules were found to accumulate most part of the waterborne pollutants with little remediation while embryos appear to have greater bioremediation capabilities. These findings support the use of beach-gathered hatched egg capsules as indicators of dissolved pollutants. Preliminary tests performed using hatched egg capsules from the Valencian Community (Spain) have achieved promising results on this regard. This study is part of the OCECOSVAL project (GVA-THINKINAZUL/2021/033) within the ThinkInAzul program and was supported by MCIN with funding from the European Union NextGenerationEU (PRTR-C17.11) the Generalitat Valenciana. This study was made possible by the grants for research groups and emerging research of the Valencian community [2023/10630] (EXP CIGE/2023/010).

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POSTER PRESENTATIONS

Modelling chondrichthyan spatial distributions within north-eastern Atlantic waters

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Good knowledge of species distribution is essential for area-based protection. Distribution models enable robust maps of species occurrence probabilities and make it possible to highlight areas of high species concentration. In this study, the spatial distributions of 40 chondrichthyan species were modelled within the North-East Atlantic waters. The study area covers the North Sea, the English Channel, the Celtic Seas, the Bay of Biscay and the Iberian coast. Fisheries-dependent and -independent presence/absence data from 2009 to 2021 were modelled in a multi-species hierarchical Bayesian occupancy framework. This framework was chosen to account for spatial autocorrelation and imperfect detection from different gear types used. Species were grouped according to their position in the water column and their habitat to reduce presence/absence imbalance and to use relevant predictors. Nine environmental variables were considered as potential predictors of species distribution: sea water temperature, sea water salinity, dissolved oxygen, and net primary production at the depth of the species group, depth of the seafloor, slope, bathymetric position index (i.e., features such as ridges, depressions, flats and slopes), distance to the coast and seabed substrate type. The selection of variables integrated in the models was based on a review of the literature and their relevance within the models. Species-specific distribution and richness maps were produced at a resolution of 0.1 x 0.1 decimal degrees. Finally, core areas of chondrichthyan distribution are identified and their location compared to existing Marine Protected Areas (MPAs) to understand whether or not MPAs could be of relevance for chondrichthyan conservation.

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The Basking Shark Project – unifying data from multiple sources

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Data checks and quality control are key components of effective data management. When assimilating data from multiple sources, these practices are even more crucial. The Shark Trust's Basking Shark Project has been running since 2004, and as such has gone through multiple iterations of recording form, altering which information is recorded, and how, over time. Furthermore, since 2021 the Shark Trust has been the custodian of the Marine Conservation Society's Basking Shark Watch database (1987- 2020), and receives data exports from several other organisations. Due to this data being assimilated from multiple sources, there are duplicates within the data where recorders have submitted the same information to multiple projects. Following work undertaken by NatureScot and the University of Exeter, the Shark Trust has developed a methodology to identify duplicate records and flag them within the dataset. This takes the Shark Trust's Basking Shark database from 24,500 records of 75,000 sharks, down to 21,000 unique records of 67,000 sharks. Now that this data has been quality checked, it is now available online as an Open Access download. The Trust will continue to collate and assess Basking Shark data, whilst engaging with interested parties to answer relevant conservation and management questions.

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The islet of Filfla (Malta, Central Mediterranean): a status snapshot of a possible key ray area within data-poor marine protected waters

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Overfishing, bycatch and other anthropogenic pressures have depleted elasmobranch populations in the Mediterranean - a problem aggravated by the lack of scientific data and enforcement, especially in data-poor areas. Filfla (Malta, Central Mediterranean) is a tiny islet characterized by its offshore location, unique benthic topography and status as Malta's first marine protected area. Despite being historically orally referred to as a breeding ground and key shark area, the islet has drawn little attention from the scientific community with only two SCUBA studies (1997, 2003) surveying the area. The aim of this citizen science project was to research any species of elasmobranch utilizing this relatively remote area. The surveys occurred from May-June 2024 through roving diving methods with photogrammetry to verify diversity and abundance. 10 dives with up to 20 volunteers each occurred within recreational limits, 2 of which were non-protected, underutilised control sites. Prior internal research (2012-2015) identified 8 batoid species around Filfla, compared to 3 in 2024. We observed 135 sightings of *Dasyatis pastinaca*, 16 *Bathytoshia lata* and 11 *Myliobatis aquila*. We also recorded a possible unique mating attempt, amongst the first of its kind to be filmed in Malta and potentially the central Mediterranean. Despite the absence of sharks and large teleosts, when compared to other areas in Malta commonly frequented by recreational and technical divers, Filfla seems to remain as a possible key ray habitat within the archipelago. Further research in the area is essential to safeguard proper protection measures for both such data-poor species and waters.

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Ontogenetic variability in the feeding ecology of the spiny dogfish (*Squalus acanthias*, Squalidae) in the Northern Adriatic Sea

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The spiny dogfish (*Squalus acanthias*) is one of the most important commercial shark species in different areas, including in the shallow and heavily exploited waters of the Northern Adriatic Sea. In this study, the stomach contents of 249 *S. acanthias* captured between 2018 and 2022 off the coast of Porto Levante, Italy, were analyzed. Differences in the diet were tested between sexes and three maturity stages (immature, maturing, and mature). 67 different prey items were identified and summarized into 17 aggregated categories for diet analysis. Preys were mostly demersal. Teleost fishes formed the bulk of the diet (%IRI = 46.97%), followed by crustaceans (22.62%) and molluscs (14.9%). Fullness% was relatively low and highly variable ($2.92 \pm 2.33\%$) and may suggest an intermittent feeding strategy. Diversity (H') and evenness (J') indices were also low (0.27 ± 0.36 and 0.29 ± 0.38 , respectively). No significant differences in the diet were found between sexes. The diet of immature and mature individuals was significantly different (p -value = 0.01) and suggested the occurrence of ontogenetic changes. Teleosts and cephalopods increased their importance as individuals matured while crustaceans decreased. The diet of maturing individuals was characterized by a high consumption of salps, in particular during one of the sampling periods, and may suggest changes in habitat use between juveniles and adults. These findings describe *S. acanthias* as an opportunistic and generalist predator, in accordance with past research. Future studies should further investigate the diet of maturing individuals and the effects of seasonality in this area.

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Genomic analyses evidence a complex population structure of the endemic Mediterranean skate *Raja polystigma* in a small-scale area

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Recognising the spatial scale of population connectivity provides information for understanding biological and evolutionary processes. This information is being used to improve the design and implementation of management strategies considering the genetic fitness among threatened populations. This study addresses the population structure of the speckled ray *Raja polystigma*, a relatively small (up to 60 cm total length) Mediterranean endemic species that is part of the bycatch in bottom trawl and artisanal fisheries. Here we generate genome-wide Single Nucleotide Polymorphism (SNP) data using the reduced representation library method double-digest Restriction-site Associated DNA sequencing (ddRADseq) from a total of 94 samples from the western Mediterranean. Since *R. polystigma* has similar morphological characteristics, mainly in small individuals, with other skate species present in the study area, the COI barcode region (550 bp) was amplified to confirm the morphological identification. The ddRAD libraries of all samples resulted in more than 452 million raw data reads (ranging from 1,049,575 to 9,824,960 per sample) and, after applying different filters, a total of 13,950 high-quality SNPs were obtained. Population genomic analyses inferred by Discriminant analysis of principal components (DAPC) and Admixture revealed that the speckled ray populations are structured in three distinct genetics units inhabiting the western Mediterranean: Gymnesians (Mallorca, Menorca, and Cabrera Islands), Pityuses (Ibiza and Formentera Islands) and southeast of the Iberian Peninsula. The complex marine geomorphology (e.g., seamounts and canyons) may have significant influence on the genetic structure of the study area, and consequently on the local adaptation and survival of these populations.

