

6-8 Oct | EEA 2026
**Discussion.
Collaboration.
Action.**



**ABSTRACT
BOOKLET**

EEA Agenda - Tuesday 6th October 2026

EEST	CEST	UTC +1	SPEAKER	PRESENTATION
11:00	10:00	09:00	Ali Hood & Cat Gordon	EEA welcome
OCEANIC REALM				
11:10	10:10	09:10	Chair: Ali Hood	Session introduction
11:20	10:20	09:20	Leire Lopetegui Eguren	Post-release survival of silky sharks in tropical tuna purse seine fishery under best handling practices: insights from tagging and predictive modelling
11:30	10:30	09:30	Gloria Marino Briceno	Estimates of elasmobranch bycatch in the Atlantic by tuna fisheries to guide mitigation priorities
11:40	10:40	09:40	William Travers	A dedicated survey of the spinetail devil ray (<i>Mobula mobular</i>) along the west coast of Corsica
11:50	10:50	09:50	Baiq Lista Azkia Sulhana	Spatio-temporal patterns and biological characteristics of silky shark (<i>Carcharhinus falciformis</i>) and scalloped hammerhead (<i>Sphyrna lewini</i>) landings at Tanjung Luar, Indonesia
11:55	10:55	09:55	SESSION Q&A	
12:05	11:05	10:05	Lola Lacambra Andreu	Evaluating ICCAT Conservation and Management Measures for Pelagic Sharks and Rays: Progress in Reporting, Mitigation, and Research
12:15	11:15	10:15	Efin Muttaqin	Turning Regulation into Practice: Advancing the Shark and Ray Conservation Measures and Tuna Industry Engagement
12:25	11:25	10:25	Lucas Zaccagnini	Porbeagle aggregation in Brittany: fine-scale monitoring and perspectives on North Atlantic connectivity
12:35	11:35	10:35	Nicolas Ziani	Environmental Constraints of the Reproduction of Myliobatiform rays within the Pelagic Zone
12:40	11:40	10:40	Cassiopé Muller	Hidden interactions in the North-East Atlantic: sea lamprey parasitism of porbeagle sharks (<i>Lamna nasus</i>)
12:45	11:45	10:45	SESSION Q&A	
13:00	12:00	11:00	BREAK - SIDE EVENTS, WORKSHOPS & SPECIALIST SESSIONS	
CITIZEN SCIENCE & LEK				
14:00	13:00	12:00	Chair: Cat Gordon	Session introduction
14:05	13:05	12:05	Malo Rio	Unlocking key information for Mediterranean sharks conservation through Fishers' Ecological Knowledge
14:15	13:15	12:15	Gordon Watson	Catching tope (<i>Galeorhinus galeus</i>): using recreational angling competitions to drive species recovery.
14:25	13:25	12:25	Lara Howe	Isle of Man Small Shark Tagging Programme
14:35	13:35	12:35	Harriet Allen	The Great Eggcase Hunt: where we are and what we're finding!

14:45	13:45	12:45	Sophia Schmalzer	A Global Perspective of Tourism-Based Citizen Science Initiatives in Shark Conservation: Challenges in Collaboration, Coordination and Networking
14:55	13:55	12:55	Rachel Mawer	Tope in the Bristol Channel: combining acoustic telemetry and citizen science to address a data gap
15:05	14:05	13:05	Lauren Smith	Monitoring a Flapper Skate (<i>Dipturus intermedius</i>) Egg- Laying Site in Loch Melfort, Scotland, by a Community Science Group.
15:15	14:15	13:15	SESSION Q&A	
15:30	14:30	13:30	BREAK - SIDE EVENTS, WORKSHOPS & SPECIALIST SESSIONS	
FISHERIES SCIENCE & MANAGEMENT				
16:30	15:30	14:30	Chair: Jim Ellis	Session introduction
16:35	15:35	14:35	Jack Renwick	Fisheries Management Plans: An NGO Perspective
16:45	15:45	14:45	Jasmine Barzin	Population demographics of highly vulnerable bycatch species in Papua New Guinea's fish maw fishery
16:55	15:55	14:55	Giovanna Bergamin	Effectiveness of bycatch mitigation devices in reducing captures of elasmobranchs in small-scale fisheries in the Amvrakikos Gulf, Greece
17:05	16:05	15:05	Robert Enever	SharkGuard: Advances in Electric Pulse Deterrent technology
17:10	16:10	15:10	Mikaela Abayakoon Stanborough	Drawing Change: Using Visual Storytelling to Shift Community Perspectives on Fisheries Management in Sri Lanka
17:15	16:15	15:15	SESSION Q&A	
BIOLOGICAL STUDIES				
17:25	16:25	15:25	Chair: Hettie Brown	Session introduction
17:30	16:30	15:30	Sara Asadi Gharabaghi	A Novel Application of NICMA: The First Energy Budget Assessment of the Blue-Spotted Ribbontail Ray (<i>Taeniura lymma</i>)
17:40	16:40	15:40	Jan Bierwirth	The shy, the bold, the variable: Personality differences in free-ranging adult bull sharks
17:50	16:50	15:50	Wim Zimmermann	Drone photogrammetry provides repeatable measurements of body size and shape in whale sharks
18:00	17:00	16:00	Héctor Toledo Padilla	Tracking Angelsharks Across the Lobos Marine Corridor: Connectivity, Threats and Spatial Conservation
18:10	17:10	16:10	Alicia S. Velázquez-Wallraf	Development of a pilot model to estimate post-mortem interval in elasmobranchs
18:15	17:15	16:15	Pablo Villafranca Sánchez	From predator to prey: an instance of opportunistic predation in <i>Squatina squatina</i>
18:20	17:20	16:20	Cristina Porcu	Hepatic melanomacrophages in elasmobranchs: unveiling natural variability for their use as biomarkers
18:25	17:25	16:25	SESSION Q&A	
18:35	17:35	16:35	Ali Hood	CLOSE OF DAY

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EEA Agenda - Wednesday 7th October 2026

EEST	CEST	UTC+1	SPEAKER	PRESENTATION
LIVING WITH SHARKS				
11:00	10:00	09:00	Chair: Cat Gordon	Welcome & session introduction
11:05	10:05	09:05	Jonathan Mitchell	Shark depredation: a growing human-wildlife conflict threatening shark conservation
11:15	10:15	09:15	Victoria Camilieri-Asch	Finding a path to coexistence between fishers and sharks in the deepwater line fishery at Cocos Keeling Islands (Australia) using a new deterrent device
11:25	10:25	09:25	Paolo Cappa	Using big data analytics to assess SMART drumlines as an ecologically appropriate fishery strategy for shark bite management
11:35	10:35	09:35	Eleonora de Sabata	Living Together: the LIFE European Sharks approach to elasmobranch conservation in the Mediterranean Sea— the case of <i>Mustelus</i> spp.
11:45	10:45	09:45	SESSION Q&A	
TRADE AND UTILISATION				
11:55	10:55	09:55	Chair: Paddy Walker	Session introduction
12:00	11:00	10:00	Rebecca Lewis	Illicit trade of elasmobranchs in India: 2015–2021
12:10	11:10	10:10	Elisabeth Fahrni Mansur	Improving the management of fish maw fisheries and trade to reduce the extinction risk of threatened marine wildlife
12:20	11:20	10:20	Inge M Turk	Unseen shagreen: Quantifying an emerging online trade in endangered stingrays
12:30	11:30	10:30	Christopher Mull	The Global Footprint of Fish and Chips
12:40	11:40	10:40	Tomas Bañeras Bosch	Is it safe to eat shark? Metal bioaccumulation and human health risk assessment in <i>Squalus megalops</i> meat from Gran Canaria
12:45	11:45	10:45	Nuthatai Chotechuang	Unveiling the species in shark-based pet snack products sold in Thailand with an overview of e-commerce trends
12:50	11:50	10:50	SESSION Q&A	
13:00	12:00	11:00	BREAK - SIDE EVENTS, WORKSHOPS & SPECIALIST SESSIONS	
GENOMICS				
14:00	13:00	12:00	Chair: Eleanor Greenway	Session introduction
14:05	13:05	12:05	Dylan Jones	Comparing the effectiveness of protein and DNA analysis for the species identification of elasmobranch egg casings
14:15	13:15	12:15	Martina Ciprian	Genetic population structure of the Common Smoothhound (<i>Mustelus mustelus</i>) across the Mediterranean Sea
14:25	13:25	12:25	Carolyn Dahms	Genomics for shark conservation: Unraveling sex-biased demography and ancient lineages in reef sharks

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14:35	13:35	12:35	Alice Manuzzi	A genetic toolkit for elasmobranch eDNA monitoring in the Northeast Atlantic
14:45	13:45	12:45	Hap Fatzinger	Elasmobranch Genetics Project for ex situ and in situ conservation
14:55	13:55	12:55	Alice Iddon	Population connectivity of the porbeagle shark (<i>Lamna nasus</i>) across the North Atlantic Ocean revealed by microsatellite and mitochondrial markers
15:05	14:05	13:05	Martina Arcioni	Advancing non-invasive dietary studies in elasmobranchs: validation of the fDNA metabarcoding approach
15:10	14:10	13:10	SESSION Q&A	
15:20	14:20	13:20	BREAK - SIDE EVENTS, WORKSHOPS & SPECIALIST SESSIONS	
SCINTILLATING SKATES				
16:30	15:30	14:30	Chair: Jack Renwick	Session introduction
16:35	15:35	14:35	Gioia Egloff	Getting Busier with Age: Dorsal Pattern Variation in Thornback Skates (<i>Raja clavata</i>)
16:40	15:40	14:40	Licia Finotto	A tale of two skates: biological and ecological aspects of two commercial species inhabiting the Northern Adriatic Sea
16:50	15:50	14:50	Kevan McBean	Structural differences in the metal concentrations found in egg cases of flapper skate (<i>Dipturus intermedius</i>)
17:00	16:00	15:00	Rebecca Greatorex	Behavioural responses of thornback ray embryos to offshore windfarm related stressors.
17:10	16:10	15:10	Carla Ewart	Revealing Hidden Layers: High-resolution analysis of elasmobranch eggcase structure and composition.
17:20	16:20	15:20	Simone Di Crescenzo	<i>Raja radula</i> Delaroche, 1809: From Genetic Diversity to Cryptic Lineages in the Mediterranean Rough Skate
17:25	16:25	15:25	SESSION Q&A	
BIG FISH - BIG DATA				
17:35	16:35	15:35	Chair: Harriet Allen	Session introduction
17:40	16:40	15:40	Avivit Levy	EcoMorphLab: a desktop-based computer-vision and machine-learning platform for exploratory analysis of morphological variation in marine organisms
17:50	16:50	15:50	Ryan Charles	Emerging global patterns in Important Shark and Ray Areas
18:00	17:00	16:00	Nicholas K. Dulvy	Sharkipedia: living data for all 1,250 sharks, rays, and chimaeras
18:10	17:10	16:10	Simon Dedman & Guuske Tiktak	Shark Oracle: a Comprehensive Living Database of Elasmobranch Research for Literature Reviews, Research Geography, and Conservation Prioritisation
18:20	17:20	16:20	SESSION Q&A	
18:30	17:30	16:30	Cat Gordon	CLOSE OF DAY

EEA Agenda - Thursday 8th October 2026

EEST	CEST	UTC+1	SPEAKER	PRESENTATION
11:00	10:00	09:00	Ali Hood	Welcome
		CHONDRICHTHYANS IN DEEPWATER		
11:05	10:05	09:05	Chair: Brit Finucci	Session introduction
11:10	10:10	09:10	Brit Finucci, Cassie Rigby, Jules McAlpine, Madeline Green	Short presentations & panel discussion: Out of Sight, No Longer Out of Mind: Deepwater Sharks and Global Policy
11:45	10:45	09:45	Romaric Jac	How do you study a ghost? A multi-method framework for understanding <i>Chimaera monstrosa</i> in Norwegian waters
11:55	10:55	09:55	Laurence Fauconnet	Shedding light in the deep sea: an effective bycatch avoidance measure for elasmobranchs in bottom longline fisheries?
12:05	11:05	10:05	Claudia Valerioti	Trophic niche partitioning among demersal Chondrichthyes in the Strait of Sicily: Insights into resource use in deep-sea ecosystems
12:15	11:15	10:15	Leonor Mendonça	Incorporating fishers' knowledge into vulnerability assessments of two data-poor deep-sea shark species to the bottom longline fishery in the Azores
12:25	11:25	10:25	Guillaume Beauvois	Spatial analysis of trade-off areas for the bottom longline fishery in the Azores
12:35	11:35	10:35	Samira Gallo	Tissue-specific trace element distribution in the blackmouth catshark (<i>Galeus melastomus</i>) from the Strait of Sicily
12:40	11:40	10:40	Riccardo Porceddu	Postnatal brain development in the deep-water shark <i>Galeus melastomus</i>
12:45	11:45	10:45	SESSION Q&A	
13:00	12:00	11:00	BREAK - SIDE EVENTS, WORKSHOPS & SPECIALIST SESSIONS	
CONSERVATION				
14:00	13:00	12:00	Chair: Àlex Bartolí	Session introduction
14:05	13:05	12:05	Jim Ellis	Listing fish on Multilateral Environmental Agreements: Is there a need for broader scientific input and review?
14:15	13:15	12:15	Eva K.M. Meyers	Uniting a Region for a Species: An International Working Group Delivering the Mediterranean Angelshark Action Plan under the Convention on Migratory Species
14:25	13:25	12:25	Leonor de Miguel Ozanne	Policy framework for the conservation and management of activities affecting sharks, rays, and chimaeras and its implementation in French law
14:35	13:35	12:35	Samy Yasser Abouhussein	Preliminary Survey of Elasmobranch Diversity for Further Conservation in Egypt's Mediterranean Coast
14:45	13:45	12:45	Manu Krishnadath	Not only Great Whites: An exploratory study on coloniality in shark conservation

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14:50	13:50	12:50	Tobias Capel	The Angel Shark Conservation Network: Coordinated Action for the Conservation of Critically Endangered Angel Sharks
14:55	13:55	12:55	Marcela Maki Alvarenga	Angels in Trouble in the Southwest Atlantic
15:00	14:00	13:00	Bethan Smith	A Holistic Approach to Shark Protections: Biocentrism in Law, Ethics, & Culture
15:05	14:05	13:05	Eynav Cohen	Beyond a Single Nursery Ground: Insights into Blackchin Guitarfish (<i>Glaucostegus cemiculus</i>) Nursery Ecology
15:10	14:10	13:10	Irene Kingma	CMS SSAPs: priority actions for Tope & other elasmobranchs
15:20	14:20	13:20	SESSION Q&A	
15:30	14:30	13:30	BREAK - SIDE EVENTS, WORKSHOPS & SPECIALIST SESSIONS	
			ECOLOGICALLY-IMPORTANT AREAS	
16:30	15:30	14:30	Chair: Jim Ellis	Session introduction
16:35	15:35	14:35	Luca Asshauer	More Than an Aggregation: Individual Variation in Residency, Social Structure and Behavioral Ecology of Tiger Sharks (<i>Galeocerdo cuvier</i>) in Fuvahmulah, Maldives
16:45	15:45	14:45	Leire Gabiola Hernandez	Biotic and abiotic factors that determine the presence of the angel shark (<i>Squatina squatina</i>) at Las Teresitas beach
16:55	15:55	14:55	Ángela Palomino Gaviria	Unravelling the spatial ecology of four Myliobatiformes in the northwestern Mediterranean
17:05	16:05	15:05	M. Nicole Firing	Relative abundance of elasmobranchs in nearshore habitats of St. Barthélemy, French West Indies
17:10	16:10	15:10	Helena Verbruggen	Integrating Important Shark and Ray Areas into Marine Protected Area Network Design in the Australian Exclusive Economic Zone
17:15	16:15	15:15	Charlie Matthews	Beyond bombs and batoids: an emerging multi-species elasmobranch hotspot in need of protection at Filfla, Malta
17:20	16:20	15:20	SESSION Q&A	
17:30	16:30	15:30	Nikoletta Sidiropoulou	Habitat Association of Selected Elasmobranchs in Lemnos: Looking into Posidonia Meadows, Maerl Beds and Rocky Reefs
17:40	16:40	15:40	Filippo Bocchi	Cleaning-associated behaviour of pelagic thresher sharks (<i>Alopias pelagicus</i>) at a Maldivian Atoll. Can cleaning events influence the spatial ecology of pelagic thresher sharks?
17:50	16:50	15:50	Jule Buschmann	Spatial ecology, site fidelity and courtship behaviour of Critically Endangered leopard sharks (<i>Stegostoma tigrinum</i>) in southern Mozambique
18:00	17:00	16:00	Hristina Gelevska	Is the Gulf of Trieste a Potential Nursery Area for Certain Elasmobranch Species?
18:10	17:10	16:10	Annika Herzog	Distribution of Early Life Stages of Three Threatened Stingrays in Amvrakikos Wetlands National Park (Greece)
18:15	17:15	16:15	Maria Pozo Montoro	From monitoring to conservation: new insights into the last known population of the Common Guitarfish (<i>Rhinobatos rhinobatos</i>) in the Western Mediterranean
18:20	17:20	16:20	SESSION Q&A	
18:30 - 18:45	17:30 - 17:45	16:30 - 16:45	Ali Hood & Cat Gordon	CLOSING REMARKS

DAY 1 — SESSION 1 (Oceanic Realm)

Post-release survival of silky sharks in tropical tuna purse seine fishery under best handling practices: insights from tagging and predictive modelling

Leire Lopetegui Eguren¹; Maitane Grande¹, Nagore Cuevas², Jefferson Murua², Alex Salgado¹, Maite Erauskin-Extramiana¹, Iñigo Onandia², Arnaitz Mugerza², Lluís Horrach², Jon Ruiz², Hilario Murua³, Gala Moreno³, Josu Santiago², Haritz Arrizabalaga¹

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³International Seafood Sustainability Foundation, Pittsburgh, PA, 15201, United States.

