SIMERPE 3

Iberian Symposium on Modeling and Assessment of Fishery Resources

4 to **7** **november** **2025**

Lisbon | Portugal

IPMA | Instituto Português do Mar e da Atmosfera

BOOK OF ABSTRACTS

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Symposium Overview

The concept of fishery resources modelling and assessment is handled in the scientific literature in two different ways: (1) as the process by which the dynamics of an exploited population is analysed to determine its status or level of exploitation, and (2) as the assessment of the consequences of implementing different management alternatives. This second definition is more complete since it includes the first one and links the assessment process and its social purpose, that is, the scientific advice for the sustainable management of fishery resources.

In **SIMERPE 3** we understand the assessment process as an activity fundamentally quantitative, where modelling and simulation are the fundamental elements in the construction of the scientific advice for sustainable management of fishery resources.

SIMERPE 3 is organised as a forum of activities that allow a productive discussion on the present and future of the assessment of fishery resources. For this purpose, **SIMERPE 3** includes scientific communications, as well as several theme panels where the current challenges of stock assessment will be addressed by leading researchers and other stakeholders such as managers, politicians, the fishing sector, NGOs, etc.

Format

This year's SIMERPE will be organised exclusively for on-site participation. All presentations will be live-streamed.

SIMERPE 3 welcomes proposals for communications (oral and poster) in English, with abstracts provided in both English and Spanish or Portuguese. Submissions include original research papers, reviews, and syntheses on the following topics:

Biological processes: The influence of natural mortality, growth, reproduction, connectivity, and trophic relationships on stock assessment.

Fishing activity: The impact of discards, discard survival rates, landing obligations, or misreporting on stock assessment. Selectivity, effort and technical measures.

Model calibration: The role of surveys, CPUEs, and fishing effort in refining assessment models. New technologies such as Close Kin Mark Recapture, UnderWater TV, eDNA, etc.

Assessment, and management strategies: Approaches ranging from data-limited to data-rich stocks, mixed fisheries, and multispecies assessments.

Reference points: Metrics to evaluate stock and ecosystem status.

Stakeholder engagement: Enhance stakeholder involvement from data collection to decision on management measures.

Ecological considerations: The effects of climate change, species interactions, and environmental factors on fisheries and fish stocks.

Economic and social aspects: The broader socio-economic implications of fisheries management.

Spatial considerations: Connectivity, stock structure, and spatial population and fisheries dynamics.

Ecosystem modeling and environmental indicators: Integrating ecosystem information to improve single-species stock assessments.

Competing marine uses: Challenges posed by Marine Protected Areas, offshore wind farms, and other competing activities.

Participants of the Symposium

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SIMERPE 3

Iberian Symposium on Modeling and Assessment of Fishery Resources

Lisbon | Portugal 2025

SESSIONS

OPENING SESSION

Knowing the Unknown: Scientific Challenges in Monitoring and Advising the Sustainable Management of Exploited Fishery Resources and Their Habitats

Ivone Figueiredo

ABSTRACT

Fisheries are vital to global food security, supplying roughly 20% of the animal protein consumed worldwide and supporting millions of livelihoods, particularly in small-scale and artisanal communities. However, growing fishing pressure has led to widespread overexploitation, with around one-third of global fish stocks now classified as biologically unsustainable. This trend threatens both marine ecosystems and the socio-economic stability of communities that depend on them.

Sustainable fisheries management relies on robust scientific monitoring and high-quality data. Techniques such as acoustic surveys, scientific trawling, remote sensing, and genetic or biochemical analyses provide essential information on stock abundance, recruitment, mortality, fishing effort, and environmental variability. These data underpin stock assessments and ecosystem-based management frameworks. Despite advances, key challenges remain—particularly the accurate definition of stock units. Misaligned biological boundaries can lead to incorrect assessments of abundance, productivity, and mortality, undermining effective management.

A comprehensive understanding of species' biology and dynamics is fundamental to evaluating population resilience to exploitation. Emerging methods, including isotopic and elemental analyses, enable reconstruction of migration routes, habitat use, and environmental histories, supporting more accurate spatial–temporal modelling. Modern ageing techniques—such as integrated models, Bayesian approaches, morphometrics, and spectroscopy—have improved the precision of age determination, while metrics including age and size at maturity remain central to estimating spawning stock biomass (SSB), a key although imperfect indicator of reproductive potential. Density-dependent processes, particularly compensatory growth at lower population densities, are also critical for understanding productivity and resilience.

The spatial structure of fish populations profoundly influences sustainability and management outcomes. Spatially explicit modelling approaches—including area-based assessments, metapopulation frameworks, and advanced spatio-temporal statistical models—are increasingly needed to align management measures with ecological realities. Management Strategy Evaluation (MSE) has emerged as a crucial tool for ensuring that fisheries deliver food, income, and economic security while maintaining ecosystem integrity. MSE provides a rigorous process for testing alternative management strategies under uncertainty. Within this framework, decision rules translate perceived stock status into management actions such as total allowable catches, spatial closures, or adjustments to fishing effort. Validating all model components—through hindcasting, comparison with historical data, and testing under conditions of perfect knowledge—is essential for credibility and realism. Importantly, MSE processes must involve managers, scientists, advisory bodies, and stakeholders from the outset to ensure transparency, legitimacy, and the inclusion of local and traditional knowledge.