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Using local ecological knowledge to understand the recreational fishing impact on elasmobranch populations in the Northern Adriatic Sea coastal area

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Citizen science records and the local ecological knowledge (LEK) are powerful tools to provide a lot of useful information about the interaction between elasmobranchs and recreational fishing. In the Northern Adriatic Sea (Mediterranean Sea) recreational fisheries consist of a range of fishing techniques targeting several species and the impact of this activity on demersal elasmobranch species is still poorly known. The aim of this study is to investigate, through online questionnaires, the impact of recreational fishing on some elasmobranch species (e.g., *Mustelus* spp., *Squalus acanthias*, and batoids), in the North-East Adriatic coastal area. A total of 132 questionnaires were collected between December 2022 and October 2023. The data collected shows how the fishing effort seems to be higher near the port entrance of the Venice Lagoon. Regarding the shark catches, 77% of anglers reported catching *Mustelus* spp., 77% never have caught *S. acanthias*, and 41% reported regularly catching batoids. 83% of the anglers release sharks and rays after capture. The data collected highlight a higher catchability of the smooth-hounds, especially in the areas where the fishing effort is higher. The collaboration with recreational fishery could provide precious information on the negative effect of this activities on these species such as post release mortality and about the presence and abundance of demersal elasmobranch species in the Northern Adriatic Sea, especially in Venice Lagoon, where there is not the possibility to obtain this data from commercial fishing activities.

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Recurrent occurrence of elasmobranchs around shallow hydrothermal vents of the Aeolian Islands (Western Mediterranean)

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Hydrothermal vents are unique ecosystems, essential for many biogeochemical and ecological processes. In addition to affect global geochemical cycles, these systems may also support unexpectedly rich communities of sessile, vagile, and migratory organisms. Previous studies highlighted the importance of hydrothermal vents for the ecology and the life cycle of elasmobranchs (e.g., egg case incubation and nursery grounds). The Aeolian volcanic complex, located in Sicilian waters (Southern Tyrrhenian, Italy), features many shallow hydrothermal vents (<200m depth) whose benthic communities have been extensively studied. Despite their importance, there is no information on their elasmobranch populations. To address this knowledge gap, non-destructive sampling using Baited Remote Underwater Videos (BRUVs) was conducted over the past year (October 2023 and March, May, and July 2024) off Panarea and Vulcano Islands at depths ranging from 40 to 80 meters. This approach was used to collect data on shark and ray species diversity, abundance (maximum number of individuals in a single frame, MaxN) and distribution in different vents' habitats. Off Panarea, BRUVs caught on video different *Raja clavata* and *Scyliorhinus canicula* individuals, with the highest abundance recorded in October (MaxN of 5 and 2 over 1 hour, respectively). Similarly, *R. clavata* showed its highest abundance in October (MaxN=5) off Vulcano. Shark and ray abundances differed among habitats. Given that both volcanic vents and elasmobranchs are threatened by various human activities, this preliminary study will help to inform future management measures for this essential communities.

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Tuning into the Identification Challenges of Guitarfish in the Mediterranean

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In the Mediterranean Sea, two species of guitarfish are present: the Blackchin [giant] Guitarfish (*Glaucostegus cemiculus*) and the Common Guitarfish (*Rhinobatos rhinobatos*). Due to their benthic ecology and coastal proximity, both species are particularly susceptible to both accidental and targeted capture in fisheries. As a result, the two species are now listed as Critically Endangered on the IUCN Red List of Threatened Species and are listed under binding Recommendation GFCM/42/2018/2, which prohibits the retention, transshipment, landing, storage, display, and sale of species listed on Annex II of the Barcelona Convention.

A recent literature review has revealed various inconsistencies in the identification of Mediterranean guitarfish species. The two species bear many resemblances, complicated by the availability of market photos with identifiable features showing, and differences in fresh compared to older specimens. We ask that EEA delegates complete a quiz, to expand on their understanding of the two species and their morphological differences. This will help us gain a better understanding of regional morphological differences in both Common and Blackchin Guitarfish populations, and guide the creation of accurate identification resources for these Critically Endangered species.

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Exploring Electromagnetic Field impacts at offshore wind farms: North Sea field test of novel acoustic tags

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Aquatic tracking tools like acoustic transmitters are crucial for understanding animal movement, and Thelma Biotel's new acoustic EMF tags have the potential to revolutionize the study of electromagnetic field (EMF) impacts on marine species. The field test of a novel acoustic tag with an integrated magnetometer in the North Sea aims to validate the performance of these tags in aquatic environments. This study provides baseline knowledge of the EMF values present around the power cables of Offshore Wind Farms (OWF), facilitating accurate analyses in future research on EMF-sensitive species such as sharks and rays. The trial was conducted at an OWF in the Belgian part of the North Sea (BPNS) using the RV Abbé Mann. Tags were towed parallelly, perpendicularly, and diagonally to the buried export power cables. Three tags, each with unique codes and frequencies, were attached to a weighted rope and towed below the vessel at 3 knots. The tags measured and transmitted magnetic field values to an acoustic receiver, while a GPS track of the boat was recorded. Data analysis utilized a generalized additive model (GAM) to map the spatial variation of magnetic field values, creating an EMF landscape map of the area. The outcome of the test established crucial baseline field data for future studies and supported the conservation and management of EMF-sensitive marine species.

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Trophic habits of the California butterfly ray (*Gymnura marmorata*) in the western Gulf of California, Mexico

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The butterfly ray (*Gymnura marmorata*) is a coastal benthic species that can be found between southern California (USA) and Mexico. It is one of the most commonly captured batoid species in the Gulf of California. In order to establish an effective conservation and fishery management strategy, it is essential to gain a deeper understanding of the biological aspects of this species. The objective of this study was to estimate the food habits of *G. marmorata* in the Gulf of California. Samples were gathered from two artisanal fishing grounds between the summer of 2019 and the winter of 2020. The diet spectrum was analysed, and the trophic niche width and trophic level of the diet were estimated. A total of 59 stomachs were collected, predominantly from immature individuals. The majority of stomachs exhibited a digestion level of between 1% and 25%, with the prey items largely in an advanced state of digestion. The diet consisted of 17 prey items, primarily from the class Teleostei (PSIRI: 75.99%). Trophic niche analysis indicated that *G. marmorata* is a specialist predator of teleosts and can be classified as a secondary predator. This information is important to recognize the possible trophodynamics in the zone and the interactions of *G. marmorata* as a secondary predator, contributing to the biological knowledge base that could help improve the management of this resource.

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A multi-method approach identifies high density areas of threatened elasmobranchs in the Central Mediterranean Sea

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Mediterranean sharks and rays are facing a heavier extinction crisis than elsewhere. The Italian and Tunisian sides of the Strait of Sicily (SoS, Central Mediterranean Sea) are considered a diversity hotspot for elasmobranchs, hosting more than 70% of the Mediterranean species, and one of the most fishery-exploited areas in the Basin. Five Important Shark and Ray Areas (ISRAs) have been recently designated in the area, but effective spatial conservation actions to halt ongoing declining trend for shark and ray populations need a clearer and updated picture of distribution and abundance patterns. In the frame of the project PRESTO - Preserving endangered sharks and rays in their ultimate Mediterranean hotspots - we identified high-density areas for threatened shark and ray species in the Gulf of Gabès (Tunisia) and the Pelagie Archipelago (Italy). By coupling fishery-dependent surveys (onboard observers, opportunistic catch records) with Local Ecological Knowledge and Baited Underwater Video samplings between Spring and Summer 2023, we identified high density areas for newborns, juveniles and adults of the Sandbar shark (*Carcharhinus plumbeus*), the Bull Ray (*Aetomylaeus bovinus*), the Shortfin Mako (*Isurus oxyrinchus*), the blackchin guitarfish (*Glaucostegus cemiculus*). We recorded a total of 20 different species, whose IUCN conservation status spans from Low Concern to Critically Endangered. Our preliminary data confirm the importance of the Italian and Tunisian sides of the SoS for the conservation of shark and rays in the Mediterranean Sea and provide useful information for transnational management actions aimed at halting their ongoing decline in the Basin.