Silky sharks (*Carcharhinus falciformis*) are the most common shark bycatch species in tropical tuna purse seine fisheries, making reliable estimates of post-release survival essential for evaluating mitigation measures. This study identified the main factors influencing post-release survival and estimated survivorship at the scale of commercial fishing operations. Between 2020 and 2026, 2,685 released silky sharks were observed aboard purse seiners in the Atlantic, Indian, and Pacific Oceans, of which 220 were satellite-tagged to determine post-release fate. Binomial Generalized Additive Models (GAMs) developed from sharks with known outcomes showed that vitality at release, total tuna catch, and shark length were the main predictors of survival, explaining 41.4% of deviance (AUC = 0.87; TSS = 0.66). Survival increased strongly with vitality, approaching 100% for sharks released in excellent condition, while larger catches reduced survival. Applying the model to all observed sharks revealed marked variation among fishing trips, with predicted mean survival ranging from 0.205 to 0.636. Larger catches and longer retention times in the sac were associated with lower survival probabilities. These findings indicate that shark condition at release is the main determinant of survival and that further improvements will require reducing stress and injury before release, particularly by minimizing retention time and adverse conditions while sharks remain confined in the sac.

Silky Shark, bycatch, post-release survival

Estimates of elasmobranch bycatch in the Atlantic by tuna fisheries to guide mitigation priorities

Gloria Marino Briceno¹; Hilario Murua², Maitane Grande³, Miguel Herrera⁴, María José Juan Jordá¹

¹Spanish Institute of Oceanography (IEO), Madrid, Spain;

²International Seafood Sustainability Foundation (ISSF), Pittsburgh, Pennsylvania, USA;

³AZTI, Marine Research, Basque Research and Technology Alliance (BRTA), Basque Country, Spain;

⁴Organización Productores Asociados Grandes Atuneros Congeladores (OPAGAC), Madrid, Spain.

Overfishing and incidental capture remain major threats to the survival of many elasmobranch species. Several mitigation measures have been developed to reduce catches and associated mortalities in different fisheries, but each entails trade-offs between conservation benefits and operational feasibility. Therefore, efforts to implement mitigation measures should focus on fisheries with the greatest impact. Quantifying fleet-species interactions helps identify where elasmobranch catches and mortalities are highest, guiding the prioritization of mitigation efforts.

In the Atlantic Ocean, under the management framework of the International Commission for the Conservation of Atlantic Tunas (ICCAT), this study updates and expands previous assessments of bycatch of Endangered, Threatened, and Protected shark and ray species. It incorporates recent data (2010–2024) and provides species-level estimates of catches by fleet and region. We compiled public fisheries data from logbooks, observer records, and published sources documenting fleet-level shark and ray catches across ICCAT fisheries.

By identifying high-risk species—fleet interactions and the fisheries contributing most to overall impacts, it delivers essential knowledge for evidence-based bycatch management. These results form a foundation for prioritizing and implementing the most appropriate mitigation measures within ICCAT to reduce elasmobranch bycatch and mortality.

bycatch, RFMO, Atlantic

A dedicated survey of the spinetail devil ray (*Mobula mobular*) along the west coast of Corsica

William Travers¹, Lapinski Matthieu¹, Bisch Amaelle¹

¹AILERONS Association

AILERONS is a French NGO studying Mediterranean elasmobranchs. From 2020 to 2026, AILERONS has conducted seven surveys along the west coast of Corsica to study the occurrence and behaviour of the Spinetail devil ray (*Mobula mobular*). This threatened species remains poorly understood in the Mediterranean, particularly regarding its spatial ecology and behaviour. Surveys covered 7,453 km over 47 days. A total of 190 observations and 454 individuals were recorded through non-exhaustive counts and several behavioural events documented.

We described the spatial distribution of observations while accounting for survey effort. Observation rates were standardised to survey effort and expressed as observations per 100 km. Rates were higher in the southern part of the study area, particularly off the Ajaccio and Sagone canyons.

Behavioural observations were mapped according to 4 categories: breaching, reproduction, feeding and aggregation. Breaching was recorded in 56% of observations, while reproductive behaviours, feeding and aggregation were recorded in 9%, 3% and 2%, respectively. Breaching was widely distributed, whereas feeding events appeared more spatially restricted.

These first results provide a first synthesis of this 7-year survey programme, highlighting their value for documenting recurrent devil ray occurrence and remarkable behaviours along western Corsica. This unique dataset provides a basis for further investigating environmental drivers of occurrence and behaviour.

Spinetial Devil Ray, spatial distribution, swimming behaviour

Spatio-temporal patterns and biological characteristics of silky shark (*Carcharhinus falciformis*) and scalloped hammerhead (*Sphyrna lewini*) landings at Tanjung Luar, Indonesia

Baiq Lista Azkia Sulhana¹, Rolf Voorhuis², Raditya Andrean Saputra², Charles Lucas Makio², Muhsin²

¹Indonesia Biru Foundation;

²Coral Reef Care

Tanjung Luar is an established shark landing centre in East Lombok, but publicly accessible long-term biological landing data remain limited. This study provides continuous landing observations from January 2025, followed by expanded monitoring from September 2025, to examine maturity patterns by reported ground and month. Observations covered 15–18 days per month and represent sampled landings. 9,129 records representing 81 species were documented, with silky shark (*Carcharhinus laliformis*) as the highest caught representing 52.0% of records. The result found the silky shark were 2,549 immature, 571 mature, and 5 unclassified individuals; 81.6% of classified individuals were immature. Scalloped hammerheads (*Sphymna lewini*) comprised 259 immature and 73 mature individuals, with 78.0% immature. Immature silky sharks occurred across nearly all reported grounds, while scalloped hammerheads showed greater spatial variation. Overall, Savu Sea had the highest number of immature individuals. Silky shark was immature-dominated in most months, although this pattern shifted in July 2026, while scalloped hammerhead remained generally immature-dominated in months with sufficient sample sizes. The prevalence of immature individuals raises concerns about fishery sustainability. These findings support incorporating spatial and temporal fisheries information into adaptive shark fisheries management.

physiological, sharks, spatio-temporal

Evaluating ICCAT Conservation and Management Measures for Pelagic Sharks and Rays: Progress in Reporting, Mitigation, and Research

Lola Lacambra¹, Gloria Mariño¹, Hilario Murua², Maitane Grande³, María José Juan-Jordá¹

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Tuna regional fisheries management organizations (trFMOs) provide the central governance framework for pelagic sharks and rays in tuna fisheries. Since 1995, ICCAT has progressively adopted Conservation and Management Measures (CMMs) to strengthen fishery reporting, mitigate bycatch and mortality, and support elasmobranch research. We assess their evolution across three pillars: reporting, mitigation and research, and identify gaps between regulation, scientific evidence and observed outcomes.

For reporting, we examined ICCAT requirements and temporal patterns in Task I and Task II data. For mitigation, we classified CMMs according to the mitigation hierarchy and assessed their regulatory strength, taxonomic and gear coverage, and alignment with scientific evidence. For research, we examined whether priorities established in CMMs have been addressed through ICCAT scientific activities.

Preliminary results show improved species-level reporting and reduced use of aggregated taxonomic categories, although gaps remain for many sharks and rays. Mitigation remains concentrated on post-capture remediation, while binding avoidance and minimization measures are scarce. Research priorities have stimulated scientific activity, but key knowledge gaps persist. Together, these findings identify where ICCAT has strengthened evidence-based management and where gaps remain between knowledge and regulatory action.

bycatch mitigation; elasmobranch conservation; fisheries management

Turning Regulation into Practice: Advancing the Shark and Ray Conservation Measures and Tuna Industry Engagement

Efin Muttaqin¹, Paula Schiefer², Ayi Warmia¹, Lilik T Pambudi¹, Toni Ruchimat¹, Joanna Murray²

¹Fisheries Resource Center of Indonesia, Rekam Nusantara Foundation, Bogor, Indonesia;

²Centre for Environment, Fisheries and Aquaculture Science, Lowestoft Laboratory, Lowestoft, UK.

Tuna regional fisheries management organizations (trFMOs) provide the central governance framework for pelagic sharks and rays in tuna fisheries. Since 1995, ICCAT has progressively adopted Conservation and Management Measures (CMMs) to strengthen fishery reporting, mitigate bycatch and mortality, and support elasmobranch research. We assess their evolution across three pillars: reporting, mitigation and research, and identify gaps between regulation, scientific evidence and observed outcomes.

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IOTC compliance; shark and ray bycatch management; fisher engagement

Porbeagle aggregation in Brittany: fine-scale monitoring and perspectives on North Atlantic connectivity

Lucas Zaccagnini^{1,2}, Arthur Ory¹, Paul Abaut¹, Gael Le Croizier³, Armelle Jung¹

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³French National Research Institute for Sustainable Development (IRD), Technopôle Brest-Iroise, Rue Dumont d'Urville, 29280 Plouzané, France.

Porbeagle sharks (*Lamna nasus*) are Globally Vulnerable and Critically Endangered in Europe, yet knowledge of their spatial ecology use and reproductive behaviour remains scarce. Over five years, a non-capture monitoring program has investigated a recurrent seasonal aggregation in northern Brittany (southern English Channel). Monitoring relies on photo-identification of persistent marks, combined with ecological and behavioural observations while freeing. To date, 181 individuals have been identified, including 26 re-sighted 2–16 times across years. The aggregation is strongly female-biased (95%), with evidence of site fidelity and consistent seasonal use from May to October. Repeated observations of pregnant females and recurring pairs of individuals, together with first records of mating behaviour, highlight the ecological importance of this area and provide new insights into porbeagle reproductive ecology. These observations raise broader questions about the role of aggregation sites within the species' distribution range and their connectivity across the Northeast Atlantic. Building on this local monitoring, future research will investigate ecological connectivity among distant areas using samples collected across the Northeast Atlantic and compound-specific isotope analyses. Integrating fine-scale behavioural observations with large-scale approaches will provide new insights into porbeagle spatial ecology and support conservation across North Atlantic.

photo ID, connectivity, site fidelity

Environmental Constraints of the Reproduction of Myliobatiform Rays within the Pelagic Zone

Nicolas Ziani¹, Itsuki Kyatake², Ana I. Colmenero^{3,4}, Nithika K P¹, Terry Carbon¹, Mathis Bernard¹, Marceau Begon¹, Benjamin Laforet¹, Thierry Thibaut⁵, Claudio Barría³

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³Association Catsharks for the study and conservation on elasmobranchs and their ecosystems, Barcelona, Spain;

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The pelagic environment requires species to develop ecophysiological and behavioral adaptations that enable them to complete their life history within the water column. Myliobatiform rays are elasmobranchs whose life cycles are fully adapted to pelagic and benthopelagic lifestyles. Their specific morphology—wide disc, dorsoventrally flattened body and highly flexible pectoral fins—requires adaptations in both locomotion and ecophysiology to maintain sustained swimming, while reproduction must take place within the water column. Here, we describe pre- and post copulatory reproductive behaviors observed in the spinetail devil ray (*Mobula mobular*) and in the pelagic stingray (*Pteroplatytron violacea*) in the wild and in public aquaria. These species were studied by the authors as models to highlight the constraints and adaptations associated with reproduction in highly mobile rays, whose mating behaviour within the water column appears more constrained than that of sharks, including large pelagic species. We discuss these differences from a Pleurotremata vs. Hypotremata perspective.

myliobatiforms, pelagic domain, reproduction

Hidden interactions in the North-East Atlantic: sea lamprey parasitism of porbeagle sharks (*Lamna nasus*)

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The sea lamprey (*Petromyzon marinus*) is an opportunistic marine parasite known to exploit a broad range of hosts, yet interactions with large pelagic sharks remain poorly documented. Here, we report the first evidence of a parasitic association between the sea lamprey and the porbeagle shark (*Lamna nasus*) in the North-East Atlantic. Evidence was obtained from three direct observations and non-invasive photographic monitoring in the Trégor region, Brittany, France, using the Des Requis et Des Humains (DRDH) porbeagle catalogue, comprising 205 identified individuals. Photographs of 34 sharks revealed 1-16 bite marks per individual consistent with sea lamprey attachment and feeding, representing over 25% of the catalogue. The number of bite marks increased significantly with porbeagle body size, suggesting that larger sharks may be more frequently exploited as hosts.

Recent marks were predominantly recorded from spring to early summer, coinciding with the seasonal coastal occurrence of both species.

These findings provide the first documented evidence of a sea lamprey-porbeagle parasitic interaction and reveal a previously overlooked ecological link between two highly mobile marine species. They also highlight the value of long-term photo-identification programmes for detecting cryptic interspecific interactions and advancing our understanding of marine ecosystem dynamics in the North East Atlantic.

Porbeagle; parasitism, lamprey



DAY 1 — SESSION 2 (Citizen Science)

Unlocking key information for Mediterranean sharks conservation through Fishers' Ecological Knowledge

Malo Rio¹

¹Mediterranean Science Commission (CIESM)

Fishers, who spend much of the year at sea, accumulate valuable knowledge of elasmobranchs, many of which remain data-deficient despite being increasingly threatened. SHARKnowledge, an initiative coordinated by CIESM (Mediterranean Science Commission), aims to leverage Fishers' Ecological Knowledge (FEK) at the Mediterranean basin scale to fill these knowledge gaps. Using a standardised protocol combining structured questionnaires and participatory mapping exercises, SHARKnowledge aims to capture perceived abundance trends, seasonal and spatial occurrence patterns of target species. During its first phase, the protocol was implemented in Cyprus, Egypt, Italy, and Türkiye, where 165 fishers were interviewed about seven target taxa: *Alopias vulpinus*, *Carcharhinus plumbeus*, *Isurus oxyrinchus*, *Mustelus spp.*, *Prionace glauca*, *Squalus spp.*, and *Squatina spp.* The consistency between collected data and independent scientific records confirms that the approach can produce ecologically reliable information at a regional scale. As SHARKnowledge expands to Algeria, Libya, and Tunisia, the initiative contributes to a broader integration of FEK into elasmobranch conservation strategies. It also recognises that fishers, who have encountered these species over decades, are firsthand observers whose long-term experience helps bridge gaps in the scientific literature.

fishers' ecological knowledge (FEK), Mediterranean Sea, shark conservation

Catching tope (*Galeorhinus galeus*): using recreational angling competitions to drive species recovery.

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Coastal fisheries are economically important, but to make evidence-based management decisions about elasmobranchs, data are key. However, for many targeted species, appropriate data collection has relied on limited commercial fishing records and subsequent stock estimates, which can lead to unsustainable fisheries. The challenge in collecting sufficient fisheries-relevant data is the significant investment of people, time, and money so a popular is the use of citizen scientists. We utilise data collated from a global first: an annual competitive sea angling competition (Sea Angling Classic) established in 2021 in the UK. Up to 100 teams in this event target groups to compete for a significant monetary prize. Since 2021 >3000 geolocated images have been collated generating hot and cold spot maps linked to essential fish habitat use, plus length measurements/condition assessments of data deficient, but economically important species/groups: tope (*Galeorhinus galeus*), smoothhound (*Mustelus spp.*) and skates & rays (*Raja spp.*). Although there are currently temporal limitations of our 6-year dataset, a standardised workflow combined with catch-per-unit-effort will provide a powerful, cost-effective approach for generating long term scientific evidence. These data will inform ecosystem-based fisheries policies and the conservation of critically endangered species (e.g. *G. galeus*). However, the methods can equally be applied to competitive angling events globally.