Integrating scientific monitoring, population dynamics, spatial structure, life-history traits, reproductive metrics, and management strategy evaluation provides the foundation for balancing sustainable exploitation with the long-term conservation of marine resources

SESSION 1
From tradition to innovation: progress for data-rich stock assessment and management strategy evaluation

In the middle of the 21st century, stock assessment and fisheries management for single data-rich stocks continue to be the cornerstone of fisheries science. Despite being rooted in the same conceptual principles, the underlying data, models and methods are very different from those used in the past. Cutting-edge tools and techniques are continuously being developed and incorporated with the final aim of improving the scientific advice that ensures the sustainability of marine resources.

In this session we invite contributions that showcase the most recent advancements and developments into the following four broad topics:

- **Data informing stock assessment and management advice** – biological parameters and life-history traits, data collected from scientific surveys, monitoring of commercial fisheries and any alternative innovative source of information (genetics, robotics, electronic monitoring systems, etc).
- **Stock assessment models** – new statistical methods, model developments, inclusion of spatial aspects, model ensembles, non-stationary processes, etc.
- **Management Strategy Evaluation (MSE)** – development of operating models, testing key uncertainties, developing and testing harvest control rules and management procedures, robustness tests, including in face of changing environment conditions and climate change, the role of stakeholders on MSE, etc.
- **Management adice and decision making** – reference points, management objectives, management measures, risk assessment, socio-economic aspects, developing tools for effective communication with stakeholders, etc.

Join us to discover how innovation is driving progress in stock assessment and fisheries management!

SESSION 1 – SUMMARY

Keynote speaker: Dorleta Garcia guided us from MSE to EBFM, while reflecting on the most recent scientific advances, the major challenges and some potential solutions.

Session speaker: Rui Coelho presented recent progress in data collection, fisheries assessment and management of large migratory pelagic species, with special focus on MSE work.

10 oral presentations + **12 posters** focusing in challenges and advances in data collection, assessment methods, MSE and management

Round-table on MSE with 5 participants: sharing ideas on conditioning OMs and implementing the MPs for MSEs.

OM	• ICES typically uses a single OM based on stock assessment; more OMs and better uncertainty characterization are needed. • ICCAT handles OM uncertainty more robustly, using large grids and robustness tests. • Challenge: move away from basing OMs solely on stock assessment model results and use ecosystem models as OMs. However, ecosystem models are difficult to translate into single-stock dynamics. • Setting the risk threshold (e.g., 5%) is a management decision. Results depend on the uncertainty introduced (specially if the threshold is at the tails of the distribution).
MP	• Including the assessment model can introduce biases that are hard to interpret. • The choice between shortcut and full-loop depends on the study's objective (e.g., catch limits vs. mixed fisheries advice). Full-loop is more realistic but computationally demanding; shortcut can be a useful first step.

SESSION 2
Assessment and management of data-limited stocks

Methods and tools for assessing data-limited stocks have advanced significantly in recent years, offering new opportunities to improve fisheries management despite limited data availability. This session will explore the latest methodological advances and their application for assessing and managing data-limited stocks, including the following topics:

- **Length-based assessments and surplus production models** – methodological advances and new applications;
- **Empirical indicators and harvest control rules (HCRs)** – understanding the performance of existing as well as the development of new ones;
- **Design and implementation of simulation frameworks for data-limited stocks;**
- **Reference points** – a key challenge in data-limited assessments;
- **Improve stock assessment approaches for long- or short-lived species, elasmobranchs, cephalopods and other sensitive or rare species.**

SESSION 2 – HIGHLIGHTS

Keynote speaker: Tobias Mildenberger discussed strategies for managing data-limited fisheries in the Northeast Atlantic, emphasising specialised assessment methods, precautionary harvest rules, and simulation-based frameworks to balance sustainability, yield, and risk under uncertainty.

Session speaker: Wendell Medeiros-Leal presented innovative approaches for assessing deep-sea fisheries under data-limited conditions, as empirical length-based indicators, SPiCT models and Management Strategy Evaluation to design precautionary harvest rules for vulnerable stocks.

7 oral presentations + **7 posters focusing in**

- **Target species:** cephalopods, crusctaceans, small pelagics, deep-sea fishes, skates and coastal species
- **Regional focus:** Bay of Biscay, Iberian Waters, Western Mediterranean, Azores, Canary Islands, West Africa and São Tomé
- **Methods applied:** data-limited assessment methods, length-based indicators, biomass indices modelling and genetic methods
- **Advances:** Precautionary harvest rules tested via simulation and open-source tools for transparency

Interactive session with the audience about limitations and future improvements in the assessment and management of data-limited stocks

SESSION 2 – SUMMARY

Data limitations:
✓ Missing biological data, unreliable catch records, and short or unreliable abundance indices hinder full assessments

Potential improvements:
✓ Develop new methodologies and refine indices
✓ Invest in data collection, species identification and leverage spatial data
✓ Integrate environmental drivers despite variable selection challenges

Length data:
✓ Valuable but could be biased (fleet selectivity and regulations)
✓ Explore commercial size categories and electronic monitoring

Management Strategy Evaluation (MSE):
✓ Offers robust, adaptable solutions for data-limited stocks, avoiding provision of overly restrictive advice while maintaining risk equivalence.
✓ Enables development of global methods across species but can also be tailored for species or groups of species with unique traits (e.g., long-lived, low-resilience species).