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Promoting enforcement and compliance with regulations on sharks, skates and rays in the Mediterranean Sea: interpretation and implementation headaches

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The main challenges in enforcing EU regulations on elasmobranchs in the Mediterranean Sea lies in the wide range of laws involved, and difficulties in identifying protected species. To increase compliance, monitoring and enforcement LIFE European Sharks (LIFE22-GIE-IT-LIFE-EU-SHARKS/101114031, co-funded by the European Commission) will carry out in 2025-2027 an unprecedented capacity building effort. With this training, 1200 fishers, fishery officers, veterinarians and specialists in Croatia, Slovenia, Italy, France, Spain will have a clear understanding of regulations on elasmobranchs, skills to identify protected species and procedures to apply if illegal fishing is detected. To address the main challenges in enforcing regulations, EUSharks commissioned to a transdisciplinary group of experts a review of current legislations; a field guide to species identification and a training module for both fishers and inspectors. The research was conducted in three phases. First we reviewed current international and regional regulations on elasmobranchs in Italian seas and applicable to Italian vessels (commercial and recreational) fishing in Italian and Mediterranean seas (FAO area 37). A table of 37 species (24 sharks and 13 skates and rays) associated to 13 binding regional recommendations and European regulations was produced. The second phase highlighted gaps in sanctions within Italian laws and addressed its application to recreational fishermen. Steps are being taken to overcome these shortcomings at a legislative level. The third phase - adapting this review to other Mediterranean states' regulations - is ongoing. This toolkit aims to become a standard tool to improve implementation of Regional regulations across the Mediterranean Sea.

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A comparison of operational eDNA sampling methods for effective marine fish biodiversity monitoring: a controlled study in aquarium conditions

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Understanding ecosystem changes and implementing effective management require comprehensive environmental monitoring, including biodiversity assessment and the tracking of alien, endangered and indicator species. Environmental DNA (eDNA) has emerged as a powerful non-invasive tool for monitoring marine habitats, particularly for detecting rare and elusive megafauna. Within the framework of a national biomonitoring project for Mediterranean elasmobranchs we conceived and performed a methodological investigation to test the efficacy of various eDNA water sampling methods in a controlled environment and establish benchmarks for interpreting metabarcoding data from diverse sampling methods. Five types of eDNA samplers, including both active and passive filtering instruments, were evaluated in four tanks at the Genoa Aquarium, containing different species assemblages, including both cartilaginous and bony fishes. DNA extraction from the collected samples was performed using modified protocols for higher volumes. PCR amplification was performed targeting a short 12S ribosomal fragment using an elasmobranch specific marker (Elas02) and samples were sequenced on an Illumina iSeq™ 100 platform. Bioinformatic processing will be performed following the OBITools metabarcoding pipeline, with customized modifications at the taxonomic assignment step based on a custom-made reference database of the species in the tanks. Preliminary results showed that the active filtration device accumulated and, consequently, allowed the extraction of, a higher quantity of DNA. Expected outcomes include a comparative analysis of eDNA samplers focusing on species richness and the correlation between taxa abundance in each tank and obtained reads per samples, towards an informed, calibrated interpretation of marine eDNA surveys conducted using different collection methods.

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Last French Angelshark population: better knowledge from eDNA, population genetics and tags

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The common angel shark (*Squatina squatina*) is a benthic shark classified as critically endangered by the IUCN due to fishing and habitat destruction. In a few decades, it has disappeared from French coasts, except in Corsica, where bycatch regularly continues along the eastern coast. The aim of this study is to better understand these residual populations and improve its conservation. After having developed a detection method based on environmental DNA (eDNA), we have sampled the entire Corsican coastline at depths of -40 m using 156 transects of 2.5 or 5 km. Human activities 500 m either side were compared according to the presence/absence of the species. Five individuals were tagged with X-tags designed to release after 10 months. A population genetics study based on SNPs (single nucleotide polymorphism) was carried out using tissue samples taken in collaboration with fishermen. We confirm the presence of *S. squatina* along the eastern coast, in the Cap Corse and Agriate Natural Marine Park and extended its distribution in south-west Corsica. Tags' data suggest that this species frequents the -20 to -60 m range, with temperature preferences, long periods of immobility and short movements. This sedentary nature is confirmed by genetic analyses showing the existence of a single population on the east coast, strong similarity between individuals from the same site and a weak effective population size of 281 individuals. Areas where the species is present appear to be less submitted to human activities than areas where it is absent.

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Tunisian waters: An important area for large predatory sharks in the Mediterranean Sea

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Sharks, positioned at the top of the marine food chain, are the most affected taxon within marine megafauna. They face significant pressures worldwide, which are intensifying in the Mediterranean. Tunisia, recognized as the largest producer of elasmobranchs in the Mediterranean, plays a crucial role in shark conservation. One significant shortcoming in this area is the lack of regular monitoring of landings, hindering the identification of species distribution areas, hotspots, and migration routes. Regular monitoring of fishing landings in the main Tunisian ports of Sfax, Teboulba, and Zarzis has been underway since January 2023. This monitoring has revealed the presence of not only the common species *Carcharhinus plumbeus* but also other large predators considered rare in the Mediterranean. These include the great white shark, *Carcharodon carcharias* (33 individuals), the mako shark, *Isurus oxyrinchus* (132 individuals), the thresher shark, *Alopias vulpinus* (24 individuals), and the bluntnose sixgill shark, *Hexanchus griseus* (68 individuals). Both industrial and artisanal gears contribute to these captures, with high white shark catches recorded using bottom trawls (48.78%) and significant mako shark catches using longlines (60%). The majority of the catches were juveniles: 65% for white sharks, 92% for mako sharks and 54.41% for sixgill sharks, exhibiting different spatio-temporal distributions. These data are essential for implementing effective management measures and conservation strategies.

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Will shark survive capture in recreational fishery? A case study from the northern Adriatic Sea

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Worldwide, elasmobranchs' conservation status is critical, even more so for Mediterranean populations. In this area, the impact of recreational fishery has not been investigated in depth, nonetheless it can represent an important threat for some species. Recreational fishery that targets sharks is uncommon in the Mediterranean, however they are commonly bycaught. Despite the widespread practice of "catch-and-release", animals still suffer from stress and injuries due to capture, which could lead to delayed death and altered behaviour. In the northern Adriatic Sea, blue (*Prionace glauca*) and thresher sharks (*Alopias vulpinus*) are the most frequently recorded. Fishers report good health/activity status at release and high perceived survival rate, however no empirical data exist. This study aims to use acoustic and satellite telemetry to provide the first estimates of survival. During spring/summer 2024, we aim to tag 30 pelagic sharks recording environmental (depth, water and air temperature), and operational data (fight time, number of burst swim runs, whether the shark has been landed and how it was handled, use of dipnet/grappling hook, irrigation, release time, hook type and size). Moreover, size, sex, and animals' conditions (line wrapping, hook location, injuries, and health/activity status at release) are noted. These variables will be correlated with the survival rate and diving behaviour extrapolated from detected animals to verify whether specific practices or handling procedures might be associated with higher survival rate. This information will help understand the impact of recreational fishery and develop manuals of best practices that could implement sharks' health and survival.