Galeorhinus galeus, fishing, recreational angling

Isle of Man Small Shark Tagging Programme

Dr Lara Howe¹

¹Manx Wildlife Trust

Established in 2013 in partnership with the Isle of Man Government's Department of Environment, Food and Agriculture, the project aims to tag small sharks, skates, and rays to improve our understanding of their distribution and abundance in Manx waters. The programme works with local anglers to capture, tag, and release these animals while recording key biological data.

The objective is for tagged individuals to be recaptured at a later date, providing valuable information on their movements and population dynamics. Using identification (streamer) tags, the project has tagged more than 800 sharks and rays across four species, with the support of over 100 anglers.

Although recapture rates have been relatively low, the data collected have revealed several interesting insights around their abundance and movements.

Manx, shark, tagging

The Great Eggcase Hunt: where we are and what we're finding!

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The Shark Trust's Great Eggcase Hunt has now received a staggering >630,000 eggcases, with 88% of these verified to species. The dataset spans 35 countries and includes records from ~60 species, including >4,300 in situ eggcases – helping groundtruth egg-laying grounds which inputted to the ISRA European Atlantic process.

While encouraging public reporting of Chondrichthyan eggcases found on shorelines or observed developing underwater, this project also provides a valuable insight into eggcase morphology, species distribution and the diversity of oviparous species. Participation ranges from beachcombers making occasional finds to organised surveys by dedicated long-term contributors, such as those engaged in Project SIARC (Sharks Inspiring Action and Research with Communities). Recent developments, including a Community Verification Platform and a identification training course, are intended to increase participation, support the data approval process, and empower citizen scientists.

This presentation will highlight the wealth of data that can be harnessed from a long-term, global dataset, showing the strength of citizen science and the potential applications to research and conservation. It will introduce the concept of a data directory signposting towards and connecting existing community science projects. The spotlight will be on these new developments, as well as the initial outputs of analyses on the influence of seasonality and weather events on eggcase reporting.

oviparous, community science, analysis

A Global Perspective of Tourism-Based Citizen Science Initiatives in Shark Conservation: Challenges in Collaboration, Coordination and Networking

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¹University Centre of the Westfjords, Iceland

The ocean is the planet's life-supporting system, and sharks play a pivotal role in maintaining ecosystem health. However, anthropogenic activities, particularly overfishing, have led to alarming declines in shark populations, highlighting the need for effective conservation strategies. Tourism-based citizen science (TBCS) presents a promising approach by engaging the public in shark research and conservation. Yet, few studies have focused on marine citizen science, and even fewer have explored tourism's role in shark conservation through TBCS. To address this gap, this study employs a mixed-methods approach, using online questionnaire surveys and follow-up interviews with shark conservation projects globally to investigate how TBCS is utilized in global shark conservation and to explore central challenges faced by these initiatives.

Results show that TBCS offers valuable contributions to shark conservation research gaps through public engagement, data collection, long-term monitoring, and local awareness. However, the studied projects have limited power in driving legislative change and enforcement measures. Their potential is further constrained by insufficient funding and lack of systemic support, restricting opportunities for global collaboration.

Strengthening the data collection standardization, governmental leadership, diversified funding, and longer tourist engagement could enhance the effectiveness and sustainability of shark conservation initiatives using TBCS.

citizen science, shark conservation, sustainable shark tourism

Tope in the Bristol Channel: combining acoustic telemetry and citizen science to address a data gap

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¹Swansea University

²ZSL

The Bristol Channel is an Important Shark Ray Area, designated as a reproductive area for multiple skate species and smooth hounds. Tope (*Galeorhinus galeus*) – a supporting species – are also believed to use the Bristol Channel as a reproductive area. Recreational anglers report large females entering the channel in summer months, while small pups are frequently encountered when targeting other species. Meanwhile, tope tagged by researchers across the British Isles and in the Azores have been detected on the Bristol Channel acoustic receiver array, indicating it is visited by individuals across the north-east Atlantic. In 2026, Swansea University launched a tope research programme, to investigate reproductive behaviour and spatial usage in the Bristol Channel. In June, 20 tope were tagged with acoustic tags and initial data have given insights into movements within the Bristol Channel. Concurrently, capture data from recreational anglers have provided quantitative data on neonate and juvenile tope in the Bristol Channel, including those with visible umbilical cord scars. Feedback between researchers and anglers have enhanced outputs, strengthening and complementing the research programme at Swansea. Following a successful initial tagging season, the programme will expand tagging efforts in future years (including deployment of satellite tags) while efforts are underway to tag neonate and small juvenile tope, enabling description of juvenile nursery areas.

acoustic telemetry, elasmobranch reproduction, citizen science

Monitoring a Flapper Skate (*Dipturus intermedius*) Egg- Laying Site in Loch Melfort, Scotland, by a Community Science Group.

Lauren Smith¹, Chris Rickard¹, Marnik van Cauter²

¹Shark & Skate Scotland

²Kilchoan Melfort Trust

This study presents the first long-term, multi-method monitoring of a known essential fish habitat (EFH), an egg-laying site of the critically endangered flapper skate (*Dipturus intermedius*). For 31 months, a community science group conducted monthly SCUBA surveys recording the presence of *D. intermedius* egg cases within a defined area. Viable egg cases were carefully inspected, measured and then sampled non-invasively for further genetic analysis. During the surveys, Seasearch Observer forms were completed providing detailed information on the overall ecosystem. To complement diver observations, Baited Remote Underwater Video (BRUV) deployments were undertaken, and an acoustic receiver was placed nearby. During the study period, 16 egg cases were laid within the designated site during spring, autumn and winter over consecutive years. Viable egg cases were confirmed to have hatched successfully across all four seasons. BRUVs were deployed 10 times, documenting 13 species, although no *D. intermedius* were observed. An acoustic receiver recorded multiple visits to the site by two adult male skates that had been tagged in the Firth of Lorn. This study demonstrates the value of community-led monitoring in identifying and safeguarding critical reproductive habitats of *D. intermedius*, emphasising the importance of collaborative approaches between local communities, researchers, and conservation bodies to ensure the survival of critically endangered species.

Flapper Skate, Loch Melfort, community science



DAY 1 — SESSION 3 (Fisheries Science and Management)

Fisheries Management Plans: An NGO Perspective

Jack Renwick

Shark Trust

Following the United Kingdom leaving the European Union, the regulatory landscape for fisheries managed by the UK has changed significantly. With the passing of the Fisheries Act (2020) into law, and the subsequent Joint Fisheries Statement, the emerging method for managing fisheries is now through Fisheries Management Plans. Defra defines these as “evidence-based action plans” with their purpose being to deliver sustainable fisheries for future generations. 43 FMPs were proposed, with 11 now published and the rest either in consultation or in preparation for publication.

The Shark Trust has been involved in this process since the first tranche of frontrunner FMPs, providing advice and feedback for FMPs which featured elasmobranchs as key species, and FMPs where elasmobranchs are likely bycatch of the primary fisheries. Despite good engagement from both NGOs and the fishing industry, unfortunately the FMPs have missed a prime opportunity to commit to management measures for many species.

This presentation will discuss the policy framework for fisheries management at a UK level, the missed opportunities of the FMP process, and how scientists can use their data to inform fisheries management decisions.

fisheries, management, policy

Population demographics of highly vulnerable bycatch species in Papua New Guinea's fish maw fishery

Jasmine Barzin

James Cook University

The fish maw fishery in Papua New Guinea (PNG) has rapidly expanded since its emergence in 2014. Despite its growing economic importance, this gillnet fishery operates with minimal regulation, limited data, and increasing risks of overexploitation. This fishery has significant bycatch of threatened elasmobranch species including the winghead shark (*Eusphyra blochii*), dwarf sawfish (*Pristis clavata*), large-tooth sawfish (*Pristis pristis*), narrow sawfish (*Anoxypristis cuspidata*), and spear-tooth shark (*Glyphis glyphis*). These species possess specific life history traits such as slow growth, late maturity, and low reproductive output, that make them highly vulnerable to fishing pressure. Additionally, there is an absence of catch data, biological information, and population indicators which can hinder effective management. This study used species life history data to incorporate into age-structured Leslie matrix models for the five conservation focused bycatch species in PNG's fish maw fishery. Demographic models that use life history traits, such as Leslie matrix models, provide insight into species' population growth. These models can be used to simulate different fishery management strategies and show changes in population dynamics under data-limited conditions. By integrating demographic modelling with fisheries management, this research informs sustainable use of PNG's aquatic resources and supports conservation of vulnerable elasmobranchs.

demographic modelling, life history traits, fishery management

Effectiveness of bycatch mitigation devices in reducing captures of elasmobranchs in small-scale fisheries in the Amvrakikos Gulf, Greece

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Despite elasmobranchs are not commonly targeted in Mediterranean fisheries, their bycatch remains substantial and remains of the major threats. This study evaluates the effectiveness of bycatch mitigation devices (BMDs) in reducing elasmobranchs bycatch and its effect on the catch of target species. Onboard surveys were conducted from July to October 2025 and May to August 2026 in the Amvrakikos Gulf (Greece). Green flashing light emitting diodes (LEDs) and neodymium-iron-boron permanent magnets (Nd2Fe14B) were trialled on trammel nets (n=40). Trials were conducted with magnets (n=10) and LEDs (n=18) in trammel nets targeting prawns, while magnets were also tested in trammel nets targeting molluscs or fishes (n=12). In prawns-targeting nets, elasmobranchs NCPUE increased significantly (217%) in magnetized nets, while a significant reduction (75%) was observed in illuminated nets. Significant reduction in target species BPUE (kg) was observed between treatments with permanent magnets, but no significant differences were detected between illuminated and control nets. Considering the high levels of elasmobranch bycatch in trammel nets, results indicate that LEDs could be an effective bycatch mitigation strategy in Amvrakikos Gulf. Moreover, LEDs do not affect target species capture, increasing the fishers' willingness to adopt them. Further studies are needed to assess the effectiveness of BMDs, with the final aim to support wider implementation as possible management strategy.

elasmobranchs; BMDs; small-scale fishery

SharkGuard: Advances in Electric Pulse Deterrent technology

Robert Enever, Phillip Doherty, Brendan Godley, Thomas Day, Guy Pascoe, Pete Kibel

Fishtek Marine; University of Exeter

Global abundance of oceanic sharks and rays has declined 71% over the last 50 years, driven largely by overfishing and bycatch. This study tested SharkGuard (Fishtek Marine), an Electronic Pulse Device (EPD) for commercial longline fisheries, assessing operational performance and effects on sharks bycatch and tuna target catch.

Trials ran on 3 tuna longline vessels in the New Caledonian Marine Park over 35 days (4 trips, 40 hauls, – 45,000 hooks), comparing SharkGuard and control branches. EPDs were positioned 40cm or 60cm above baited hooks.

At 60cm, SharkGuard had no significant effect on target catch (-1.1%, mainly albacore tuna) and reduced shark bycatch by 46.6%. At 40cm, shark bycatch fell 88.7%, but target catch also declined significantly (-19.4%), likely from tuna being visually deterred by EPD proximity to the bait.

SharkGuard performed reliably across all vessels, recharging via vessel power between hauls with minimal crew input and negligible impact on hauling or shooting speed versus standard gear. Achieving near-90% bycatch reduction without target catch loss requires SharkGuard to deliver the same field strength at 60cm as it currently does at 40cm.

This study demonstrates, for the first time in a commercial fishery, that shark bycatch can be substantially reduced without compromising target catch or vessel operations, marking a significant advance in pelagic longline bycatch mitigation.

pelagic sharks, bycatch, fisheries, tuna, longline, Electric Pulse Deterrent

Drawing Change: Using Visual Storytelling to Shift Community Perspectives on Fisheries Management in Sri Lanka

Mikaela Abayakoon Stanborough¹, Fahim Ismail¹, Daniel Fernando¹, Akshay Tanna¹

¹Blue Resources Trust

Small-scale fisheries are essential for food security and livelihoods, yet face increasing pressure from overfishing. In Sri Lanka, fisher communities often lack access to understandable, locally relevant information on how effective management practices, including protections of threatened species such as sharks and rays, can safeguard the future of fisheries; in turn restricting community engagement in fisheries management. To address this gap, a trilingual animated video was developed to improve community understanding of overfishing and sustainable fisheries management, with a focus on elasmobranchs. To evaluate the videos' effectiveness, screening events were hosted with two fishing communities (n = 91). Participants included significant issues, such as the loss of fish from all nototidally significant species. Over 90% of participants demonstrated a greater interest in understanding that overfishing contributes to declining fish stocks and that regulations can support livelihoods, with over 90% of participants wanting to learn more about how they could contribute to sustainable fisheries management. Overall, visual storytelling offers an engaging, low-cost and scalable tool for bridging knowledge gaps and shifting perspectives around sustainable fishing practices.

outreach, science communication, sustainable fisheries



DAY 1 — SESSION 4 (Biological Studies)

A Novel Application of NICMA: The First Energy Budget Assessment of the Blue-Spotted Ribbontail Ray (*Taeniura lymma*)

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¹Nicma Co, Chemnitz, Germany

²Minorities in Shark Sciences (MISS)

Quantifying energy expenditure in free-ranging elasmobranchs is essential for linking behaviour and habitat use to individual energetics and population-level processes. Yet energetic data remain scarce for many species, particularly reef-associated rays. NICMA (Non-Invasive Camera Motion Analyses of Marine Megafauna) is a non-invasive, video-based framework for estimating energetic costs from kinematic observations, eliminating the need for capture or respirometry.

Here we present the first NICMA application to the blue-spotted ribbontail ray (*Taeniura lymma*). Over 5 hours in situ footage of more than 10 free-ranging individuals were recorded in the Red Sea, Egypt. Swimming speed, behavioural states (swimming, resting, foraging), and key kinematic parameters were quantified to estimate activity-related energy expenditure under natural conditions.

This is the first NICMA-based energetic assessment of *T. lymma*. Results demonstrate that species-specific energetic information can be derived non-invasively from field video, establishing an energetic baseline for this species and a foundation for future comparisons across habitats, environmental conditions, and elasmobranch taxa.

elasmobranch energetics, NICMA, video-based kinematics

The shy, the bold, the variable: Personality differences in free-ranging adult bull sharks

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Animals often exhibit consistent behavioural differences, termed personality. These are a recognised dimension of biodiversity that can influence individual fitness and population persistence. Personality further shapes predator-prey dynamics as well as responses to human activities. However, the evidence for its existence in free-ranging adult sharks remains limited. We quantified consistent behavioural differences and plasticity, via video analysis of risk-associated behaviours in 30 adult bull sharks over three calendar years at a Fijian provisioning site. Individuals showed highly repeatable differences, driven by individual identity rather than environment or feeding experience, and varied in both average risk-taking and seasonal plasticity. They persisted after accounting for site exposure and feeding history, suggesting they are not merely an artefact of provisioning. This raises the question of how such variation responds to selective pressures that could erode behavioural diversity and population resilience. Individuality may further shape interactions with humans, which reflect responses to a risky stimulus shaped by environmental, ecological and human-activity factors. Here, our results add another, often overlooked piece. Provisioning sites also turn tourism dives into nearly daily individual-level data. Linking per-shark attendance and feeding reveals which individuals are most exposed, enabling adaptive decisions that limit negative impacts and increase safety.

animal personality, behavioural ecology, shark-diving tourism

Drone photogrammetry provides repeatable measurements of body size and shape in whale sharks

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Accurate morphological measurements of whale sharks (*Rhincodon typus*) are important for monitoring population size structure, body shape, and growth but remain difficult to obtain. We assessed repeatability and accuracy of a drone-photogrammetry workflow and used the body area index (BAI) as a size-standardised measure of projected dorsal surface area. Pre-caudal length (PCL) and multiple widths were measured from drone videos of 62 individuals across 70 encounters at Ningaloo Reef, Western Australia, taken from 28 April and 9 May 2025. Repeatability was high for PCL across replicate images ($R = 0.955$), while body width repeatability ranged from 0.633 to 0.909. Independent encounters of the same individual differ in BAI by 2.7% on average. PCL ranged from 3.51 to 7.12 m, with a mean of 5.57 ± 0.81 m (mean $\pm$ SD). Body width was greatest in the head region and showed most variation around the posterior of the head and the anterior of the pectoral fins. BAI ranged from 18.0 to 23.7, showing that whale sharks differ in body shape. BAI decreased significantly with increased interest in larger individuals showing the BAI. While BAI should currently be seen as a measure of external morphology, validation against energetic indicators could make it a useful tool for measuring body condition. This study demonstrates the use of drone photogrammetry under field conditions and establishes baseline BAI values for whale sharks at Ningaloo Reef.

morphometrics, *Rhincodon typus*, UAV

Tracking Angelsharks Across the Lobos Marine Corridor: Connectivity, Threats and Spatial Conservation

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¹RedPROMAR, Gobierno de Canarias

Effective conservation of mobile marine species requires spatial protection to encompass both areas of high residency and the movements connecting critical habitats. The Critically Endangered angelshark (*Squatina squatina*) retains its largest known population in the Canary Islands, yet major knowledge gaps remain regarding inter-island connectivity, overlap with protected areas and exposure to anthropogenic pressures.