SESSION 3
Beyond Single Stock Assessment: Integrating Ecosystem Considerations into Fisheries Management

There is a growing recognition among scientists, fisheries managers, and stakeholders that sustainable and effective fisheries management must extend beyond single-species assessments. A holistic approach that explicitly incorporates environment and ecosystem considerations is essential to achieving long-term fisheries sustainability and resilience in marine ecosystems. This shift aligns with the principles of Ecosystem-Based Fisheries Management (EBFM), a key objective of European and global fisheries policies. While significant strides have been made toward EBFM, including several successful implementations worldwide, challenges remain in fully integrating ecosystem information into fisheries management frameworks.

This session provides a platform to explore the latest advancements in multispecies models and ecosystem-based research, addressing both the needs and the pragmatic solutions required for incorporating environment and ecosystem information into fisheries management and ICES advice. By bringing together experts in the field, we aim to facilitate discussions on how ecosystem-informed fisheries management can be effectively implemented and identify actionable steps toward this goal.

We invite contributions on a broad range of topics, including but not limited to:

- **Multispecies Models –** Advancing approaches that account for species interactions and food web dynamics.
- **Enhancing Single-Species Assessments** – Using ecosystem models or ecosystem-derived information to improve traditional stock assessment methods.
- **Ecosystem Modelling** – Developing tools and methodologies to derive ecosystem indicators and ecosystem information to improve single-species assessments.
- **Development of Ecosystem Reference Points** – Establishing ecological/ecosystem benchmarks that guide sustainable management decisions.
- **Integrating Environment and Ecosystem Information into MSE** – Management Strategy Evaluation (MSE) approach, as robust method for advancing ecosystem-based fisheries management.
- **Environmental and Ecological Considerations –** Addressing climate change, habitat degradation, species interactions, and other environmental factors in fisheries management.
- **Case Studies –** Showcasing real-world examples of ecosystem-based approaches in fisheries management, demonstrating successful implementation and lessons learned.

SESSION 3 – HIGHLIGHTS

1. Diverse Range of Presentations
Topics spanned from spatial, social, economic considerations and ecosystem modelling to practical applications of ecosystem information in fisheries management.

2. Advances in Research and Methods
- Increasing focus on environmental variables and climate change impacts, beyond traditional predator–prey dynamics.
- A variety of modelling approaches showcased, including species distribution models, ecosystem models, and multi-species size spectrum models — all with strong potential to support EBFM.

3. Keynote Insights: Barriers to EBFM Implementation
- **Institutional and governance barriers:** lack of clear objectives, internal conflicts, and weak communication between science and policy.
- **Scientific barriers:** limited data availability and challenges in adaptive management.

4. Success Factors and Lessons Learned
- Participatory approaches, involving stakeholders since the early stages, are crucial.
- Institutional support enhances continuity and success.
- Progress depends on reaching agreement and collaboration among all parties involved.

5. Reflections on EU Projects
- Despite substantial funding, progress in implementing EBFM remains slow.
- However, EU projects have been invaluable in building networks and collaborations among scientists and stakeholders.

6. Open Questions?
- What drives successful EBFM operationalization more: institutional support or personal scientist commitment?

SESSION 4
Competing marine uses to fisheries: challenges posed by Offshore Wind Farms and Marine Protected Areas

There is a growing recognition among scientists, fisheries managers, and stakeholders that sustainable and effective fisheries management must extend beyond single-species assessments. A holistic approach that explicitly incorporates environment and ecosystem considerations is essential to achieving long-term fisheries sustainability and resilience in marine ecosystems. This shift aligns with the principles of Ecosystem-Based Fisheries Management (EBFM), a key objective of European and global fisheries policies. While significant strides have been made toward EBFM, including several successful implementations worldwide, challenges remain in fully integrating ecosystem information into fisheries management frameworks.

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SESSION 4 – HIGHLIGHTS

Keynote Talk: Offshore Wind & Marine Spatial Planning

Promoting Sound MSP for Offshore Wind in the Mediterranean

- OWF expansion poses risks to sensitive species, vulnerable habitats, fishery resources, and MPAs.
- Evidence from BIOPAIS & NID4OCEAN shows ecological impacts may outweigh climate benefits in high-value ecological zones.
- Recommends excluding OWFs from MPAs and adjacent buffer areas.
- Stresses **early stakeholder engagement**—fishers, tourism, civil society—for socially equitable and environmentally sustainable energy development.

1. **Atmosphere–Ocean Modelling (Western Iberia)**

- Two WRF simulations (with/without wind farm effects) reveal OWFs can alter wind fields, circulation, and upwelling.
- Coupled models help understand physical changes induced by wind-energy extraction.