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Differential bioaccumulation patterns in 12 different species of Elasmobranchs from Tyrrhenian and Ionian Sea

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In recent decades, there has been a concerning increase in the prevalence of pollutants in marine ecosystems. Among these pollutants, trace elements have been frequently monitored due to their persistent nature, toxicity, and tendency to accumulate in organisms. Sharks are considered reliable semi-quantitative bioindicators, reflecting the presence and bioavailability of contaminants in their habitats. Given their critical role in aquatic ecosystems, particularly in enclosed basins like the Mediterranean Sea, investigating the concentration of trace elements in these species has become crucial.

This study aims to compare bioaccumulation levels across 12 different species of elasmobranchs, totaling 34 specimens collected from Calabria (Southern Italy), between 2006 and 2019. Specimens were collected through incidental events such as bycatch and strandings. Muscle tissues were analyzed as the primary target for all the species, with additional analysis of 4 brain samples (from three species), 5 skin samples (from three species), 1 fat sample (from one species), and 1 liver sample (from one species). Seventeen different trace elements were investigated using inductively coupled plasma mass spectrometry (ICP-MS).

The results revealed variations in element affinity for different tissues on a species-specific basis. Furthermore, there were notable differences in the average concentrations of individual elements across species. This study represents the first comparative analysis of its kind, exploring differential bioaccumulation patterns across species and tissues in a significant passage area within the Mediterranean Basin. It serves as a foundational reference for future studies assessing potential trace element pollution and deepening our understanding of bioaccumulation mechanisms in elasmobranch physiology.

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New records of fluorescence in elasmobranchs provide further evidence of its ecological significance

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Biofluorescence, the ability of organic tissues to absorb short-wavelength (e.g. blue) light and reemit it at longer wavelengths, has been previously described in five elasmobranch taxa: *Scyliorhinus rotifer*, *Scyliorhinus canicula*, *Cephaloscyllium ventriosum*, Orectolobidae sp., and Urotrygonidae sp. To expand our understanding of the prevalence of this phenomenon within the elasmobranchs, we tested 17 other species. We revealed the presence of biofluorescence in four new species: *Raja undulata*, *Raja clavata*, *Scyliorhinus stellaris*, and *Poroderma africanum*. We also assessed the ontogenetic development of biofluorescence in *Scyliorhinus canicula*. Our results provide further evidence that biofluorescence has evolved multiple times in elasmobranchs. Indeed, this trait is present in many distantly related elasmobranch families (e.g. Rajidae and Scyliorhinidae) but not always universally present within each family. For example, we confirmed the presence of biofluorescence in *Scyliorhinus stellaris* but also show that this trait is absent from the deep-sea shark *Galeus melastomus*. By examining various individuals of *Scyliorhinus canicula* at different stages of development, we observed that biofluorescence was present prior to hatchling but only seen primarily around the eye and tips of the caudal and dorsal fins. By the time of hatching, the biofluorescent areas have expanded to cover most of the body except for the ventral surfaces as is also observed in adult specimens. Our findings suggest that biofluorescence is both more widespread than previously considered and likely plays an ecologically significant role. Further research is needed to determine whether this is related to intra- or interspecific communication, camouflage, or another purpose.

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The preference for remoteness - the distribution and status of the Galapagos shark (*Carcharhinus galapagensis*) in Macaronesia, a rare insular European elasmobranch species

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The Galapagos shark (*Carcharhinus galapagensis* Snodgrass & Heller, 1905) exhibit a worldwide distribution around tropical, subtropical, and warm-temperate oceanic islands, archipelagos, atolls, and seamounts. Its distribution can be described as „patchy“, „scattered“, or „disjunct“. However, this remarkable and pronounced distribution pattern is poorly understood, which makes the Galapagos shark one of the remaining mysteries in the shark world. The understanding of isolation and the spatial connectivity of populations is crucial for the delineation of single stocks and management units. The Northeast Atlantic can be assessed a data-poor region regarding the information about *C. galapagensis*. By conducting a literature review and investigation of voucher specimens, a reliable and updated distribution map was created that displays the current state of knowledge as a base for spatial investigations. In Europe, the distribution of *C. galapagensis* is restricted to the oceanic islands of Macaronesia and spans the Portuguese and Spanish waters of the Northeast Atlantic Ocean (Azores Archipelago, Madeira, Savage Islands, Lanzarote). For these four European islands / island groups, information is largely outdated, which is unpleasant regarding a proper assessment of stocks. Almost nothing is known about the migration behavior of *C. galapagensis* in the Northeast Atlantic. Thus, there is an urgent need to clarify the status of *C. galapagensis* around the Portuguese and Spanish islands, from where this shark has been reported historically, by intensifying research efforts and conducting more in-depth research. A tagging program of sharks in the Northeast Atlantic could reveal more insights into the connectivity of isolated populations.

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Guardian of the Deep: revealing habitat use of *Hexanchus griseus* in the Northwestern Mediterranean

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The bluntnose sixgill shark (*Hexanchus griseus*) is the largest deep-sea shark in the Mediterranean. To date, most knowledge about this predator and scavenger largely relies on bycatch data. Along the Catalan coast, these sharks are predominantly bycaught in spring and summer (75% of total catches), mostly by bottom trawlers at an average depth of $431\text{m} \pm 175\text{m}$. Individuals caught averaged $205\text{cm} \pm 83\text{cm}$ in total length and were consistently found in submarine canyons and the adjacent slope. To extend our knowledge of their ecology, four sharks were tagged with LOTEK PSAT Pop-up Satellite Archival Tags from autumn 2023 to summer 2024. Tags registered temperature and depth and were set to store data for 150 days. All tags were deployed in or near La Fonera submarine canyon, 5nm offshore. Three individuals were caught using braided fishing lines with circle hooks and chub mackerel as bait; a fourth individual was tagged after being bycaught by a bottom trawler. The first data on the depth and vertical movements of this species in the Mediterranean were obtained after the emergence of the first two deployed tags, belonging to a 160cm juvenile and a 260cm female. The juvenile's average depth was $717\text{m} \pm 176\text{m}$ (max. 1143m), spending 60% of its time at 600-900m. The female's average depth was $336\text{m} \pm 219\text{m}$ (max. 1384m) and spent 60% of its time at 300-500m. This study provides new ecological insights and suggests site fidelity for the species, as retrieved tags surfaced near the capture locations five months later.

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Monitoring the development of Nursehound (*Scyliorhinus stellaris*) eggcases in-situ – A ten year overview

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In 2014 an egg-laying ground for Nursehound (*Scyliorhinus stellaris*) was identified in South Devon, UK, by a local resident. Since then, snorkel surveys have been run on a fortnightly or monthly basis (mean of 18.2 surveys per year), tagging each eggcase and monitoring the growth, condition and numbers of eggcases laid in a narrow channel. Over a 10-year period 288 eggcases have been recorded, with 149 recorded as hatched and the remaining 139 either lost or still developing. The average developmental duration of these eggcases is 9.5 months. Due to the irregular nature of these surveys, there is uncertainty over the exact laying and hatching dates. As such these eggcases were calculated to have a mean minimum development time of 8.4 months and a mean maximum development time of 9.8 months. The number of eggcases laid per year is relatively stable, usually between 13 - 20 a year, with the exception of 2017 (n = 9) and 2023 (n = 6). However, the number of eggcases hatching each year has shown more variation ranging from 2 - 27 (mean = 13.5). Surveys at this site continue, with the intention of refining the ongoing methodology and obtaining a large enough dataset of complete records (from deposition to hatching) to better understand the intricacies of development in this species. This data will also be assessed against a local temperature logger to unpick the influence of seasonality and temperature on embryonic development at this site.