This study investigates angelshark spatial ecology across the marine corridor between Fuerteventura and Lanzarote, focusing on Lobos and its potential connectivity with the La Graciosa Marine Reserve. Acoustic telemetry will quantify residency, site fidelity and inter-island movements, while pop-up satellite archival tags (PSATs) will investigate offshore space use. Movement data will be integrated with environmental variables, protected-area boundaries and anthropogenic pressures, particularly artisanal fishing.

The study will assess whether proposed protected areas encompass habitats used for residency and movement, evaluate functional connectivity and relative bycatch risk, and determine whether relevant space use extends beyond coastal protection. Results will support the identification of critical habitats and ecological corridors, refinement of protected-area boundaries and targeted measures to reduce threats to *S. squatina* in the Canary Islands.

acoustic telemetry; connectivity; marine protected areas

Development of a pilot model to estimate post-mortem interval in elasmobranchs

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This study develops a pilot model for estimating the post-mortem interval (PMI) in elasmobranchs, using *Gualesus megalops* as a reference species and evaluating its applicability to *Scyliorhinus stellaris* and *Galeorhinus galeus*. Two *S. megalops* specimens were examined at nine post-mortem intervals (0, 3, 6, 12, 24, 36, 48, 96, and 168 hours pm). Histological and immunohistochemical analyses using antibodies against muscle proteins (actin, desmin and dystrophin) were complemented with digital image analysis in QuPath. Additionally, five *S. stellaris* and five *G. galeus* from artisanal fisheries were assessed. The model incorporated parameter ranking, an S-index and Theil–Sen robust regression. The most reliable PMI predictors were myofibrillar disintegration, bacterial invasion and loss of anti-desmin immunoreactivity. Significant histological changes appeared from 6 hpm, with advanced degradation after 96 hpm; desmin declined early (3–6 hpm), while actin remained stable until 36 hpm. The model successfully predicted PMI in the test specimens, with most estimates ranging between 18 and 32 hpm. *G. galeus* showed higher variability than *S. stellaris*. Theil–Sen regression applied to the S-index provided robust calibration, though wide confidence intervals reflected biological variability and the exploratory nature of the dataset. This research was funded by the Atlantic Whale Deal and the SHARIK-RAY Map projects, focused on marine conservation and sustainable fisheries management.

post-mortem; muscle; immunohistochemistry

From predator to prey: an instance of opportunistic predation in *Squatina squatina*

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In recent years, multiple incidents of predation on juvenile (20–60 cm) angelsharks (*Squatina squatina*), a Critically Endangered species, have been documented at several locations across the Canary Islands, Spain. These observations include interactions with various predatory species, such as the spiny butterfly ray (*Gymnum altavela*) and the roughtail stingray (*Bathytoshia centroura*), highlighting the complexity of the predator-prey relationships affecting this species during its early life stages. The records, obtained from direct observations and photographic evidence through a citizen science collaboration network, provide new insights into the trophic ecology of the angelshark and reveal that, despite its role as a benthic predator, juveniles may be vulnerable to a wide range of predators. This set of observations provides a broader perspective on the predator-prey dynamics of *S. squatina* and highlights the importance of considering these interactions within a more holistic, ecosystem-level view when studying the recovery of threatened species.

angelshark, predation, survivorship

Hepatic melanomacrophages in elasmobranchs: unveiling natural variability for their use as biomarkers

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Despite the growing interest in melanomacrophages (MMs) as indicators of fish health and environmental stress, their occurrence and natural variability remain poorly understood in elasmobranchs. Here, we provide a comparative assessment of hepatic MMs in four species differing in habitat and reproductive traits:

Scyliorhinus canicula, *Galeus melastoma*, *Raja polystigmo* and *Isurus oxyrinchus*. MMs were detected in all individuals, mainly isolated cells scattered throughout the hepatic parenchyma, supporting a distinctive organization compared with the large melanomacrophage centres commonly described in teleosts. Striking interspecific differences emerged, with higher MM abundance in the demersal species and remarkably low values in the pelagic *I. oxyrinchus*. *G. melastomus* showed the highest MM number and occupied area, providing novel baseline information for this species. MM abundance increased with total length in *S. canicula* and *G. melastomus*, while sex-related patterns were species-specific, with higher values in *S. canicula* females. Overall, our findings suggest that species ecology, ontogeny, sex and reproductive condition are key sources of natural MM variability. Accounting for these factors is therefore essential before interpreting MM changes as resonating environmental stress and supports their future application in elasmobranch health assessment and biomonitoring.

elasmobranch health, biomarker, liver



DAY 2 — SESSION 1 (Living with Sharks)

Shark depredation: a growing human-wildlife conflict threatening shark conservation

Jonathan Mitchell¹

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Shark depredation, also known as ‘bite-offs’ or ‘shark tax’, is where sharks remove a fish caught on fishing gear before it can be retrieved. This phenomenon is increasing in many fisheries around the world due to learnt shark behaviour, recovering shark populations, increasing fishing activity, reduced natural prey populations and climate change. Shark depredation is causing socio-economic impacts for fishers, increased shark bycatch and retaliatory actions towards sharks. In some locations, depredation is threatening the positive progress made by shark conservation measures, with some fishers pushing for expansion or reopening of shark fisheries to mitigate depredation. Research conducted over the last 10 years, primarily in Australia and the USA, has increased understanding of the factors driving depredation, quantified its impacts and identified the shark species involved. Applying this knowledge, more recent work has developed and tested mitigation methods for reducing depredation. For example, testing of two shark electrical deterrent devices in Australia has shown they can reduce depredation rates by ~60%. Further research is needed to test these devices on a larger scale and ensure their design is practical and cost-effective for fishers. This presentation provides a reflection on progress made over the last 10 years in shark depredation research and how it can prepare us for shark conservation success in locations where this human-wildlife conflict is emerging.

fisheries management, coexistence, shark deterrents

Finding a path to coexistence between fishers and sharks in the deepwater line fishery at Cocos Keeling Islands (Australia) using a new deterrent device

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Sharks regularly interact with fishing vessels at the Cocos Keeling Islands (CKI), resulting in high rates of depredation. This human-wildlife conflict causes substantial losses of target catch and fishing gear for artisanal fishers, additional mortality of target species, and increasing negative actions towards sharks. Community surveys identified the need to test suitable mitigation measures. Here, we co-designed a study to evaluate the effectiveness and practicality of the commercially available RPELX shark deterrent device in deepwater demersal line fishing. We used a randomised experimental design to compare RPELX and control fishing sessions over 11 days. Across 51 fishing sessions, 262 fish were caught, with grey reef sharks (*Carcharhinus amblyrhynchos*) identified as the primary species responsible for depredation. A Generalised Linear Model showed that treatment and skipper significantly influenced the number of fish depredated, with RPELX reducing the probability of a depredation event by 63%. The device also reduced shark bycatch and fishing gear loss. Subsequent community consultations identified design improvements to facilitate uptake and supported development of a new prototype for pelagic fishing. Overall, RPELX has the potential to provide environmental and socio-economic benefits for the marine ecosystem, local artisanal fishery and CKI community by promoting human-shark coexistence. Further testing across other line fisheries worldwide is recommended.

human-wildlife interactions, shark depredation and bycatch, co-management, mitigation strategies

Using big data analytics to assess SMART drumlines as an ecologically appropriate fishery strategy for shark bite management

Paolo Cappa¹

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Shark management is becoming increasingly prominent due to an increase in shark bites. In contrast to conventional fishing gear that kills sharks, SMART (Shark Management Alert in Real Time) drumlines have been tested and adopted as a recent shark bite mitigation tool, as they also have little impact on shark populations. Using catch data from shark management programs in La Réunion (France) and New South Wales (NSW, Australia), this research explores the catch performance, selectivity, at-vessel survival outcomes and then explains the spatial-temporal variability of catches using environmental and operational factors. Across all regions, SMART drumlines showed high selectivity for potentially dangerous sharks and high at-vessel survival rates for target and bycatch species, supporting their use as a reduced-mortality alternative to conventional fishing gear. Focusing on NSW, the analyses of a large multi-year deployment of SMART drumlines across 20 locations showed that catches were highly structured in space and time, and being most consistently explained by sea surface temperature, with additional species-specific effects due to ocean swell, current speed and rainfall. Operational analyses showed that the effectiveness of the program is also influenced by logistics and gear operation. Overall, this research concludes that SMART drumlines can support more ethical and ecologically sustainable shark bite mitigation by combining selective capture with high at-vessel survival.

shark management, shark bite, human-wildlife conflict



Living Together: the LIFE European Sharks approach to elasmobranch conservation in the Mediterranean Sea—the case of *Mustelus spp.*

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Despite their depleted status, *Mustelus spp.* (smoothhounds) remain among the most commercially important landed shark species in the Mediterranean Sea, a regular angler bycatch and traditional ingredient in regional recipes. Over the last century, abundance and distribution declined regionally; however, stock status varies significantly by area, for example showing signs of recovery in the Northern Adriatic but severe depletion in the Tyrrhenian Sea.

The LIFE European Sharks project spearheaded a collaborative initiative combining governance, stakeholder engagement, citizen science, and knowledge sharing to foster locally tailored sustainable fishing and consumption practices:

- Local authorities receive in-depth training to ensure stricter compliance with regional management regulations;
- Professional fishers are testing a voluntary minimum landing size for smoothhounds, promptly releasing undersized individuals with improved handling techniques to maximize post-release survival, while socioeconomic impacts are monitored;
- Recreational fishers widely adopt voluntary catch-and-release practices for all elasmobranchs; notably, their observations helped identify a seasonal nursery area, a candidate ISRA for the species;
- Conservation extends to consumers: a consumption guide drafted with IUCN-SSG is promoted in culinary schools.

Ultimately, smoothhounds demonstrate how elasmobranch conservation can transition from pure protection toward sustainable human-shark coexistence.

elasmobranch conservation, community-based conservation, *Mustelus spp.*



DAY 2 — SESSION 2 (Trade and Utilisation)

Illicit trade of elasmobranchs in India: 2015–2021

Rebecca Lewis

WWF-India

India is an important source and transit country in global elasmobranch trade, yet information on illicit trade remains fragmented. We analysed open-source reports of marine wildlife seizures in India from 2015–2021 to characterise the scale, products and geographic patterns of illegal shark and ray trade. Of 187 documented marine wildlife seizure incidents, 15 involved sharks or rays. Approximately 14,188 kg of processed shark fins were seized across eight major incidents, including a single seizure of 8,000 kg from export warehouses in Mumbai and Gujarat. Other seizures involved whale shark meat, dried shark skin and teeth, and mobulid ray gill rakers, highlighting the diversity of products entering illegal trade. Several cases indicated organised networks and the involvement of export agencies, with illicit products moving through or being concealed within legitimate seafood supply chains. These records highlight potential trade and enforcement hotspots and demonstrate the value of systematically compiling open-source seizure data to understand otherwise poorly documented wildlife trade. However, media-derived records are subject to reporting and detection biases and represent only documented incidents. Strengthening inter-agency coordination, species identification and forensic capacity, coastal surveillance, and systematic seizure-data collection will be important for improving detection and enforcement against illicit elasmobranch trade in India.

illegal trade; sharks and rays; shark fins; seizures; India; wildlife crime

Improving the management of fish maw fisheries and trade to reduce the extinction risk of threatened marine wildlife

Elisabeth Fahrni Mansur

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Along with shark fins, sea cucumbers and abalones, the collagen-rich swim bladder or maw of certain bony fishes is one of the top four seafood delicacies in Chinese cuisine. The most valuable maws, which can sell in retail markets for more than their weight in gold, are from large-bodied croakers with coastal spawning aggregations. The extraordinary prices paid for large croaker maws has led to the overexploitation of at least two endemic species, the Chinese bahaba and the totoaba – the latter known as ‘cocaine of the sea’ due to extreme black-market prices and criminal cartel involvement. While trade in shark fins, sea cucumber and abalone is increasingly controlled, international trade in fish maw remains largely unregulated.

As catches of bahaba and totoaba have declined, the demand for fish maw is spreading to other large-bodied croakers, such as acoupa weakfish in the western Atlantic and blackspotted croaker in the northern Indian Ocean. Bycatch in gillnet fisheries targeting high value croakers has increased the extinction risk for numerous coastal dolphin, porpoise, shark, ray, and marine turtle species. The illegal gillnet fishery targeting totoaba is the greatest threat to the world’s most endangered marine mammal, the vaquita porpoise. Improving national management of croaker fisheries and regulating the international trade in croaker maw for sustainability and traceability is urgently needed to protect targeted fishes and incidentally caught marine wildlife.

fish maw, bycatch, international trade

Unseen shagreen: Quantifying an emerging online trade in endangered stingrays

Inge M Turk¹, Alec BM Moore¹

¹School of Ocean Sciences, Bangor University

Unsustainable wildlife trade continues to drive global population declines. As a consequence of their slow life histories, elasmobranchs are especially sensitive to overexploitation. Shagreen, a leather produced from the skins of elasmobranchs, has been used across cultures for centuries. Despite over half of stingrays (Myliobatiformes: Dasyatidae) being threatened with extinction, little is known about the trade of their leather, which is widely available online. Systematic surveys of e-commerce platforms provided a first snapshot into the current online market for stingray leather, uncovering hundreds of hides available for purchase. Hides originated from small to large stingrays, with larger sizes and more unique morphologies being more valuable. Sellers were based across Asia, Europe and the United States and hides were listed as predominantly originating from East and Southeast Asia. Genera potentially implicated in the trade are identified, revealing an increasing global demand for a “luxury” and “exotic” leather derived from endangered elasmobranchs.

wildlife trade; stingrays, conservation

The Global Footprint of Fish and Chips

Christopher Mull¹, Patricia Charvet, Brit Finucci, Luz Saldaña-Ruiz, Elizabeth Babcock, Hollie Booth, Demian Chapman, Luke Warwick, Glenn Sant, Nathan Pacoureau, Nick Dulvy, Jess Gephart, Holly Kindsvater, Aaron MacNeil

¹Dalhousie University

There is a long culinary tradition of eating sharks across many countries with varying degrees of labeling reliability. Throughout Commonwealth countries and mainland Europe, smaller bodied coastal sharks are often used for fish and chips and marketed with generic names (e.g. ‘flake’, ‘rock salmon’, ‘bull huss’). These generic names highlight the degree to which species are substitutable in many supply chains and end markets, making it difficult to estimate the footprint of particular dishes. Here we examine the global footprint of fisheries and trade for species used for fish and chips (*Galeorhinus galeus*, *Squalus spp.*, *Mustelus spp.*, and *Scyliorhinus spp.*) To estimate the effects of fisheries and supply chains we used species specific estimates of landings and trade from the Global Shark Meat project and the ARTIS seafood trade database combined with a literature search of culinary traditions. Estimates of landings and trade were then compared with the range weighted IUCN Red List Indices for fishing countries. We find that many European countries exhibit a higher consumer red list score than producer red list score for fish and chips species, suggesting that they are sourcing their products from countries with lower capacity for fisheries management and trade enforcement. These findings will help refine efforts for CITES implementation and compliance in light of recent listing of species in the fish n chips trade.

trade, fisheries, meat, *mustelus*, CITES

Is it safe to eat shark? Metal bioaccumulation and human health risk in *Squalus megalops* meat from Gran Canaria

Tomas Bañeras¹, Ángel José Gutiérrez Fernández², Enrique Lozano-Bilbao², Ana Espino-Ruano¹, José Juan Castro¹, Lorena Couce-Montero¹, Airam Guerra-Marrero³, Julián Cabana-Gandiaga¹, Carmen Verónica Martín León⁴, Andrea Martínez-Climent², Soraya Paz², Arturo Hardisson de la Torre², David Jiménez-Alvarado¹

¹Universidad de Las Palmas de Gran Canaria

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³Universidad del Atlántico Medio Ctra

⁴Laboratorio de Salud Pública de Gran Canaria

Metal accumulation in sharks is of increasing concern due to its potential impacts on marine ecosystems and human health. This study quantified mercury (Hg), lead (Pb), arsenic (As), and cadmium (Cd) concentrations in the muscle and liver of 40 *Squalus megalops* specimens collected from the Canary Islands. Metal analyses were performed using cold vapor atomic absorption spectrophotometry (CV-AAS) and inductively coupled plasma mass spectrometry (ICP-MS). Mercury concentrations showed a significant positive relationship with total length, indicating bioaccumulation with growth. Sex also significantly influenced metal concentrations, whereas female pregnancy status had no detectable effect. Liver tissues contained higher concentrations of metals than muscle, consistent with their role in metal storage and detoxification. Notably, elevated concentrations of Hg ($1.69 \pm 0.80 \text{ mg kg}^{-1} \text{ ww}$) and As ($25.4 \pm 18.2 \text{ mg kg}^{-1} \text{ ww}$) were detected in muscle tissue, suggesting potential concerns for human consumption. These findings provide new insights into metal accumulation patterns in *S. megalops* and underscore the importance of species- and region-specific assessments of contaminant burdens in sharks. The observed levels may have implications for individual health, trophic transfer to predators, and food safety for human consumers.