2. **Anglerfish Spatial Distribution Modelling**

- SDMs integrate fishery-dependent/independent data to map habitat suitability.
- Identifies conflict hotspots between fisheries, MPAs, and OWF development.
- Supports adaptive, science-based spatial management.

3. **Socioeconomic Impact of Fishing Exclusion Zones (Portugal)**

- Spatial point-process modelling evaluates effects of hypothetical closures.
- Impacts vary by location; revenue and activity displacement assessed.
- Provides tools to balance conservation/energy objectives with fishery viability.

Poster Insights: Data Gaps & Ecosystem Impacts

Integrating Fisheries-Dependent Data to Fill Survey Gaps

- Commercial logbooks + observer data can complement independent surveys.
- Improves abundance estimates and supports more robust stock assessments.
- Impacts of Semi-Pelagic Longlining on VMEs
- Monitoring of 1.6M hooks (observers + electronic cameras) assesses interactions with vulnerable species.
- Provides evidence to support sustainable continuation of this socio-economic fishery while protecting sensitive habitats.

SESSION 5
"To the future" - Strategic Evolution and Future Directions of SIMERPE

Ernesto Jardim, IPMA

1. Executive Summary

This report integrates the strategic vision outlined in the SIMERPE3 planning session with the practical feasibility data from the community survey. The session positioned SIMERPE to evolve from an ad-hoc group into a formal network of quantitative fisheries science, with a strong focus on supporting young scientists and fostering stakeholder engagement. The community overwhelmingly voted against dissolving the group (0 votes for "No group"), validating the strategic goal of continuity.

The survey results highlight a clear set of priority activities, with workshops and conferences dominating community demand. They also reveal a healthy and engaged leadership base, with approximately 30% of participants volunteering for leadership roles (both organizational and activity-specific), confirming the network's capacity to execute its mission. The primary unresolved issue is the structural model, which is split evenly between maintaining the current informal status and establishing a protocol between the institutes.

2. Defining the Structural Future

The strategic session began by examining how SIMERPE should evolve from its current state as an informal group focused on specific actions.

Preferences are evenly split, 21 votes each, between keeping the current model and transitioning to a formal protocol between the institutes (Figure 01). More formalized options, such as creating a formal organization (e.g., an association or foundation), received minimal support (5 votes), indicating a clear preference for a streamlined operational approach. A key strategic task for the newly identified leadership core will be selecting the model that best supports the delivery of high-demand activities.

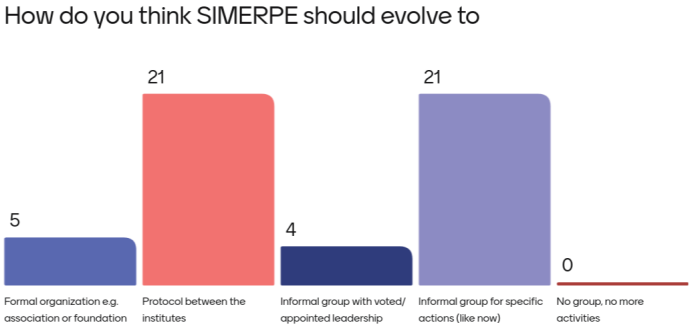

Figure 01: How SIMERPE should evolve?

3. Thematic Pillars and Engagement Strategy

Beyond structural decisions, the session emphasized SIMERPE's role in developing the next generation of scientists and strengthening engagement with external stakeholders.

A major focus is to act as an attraction pole to incentivize individuals to pursue quantitative science. Proposed actions include promoting mobility and internships, as well as creating a safe space for early-career researchers to gain experience in presenting their work, allowing them to practice communication in a supportive environment.

Regarding external relations, the discussion showed strong interest in expanding stakeholder engagement through tangible formats such as round tables, and in establishing a webpage to increase visibility and communicate the network's work.

4. Operational Activities and Priorities

The strategic brainstorming produced a wide range of potential activities, from methodological development to running formal MSc programs. The survey served as a critical filter, prioritizing activities based on community demand (Figure 02). The community's primary focus is on direct, impactful scientific exchange. Workshops on specific topics received the highest number of votes (34), followed by conferences (28 votes).

Secondary activities supporting capacity building include training courses (14 votes), mobility/internships (11 votes), and working groups (10 votes). In contrast, the idea of establishing formal training programs (e.g., a shared MSc) was effectively rejected, receiving only 1 vote. The network should therefore concentrate resources on highdemand, short-term activities and deprioritize the creation of formal degrees.

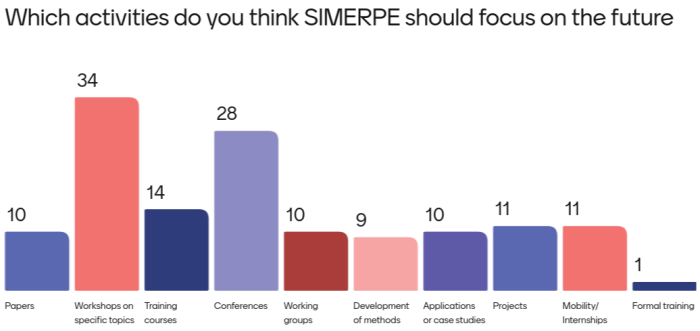

Figure 02: Which activities SIMERPE should focus on the future?