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Unveiling the Past: Assessment of Historical Ecology and Baseline Shifts of Mediterranean Angel Sharks

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The Mediterranean Sea hosts to three angel shark species (*Squatina*) listed as Critically Endangered by IUCN. Their slow growth, late maturity, and low reproductive rates make them highly vulnerable, impeding population recovery. As benthic predators, they play a vital role in maintaining marine ecosystem balance. The recent decline of these species highlights the urgent need to understand the factors driving their decrease and its conservation implications. In this study, we used museum specimens and a multidisciplinary approach to assess the historical species and ecological diversity of Mediterranean angel sharks. We drew on historical osteological and wet specimens from the 19th to 21st centuries, sourced from over 30 museums and private collections across the Mediterranean region. We employed traditional and geometric morphometry species identification techniques, complemented by ancient DNA and multi-element stable isotope analyses. Preliminary data allowed us to distinguish 53 specimens of *Squatina* sp., through morphometric analysis. New extraction techniques enabled us to obtain DNA from formalin-preserved samples, allowing species-level identification for individuals unsuitable for morphometric analysis. We also create a comprehensive Mediterranean stable isotope database using historical elasmobranch remains. This database provides a robust framework for future stable isotope analysis, offering insights into the dietary habits and ecological roles of angel sharks and other elasmobranchs over time. Moreover, this research aims to make the collection accessible to researchers and highlight the significant contribution of natural history museum collections to the knowledge and conservation of elasmobranchs. It also seeks to strengthen the commitment to marine biodiversity protection and environmental education.

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Morphometric analysis of White sharks in Tunisian waters

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The conservation status of the white shark (*Carcharodon carcharias*) has been upgraded from Endangered to Critically Endangered in the Mediterranean and European regional Red Lists, based on its sporadic presence in the region and detected population decline. To develop a management plan and conservation strategy for this species in the Mediterranean Sea, it is essential to advance our understanding on this population size and distribution. Tunisian waters are emerging as one of the last strongholds for the Mediterranean white shark. Since January 2023, we have systematically monitored primary Tunisian ports to assess the extent of white shark landings. For each catch, we took multiple morphometric measurements and sampled biological material, integrating these records into a historical database on white sharks in Tunisia. In total, 11 morphometric measurements were recorded for 41 individuals, either directly in the ports or determined using ImageJ software. Linear regression models were constructed using total length (TL) as the dependent variable to analyze the relationships between these morphometric parameters. Our analysis shows a strong correlation between dorsal fin height (DH) and total length (TL), as well as between head length (HL) and total length (TL) for Mediterranean white shark population. This relationship may be a criterion for distinguishing the Mediterranean population from the Atlantic population, and will allow us to increase our sample size for the length distribution of Mediterranean white sharks, enabling us to reconstruct historical and current population trends.

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Sound of Sharks

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Elasmobranchs play a critical role in maintaining marine ecosystem structure, contribute to ocean-human connections through tourism, and support valuable fisheries. However, they are increasingly threatened worldwide primarily through overfishing, bycatch, and climate change. Population recovery is limited by their slow maturation and reproduction, underscoring the urgent need for improved management strategies. As the first national Marine Park in the UK and a designated Special Area of Conservation, Plymouth Sound provides a unique opportunity to explore protection strategies necessary for sustaining healthy marine environments. Despite its significance, the status of elasmobranchs within Plymouth Sound has been largely underexplored, with many key species facing significant human pressures. This study aims to elucidate the abundance and distribution of key elasmobranch species in Plymouth Sound using baited remote underwater cameras. Surveys were conducted over five years across various habitats, including seagrass beds, kelp forests, and reefs. The small spotted catshark (*Scyliorhinus canicula*) was the most prevalent species, with larger elasmobranchs, such as the near threatened (IUCN) nursehound (*Scyliorhinus stellaris*), frequently observed in association with *S. canicula*. Monitoring elasmobranch populations and their spatial and temporal distribution within Plymouth Sound will inform management and policy offering valuable insight for spatial protection of these species and their critical habitats for both commercial and conservation benefits. As a National Marine Park, Plymouth Sound is poised to serve as a pioneering case study, with findings contributing to the rollout of fully protected areas across the UK and Europe, supporting the 30 by 2030 initiative and enhancing conservation outcomes.

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Comparison of underwater stereo-video and paired laser photogrammetry to estimate size (body length) of blue sharks (*Prionace glauca*)

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Stereo-video and paired-laser photogrammetry offer cost-effective and non-capture methods to determine elasmobranch population demographics. Here, we compare stereo-video to paired-laser photogrammetry measurements of a pole of known length, in pool and field trials, using a custom-built and low-cost snorkeller-operated video system. We then apply the method with the best accuracy to collect length measurements of blue sharks (*Prionace glauca*) in UK waters. Length measurements were obtained for stereo-video footage using the StereoMorph package in R and laser photogrammetry images in Photoshop. Stereo-video was more accurate (<3.6% error) than laser photogrammetry (up to 11.4% error) when measuring a plastic pole of known length in pool and field trials, at distances up to 5m and angles up to 30°. We used stereo-video to collect length measurements of blue sharks at two sites, in the English Channel and the Celtic Sea, during snorkel surveys, in collaboration with swim-with tourism operators. Seven individual blue sharks (Pre-Caudal Length 1088-1496mm, mean \pm SD= 1288 \pm 138mm) were identified using size classes and aged using a known growth curve for the species. All were either immature (Total Length, TL< 1820mm), or maturing (TL= 1820-2210mm) sharks, suggesting that the transient UK population may consist of juvenile and subadult animals. The stereo-video snorkeler-operated system was a simple, low-cost (£191 for the frame alone, £1,444 including all lasers, cameras and accessories) and accurate method for sampling free-swimming blue sharks. Length measurements and individual identification could be used to develop a long-term understanding of the transient UK population of blue sharks.

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Nursehound nursery monitoring along the Tuscany coast, Italy

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Nursehound (*Scyliorhinus stellaris*) is a benthonic shark species, vulnerable worldwide and near threatened in the Mediterranean Sea according to the IUCN in 2016. There is little information on the ecology and nursery sites along the Italian coast. For this reason, the monitoring of nursehound nurseries was carried out along the coast of Monte Argentario in Tuscany between 2018 and 2024 through Scuba diving activities and the use of ROV and BRUVs. In particular, along the north-west coast of Monte Argentario and Argentarola Island between 35-45 meters depth, an important nursery site to be preserved has been identified.