***Squalus megalops*, bioaccumulation, shark ecotoxicology, human health risk, mercury**

Unveiling the species in shark-based pet snack products sold in Thailand with an overview of e-commerce trends

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Shark cartilage and whole-dried small sharks are increasingly being used in Thailand's pet snack market, raising sustainability concerns. This study examined the issues by identifying shark species in cartilage and whole-dried shark products used in pet snacks and analyzing online market trends. A total of 150 shark cartilage and 60 whole-dried shark samples were analyzed using DNA barcoding. Notably, 91 % of the cartilage products were identifiable at the species level, with eight shark species represented. The brown-banded bamboo shark (*Chiloscyllium punctatum*) and the Australian blackspot shark (*Carcharhinus coatesi*) were the most common, making up 63.2% of samples. Of the identified species, 61.8 % are classified as Near Threatened on the IUCN Red List, and 67.7% are from species listed in CITES Appendix II. All whole-dried sharks were *Scoliodon macrorhynchus*, also classified as Near Threatened and CITES-listed. Shark cartilage products dominated the market, appearing in 62–65 % of shops, compared to 35–38 % for whole-dried sharks. The findings emphasize the need to strengthen the monitoring and enforcement of CITES-listed sharks, improve traceability and transparency in the supply chain, and regulate the online market for shark-based pet snacks.

shark-based pet snacks, DNA barcoding, online market trends

DAY 2 — SESSION 3 (Genomics)

Comparing the effectiveness of protein and DNA analysis for the species identification of elasmobranch egg casings

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¹University of Chester

Many elasmobranch species, all skates (Rajidae) and some sharks and other rays, are oviparous. Many elasmobranch species are declining making the monitoring of their population abundance and distribution an important aspect of their conservation. The monitoring of these species can be done via the analysis of spent egg casings, particularly those that wash up on the shore from nursery sites. Egg cases are often identified morphologically using taxonomic keys; however, this is not always possible when specimens have been damaged when washed ashore or degraded through prolonged exposure on the beach. A potential solution to this problem is the use of identification methods that do not rely on morphology, such as DNA or protein analyses. The aim of this study was to trial several different protein and DNA extraction methods to determine the most effective method for extracting each biomolecule from elasmobranch egg cases, and then determine which of the two techniques, DNA barcoding or protein mass fingerprinting, is more effective for the species identification of elasmobranch egg cases. This study found that protein mass fingerprinting may be a viable method for identifying elasmobranch species through egg case analysis, whereas DNA analysis proved more challenging. This is possibly due to the high levels of degradation experienced by egg cases, which can compromise DNA integrity, combined with the inherently low quantity of DNA present in these biological structures.

egg cases, DNA barcoding, protein mass fingerprinting

Genetic population structure of the Common Smoothhound (*Mustelus mustelus*) across the Mediterranean Sea

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The Mediterranean Sea has one of the longest histories of human exploitation. The Common Smoothhound (*Mustelus mustelus*) is a demersal shark widely distributed in the Mediterranean, where it is caught both as a target and as bycatch, mainly by trawlers and small-scale fisheries. *M. mustelus* is classified as Endangered globally and Vulnerable in the Mediterranean Sea. The species has declined by 80-90% in the Mediterranean basin since the beginning of the last century and almost disappeared in a large part of its original distribution range.

For this study, muscle tissue samples were collected from 182 individuals (N=62 from the Northern Adriatic Sea; N=38 from the Strait of Sicily; N=75 from Amvrakikos Gulf; N=7 from the Aegean Sea). Population genetic structure was investigated using 17 microsatellite loci. Cluster analysis revealed no clear genetic structure between the Adriatic Sea and the Strait of Sicily, although microsatellite-derived FST showed a weak yet statistically significant differentiation between the two sites. In contrast, STRUCTURE analysis identified two well differentiated clusters corresponding to the Northern Adriatic Sea and the Amvrakikos Gulf.

The study confirms genetic differentiation among Mediterranean populations of *M. mustelus*. For this reason, it is fundamental to define management strategies for the species that take into consideration the geographic boundaries of the populations, and the differentiation of the species' genetic stocks.

Common Smoothhound, genetic population structure, Mediterranean Sea

Genomics for shark conservation: Unraveling sex-biased demography and ancient lineages in reef sharks

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¹The University of Hong Kong,

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Understanding past & present factors shaping genetic diversity and connectivity patterns is vital to determine effective species management units and prioritise vulnerable or evolutionarily distinct populations. Using whole genome sequencing, this research identifies selection signatures, and tests demographic history hypotheses for the threatened grey reef shark *Carcharhinus amblyrhynchos*. We quantify the effects of sex-biased dispersal on genetic diversity of the newly discovered X-chromosome in this and other carcharhinids leveraging the newly published *C. amblyrhynchos* genome. We find conclusive support for two ancient and largely independent Indo-Pacific metapopulations, as well as extreme female philopatry. We highlight the isolated western and central Indian Ocean populations showing extreme X-chromosome diversity reduction and long divergence, likely representing Evolutionary Significant Units. Our results highlight the power of combining multi-population whole genome data with chromosome-specific diversity metrics to resolve complex demographic histories highly relevant for population management.

conservation genomics, sex-bias, genetic diversity

A genetic toolkit for elasmobranch eDNA monitoring in the Northeast Atlantic

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Environmental DNA (eDNA) extracted from seawater is increasingly used for marine biodiversity monitoring. However, its application to elasmobranchs remains limited, despite its considerable potential to improve the detection of species that are difficult to survey using conventional methods. Routine implementation of eDNA-based approaches for elasmobranch monitoring relies on the availability of assays optimized and validated for the target species and regional context. Here, we present a genetic toolkit for pelagic elasmobranch surveillance in the Northeast Atlantic. Species-specific qPCR/dPCR assays were developed for ten shark and ray species and validated in silico and in vitro against target and non-target taxa, confirming specificity and discrimination among closely related species. In addition, MiFish-E metabarcoding primers were optimized to improve detection of regional elasmobranch diversity and validated through in silico screening and in vitro testing. The toolkit will be applied to eDNA samples collected during scientific surveys in the Bay of Biscay, a key fisheries area where several elasmobranch species are affected by bycatch and knowledge on their spatial dynamics remains limited. By integrating targeted assays, metabarcoding optimization, and field application, this work provides a standardized framework for eDNA-based elasmobranch monitoring in the Northeast Atlantic that can be adapted to other regions.

elasmobranch; eDNA; monitoring

Elasmobranch Genetics Project for ex situ and in situ conservation

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¹SAFE Shark and Ray

²Shark Ray 360

The Elasmobranch Genetics project is coordinating global efforts to establish a framework for collecting, managing, sharing, and applying genetic information to support the conservation and management of elasmobranchs in managed care. The project will build the framework necessary to connect aquariums, zoos, field researchers, laboratories, and conservationists through standardized protocols, shared resources, and accessible genetic information.

This initiative supports the goals of SAFE Shark and Ray, the IUCN Shark Specialist Group, regional conservation programs, and species-specific recovery initiatives by improving access to genetic resources needed for population management, conservation breeding, and reintroduction planning.

Our presentation will present an overview of work completed on pilot species of *Stegastoma* and *Rhina*, and share future efforts for additional species and how this data will support coordination of in situ and ex situ conservation efforts for critically endangered elasmobranchs.

genetics, conservation, collaboration

Population connectivity of the porbeagle shark (*Lamna nasus*) across the North Atlantic Ocean revealed by microsatellite and mitochondrial markers

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¹Scotland's Rural College (SRUC)

Despite playing a vital role in marine systems and supporting the 'blue economy', over one-third of elasmobranch species are currently at risk of extinction. To promote population recovery within threatened groups, robust assessments of genetic connectivity across the species' geographical range are required. Such insights facilitate the delineation of genetic management units and enable tailored conservation strategies, which is crucial for imperilled species like the porbeagle shark (*Lamna nasus*). The porbeagle has experienced severe population declines owing to fisheries pressure in the North Atlantic since the 1920s, resulting in two recorded instances of stock collapse. Consequently, the IUCN classifies the porbeagle as 'Critically Endangered' in the North Atlantic, and 'Vulnerable' globally. Utilising mitochondrial control region sequences and 22 microsatellite loci, this study aimed to characterise the population structure of porbeagle sharks across the North Atlantic (n=429). Both marker types indicated a single, highly connected population, contrasting with current stock assessments, which treat the Northeast and Northwest Atlantic as separate units. The high genetic connectivity inferred across the North Atlantic highlights the necessity for future research to identify possible migration routes and investigate locations linked to ontogeny. Such insights could guide management and inform policy in order to safeguard ongoing gene flow and support stock recovery.

Porbeagle; phylogeography; genetics

Advancing non-invasive dietary studies in elasmobranchs: validation of the fDNA metabarcoding approach

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DNA metabarcoding of faecal material is increasingly applied in ecological studies to gather biological data non-invasively. In aquatic environments, where the collection of excreted waste is challenging, cloacal swabbing provides a practical sampling tool. The aim of this study was to evaluate the effectiveness of cloacal swabs in reconstructing the diet of elasmobranchs. To this end, stomach contents and corresponding cloacal swabs were sampled from 55 individuals belonging to 10 different elasmobranch species caught during trawling, alongside environmental controls. Metabarcoding of cytochrome c oxidase subunit I (COI) DNA was performed using Folmer primers combined with nanopore sequencing technology. Our results indicate that DNA metabarcoding of cloacal swabs presents limitations when applied in high-density catch scenarios. Stomach contents yielded significantly higher taxonomic richness, detecting on average a dozen additional prey species per individual. Faecal DNA retained only a partial biological signal, which was heavily overprinted by environmental noise. These findings warrant caution when implementing cloacal sampling, and underscore the importance of accounting for contamination. Nonetheless, subject to technical refinements and protocol optimization, this approach retains the potential to serve as a non-lethal tool for monitoring elasmobranch trophic ecology and supporting management efforts.

genetics, conservation, collaboration



DAY 2 — SESSION 4 (Scintillating Skates)

Getting Busier with Age: Dorsal Pattern Variation in Thornback Skates (*Raja clavata*)

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Thornback skates (*Raja clavata*) pose taxonomic challenges due to significant variation in their dorsal colouration patterns. Their Vulnerable status calls for more thorough research in such variation to target conservation efforts. This study is the first to quantify dorsal colouration pattern variation in *Raja clavata* and test it against total length, maturity, sex and region, and the feasibility of pattern morph type categorisation. A semi-quantitative, synthesised methodology based on automated image analysis, using machine-learning, and human readings was performed. Total length was the strongest predictor, positively associated with pattern complexity and disruptive elements ($p < 0.001$). These ontogenetic changes likely reflect shifts from nursery habitats requiring crypsis to adult environment favouring disruptive camouflage against structured substrates. Females showed higher dark pattern proportions and contrast ($p < 0.05$), possibly balancing camouflage and reproductive signalling. Northern individuals (North Wales) displayed higher contrast to match heterogeneous environments, while southern individuals showed more eye spots, potentially anti-predator signals in turbid conditions ($p < 0.001$). Cluster analysis did not yield robust morph categories, suggesting a family resemblance approach at pattern-element level. Results aid in species identification and advocate for machine-based, regionally sensitive management and monitoring in fisheries conservation.

fisheries conservation; animal colouration; machine learning

A tale of two skates: biological and ecological aspects of two commercial species inhabiting the Northern Adriatic Sea

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Skates are particularly vulnerable to unmanaged fishing exploitation. The Northern Adriatic Sea is one of the most intensively exploited fishing areas in the Mediterranean Sea, which contributed to the decline of several species, including the thornback (*Raja clavata*) and starry skate (*R. asterias*). This study investigates key reproductive, spatial, and dietary traits of these species providing new insights into their life-history and ecological dynamics.

Both species reached sexual maturity at large sizes, corresponding to about 75–85% of their maximum size, confirming their high vulnerability to fishing exploitation, as individuals may be captured before contributing to the spawning stock biomass. The occurrence of females carrying fully developed egg cases, laid egg cases, and juveniles of both species off the coast of the North-eastern part of the basin confirms that this area represents an important, shared nursery and spawning ground. Both species showed a generalist feeding strategy; nevertheless, diet differed between species and, within species, among size classes. Spatial occurrence also varied with maturity stage and body size, suggesting a spatial and dietary segregation that may reduce competition between and within species.

Together, these findings highlight that tailored management measures accounting for late sexual maturity and differential spatial occurrence across life stages are essential to support the conservation of these vulnerable skate populations.

skates, reproduction, ecology

Structural differences in the metal concentrations found in egg cases of flapper skate (*Dipturus intermedius*)

Kevan McBean¹, Steven Benjamins¹, Richard Abell¹, Helena Reinardy¹

¹Scottish Association of Marine Science (SAMS)

The flapper skate (*Dipturus intermedius*) is critically endangered due to historic overfishing. Much less is known regarding its sensitivity to pressures such as contaminants, including their effects on embryonic development. Their egg cases are large to protect the embryo during its prolonged (>1 yr) development but are concurrently exposed to environmental contaminants. Here, we assessed elemental concentrations in *D. intermedius* egg cases recovered from beaches Scotland using microwave acid digestion and ICPMS/MS. Biological metal concentrations were analysed through multivariate visualisation using principal component analysis, and linear mixed models. Following dissection and sub-sampling of the egg cases, elemental concentrations varied significantly across different regions of the egg cases, with concentrations of 34 being significantly elevated in the 'horn' and 'skirt'. Additionally, significant differences in elemental concentrations were observed between three discrete egg case layers, with the outermost layers containing significantly elevated concentrations of 31 elements. Compared to concurrently collected seawater samples, copper, tin, and several rare earth elements displayed the highest concentration factor into biological tissues. This broad study highlights complex variations of metal concentrations found in the egg cases of a critically endangered species and may inform future studies into impacts of metal concentrations on the development of embryos.

skate, eggs, metals

Behavioural responses of thornback ray embryos to offshore windfarm related stressors.

Rebecca Greatorex¹

¹University of Southampton

Offshore windfarms (OWF) are one of multiple renewable energy strategies being used globally to combat climate change. In response to governmental commitments to reduce reliance on fossil fuels in the UK, there has been an increase in funding and development allocated to OWFs. OWFs have various associated environmental stressors, two of which are pile-driving and electromagnetic fields (EMFs). These stressors were chosen to represent high intensity short term stress (pile driving) and low intensity long term stress (EMF). Thornback rays (*Raja clavata*) are a commercially important UK elasmobranch species, classified as near threatened, with a slow growth and maturation rate. In this study we investigate the effects of environmentally relevant levels of pile driving and EMFs on embryonic behaviour of the thornback ray using two novel methodologies. When exposed to pile driving, a predator response behaviour was observed at the start of the sound exposure. During long term exposure to EMFs, there was a general trend in elevated behavioural activity in embryos exposed. With finite energy reserves whilst encapsulated and no mechanism for avoidance, behavioural responses to unnatural windfarm stressors are energetically expensive and maladaptive. Questions are raised about the cost of persistent acoustic and EMF exposure to fitness within the species.

embryo; behaviour; renewables

Revealing Hidden Layers: High-resolution analysis of elasmobranch eggcase structure and composition.