5. Human Resources and Leadership Capacity

The session defined three tiers of commitment, ranging from participation to organizational leadership. Survey results confirm a robust and capable human resource base, demonstrating that leadership capacity is present and engaged (Figure 03).

In more detail, 30 members are willing to participate without taking on leadership roles, providing a strong foundation, while a total of 13 members (approximately 30% of participants) volunteered for leadership roles.

6. Conclusion

There is unanimous support for SIMERPE to continue and grow, evolving into a network of quantitative fisheries science. The network should prioritize workshops on specific topics and conferences as its primary outputs. These activities will serve as mechanisms to fulfill the thematic goals of attracting and supporting young scientists.

Finally, a critical decision regarding the network's future structure must be made. Given the split vote between maintaining the current informal model and establishing a protocol between institutes, the leadership core must select the option that most effectively ensures administrative continuity and provides the institutional backing needed to sustain the high-demand, resource-intensive activities identified by the community.

Figure 02: What's the level of commitment you can allocate to SIMERPE?

SIMERPE 3

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Lisbon | Portugal **2025**

PROGRAMME

SESSION 1
From tradition to innovation: progress for data-rich stock assessment and management strategy evaluation

4 November (Tuesday)

09:00 - 10:00	OPENING SESSION: ***Maria Ana Martins***, ***Ivone Figueiredo***
10:00 - 10:45	**SESSION 1** Keynote: ***Dorleta Garcia*** **Quarter Century Reflections: Challenges, Breakthroughs, and the Way Forward**
10:45 - 11:10	Coffee-break
11:10 - 11:30	***Mauricio Mardones*** Evaluating the impact of changes in minimum legal size on population dynamics of the wedge clam (*Donax trunculus*) in the Gulf of Cádiz using an integrated stock assessment model
11:30 - 11:50	***Beatriz Guijarro*** Comparing two stock assessment approaches of demersal species in the Balearic Islands (western Mediterranean Sea): age-structured vs. production models
11:50 - 12:10	***Amina Tifoura*** Assessing Natural Mortality Models Under simulations: Identifying the Most Robust Natural Mortality Model
12:10 - 14:00	Lunch
14:00 - 14:20	***Georgios Kerametsidis*** Exploring Potential Biases in Conventional Stock Assessments: A Spatially Explicit Simulation-Estimation Experiment for the red mullet *Mullus barbatus* in the Northwestern Mediterranean Sea
14:20 - 14:40	***Santiago Cerviño*** The retrospective pattern: a review of the current state of the problem and future actions
14:40 - 15:00	***Adriana Nogueira*** Using multivariate autoregressive state-space models to examine stock structure of horse mackerel in the North Atlantic
15:00 - 15:25	***Diana Feijó*** Estimating the slipping magnitude in the Portuguese purse seine fishery and the survival rates of sardine
15:25 - 15:55	**SESSION 1** Talk: ***Rui Coelho*** **Progress in data collection, fisheries assessment and management of large migratory pelagic species**
15:55 - 16:20	Coffee-break
16:20 - 16:40	***Leire Citores*** A new post-benchmark evaluation of the management plan of Bay of Biscay anchovy
16:40 - 17:00	***Juan Gil Herrera*** Blackspot seabream fishery recovery plan in the Strait of Gibraltar: A Management Strategy Evaluation
17:00 - 17:20	***Sonia Sánchez-Maroño*** A Flexibility Approach to enhance effectiveness of quota-based Fisheries Management
17:20 - 18:00	**Round table-Q&A**
18:00	CLOSING
19:30	Dinner

SESSION 2
Assessment and management of data-limited stocks

5 November (Wednesday)

09:00 - 09:45	**SESSION 2** Keynote: ***Tobias Mildenberger*** **Navigating Uncertainty: Modeling and Managing Data-Limited Fisheries in the Northeast Atlantic**
09:45 - 10:05	***Mauricio Mardones*** SARtisanal: A Comprehensive R Package for Analyzing the Swept Area Ratio (SAR) of Artisanal Fishing Fleets
10:05 - 10:25	***Wendell Medeiros-Leal*** What length-frequency data reveals about the current status of Azorean fish stocks
10:25 - 10:45	***Bárbara Serra-Pereira*** Characterization of Norway Lobster fisheries in the south of Galicia and north of Portugal: implications for redefining the Iberian stock
10:45 - 11:10	Coffee-break
11:10 - 11:30	***Miguel Pinto*** The role of environmental controls and exploitation rates on populations of three commercially relevant species along the Portuguese coast
11:30 - 11:50	***Núria Zaragoza*** Stock assessment and environmental effects on the population dynamics of small pelagic fish in the Balearic Islands (western Mediterranean Sea)
11:50 - 12:10	***Alberto Rocha*** Evaluating Biomass and Stock Status in the Algarve Octopus Fishery using CatDyn and RTMB Models
12:10 - 14:00	Lunch
14:00 - 14:30	**SESSION 2** Talk: ***Wendell Medeiros-Leal*** **Advancing Stock Assessment for Deep-Sea Fisheries Under Data-Limited Conditions**
14:30 - 14:50	***Marta Cousido Rocha*** Developing Alternative Catch Rules for Iberian Common Sole Using a Management Strategy Framework
14:50 - 15:50	**Round table-Q&A**
15:50 - 18:00	Coffee-break + Poster session
18:00	CLOSING