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“Proyecto AtracTibu”: evaluating the paper of science communication in raising awareness about the conservation status of sharks on Valencian coasts

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General public opinion about elasmobranchs in Spain is mostly negative and even non-existent regarding local species awareness, as happens in many countries. This project aims, through science communication strategies and innovative education, to tackle these issues by raising public awareness about the protection and conservation of sharks, while generating open-access educational resources and a protocol for the implementation of this project further on. This pilot initiative started in a secondary 4th grade classroom (16 years old) of the “IES Clot del Moro” (Sagunto, Spain), and has been carried out throughout the 2023-2024 school year, with a continuity during 2025. At the beginning of the project, an assessment of the students' previous knowledge about sharks was carried out. During the learning phase, students got to know sharks first-hand through digital activities, games, interviews, aquarium guided visits and necropsies. This learning is complemented by the scientific-technical phase, in which the class hatched 8 small-spotted catshark (*Scyliorhinus canicula*) eggs in the school facilities, from incidental catches in bottom-trawling nets until the moment of their birth, being transferred to the Oceanogràfic's facilities for their reintroduction in the Mediterranean. Finally, the learning has an outlet through scientific communication actions, such as an Instagram account, science fairs, talks and presentations that have been carried out by the students themselves. A significant change in the knowledge about sharks of the participating students indicates the potential of these approach to generate a significant impact.

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Tiburones y Rayas: Spanish-speaking initiative for the first Shark and Ray Wikimarathon

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The international use of English as a language for science and academic purposes has proved to be very useful, but at the same time it is a barrier for researchers or audiences with non-native English speakers. With the main objective of giving value to the Spanish-speaking community working with elasmobranchs, we created the initiative 'Tiburones y Rayas' (Spanish for 'Shark and Rays') in January 2024. One of the main purposes of the project is to support and promote the development of materials, information and scientific communication on sharks and rays in Spanish. Hence, as the first main event of the initiative, the first international shark and ray Spanish Wikimarathon was hosted between June and July 2024, with the aim of improving and extending the information on Spanish Wikipedia about these species, thereby making knowledge about them more accessible. Over a two-week period, four local events in Spain, Perú, and Chile were hosted, along with the main hybrid event hosted in Valencia, Spain and parallel online events in South America (México, Argentina, Uruguay and Perú), involving over 100 participants. 47 new articles were created, 114 articles were edited, and 735 references added. The initiative is supported by over 60 organisations from different countries. Here we present the results to serve as inspiration for other outreach and science communication initiatives in different languages, with the aim of making relevant scientific information more accessible and inclusive.

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Investigating the impact of ElectroMagnetic Fields from Offshore Wind Farms on sensitive Fish - The EMFish project

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Offshore wind farms are increasingly proposed to facilitate a global transition towards renewable energy sources. The generated electricity is transported onshore via power cables, which emit electromagnetic fields (EMFs). For species sensitive to EMFs, such as elasmobranchs, the effects of anthropogenic EMFs remain unclear. The EMFish project aims to investigate and inform on the impact of EMFs typical of OWF power cables on marine wildlife using a novel acoustic tag, focusing on benthic elasmobranchs in the Southern North Sea. It received a EuroMarine OYSTER Early Career Researcher Collaboration Grant in December 2023.

To meet its aim, the 1-year EMFish project has three main tasks:

1. Collect in-situ data on magnetic field strengths in the Southern North Sea.
2. Equip benthic elasmobranchs with novel acoustic tags to collect data on their movement behaviour.
3. Create a scientific illustration for local natural history museums to raise awareness about human impacts on marine wildlife.

Alongside these tasks, EMFish aims to deliver two scientific manuscripts for publication: One research note about the collection of in-situ data on magnetic field strengths, and one full manuscript on the collected elasmobranch movement behaviour data.

At the EEA 2024 the EMFish project will be presented to Europe's elasmobranch community. Achievements and tasks completed until then will be shown, and next steps will be outlined. Discussions with experts will benefit the early-career project members profoundly, and the conference audience will hear about the first test of a new acoustic tag which can answer new questions in elasmobranch research.

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Spatio-temporal overlap of elasmobranch aggregations and fishing operations in the Pelagic Archipelago within the Strait of Sicily: Implications for enhanced management measures

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Elasmobranchs are highly susceptible to fishing activities due to their vulnerable life-history traits, to the extent that a gradual decline has been documented worldwide. In the Mediterranean Sea, the “Strait of Sicily and Tunisian Plateau” and the “Pelagic Archipelago and Levante shoal” (PeLA), recently designated as “Important Shark and Rays Areas”, are significant fishing grounds, where elasmobranchs constitute an important portion of both commercial catch and discarded bycatch. To promote effective conservation measures for these populations, a better understanding of the spatiotemporal overlap between elasmobranch occurrence and fishing operations is crucial. We used Baited Remote Underwater Videos (BRUVs) from 2019 to 2023, and coupled this information with Apparent Fishing Hours (Fishing Effort, FE) from the Global Fishing Watch portal to assess the overlap between coastal elasmobranch occurrence and fishing operations in the PeLA. BRUVs identified aggregations of four species (*Raja radula*, *Myliobatis aquila*, *Carcharhinus plumbeus*, and *Dasyatis sp.*) around PeLA. Aggregation patterns over space and time were identified using Principal Component Analysis (PCA), and then PCs related with recorded FE of different locations within the study area. PC1 separated Lampione Island, characterized by high occurrence of endangered species *C. plumbeus*, from the other locations. FE significantly related to PC1 and was highest around Lampione Island, decreased in other parts of the archipelago, indicating a concentrated overlap between sandbar shark occurrence and fishing activity. Our findings provide insights into the spatial overlap between fishing and endangered species, suggesting the need for stricter fishery management measures when these species congregate.

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Communicating Regulations to Support Sustainable Fisheries: Shark Trust Fisheries Advisories

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In the Northeast Atlantic, elasmobranchs are encountered by mixed and directed fisheries. The Shark Trust produces commercial fisheries advisories for use by the fishing industry and enforcement agencies. These advisories are designed to give rapid access to the current legislative status of sharks, skates, and rays for UK and EU vessels in the Northeast Atlantic. Engaging with agencies responsible for enforcement of fisheries legislation, and with the fishing industry, to provide materials and advice supports and promotes sustainable fisheries. The design of the advisories has changed over time following user feedback. As of 2024, the advisories are now entirely digital, with a QR code sticker distributed to the fishing industry and enforcement agencies in March and April of this year. The decision to be entirely digital was taken so that old information is phased out of circulation following legislative changes. This poster presents these advisories, their applications, the process of improving them, and details feedback collected along with user insights. Views of the advisories spiked after distribution of the QR code stickers and have subsequently dropped but remained steady. A similar pattern is seen with the usage statistics of the QR code, but this is to be expected as users may keep the webpage open after the initial scan. Scans of the sticker have been widely distributed across the UK and Ireland. User feedback for this change has been positive, with recognition throughout various fora.

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Diving behavior of kitefin shark and shortspine spurdog in Indian Ocean

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Fisheries in the Indian Ocean (SIOFA) primarily target demersal and benthopelagic species but often accidentally catch deepwater sharks. Recently a project was accomplished in this area aiming to improve scientific advice on deep-water sharks. One of the objectives was to estimate the survival rate of the bycatch of these species. A tagging protocol was implemented on board a commercial vessel using both conventional and electronic tags. In this paper we present the results of two sharks *Dalatias licha* and *Squalus mitsukurii* tagged with electronic satellite tags (MiniPAT). One *Dalatias licha*, a male of 111 cm TL was recorded during 133 days. According to the depth profile the shark does not keep a constant depth but swims up and down in the water column. Vertical displacements ranged between 432 and 944 m with a mean depth of 548 m. Daily depth variation ranged from 0 m to 592 m. The distance covered by the shark from the tagging location and pop-up released was 4.4 miles in straight line. One individual of *Squalus mitsukurii*, a female of 106 cm, was tagged and programmed to record data for 120 days. The depth profile shows that the shark swims up and down the water column keeping an average depth of 254 m, much shallower than kitefin shark. Minimum and maximum depth recorded for this shark were 148 and 718 m respectively. The daily vertical movements can range from 48 m up to 576 m. Distance travelled from the tagging and released location was 1.2 miles.