Carla Ewart¹, Helena Reinardy¹, Bhavani E. Narayanaswamy¹ and Steven Benjamins¹

¹Scottish Association for Marine Science (SAMS)

Oviparous elasmobranchs deposit eggcases on the seabed, containing an embryo that develops over months without parental care. The eggcase protects the embryo while its permeable structure enables nutrient exchange and waste removal. This study investigated the eggcase structure and composition across five UK elasmobranch species: Flapper Skate, Thornback Skate, Spotted Skate, Undulate Skate, and Small-Spotted Catshark. Scanning Electron Microscopy (SEM) observed microstructure, while Fourier Transform Infrared Spectroscopy (FTIR) and Carbon Nitrogen (CN) analysis determined composition. Biofouling intensity was assessed by percentage coverage. Eggcase thickness, FTIR spectra, and C:N ratios were analysed using Kruskal-Wallis and paired comparison tests, alongside SEM analysis.

SEM revealed three structurally distinct layers in the Flapper skate eggcase, including a unique fibrous outer layer. Eggcase thickness differed significantly across species (Kruskal-Wallis, $p = 0.016$), with Flapper skate showing the greatest thickness (555 μm), reflecting their larger size. Other species' eggcases were thinner and lacked the fibrous outer layer. FTIR showed consistent protein bands, while CN analysis revealed only small variations, indicating similar composition.

These findings offer new insight into how eggcase structure and composition protect developing embryos, establishing baseline data for future studies on protective mechanisms and potential bioactive antifouling materials.

skates, eggcase, microstructure



***Raja radula* Delaroche, 1809: From Genetic Diversity to Cryptic Lineages in the Mediterranean Rough Skate**

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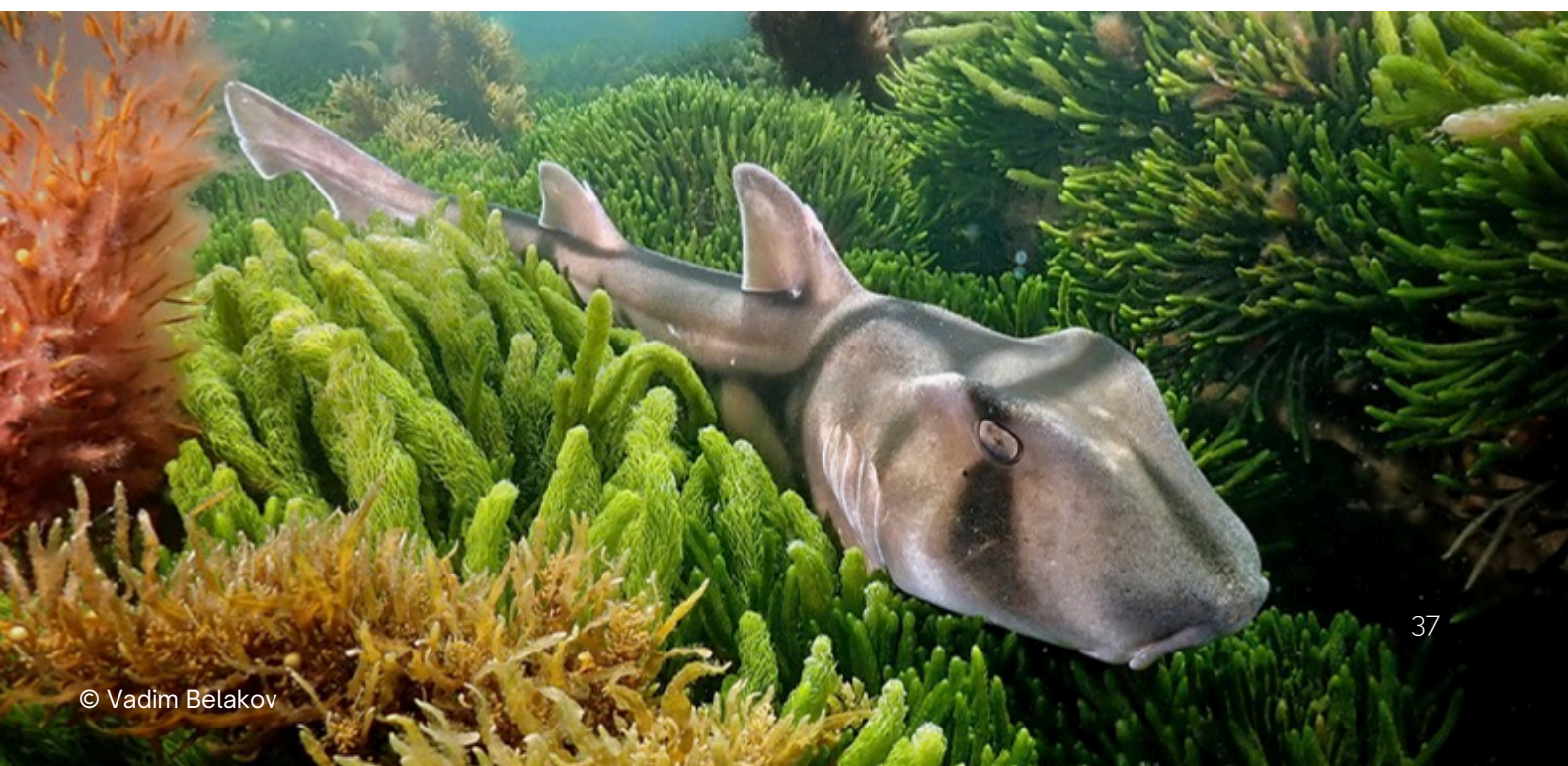
¹² Association for the Study and Conservation of Elasmobranchs and Its Ecosystems (Catsharks), Barcelona, Spain

Several studies have been extensively investigated the species diversity of the genus *Raja* with the aim to resolve taxonomic boundaries and the potential underestimation of regional biodiversity. Integrative taxonomy application has become a fundamental approach for resolving species boundaries by combining molecular, morphological, and biogeographic evidence and resulting particularly useful in groups characterized by morphological conservatism or cryptic evolution as widely observed in the rajid species. In the Mediterranean Sea, one of the rarest and least investigated species is the rough skate *Raja radula* Delaroche, 1809, despite its worrying state of conservation (Endangered). This species is distributed throughout the whole Mediterranean Sea and in the adjacent Atlantic Ocean waters. Knowledge concerning its population structure and intraspecific variability remains limited.

We investigated the intraspecific diversity and population connectivity of the species through the analysis of mitochondrial markers. Newly produced sequences were compared with those already available in online databases.

We produced the first multi marker dataset for *Raja radula*, covering most of its geographical distribution at the Mediterranean scale, laying the basis for future research and conservation actions. Our findings indicate high levels of genetic variability with signals of low connectivity among the Mediterranean. Moreover, occurrence of a cryptic lineage or species were observed.

***Raja radula*; Mediterranean Sea; DNA**



DAY 2 — SESSION 5 (Big Fish, Big Data)

EcoMorphLab: a desktop-based computer-vision and machine-learning platform for exploratory analysis of morphological variation in marine organisms

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EcoMorphLab is a desktop-based computer-vision and machine-learning platform developed to support exploratory analysis of morphological variation in marine organisms. The system is intended for research scenarios in which biological structure may be uncertain, overlapping, or difficult to define in advance.

EcoMorphLab enables researchers to prepare biological image data, extract visual representations using pretrained convolutional neural networks, apply multiple unsupervised clustering methods, and examine the resulting structures through quantitative metrics and interactive visualizations. Existing biological or contextual information can be used afterward to support interpretation without determining how the clusters are formed.

The complete analytical workflow is integrated into an offline desktop application that supports configurable processing, project management, interactive inspection of results, comparison between saved projects, and local persistence of research data.

EcoMorphLab is designed as an exploratory and hypothesis-generation tool. Its purpose is to assist researchers in identifying visual structures and relationships that may justify further biological investigation.

EcoMorphLab supports the research workflow from a software-platform perspective. The system provides tools for exploratory analysis, but the final biological interpretation remains the responsibility of marine biologists and domain experts.

marine biology, machine learning, clustering

Emerging global patterns in Important Shark and Ray Areas

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¹IUCN SSC SSG

Sharks, rays and chimaeras (chondrichthyans) are underrepresented in marine spatial planning despite high extinction risk and distinctive spatial ecological needs. Important Shark and Ray Areas (ISRAs) offer a standardised, science-based framework to address this. ISRAs are discrete, three-dimensional portions of habitat important for one or more chondrichthyan species, delineated with the potential to be managed for conservation. Since its 2022 launch by the IUCN SSC Shark Specialist Group, ~1250 ISRAs have been identified across 12 regions with input from >1700 experts. We synthesise results from the North American & Caribbean Atlantic and North American Pacific regions, examining broader patterns as the global ISRA process nears completion. Regional analyses reveal mismatches between critical habitats and spatial protection, while identifying important areas where spatial management is evolving, e.g. Areas Beyond National Jurisdiction. ISRAs are not protected areas or management prescriptions: they provide a spatial evidence base for marine spatial planning, fisheries management, environmental assessments and biodiversity frameworks. The ISRA network highlights geographic, taxonomic and life-history knowledge gaps and data-collection opportunities. This shows how a globally standardised habitat-identification framework can shift chondrichthyan conservation from documenting species declines towards identifying where conservation and management interventions can be targeted.

Important Shark and Ray Areas, marine spatial planning, fisheries management

Sharkipedia: living data for all 1,250 sharks, rays, and chimaeras

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Biodiversity databases are built by grants and are funded to be born, but not to live. Less than 40% of the biology databases launched in the 1990s remain online. Biological databases silently decay over time because coverage falls behind the rapidly growing literature just as users come to depend on it. The bottleneck is that graduate-level scientists are needed to read the literature and identify the traits to be extracted and this is work that no-one funds.

Sharkipedia is the largest trusted source of trait and trends and already supports CITES Non-Detriment Findings, Red List and stock assessments, and holds 4,247 hand-entered measurements across 59 traits for 178 of 1,250 shark, ray and chimaera species. Science and management only works for the species that have accessible data. Currently the species curated in Sharkipedia are a limited subset taxonomically and geographically biased.

We are rebuilding Sharkipedia as living data taking advantage of automated literature monitoring and AI-Large Language Model extraction to turn the ~20,000-paper chondrichthyan literature into candidate trait records, benchmarked against a human-curated gold standard. These candidate records will be scored by confidence and served up to expert editors for verification. Our vision is to first mine the legacy literature and then develop a pipeline to continually survey emerging literature forever.

biodiversity informatics; life-history traits; AI-assisted data extraction

Shark Oracle: a Comprehensive Living Database of Elasmobranch Research for Literature Reviews, Research Geography, and Conservation Prioritisation

Simon Dedman¹, Guuske Tiktak²

¹Florida International University

²MacAlister Elliott & Partners Ltd

From >30000 elasmobranch papers indexed by Shark-References.com, we extracted data using novel search strategies across ocean basin, ecosystem, species, anthropogenic pressure, fishing gear, impact on elasmobranchs, scientific discipline, analytical method. Genetics, data science, and movement publish most; conservation/policy and movement growing fastest. USA/Aus/UK/Canada publish most by nation, with others increasing, as is open access publishing. Female first authorship has risen towards parity, with differences across disciplines (more conservation & genetics, less trophic & movement) and regions. We're publishing in higher quality journals, but have poor social media metrics. Popular study areas are the Med and North Atlantic, with few in polar seas. Coastal/pelagic/demersal habitats are common, kelp/deeps/rivers rare. Carcharhinids are >2X as studied as catsharks; rays follow. Eagle rays, torpedo rays, then rays are the most understudied families. Status dashboards highlight trends and research disparities by technique/species/nation/discipline; co-occurrence heatmaps link parameters. This unlocks elasmobranch-specific lit reviews and aids conservation by identifying geographic/taxonomic research gaps. The pipeline auto-updates from Shark-References, thus is a living resource enabling research queries. Integration planned with Sharkipedia, community curation invited for expert-validated reviews, an LLM allows conversational queries on the full corpus. Collaboration welcomed.

infrastructure, management, conservation

DAY 3 — SESSION 1 (Chondrichthyans in deepwater)

How do you study a ghost? A multi-method framework for understanding *Chimaera monstrosa* in Norwegian waters.

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Ghost sharks (chimaeras) are among the least studied chondrichthyans in the Northeast Atlantic, a gap highlighted by a 2020 ICES report. Among them, *Chimaera monstrosa* is one of the most frequently recorded as bycatch in regional demersal fisheries. Low commercial value and the logistical challenges of deep-sea sampling have left its life history, population structure and movement ecology virtually undescribed, precluding meaningful stock advice and spatial management. Norway sits at the species' current northern range edge, and since 2021 we have worked to close this gap, as the species may already be shifting north with warming waters. But how are we supposed to study such a ghost? Here we present a multi-method framework for understanding *C. monstrosa* in Norwegian waters, combining three complementary tools: a long-term trawl survey time series to define distribution and detect distribution-scale shifts; RAD sequencing to characterise population connectivity; and acoustic telemetry to resolve fine-scale movement, habitat use and site fidelity. Together, these approaches build a rare, multi-dimensional picture of a data-poor deep-sea species, spanning distribution, movement and genomic structure. Beyond *C. monstrosa*, this offers a replicable roadmap for closing data gaps for this species elsewhere in the North Atlantic, and for other Northeast Atlantic deep-sea chondrichthyans, whether chimaera species or sharks such as *Etmopterus spinax*.

trawl survey time series; acoustic telemetry; population genomics

Shedding light in the deep sea: an effective bycatch avoidance measure for elasmobranchs in bottom longline fisheries?

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Bycatch is a serious threat to elasmobranchs worldwide. Deep-sea elasmobranchs are particularly vulnerable to overfishing due to their conservative life-history traits. But little is known about how their bycatch can be avoided. In European fisheries, most species of deep-water sharks are under a catch prohibition, meaning they must be released upon capture, but it does not stop bycatch from occurring. In the Azores (Portugal), deep-water sharks are a common bycatch of the bottom longline fishery, the main regional fishery in terms of landed value, number of fishing vessels and fishers. How this bycatch impacts deep-water shark populations remains uncertain but raises conservation concerns. Recent research efforts have therefore been carried out to test bycatch avoidance measures. The use of LED lights has recently proven promising to reduce the bycatch of some species of elasmobranchs, but it has never been tested on deep-water elasmobranchs. This study presents the recent experiments carried out in the Azores to test how lights of different colors affect deep-water elasmobranchs. The effects of lights of 4 different colors were tested across different depths. Results showed that elasmobranchs react differently to lights than teleosts. The effect of light was found to differ depending on the color of the light and the species. While further research is needed to consolidate these results, they hold promising perspectives for the bycatch avoidance of deep-water elasmobranchs.

bycatch mitigation; deep-sea elasmobranchs; fishing experiments

Trophic niche partitioning among demersal chondrichthyes in the strait of sicily: insights into resource use in deep-sea ecosystems

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This study investigated the feeding ecology and trophic position of four deep-sea cartilaginous fish species from the Strait of Sicily: *Galeus melastomus*, *Scyliorhinus canicula*, *Raja clavata*, and *Chimaera monstrosa*. Specimens were collected during the MEDITS survey and examined under a stereomicroscope, with prey identified to the lowest possible taxonomic rank. Stomach content analysis showed that *G. melastomus* mainly preyed on teleost fishes and cephalopods, while *S. canicula* had a more varied diet dominated by crustaceans. Both *R. clavata* and *C. monstrosa* relied heavily on crustacean prey. The Shannon-Wiener index and trophic niche breadth indicated low trophic diversity across species, with *S. canicula* showing the broadest feeding niche. Estimated trophic levels were highest in *G. melastomus*, consistent with its greater intake of fishes and cephalopods, while lower values in the other three species reflected their stronger reliance on crustaceans. Overall, all four species showed medium to high trophic levels, highlighting their key role in deep-sea community structure. Low vacuity index values suggested good prey availability in the area. Schoener's trophic overlap index and cluster analyses revealed limited dietary overlap among species, indicating effective resource partitioning. These findings improve our understanding of trophic structure and energy pathways in Mediterranean deep-sea ecosystems, which are increasingly exposed to anthropogenic pressures.

trophic ecology, Mediterranean Sea, niche overlap



Incorporating fishers' knowledge into vulnerability assessments of two data-poor deep-sea shark species to the bottom longline fishery in the Azores

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Despite the EU catch prohibition, deep-sea sharks continue to be caught incidentally by hooks-and-lines fisheries in the Azores. However, information on the bycatch of these species in the region remains scarce. In this data-limited context, knowledge from local fishers can provide a valuable source of information.