SESSION 3
Beyond Single Stock Assessment: Integrating Ecosystem Considerations into Fisheries Management

6 November (Thursday)

09:00 - 09:45	**SESSION 3** Keynote: ***Anna Rindorf*** **Realising Ecosystem Based Fisheries Management: what will it take?**
09:45 - 10:05	***Diego Panzeri*** Integration of fisheries and ecological data to support spatial management: the case of blackspot seabream (*Pagellus bogaraveo*) in the western Mediterranean Sea
10:05-10:25	***Inês Pereira*** Spatiotemporal variation of sardine, *Sardina pilchardus*, recruitment in the Northeast Atlantic and Western Mediterranean Sea: Implications for fisheries management
10:25-10:45	***Nerea Goikoetxea*** Improving Catch Data Quality to Boost Predictive Mackerel Distribution
10:45 - 11:20	Coffee-break
11:20 - 11:40	***Adrian Mencia*** Identification of key environmental variables to predict future distribution of European hake
11:40 - 12:00	***Paula Sánchez-Zulueta*** An ecosystem approach assessment of the effects of the implementation of the multiannual plan for the fisheries exploiting demersal stocks in the western Mediterranean Sea and the climate change in the Balearic Islands
12:00 - 12:20	***Xavier Corrales*** Modelling cumulative impacts of human activities on marine biodiversity using spatial-temporal ecosystem models for the Iberian Peninsula
12:20 - 14:00	Lunch
14:00 - 14:30	**SESSION 3** Talk: ***Margarita Rincón Hidalgo*** **Multidimensional framework for implementing EBFM: social, economic, and environmental dimensions of the ecosystem**
14:30 - 14:50	***Anxo Paz*** From Ecosystem Models to Stock Assessment: The Role of Cannibalism in Atlantic Iberian Hake
14:50 - 15:10	***Leire Ibaibarriaga*** Incorporation of environment-driven processes into the simulation framework of the basque pelagic inshore fishery
15:10 - 15:30	***Inês R. Pereira*** Unpacking Azorean Small-Scale Fisheries: An Integrated Structural, Social, and Economic Characterization
15:30 - 16:00	Coffee-break
16:00 - 16:20	***Juan Moreno Navas*** An evaluation of the prior stock status and the ecological risk associated with a novel boat seine fishery
16:20 - 16:40	***Danai Mantopoulou Palouka*** Optimizing Exploitation Patterns: Selectivity Indicators for Sustainable Management of Iberian Fisheries
16:40 - 18:00	**Round table-Q&A**
18:00	CLOSING

SESSION 4
Competing marine uses to fisheries: challenges posed by Offshore Wind Farms and Marine Protected Areas

7 November (Friday)

09:00 - 09:45	**SESSION 4** Keynote: ***Josep Lloret*** **Promoting Sound Marine Spatial Planning of Offshore Wind Energy to Minimize Impacts on Marine Biodiversity and Fishery Resources: A Mediterranean Case Study**
09:45 - 10:05	***Ricardo Fernandes*** Modeling the Coastal Atmosphere and Ocean off Western Iberia to inform the development of Offshore Wind Farms
10:05 - 10:25	***Maria Paz Sampedro*** Modelling the spatial distribution of European anglerfish species to inform marine spatial management
10:25 - 10:45	***Sebastião Farias*** Assessing the Socioeconomic Impact of Fishing Exclusion Zones: a Portuguese case-study
10:45 - 11:15	Coffee-break
11:15 - 12:15	**To the future: initiatives, collaborations *et al*.**
12:15 - 13:00	**Symposium summary**
13:00	CLOSING

SIMERPE3

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KEYNOTE SPEAKERS

SESSION 1
From tradition to innovation: progress for data-rich stock assessment and management strategy evaluation

Keynote Speaker – *45:00'* || **Dorleta Garcia**

Principal Researcher at AZTI and PhD in Mathematics and Statistics, with more than 20 years of experience in fisheries modeling and management. Her work focuses on bioeconomic modeling of fishery systems, stock assessment and statistical data analysis. She has led the development of FLBEIA, a library of the R statistical package designed for bioeconomic evaluation of management strategies, which is now widely used to evaluate strategies and provide advice on mixed fisheries at ICES. In recent years, her work has focused on the evaluation of management strategies in data-limited situations, as well as multi-stock and multi-fleet case studies. Currently, she holds the position of vice-chair of the ICES Advisory Committee, a position that has allowed her to acquire a deep understanding of the challenges of fisheries management in the Northeast Atlantic, with a practical focus on the link between science and policy. She has been actively involved in numerous European projects related to the definition and evaluation of management plans. Recently, she has been involved in the SeaWise project which main objective is the operationalization of ecosystem-based fisheries management from the current single stock and mixed-fisheries perspective.