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First tracking of Portuguese dogfish (*Centroscymnus coelolepis*) in Cantabrian Sea (Bay of Biscay, NE Atlantic)

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During several years, tagging surveys have been conducted in the MPA of EL Cachucho (Bay of Biscay) targeting deepwater sharks. In this paper we present the results obtain from four electronic tags (MiniPATs) deployed on *Centroscymnus coelolepis*. One of the sharks died immediately, other two released prematurely and the fourth one tagged and programmed for 5 months recorded data during this period. The Portuguese dogfish tracked remained at depths around 860 m. The maximum depth recorded was 1700 m. The shark after release dove to the bottom after 9 h from tag deployment reaching 1328 m. Average depth remained more or less constant except that it abruptly peaked to 1400-1500 m. A priori the shark remained in the tagging area.

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Evaluating bycatch rates for the Spiny Butterfly Ray, *Gymnura altavela*, in Amvrakikos Gulf, Greece

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The Spiny Butterfly Ray (*Gymnura altavela*) is Endangered globally and Critically Endangered in the Mediterranean Sea and Greece, with a suspected decline exceeding 80% over the past 20 years. As a protection measure, it has been listed in Annex II of the Barcelona Convention, mandating its release unharmed if captured, without being retained, sold, or displayed. This study assesses the frequency of *G. altavela* captures by examining landings and discards from small-scale fishing operations in Amvrakikos Gulf, a semi-enclosed embayment of 405 km² in northwestern Greece. Data from 973 fishing trips between February 4, 2022, and May 30, 2024, confirmed the bycatch of 209 individuals with an average disc width of 51.3 cm, indicating immaturity. The overall Catch Per Unit Effort (CPUE) was 0.29 individuals per kilometer of net. Psarodichta (trammel nets targeting fishes, e.g. Gilthead seabream, *Sparus aurata*) recorded the highest bycatch rates at 0.57 individuals/km. Notably, 19.1% of individuals were released alive, with the likelihood of release varying based on the ease of disentanglement: 33% were released in Apladia nets (set gillnets targeting small fishes, e.g. European pilchard, *Sardina pilchardus*) compared to 16.8% in Gamparodichta nets (trammel nets targeting Caramote prawn, *Penaeus kerathurus*). The health of individuals, assessed by measuring the time it takes them to flip from a ventral to a dorsal position, showed improvement during the 40-minute tank maintenance. Future studies will incorporate conventional tagging to assess long-term survival post-capture.

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Feeding ecology and trophic levels of sharks and rays from Amvrakikos Gulf, Ionian Sea, Greece

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The role of elasmobranchs as mesopredators has received less focus in comparison with studies realized in high predators like sharks. The aim of this study is to describe qualitatively and quantitatively the dietary habits of sharks and rays inhabiting Amvrakikos Gulf, as well as determine their trophic position. In the context of the By Elasmocatch Project, a total of 537 stomachs were collected belonging to 10 species: *Aetomylaeus bovinus* (n=72), *Bathytoshia lata* (n=2), *Dasyatis marmorata* (n=117), *Dasyatis pastinaca* (n=58), *Dasyatis tortonesei* (n=76), *Gymnura altavela* (n=48), *Mustelus mustelus* (n=54), *Myliobatis aquila* (n=35), *Torpedo marmorata* (n=3) and *Torpedo torpedo* (n=72). Except for *A. bovinus* and *T. torpedo*, most of the individuals analysed were sexually immature. Most recurrent prey items found among all the elasmobranchs species were crustacean Decapoda and unidentified Osteichthyes. Six species of elasmobranchs have specialist diets, while the other two have generalist diets. Niche overlapping was found among *D. pastinaca* and *D. marmorata*, and between *D. pastinaca* and *D. tortonesei*, as they have generalist diets and share food items in terms of composition and quantity. *A. bovinus* has the most specialized diet and lowest feeding overlap with other species. Elasmobranchs in the gulf exhibit continuous and intermittent feeding behaviour. Trophic level ranged between 2.89 (*D. pastinaca*) and 3.25 (*A. bovinus*), suggesting that elasmobranchs from Amvrakikos Gulf are mesopredators. Given that some species are specialist consumers, alteration on prey population structure as result of overfishing or habitat degradation, could impact on the dietary habits of sharks and rays from the gulf.

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A baseline study on elasmobranchs in the Comau Fjord, a Chilean fjord ecosystem in Northern Patagonia

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The largely unexplored Chilean fjords are diverse and complex ecosystems that contain high marine biodiversity. Initial data from the Comau Fjord in Northern Patagonia indicate that several species of elasmobranchs (sharks and skates) inhabit the fjord, yet, there remains a paucity on such inventory studies throughout the Chilean fjords. This study conducts an elasmobranch species inventory in the Comau Fjord over a period of six months, combining morphological and molecular analysis to confirm the species identification. Biological data were additionally collected (i.e. sex, maturity and length) to gain insights into the biological aspects of the elasmobranch community in the fjord and their relative abundance. In total, > 300 sharks and skates were recorded, belonging to six families and nine species. The results show that more species of elasmobranchs inhabit the fjord than previously assumed and that this is equivalent to nearly 20% of the elasmobranch richness found in Southern Chile. The Comau Fjord was further suggested to be a crucial habitat for several elasmobranchs, including the spiny dogfish (*Squalus acanthias*) and the bluntnose sixgill shark (*Hexanchus griseus*). This is the first time that a species inventory of elasmobranchs is conducted in a Chilean fjord system. The study provides crucial information about the elasmobranch community and their functioning role within the fjord ecosystem, which is essential for decision makers and conservation managers to improve and conserve the elasmobranch biodiversity.

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Deep-sea Elasmobranchs as Environmental Pollution sentinels in the MEDiterranean: the DEEP-MED project

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The deep sea is a key region to evaluate the accumulation, distribution, and trophic transfer of Trace elements (TEs) from natural and anthropogenic sources and Microplastics (MPs). Among the organisms living in a deep-sea environment, elasmobranchs play a crucial role in regulating these ecosystems. Moreover, elasmobranchs' deep-sea species are long-lived with slow growth rates and are likely to reach maturity at an advanced age than species from continental shelf areas; they tend also to feed at higher trophic levels than their shallow-water counterparts and thus could be exposed to higher levels of TEs and MPs for longer periods hence their accumulation could be greater. DEEP-MED aims to compare the accumulation rates of TEs and MPs in four different bento-pelagic deep-sea elasmobranch species with diverse ecology and feeding habits (*Galeus melastomus*, *Scyliorhinus canicula*, *Raja clavata* and *Chimaera monstrosa*), considering correlation with growth rates and reproductive status, parasitic load, and the effects on brain anatomy, behavior, and embryonic development after exposure of developing eggs to mercury. The study area is represented by the Tyrrhenian Calabria and Mazara del Vallo (in the Sicilian Channel). The project will contribute to fill knowledge gaps in the ecology and biology of Mediterranean deep-sea elasmobranch species, providing new information about the anthropic impact on these vulnerable marine organisms, as well as a knowledge base of their life history traits.