In this study, we assessed the vulnerability of two deep-sea shark species (*Deania profundorum* and *Deania calceus*) to the bottom longline fishery in the Azores, using the EASI-Fish model. We compared the outcomes of this assessment before and after incorporating knowledge from fishers into key parameters describing the fishery. This local knowledge was obtained through a series of workshops and discussions with fishers and fisheries representatives across several islands in the Azores. The participants were asked to review assumptions regarding the depth range of the fishery and fishing season duration, as well as to provide feedback on the spatial distribution of fishing effort and predicted species distributions.

The incorporation of information from fishers resulted in substantial changes to key model inputs and corresponding differences in outputs, particularly for *D. profundorum*. This work highlights the potential contribution of fishers' knowledge to improving the representation of fisheries in quantitative assessments in data-limited settings.

bycatch, vulnerability assessment, local ecological knowledge

Spatial analysis of trade-off areas for the bottom longline fishery in the Azores

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In the oceanic archipelago of the Azores, deep-water elasmobranchs (DWEs) are frequently caught as bycatch in bottom longline fisheries, largely due to their spatial overlap with the distribution of commercially targeted species. This work aimed to examine this spatial overlap in order to identify trade-off areas that would minimise the bycatch of DWE species while optimising the catch of commercial species. To do so, probabilities of presence of both commercial and DWE were derived from existing species distribution models and combined using different weights as multiplication factors. Several weights combinations were tested to give priority to different management concern for both commercial and DWE species. The resulting outputs were maps with values ranging from -1 to 1, negative values indicating areas where fishing should be avoided to limit bycatch and positive values indicating favourable areas for fisheries. An analysis of how these areas impact each species distribution was also conducted. The results showed that such approach and methodology are effective tools to identify trade-off areas and advise fisheries. The use of weights combination enabled to propose and compare several scenarios, allowing to visualise the outputs from contrasting management priorities. This adjustment was further improved by analysing how trade-off areas impact species-specific species distribution.

trade-off areas, deep-water elasmobranchs, weightings

Tissue-specific trace element distribution in the blackmouth catshark (*Galeus melastomus*) from the Strait of Sicily

Samira Gallo¹, Gianni Giglio¹, Chiara Carpino¹, Marica D'Andrea¹, Donatella Barca¹, Emilio Sperone¹

¹University of Calabria

Elasmobranchs are recognized bioindicators of marine metal contamination, yet tissue-specific accumulation patterns beyond liver and muscle remain poorly characterized. This study examined the distribution of 13 trace elements (Al, Cr, Mn, Fe, Ni, Cu, Zn, As, Se, Sr, Mo, Ba, Pb), quantified by ICP-MS, across four tissues — muscle, skin, heart, and brain — in twelve adult male *Galeus melastomus* (TL > 34 cm) collected during the 2025 MEDITS trawl survey in the Strait of Sicily. Despite its limited commercial value, *G. melastomus* is a common trawl bycatch species, making it a useful indicator of contaminant exposure across Mediterranean fishing grounds. Quantitative comparisons revealed clear tissue-specific patterns. Strontium and barium were markedly enriched in skin (mean Sr ~296 vs 4–13 µg/g in other tissues; Ba ~1.35 vs 0.05–0.10), reflecting the mineralized nature of dermal structures exposed to seawater. Iron peaked in heart tissue, consistent with its high metabolic and vascular demand, while arsenic was highest in muscle, matching the known affinity of organoarsenicals for muscular tissue. Notably, copper concentrations were higher in brain and heart than in muscle and skin, a pattern rarely reported for elasmobranchs and worth further investigation. These findings highlight strong tissue-dependent accumulation of trace elements in *G. melastomus* and support multi-tissue sampling for reliable biomonitoring of Mediterranean elasmobranch populations.

trace elements, bycatch, bioindicators

Postnatal brain development in the deep-water shark *Galeus melastomus*

Riccardo Porceddu¹, Andrea Bellodi¹, Cristina Porcu¹, Giovanna Mulas¹, Blondine Agus¹, Antonello Mulas¹, Maria Cristina Follesa¹

¹University of Cagliari

Across vertebrates, brain organisation continues to change during postnatal development, often in association with ontogenetic shifts in ecology, behaviour and sensory demands. In sharks, however, such developmental changes remain poorly documented, and virtually nothing is known about brain ontogeny in deep-water species. We examined whole-brain growth and the development of major brain regions (olfactory bulbs, telencephalon, diencephalon, optic tectum, cerebellum, medulla oblongata) across young-of-the-year, subadult and adult stages of the deep-water blackmouth catshark *Galeus melastomus*. Brain mass increased with body mass, but at a slower rate, and relative brain mass differed significantly among all three life stages. As sharks grew, the olfactory bulbs, medulla oblongata and cerebellum grew faster than the rest of the brain, the optic tectum at a similar rate, and the telencephalon and diencephalon more slowly. Overall, regional growth broadly matched patterns reported in other sharks, although the proportional growth of the optic tectum and the progressive changes in relative brain mass across life stages distinguished *G. melastomus*. These features may be associated with the timing of sensory pathway maturation and ecological transitions during growth. Our results provide an ontogenetic framework for understanding brain organisation in a deep-water shark.

deep-sea, brain ontogenesis, brain evolution

DAY 3 — SESSION 2 (Conservation)

Listing fish on Multilateral Environmental Agreements: Is there a need for broader scientific input and review?

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Fisheries management measures relating to elasmobranchs have increased nationally and internationally since the mid-1990s. There has also been a concurrent increase in using nature conservation instruments to afford species-level protection, including Multilateral Environmental Agreements (MEAs; e.g. CITES and CMS). Proposals to list species in the Appendices of MEAs require reflection on defined criteria, yet adoption often aligns closely to IUCN Red List Assessment status. Under the IUCN criteria, species threat status can be based on observed, estimated, projected, inferred or suspected changes. Fisheries management generally differs in the population assessment methods, with more defined ways of interpreting information by data source(s), temporal/spatial scales of underlying data (and representativeness), potential impact of management on the underlying data, and other data quality issues. There are well-defined criteria for listing species in the Appendices of CITES, but the acceptance of listing proposals (2022–2025) reveals a growing contrast in approaches between nature conservation and fisheries science audiences. This paper examines the need for improved societal consideration on interpreting scientific recommendations in delivery of MEA mandates, whether from ‘honest brokers’ or ‘issue advocates’. This is particularly important for exploited aquatic resources, as listing on MEAs can potentially (a) not negate the underlying pressure(s) on the species; (b) impact fishing communities and food security; (c) divert resources away from species or taxa of greater concern; (d) impact the availability, representativeness and quality of datasets for monitoring stock status; and (e) undermine the scientific review and listing process if species not meeting the criteria are listed.

fisheries management; nature conservation; data quality

Uniting a Region for a Species: An International Working Group Delivering the Mediterranean Angelshark Action Plan under the Convention on Migratory Species

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²Secretariat of the Convention on Migratory Species of Wild Animals (CMS)

With extinction risk rising faster for chondrichthyans, reversing their decline demands action across a range of available tools, ranging from fisheries management, spatial protection to cross-border data sharing and policy alignment. The Critically Endangered Angelshark (*Squatina squatina*), has vanished from most of its historical range, making coordinated international action essential for its recovery. The Convention on Migratory Species (CMS) provides an intergovernmental framework required to manage transboundary ecological challenges of this scale. CMS enables Range States to align conservation strategies across entire distributions, preventing jurisdictional discrepancies from undermining species protection. Central to this approach are Single Species Action Plans (SSAPs), which translate regional mandates into binding, cross-border strategies for priority species. In 2024, the Mediterranean Angelshark Population became subject to the first SSAP for a chondrichthyan under CMS, a proof of concept for similar plans for other species. Operationalizing this required a formal structure linking governments and scientists. An International Working Group was established for this purpose, and brings together government and expert representatives from Mediterranean Range States. The WG has mapped Angelshark occurrence against MPAs and has set measurable targets. With the Angel Shark Conservation Network, the WG is developing guides, protocols, and reporting tools.

conservation planning, policy, MPAs

Policy framework for the conservation and management of activities affecting sharks, rays, and chimaeras and its implementation in French law

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Metropolitan France holds 106 chondrichthyans, with about 10% threatened following the IUCN and many others Data Deficient. Their legal framework is highly fragmented, spanning international conventions and RFMOs to EU and national regulations, across fisheries, trade and environmental policy, creating uncertainty and making it hard to assess whether current rules effectively protect threatened species. This study synthesizes the policy framework governing chondrichthyans in metropolitan France. We identify all applicable regulations, their content, binding force and scope, highlighting key strengths, gaps, and inconsistencies, and examine French administrative powers and how they implement and strengthen this framework. Most legal texts derive from international or EU law, with few from French legislation. Although French authorities have tools to regulate fisheries and protect marine biodiversity, these are rarely used for chondrichthyans, which fall outside the general species protection regime; existing regulations focus mainly on fisheries and cover only a fraction of species. Stronger measures are needed for threatened species remaining poorly protected. A key contribution is an up-to-date catalogue of regulations applicable to chondrichthyans in metropolitan France, including recent amendments and new regulations. This reduces uncertainty by identifying applicable regulations and coverage gaps per species, helping stakeholders implement and improve this framework.

chondrichthyes, regulation, implementation

Preliminary Survey of Elasmobranch Diversity for Further Conservation in Egypt's Mediterranean Coast

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Egypt has one of the largest fishing fleets in the southern Mediterranean, which commonly interacts with elasmobranch. A bycatch monitoring project was conducted in a collaborative effort between Banlastic Egypt and iSea across two main landing sites, "Alexandria and Damietta" with over 62 port visits between December 2025 and August 2026. A total of 3,228 individuals were recorded, comprising 35 elasmobranch species, weighing around 61,600 kg. The most common species were Common guitarfish (*Rhinobatos rhinobatos*), Common smooth-hound (*Mustelus mustelus*), Longnose spurdog (*Squalus blainville*), Blackchin guitarfish (*Glaucostegus cemiculus*), and Lusitanian cownose ray (*Rhinoptera marginata*). Alarming, 79% of recorded individuals belong to IUCN Red List threatened categories. Morphometric data were collected for multiple species, contributing baseline biological observations currently absent from the literature for this region. Field observations also indicated a clear social dimension: most fishers acknowledge legal restrictions yet continue landing threatened species due to limited economic alternatives. These findings, together with recent research, suggest Egypt's Mediterranean coast as a significant elasmobranch bycatch hotspot and underscore the need for community-engaged conservation strategies and strengthened regional monitoring. All the data presented here are part of an ongoing project.

elasmobranch bycatch, Egyptian fisheries, threatened species

Not only Great Whites: An exploratory study on coloniality in shark conservation

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Modern Western conservation stems from colonial practices. Coloniality describes the persistence of these philosophies and patterns that entrench Western, colonial-era narratives and power structures, at the expense of marginalised social groups. Colonial practices have negative impacts on conservation outcomes, but remain underexplored in shark conservation. This thesis used knowledge hierarchies and policy preferences as themes to explore how coloniality might be present in shark conservation. A thematic analysis was performed on in-depth and semi-structured expert interviews (n=4) with actors from the shark conservation field. Their perspectives were coded. This found that while knowledge and awareness on the subject are growing, knowledge hierarchies are still present through disregard for local needs, parachute science, non-meaningful and exploitative local involvement and seeing Western science as inherently objective. It was also found that there are one-size-fits-all policy preferences that devalue and miss local needs and capacities. Large NGOs and Western-based institutions control narratives, funds and opportunities. Lastly, shark conservation narratives push Western-centric ideals and values, and villainise local communities, especially fishers. This all promotes colonial-era power imbalances. Based on this research, six recommendations to decolonise shark conservation were formulated.

coloniality, decolonisation, epistemic injustice

The Angel Shark Conservation Network: Coordinated Action for the Conservation of Critically Endangered Angel Sharks

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⁶IUCN Species Survival Commission Shark Specialist Group

The Angel Shark Conservation Network (ASCN) was established in 2016 to empower action to restore and safeguard angel shark populations across their natural range. To date, the network has focused on the Eastern Atlantic and Mediterranean Sea, encompassing the distribution of three Critically Endangered angel shark species: *Squatina aculeata*, *S. oculata*, and *S. squatina*.

The ASCN facilitates collaboration, dialogue and knowledge exchange among researchers, conservation practitioners, policymakers and stakeholders, while providing a mechanism for developing strategic conservation planning documents at regional and national scales. Through multidisciplinary workshops, several Angel Shark Action Plans have been developed under the Eastern Atlantic and Mediterranean Angel Shark Conservation Strategy. These plans identify priority actions needed to address key threats and guide future research, management, policy and conservation efforts.

The ASCN encourages and supports organisations and individuals to deliver actions outlined within these planning documents, promoting a coordinated approach to angel shark recovery. Recently, the network formalised its structure, creating opportunities for engagement as Partners, Members or Subscribers. This presentation will showcase priority conservation actions delivered by ASCN Partners and Members, highlighting achievements and the importance of collaboration in advancing angel shark conservation.

Angel Shark, strategy, partnership

Angels in Trouble in the Southwest Atlantic

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In the Southwest Atlantic, at least four angelshark species have been confirmed: *Squatina argentina* (Argentine Angelshark), *S. guggenheim* (Angular Angelshark), *S. occulta* (Hidden Angelshark), and *S. varii* (Vari's Angelshark). *Squatina argentina*, *S. guggenheim* and *S. occulta* occur in temperate waters off Argentina, Uruguay and southern Brazil and are classified as Critically Endangered (CR - *S. occulta* and *S. argentina*) and Endangered (EN - *Squatina guggenheim*) by IUCN. *S. varii*, found only in northeast Brazil, is Least Concern (LC). Additionally, in northern Brazil, there are putative records of *Squatina* cf. *dumeril* (Atlantic Angelshark) and *S. david* (David's Angelshark). Brazil has listed the three endangered species in regulations prohibiting their capture, transport, and trade, with *S. guggenheim* and *S. occulta* listed since 2004 and *S. argentina* in 2014. Still, angelsharks continue to be commercialized in the country. Argentina and Uruguay, conversely, have a joint-management agreement for elasmobranchs that issues fishing quotas instead of prohibitions, and there is evidence of exportation to Brazil. Despite this, research on Southwest Atlantic angelsharks remains scarce, especially molecular data, present mostly for *S. guggenheim*. Research to monitor angelshark trade and population dynamics is needed to improve understanding of movement, connectivity, and international trade, and thus to update conservation status and enforcement strategies in the Southwest Atlantic.

Angel Sharks, conservation genomics ; Southwest Atlantic



A Holistic Approach to Shark Protections: Biocentrism in Law, Ethics, and Culture

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Shark fishing practices are causing serious animal and environmental harm globally. Currently, laws are ineffective in protecting sharks. Research shows that harmful shark fishing practices are growing on a global scale, despite the increasing number of protective laws. Consequently, this presentation will propose a solution which adopts a holistic approach to shark protections through biocentrism. It will argue that the law should not be viewed in isolation but as one element of the solution. The other elements which will be discussed are environmental ethics and culture. Under environmental ethics, shark protections that are grounded in anthropocentric (human-centred) ethics will be criticised because they morally justify exploiting animals for human gains. Instead, it will be argued that biocentric (life-centred) ethics should guide protections based on its values, including intrinsic value, moral consideration, and perceiving all lives as equal while providing each species with what they need to thrive. Subsequently, the importance of cultural relationships with sharks in coastal nations will be discussed to establish their significance to shark fishing practices. It will also look at the ways in which anthropocentric cultures can transition from harmful practices to biocentric conservation practices while protecting culture. The concluding argument will be that biocentrism should guide shark protections through law, ethics, and culture.

Shark protections, biocentrism, law

Beyond a Single Nursery Ground: Insights into Blackchin Guitarfish (*Glaucostegus cemiculus*) Nursery Ecology

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The first confirmed nursery habitat worldwide for a guitarfish species was recently identified in the Eastern Levantine Basin for the Critically Endangered blackchin guitarfish (*Glaucostegus cemiculus*) at Ma'agan Michael. Building on this, we expanded long-term monitoring 90 km south, of Evtach MPA and evaluated it as a second nursery habitat and conducted an analysis comparing the two confirmed nurseries. At Evtach, same-day paired surveys showed significantly higher neonate densities than at a nearby reference site (6.97 vs. 0.90 individuals/km; $n = 10$ pairs; Wilcoxon $P = 0.014$). Neonates occurred from August to November in all monitored years (2017-2018, 2023-2025). This shows that Evtach fulfills all three nursery habitat criteria and exhibits the same seasonal pattern reported at Ma'agan Michael. Size-adjusted disc morphology did not differ between nurseries (PERMANOVA, $P = 0.574$), and mass-length allometric scaling was conserved (Likelihood ratio test, $P = 0.537$). However, neonates from Evtach exhibited higher expected body mass at a given length (SMA elevation, $P = 0.0096$) and significantly better body condition than those from Ma'agan Michael (SMI: 112.5 ± 10.9 vs. 108.0 ± 13.9 ; Wilcoxon $P = 0.011$). Our findings reveal strong ecological similarity between nurseries while highlighting spatial variation in juvenile condition. Comparative nursery ecology can help identify and prioritize habitats essential for recruitment and persistence of this endangered batoid.