TITLE: **Quarter Century Reflections: Challenges, Breakthroughs, and the Way Forward**

ABSTRACT

Now that a quarter of century has passed, it is an opportune moment to reflect on the key developments of the past 25 years, examine the challenges we currently face, and consider how they might be addressed in the future. The period began with the rise of management strategy evaluation (MSE) and a growing emphasis for ecosystem-based fisheries management (EBFM).

MSE was initially postulated as a solution to many longstanding problems in fisheries management. However, after 25 years, implementation remains relatively limited and uneven across fisheries organizations. On the stock assessment front, the emergence of state-space and integrated models stands out as a transformative shift in how data are analyzed and underlying assumptions are framed.

Genetics, that gained popularity in the last decade, represented a revolution in the definition of stocks units which is always controversial. The definition of stock units was usually driven by management factors and genetics allowed us to define them based on biological considerations. However, increasing knowledge has also created a big challenge related to stock mixing from both assessment and management perspective. Environmental DNA and stock assessment based on genetic tagging (known as close-kin mark-recapture, CKMR) are other less implemented tools that have a great potential to revolutionize stock assessment in the short term.

The rise of genetics over the last decade has significantly reshaped the way stock units are defined—often a contentious issue. Usually driven by management needs in the past, stock unit boundaries can now be better informed by biological insights, thanks to advances in genetic tools. However, this expanding knowledge base has introduced new challenges, particularly regarding stock mixing, with implications for both assessment and management. Techniques such as environmental DNA (eDNA) analysis and genetic tagging methods like close-kin mark-recapture (CKMR) remain underutilized but hold substantial potential to revolutionize stock assessment in the near term.

As for EBFM, while a range of full ecosystem models are now available and some improvements have been made in how fishing opportunities advice is formulated, the core principles underlying annual recommendations have remained largely unchanged.

Focusing on stocks in the Northeast Atlantic assessed by ICES, this talk will explore these and other recent advances in fisheries assessment and management, current challenges, and the paths we might take moving forward.

SESSION 2
Assessment and management of data-limited stocks

Keynote Speaker – *45:00'* || **Tobias Mildenberger**

Dr. Tobias Mildenberger is a quantitative marine ecologist specializing in the modeling and management of data-limited fish stocks. With a strong background in fisheries science, he has led the development and application of state-space and spatiotemporal models to assess marine populations under uncertainty. His research bridges statistical modeling, stock assessment, and management strategy evaluation, aiming to support sustainable and precautionary fisheries management across diverse data situations.
Dr. Mildenberger currently is a researcher at the National Institute of Aquatic Resources at DTU Aqua. He has worked closely with international organizations including ICES and FAO, contributed to benchmark assessments, and developed tools for global capacity building. His work has informed advice processes in the Northeast Atlantic and beyond, particularly for stocks with limited data availability.

TITLE: **Navigating Uncertainty: Modeling and Managing Data-Limited Fisheries in the Northeast Atlantic**

ABSTRACT

Managing fish stocks under uncertainty is central to ensuring both ecological integrity and the sustainable use of marine ecosystems. While the Northeast Atlantic is generally considered a data-rich region due to its long history of fisheries and monitoring, more than half of its assessed stocks were classified as data-limited in 2024. This apparent paradox highlights the persistent challenges in aligning available information with the needs of robust stock assessment and management.

Data limitations create substantial uncertainty about stock status and the underlying population dynamics, challenging the foundation of sustainable management. To address this, specialized assessment approaches and precautionary harvest control rules are needed, approaches that can operate effectively despite limited or imprecise data. Central to their development are closed-loop simulation–estimation frameworks, which allow researchers and managers to rigorously evaluate trade-offs among short-term yields, long-term sustainability, and the risk of stock depletion. These tools not only support the design of robust management procedures but also underpin transparent and science-based advice on catch limits and stock status classification.

In this keynote, I will explore the characteristics and challenges of data-limited stocks in the Northeast Atlantic, review the suite of methods currently applied, and reflect on the evolution of these tools through more than a decade of ICES workshops dedicated to this theme. Drawing on insights from 14 such workshops, I will highlight key innovations, lessons learned, and practical outcomes that have shaped the current advisory framework. Finally, I will discuss emerging challenges and opportunities in assessing and managing data-limited stocks, both in the Northeast Atlantic and globally, as we move toward more precautionary, adaptive, and ecosystem-based advice grounded in the best available science.