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Be a Shark Spotter: Contributing to Scotland's Marine Research

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Scotland's cold waters, contrary to common beliefs, are home to a rich diversity of shark species. This study leverages citizen science data from platforms such as iNaturalist and GBIF to document 12 shark species found in these waters. Over a period of 145 years, we analyzed 3,844 verified observations, cross-checked by marine biologists and official databases. Among the most frequently recorded species are the basking shark (*Cetorhinus maximus*), small-spotted catshark (*Scyliorhinus canicula*), nursehound (*Scyliorhinus stellaris*), spiny dogfish (*Squalus acanthias*), and porbeagle (*Lamna nasus*). Our findings reveal increased sightings during warmer months, offering valuable insights into seasonal patterns and behaviors. Geographic mapping of these sightings highlights significant distribution trends, emphasizing the importance of continued conservation efforts. Public participation has been key to this research, with citizen science playing a vital role in collecting long-term data. This poster seeks to raise awareness and challenge misconceptions about shark presence in Scotland's waters, while encouraging continued public involvement in reporting shark sightings. By supporting initiatives like this, the public can contribute meaningfully to shark conservation and ensure the ongoing study and protection of these species. Public engagement is essential to safeguarding Scotland's marine biodiversity for future generations and supporting more informed conservation strategies.

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The Importance of Amvrakikos Gulf (Greece) as a Nursery Area for Sharks and Rays

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Elasmobranchs are one of the oldest groups of fish and are now facing high extinction risks because of anthropogenic activities, particularly fishing. Due to their complex life-history traits as k-selected species, they cannot withstand high mortality rates. For this reason, some species of sharks and rays use nursery areas to reduce the mortality of newborns by avoiding predators and having abundant food. These areas can have a direct effect on the abundance of the adult population of the species, therefore they are of high importance and should be prioritized in conservation efforts. Located in northwest Greece, Amvrakikos Gulf is a peculiar area with high nutrients and low salinity, and is home to ten elasmobranch species. This study aims to determine whether Amvrakikos Gulf serves as a nursery for the Vulnerable Common Smoothhound, *Mustelus mustelus*; the Critically Endangered Duckbill Eagle Ray, *Aetomylaeus bovinus*; the Critically Endangered Spiny Butterfly Ray, *Gymnura altavela*; and the Least Concerned Ocellate Torpedo, *Torpedo torpedo*. Fishery-dependent data, including 949 interviews with fishers and 503 biological measurements of bycaught individuals, was collected from February 2022 to April 2024. results of this study show that these species use the gulf as a nursery. Future research, including fishery-independent data and acoustic telemetry, will be needed to further confirm these findings also for the other species inhabiting the gulf and further support conservation efforts.

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Insights on the actual interactions of pelagic elasmobranchs with drifting midwater longlines in the Central Mediterranean Sea

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The pelagic waters of the Mediterranean are home to a wide range of marine species, some of which have endemic and vulnerable status or are considered intrinsically rare. Pelagic fishing operations may disrupt marine species in several ways and likely, along with targeted fishing, incidental catches (by-catch) and retaliatory killings are considered the main ones. In turn, the pelagic fauna can reduce fishers' income through depredation or bait removal from their gears. This has led to increasing human-wildlife conflicts, thus raising both socio-economic and conservation concerns. Despite this, there is no information on the interactions between pelagic elasmobranchs and fishing gears deployed in the open sea, other than that belonging to fishery-dependent data. Here, we used experimental drifting longlines with line-mounted cameras to assess the composition and structure of pelagic shark and ray species around the Pelagie Archipelago (Central Mediterranean Sea), and documented their actual interactions (incidental catches, bait depredation and sightings) with drifting longlines in over 550 hours of videos. Our results showed three species of sharks and rays interacting with longline baits as feeding opportunities, and one ray species being accidentally caught. We propose fishery-related video surveys as promising tools for monitoring the biodiversity of elasmobranch assemblages, as well as for assessing the behavior of threatened species and their interactions with fishing gears. The use of this technique also allows to quantifying the actual incidence of by-catch events compared to depredation interactions, thus providing key information both from a conservation and management perspective.

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Insights on a new ectoparasite of the blackchin guitarfish, *Glaucostegus cemiculus*, in Cádiz (Atlantic, south Spain)

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Parasites are frequently overlooked species that, when host-specific, face the same fate towards extinction as their endangered hosts. We present a new monogenean ectoparasite of the blackchin guitarfish (*Glaucostegus cemiculus*) collected during the tagging campaign of “Proyecto Glaucostegus”, which study this Critically Endangered species off Cádiz and Huelva (Andalucía, Spain). Eighteen *G. cemiculus* were examined for parasites. A total of 48 monogeneans (prevalence = 44,4%) were collected from the posterior region of the base of pelvic fins on the field and preserved in 96° ethanol and later transferred to absolute ethanol, some individuals were studied fresh in salt water. The monogeneans showed characteristics that place them within the monocotyloid subfamily, Dasybatotrematinae. However, it does not seem to fit into any of the existing genera or species within this family. Previous records report the presence of *Mehracotyle insolita* (Monocotyliidae), a strictly specific species on the gills of *G. cemiculus*. Nevertheless, geographic distribution, location within the host, size, and the unique diagnostic traits (presence of several testes and a multilobulate ovary) confirm that it is a different genus and species. *Glaucostegus cemiculus* would at least harbour two specific species and probably two genera. This is a call for action for anyone working with endangered elasmobranchs and might be working unknowingly with endangered parasites too. Critically Endangered species, particularly those with charismatic traits, often serve as ‘umbrella species’ to protect a wider concepts (ecosystems, regions, orders). For parasites, their hosts act naturally as their ‘umbrella species’ underscoring the need for integrated conservation strategies.

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Jaw Morphometric Analysis of White Sharks (*Carcharodon carcharias*) in Tunisian waters

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In the Mediterranean Sea, white sharks (*Carcharodon carcharias*) have been sporadically but regularly detected throughout the year, yet little is known about the ecology and biology of the Mediterranean population. Studying white sharks in this region is challenging due to their low population density and the absence of conventional aggregation sites, such as around pinniped colonies. Shark jaw morphology is considered a key method for identifying shark species. For white sharks, knowledge of jaw morphometry is limited, but it can be directly linked to the size of individuals and their distribution, which is crucial for adopting effective conservation strategies. Tunisia leads the Mediterranean in landing production, with elasmobranchs commonly caught both as bycatch and target species. In response to interviews with local fishers, we launched a systematic monitoring survey of landings in January 2023 to assess the significance of white sharks in the region. Among the 33 individuals captured, we took 5 morphometric jaw measurements for 16 white sharks: Right Side Upper Jaw (RUJ), Left Side Upper Jaw (LUJ), Right Side Lower Jaw (RLU), Left Side Lower Jaw (LLJ) and Upper Jaw (UJ). We found a strong correlation between upper jaw length and total length, indicating that jaw morphometry can effectively estimate the total length of white sharks. This is a valuable tool for reconstructing the crucial data needed to assess the distribution of different population sizes. Such information is essential for developing targeted conservation strategies to protect this critically endangered species in Tunisia and throughout the Mediterranean.

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The Quest for archival materials uncovered three unpublished great white sharks, *Carcharodon carcharias*, caught in the waters of the Gulf of Lion, Northwestern Mediterranean Sea, between the 1920s and 1950s

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Extensive archival investigations resulted with the discovery of three unpublished specimens of the great white shark, *Carcharodon carcharias* (Linnaeus, 1758), caught in the waters of the Gulf of Lion (NW Mediterranean Sea, GSA07). Examined materials consisted of archival photographs and a newspaper report (specimen No. 1 and 3), and a complete set of upper and lower jaws (specimen No. 2). The unpublished specimens were caught in artisanal trammelnet fishery by the fishermen of Brusç Port, Toulon (France). Total lengths of the studied specimens were estimated between ca. 400 to 480 cm.

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