Blackchin Guitarfish, nursery ground, critical habitat conservation

DAY 3 — SESSION 3 (Ecologically-important areas)

More Than an Aggregation: Individual Variation in Residency, Social Structure and Behavioral Ecology of Tiger Sharks (*Galeocerdo cuvier*) in Fuvahmulah, Maldives

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Fuvahmulah, Maldives, hosts one of the largest documented aggregations of tiger sharks (*Galeocerdo cuvier*), with over 320 individuals identified through long-term photo-identification. This predictable food subsidy provides a unique opportunity to investigate how provisioning may influence tiger shark ecology. We analysed 280 individuals recorded between 2022 and 2024, examining residency and social associations in relation to sex, body length and seasonality.

Of these, 125 were sighted more than eight times, indicating a substantial resident component. Social network analysis revealed non-random associations across nine networks. Stronger associations occurred among medium and large sharks, with females showing stronger social associations than males. Mean network density was 0.54 ± 0.18 , while overall association strength was low (mean HWI = 0.0723). However, specific dyads showed high association indices, with some relationships strengthening across years, suggesting persistent social bonds. Association patterns also varied between monsoon seasons, while lagged association rates indicated predominantly short-lived associations alongside persistent dyads.

These findings reveal substantial individual variation in residency and dynamic social structure within a provisioned aggregation. Building on this behavioural dataset, STRIPE integrates stable isotope, fatty-acid and genetic analyses to assess how provisioning may influence tiger shark ecology.

tiger shark, social associations, dive tourism



Biotic and abiotic factors that determine the presence of the angel shark (*Squatina squatina*) at Las Teresitas beach

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For the last 10 years, the Angel Shark Project has monitored the largest known nursery area for the Critically Endangered angelshark (*Squatina squatina*), Las Teresitas, Tenerife, North-East Atlantic. Long-term monitoring of this area has contributed to a better understanding of the species' biology and habitat use, which has been used to delineate an Important Shark and Ray Area (ISRA) and to develop targeted conservation measures at the local scale. With more than 600 individuals captured and tagged, a recapture rate of 18.4% and confirmed year-round presence of neonates and young-of-the-year, Las Teresitas was confirmed as a functional nursery area. Despite these findings, long-term monitoring has revealed fluctuations in juvenile abundance, highlighting the need to better understand the factors driving these temporal variations. Therefore, it is essential to conduct a new study analyzing the biotic and abiotic factors that influence the abundance and habitat use of the angelshark in order to establish a baseline for the nursery area and provide a reference against which future changes can be assessed. This is particularly relevant in the Canary Islands, where increasing urban and tourism development may alter coastal habitats and potentially affect critical areas such as Las Teresitas. Moreover, evidence that the Tenerife population represents a distinct genetic unit highlights the importance of this area for its conservation of the species.

Squatina squatina, angelshark, Las Teresitas



Unravelling the spatial ecology of four Myliobatiformes in the northwestern Mediterranean.

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Rays species have experienced significant population declines in recent decades and are highly vulnerable to anthropogenic impacts due to their slow life cycles, low fecundity, and susceptibility to bycatch. Despite their ecological importance, knowledge of the spatial ecology of rays in the northwestern Mediterranean remains limited and is based mainly on fishing records and occasional sampling. Understanding their spatial ecology is essential for designing effective conservation strategies. In this study, acoustic telemetry is used to assess movement patterns, site fidelity, habitat use, and connectivity in four ray species along the northwestern Mediterranean coast: *Myliobatis aquila* and *Aetomylaeus bovinus* (Myliobatidae), and *Dasyatis pastinaca* and *Pteroplatytrygon violacea* (Dasyatidae).

The study area includes a network of Marine Protected Areas (MPAs), allowing for the assessment of functional connectivity. Preliminary results reveal movement patterns and a preference for shallow sandy habitats associated with *Cymodocea nodosa* meadows, mostly outside existing MPAs. These habitats serve as both feeding grounds and movement corridors between neighbouring bays.

Our findings highlight gaps in current MPA coverage and the need to integrate critical habitats, movement routes, and species-specific requirements into conservation and fisheries management to improve batoid conservation.

myliobatiformes, distribution, connectivity

Relative abundance of elasmobranchs in nearshore habitats of St. Barthélemy, French West Indies

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Sharks and rays are key apex and meso-predators in coastal Caribbean ecosystems. However, researchers have not adequately characterized their community structure in nearshore waters of Saint Barthélemy, French West Indies despite the presence of established Marine Protected Areas (MPA). We deployed baited remote underwater video surveys (BRUVS) in relatively shallow (<8m depth) nearshore habitats (<250m from shoreline) to determine relative abundance of elasmobranchs within these areas. Additionally, across two years, we sampled single and replicated sites within and outside MPA to determine if abundance differed between these treatments. We systematically analyzed each video and recorded species identity, number of individuals, time in frame, approach behavior, feeding posture, and interactions with the bait cage. We used mean counts rather than MaxN or MaxIND to better estimate populations represented in these surveys. Analyses are ongoing to compare survey results between sites inside and outside the MPA and to evaluate associations with habitat characteristics, including coral and seagrass presence, human recreation, boating activity, island location, and current direction. Preliminary results from Season 1 revealed a significant difference between MPA and non-MPA sites. Our results improve understanding of MPA function and elasmobranch relative abundance within nearshore Caribbean habitats, while providing essential data to the local natural-resource management agency.

marine protected area, BRUVS, Caribbean

Integrating Important Shark and Ray Areas into Marine Protected Area Network Design in the Australian Exclusive Economic Zone

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Marine Protected Areas (MPAs) are expanding under the global goal to protect 30% of the ocean by 2030. However, effective conservation depends on whether protection covers vulnerable species and key habitats. Chondrichthyans are among the most threatened marine vertebrates, mainly due to fishing. This study assessed how well Australia's no-take MPAs, where fishing is prohibited, protect chondrichthyan distributions and Important Shark and Ray Areas (ISRAs). We also compared two spatial planning scenarios for expanding no-take protection to 30% of Australian waters: strengthening protection within existing MPAs, or also allowing new no-take areas outside them. Existing no-take areas poorly represented chondrichthyan biodiversity and ISRAs, with species richness highest in areas open to fishing and outside MPAs. Strengthening protection within existing MPAs improved representation but left many targets unmet. Allowing new no-take areas outside current boundaries more than doubled the number of targets achieved and reduced average target shortfall from $18.9 \pm 29.8\%$ to $3.4 \pm 6.4\%$. Irreplaceable areas were concentrated on the continental shelf and slope, while most existing no-take MPAs occurred in the deep sea. These results show that area-based targets alone are insufficient: combining species distributions with ecologically important habitats can support more representative and strategically located protection for chondrichthyans.

Important Shark and Ray Areas (ISRA); systematic conservation planning; spatial prioritization

Beyond bombs and batoids: an emerging multi-species elasmobranch hotspot in need of protection at Filfla, Malta

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¹Sharklab-Malta

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 (MPA). Despite recognition in oral histories as a key shark area, it has received little scientific attention outside ornithology, resulting in a very limited marine survey history. Regardless, historical and contemporary records continue to indicate that Filfla supports a diverse elasmobranch assemblage. *Carcharodon carcharias* was recorded at Filfla in 1956, the 1960s and 1987. *Squatina spp.* were seen in 2006 and 2022, and local fishers report a possible nursery around the islet. *Galeus melastomus* was photographed in a cavern in 2006. Sharklab-Malta's SCUBA surveys have added to this picture since 2012, with presence/absence records to 2015 detailing 8 batoid species, and a quantitative baseline snapshot in 2024 recorded 162 batoids across 3 species, *Dasyatis pastinaca*, *Bathytoshia lata* and *Myliobatis aquila*, including *D. pastinaca* courtship behaviour and a recorded mating attempt. At least 11 elasmobranch species are now known from the 1NM exclusion zone that marks the MPA boundary. However, a legacy fishing exemption from 1990 remains active within the MPA, and several of the species recorded remain without any national protection despite CMS/Barcelona Convention updates. We present this synthesis to argue for expanded, standardised survey efforts at Filfla and closure of its regulatory gaps.

Marine Protected Area, batoids, Local Ecological Knowledge

Habitat Association of Selected Elasmobranchs in Lemnos: Looking into Posidonia Meadows, Maerl Beds and Rocky Reefs

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Angelsharks (*Squatina spp.*) are among the most threatened shark families worldwide, with all three Mediterranean species listed as Critically Endangered by the IUCN Red List. In June 2026, Angel Shark Project (ASP) Greece and ASP Canary Islands joined forces on Lemnos Island for a ten day campaign implemented under the 5-year ELSP project "Reviving Lemnos," aiming to expand knowledge of angelsharks around Lemnos, a recently identified key area for the species, while also launching a new Shark Conservation Fund project on angelshark conservation in Greece and the Canary Islands. A multi-method survey combined specialised training in adult satellite tagging, applied to individuals incidentally caught as bycatch by local fishers, with underwater visual censuses, BRUVS deployment, and night snorkelling surveys on sandy beaches targeting potential nursery areas. The first individual, a 90 cm female caught as bycatch over *Posidonia oceanica* meadows at 20 m depth, was fitted with a LOTEK PSATFLEX pop-up satellite tag (4 month duration), the first shark satellite tagging in Greek waters and one of the few conducted for the species globally. Four further deployments are scheduled, with tag durations of 6 to 12 months. Satellite tracking, combined with visual census and fisheries monitoring data, will inform movement patterns and habitat use around Lemnos, supporting conservation of one of the Mediterranean's most threatened sharks.

angelshark, *Squatina squatina*, satellite tagging



Cleaning-associated behaviour of pelagic thresher sharks (*Alopias pelagicus*) at a Maldivian Atoll. Can cleaning events influence the spatial ecology of pelagic thresher sharks?

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Pelagic sharks range across expansive oceans, yet some biological requirements depend on localised reef habitats. Cleaning provides parasite removal and tissue maintenance, suggesting cleaning services may be important to wide-ranging species. Pelagic thresher sharks (*Alopias pelagicus*) host diverse parasite communities and visit cleaning stations across isolated parts of their range. We investigated reef-associated behaviour at three cleaning sites around Fuvahmulah, Maldives, using remote cameras from August 2022 to February 2024. We recorded 649 encounters within a 06:00–17:00 window. Encounters were temporally structured, with highest effort-standardised rates occurring during morning and midday hours. Circling was also temporally structured and strongly associated with cleaner-wrasse presence. When controlling for site and clustering within site and date, the odds of circling were 3.31 times higher when blue-streaked cleaner wrasse (*Labroides dimidiatus*) were present (95% CI: 1.78–6.16, $p < 0.001$). Although direct parasite removal was not observable, these patterns provide evidence from the Maldives that its consistent with cleaning-associated habitat use documented elsewhere. We propose that recurrent cleaning-habitat use across separated populations reflects a broader health-maintenance strategy that influences local habitat use and broader movement decisions.

pelagic thresher shark, cleaning-associated behaviour, behavioural ecology

Spatial ecology, site fidelity and courtship behaviour of Critically Endangered leopard sharks (*Stegostoma tigrinum*) in southern Mozambique

Jule Buschmann¹

¹All Out Africa Marine Research Centre

The Indo-Pacific leopard shark (*Stegostoma tigrinum*) has undergone severe declines across much of its range, with the Western Indian Ocean–Southeast Asian subpopulation listed as Critically Endangered. We used a 14-year dataset (2011–2025) of underwater surveys and photo-identification records to investigate the spatial ecology, site fidelity, and behaviour of leopard sharks in southern Mozambique. Across 9,219 surveys, 631 leopard shark sightings were recorded, representing 164 identified individuals. The population was strongly female-biased and dominated by adult and subadult sharks. Sightings were concentrated at a small cluster of reefs north of Tofo, highlighting these reefs as an important habitat for the species. Photo-identification records revealed long-term site fidelity, with 35% of sharks resighted at least once and 27% recorded across multiple years, including one individual documented over an 11-year period. Inter-regional movements were rare, with only three sharks recorded moving between Tofo and Morrungulo, approximately 60 km apart. Three courtship interactions were documented, representing the first records of courtship behaviour for *S. tigrinum* in the Western Indian Ocean. Observed behaviours included close pursuit and caudal fin grasping, consistent with pre-copulatory behaviour. Our findings support the need for targeted protection of key habitats and continued long-term monitoring to inform conservation management.

Stegostoma tigrinum, spatial ecology, Western Indian Ocean

Is the Gulf of Trieste a Potential Nursery Area for Certain Elasmobranch Species?

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This study aimed to determine whether the Gulf of Trieste meets the criteria for a nursery area as defined by different sources, primarily Heupel et al. (2007). The analysis was based on elasmobranch specimens from the collection of the Marine Biology Station Piran (National Institute of Biology, Slovenia), comprising five species (*Mustelus mustelus*, *M. punctulatus*, *Torpedo marmorata*, *Raja asterias*, and *Aetomylaeus bovinus*) caught as bycatch over a 24-year period. Four of the five species (excluding *A. bovinus*) fulfilled all three criteria. According to the data analyzed, the Gulf of Trieste could be considered a communal juvenile nursery area for the assessed species. In addition, records of juveniles belonging to other elasmobranch species reported during the study period in the area suggest the potential importance of this area as a nursery ground for other species as well.

nursery area, northern Adriatic, bycatch

Distribution of Early Life Stages of Three Threatened Stingrays in Amvrakikos Wetlands National Park (Greece)

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The Amvrakikos Gulf is a known nursery area for elasmobranchs, including *Gymnura altavela* and *Aetomylaeus bovinus*, while its role for *Myliobatis aquila* has remained unclear until recently. The specific distribution of early life stages and their fishery interactions were poorly understood. This study assessed the spatiotemporal distribution of early life stages and fishery interactions of these three threatened species across the Gulf.

Data from 1,298 fishing deployments were analysed using GIS and statistical analyses to examine differences in catch intensity by port, month, depth, and fishing métier.

Early life stages dominated catches of all three species. Estuarine conditions favoured early life stages, with catch rates peaking from late spring to early autumn. They occurred at shallower depths than mature individuals, though *M. aquila* was distributed deeper than the other two. Prawn fishery had the highest total catch due to greater fishing effort, while standardised catch rates were highest in métiers using larger mesh sizes, likely reflecting increased entanglement risk from the wider disc width.

These findings confirm the Gulf's nursery function for *G. altavela* and *A. bovinus* and support including *M. aquila* in the Gulf's ISRA delineation. Management should engage local fishers through training in safe handling and release, and advocate for measures for these species in the area's Natura2000 Management Plan and the revision of the National Park's Presidential Decree.

nursery areas, bycatch, fisheries management

From monitoring to conservation: new insights into the last known population of the Common Guitarfish (*Rhinobatos rhinobatos*) in the Western Mediterranean

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The last known reproductive population of the Critically Endangered Common Guitarfish (*Rhinobatos rhinobatos*) was rediscovered in southeastern Spain after being presumed extinct in the Western Mediterranean for over three decades. Since 2024, the GuitarProtect Initiative has combined acoustic telemetry, underwater visual censuses, and community science to improve the understanding of its spatial ecology and inform conservation.

Acoustic telemetry has provided over two years of continuous monitoring (July 2024–August 2026), revealing high residency within known and newly identified hotspot areas for individuals up to a certain body size. However, larger individuals increasingly disappear from monitored shallow-water areas, with some subsequently returning while others remain undetected. This pattern raises questions about ontogenetic shifts in habitat use and potential fishing-related mortality, motivating the expansion of the acoustic array into deeper waters in September 2026. Initial deep-water BRUV and ROV surveys provide complementary information on habitat use, with early results presented here.

The programme is complemented by 96 underwater visual census transects and over 600 community science records of sharks and rays. Together with genetic and blood analyses, these approaches are improving our understanding of the spatial ecology and biological status of this highly threatened population, providing a solid evidence base for current conservation and management.

Rhinopristiformes, ETN, ISRA