SESSION 3
Beyond Single Stock Assessment: Integrating Ecosystem Considerations into Fisheries Management

Keynote Speaker – *45:00'* || **Anna Rindorf**

Anna research combines knowledge of ecological processes, advanced statistics and collaboration with stakeholders at the interface between natural, social and economic science to solve pressing management questions. She enjoy the process of unraveling challenges to understanding and managing ecosystems through quantifying ecosystem processes and subsequently considering how to adapt human activities to achieve stated objectives. I focus my work in four areas:

- Linking changes in ecosystems to natural variation, population dynamics and human impacts
- Developing and using indicators for biodiversity, food webs and pelagic ecosystems, predator and prey growth and condition, species distribution and measures of natural mortality
- Defining management objectives and advice to achieve these in a way that is robust to ecosystem changes by developing and analysing indicators in a full ecosystem context and developing and using ways to address trade-offs between management objectives
- Ecosystem based advice that is scientifically justifiable, reflects wider societal objectives and is feasible in a cooperative management setting.

TITLE: **Realising Ecosystem Based Fisheries Management: what will it take?**

ABSTRACT

Ecosystem Based Fisheries Management considers both ecological and social sustainability of the fished stocks in the constantly changing environment that the sea presents. It is ideally based on combined management advice for relevant aspects of ecological and human wellbeing, building on reliable forecasts of the development of items of interest under various management decisions.

This presentation outlines examples of how impacts of management measures and climate change on target species, wider ecologies, and fishing fleets, alongside the broader society can be modelled without having models that include all components of the ecosystem in full detail. Following agreement on items of interest, the presentation examines results of tailored Ecosystem Management Strategy Evaluation (E-MSE) models focusing on key species and processes, fit to data and accounting for uncertainties. Across the European seas, the E-MSE models demonstrate that current fisheries management performs poorly on ecological aims but better on some social aims. Restrictive management such as that based on FMSY with strict implementation of a landing obligation can enhance ecological performance in some areas. However, they lead to substantial declines in simulated long-term catches with a subsequent deterioration in social indicators, including the number of meals produced from the catches and hence European food supply. Further, the declining productivity of some stocks under future climate conditions will lead to less fish biomass produced, and lower performance on social aspects in the future. The models indicated that the effect of closed area management depended on whether the areas closed contained the species or habitats of interest and how effort was redistributed. The closures generally decreased performance on social aspects, as catch rates declined, and operating costs and carbon emissions increased. The same effects occurred when increasing mesh size while gear changes shifted pressures between different ecological components.

The impacts of management scenarios and climate change differed between small- and large-scale fisheries, but neither of these fleet segments consistently performed better on ecological or social objectives than the other. Across studies, the measures required to attain the aims of fisheries management were often in conflict, and required decisions on how to weigh different considerations to identify attainable targets for fisheries management. In some cases, the model predictions varied greatly between different models. As a result, investigating only output of a single model leaves decision making open to acting on structural uncertainty or bias and to attempting to reconcile differences in the predictions of different research groups. Both factors decrease trust and buy-in from scientists, managers and stakeholders, as well as the demonstrated reliability of advice used to underpin management decisions and as a result, may lead to low uptake of this type of advice. Finally, the barriers to operationalizing EBFM for both ecological and social priorities are discussed together with the need for information to support management decisions.

SESSION 4
Competing marine uses to fisheries: challenges posed by Offshore Wind Farms and Marine Protected Areas

Keynote Speaker – *45:00'* || **Josep Lloret**

Senior marine biologist with over 20 years of experience in marine ecology and biology. Based at the Institute of Marine Sciences (ICM-CSIC) in Barcelona, I specialize in interdisciplinary research, training, and knowledge transfer. My work addresses key challenges in marine conservation and sustainability, with a strong emphasis on linking science to policy and society.

Research Focus

- Impacts of the Blue Economy (e.g., commercial and recreational fisheries, leisure boating, cruises, offshore wind energy) on marine ecosystems
- Effects of global change on marine biodiversity, particularly vulnerable species and habitats
- Fish health and its role in the sustainable management of fishery resources
- Marine Protected Areas as tools for conservation and contributors to human health and well-being
- Interactions between marine ecosystems and human health, including:
  - Seafood security and safety
  - Physical and mental health benefits of marine-related activities
  - Health risks associated with marine ecosystems
  - Bioactive marine organisms as potential sources of new medicines.

TITLE: **Promoting Sound Marine Spatial Planning of Offshore Wind Energy to Minimize Impacts on Marine Biodiversity and Fishery Resources: A Mediterranean Case Study**

ABSTRACT

This talk will explore how effective planning of offshore wind energy—a rapidly emerging industrial activity in the Mediterranean Sea—can help avoid or minimize ecological impacts and prevent socio-environmental conflicts, thereby supporting a just energy transition. Emphasis will be placed on the importance of data-driven planning that incorporates biological, social, and economic information at the regional and local scales.

Drawing on insights from two ongoing research projects I coordinate—**BIOPAIS** and **NID4OCEAN**—at the Institute of Marine Sciences (ICM-CSIC), I will present evidence on the potential impacts of offshore wind farms (OWFs) on sensitive species, vulnerable habitats, fishery resources, and marine protected areas (MPAs) in the Mediterranean. The talk will argue that OWF development should be excluded from areas of high ecological value, including MPAs and adjacent buffer zones, where the environmental risks may outweigh the benefits of climate change mitigation.

I will highlight the need for marine spatial planning that is scientifically grounded, based on accurate and context-specific data. Moreover, I will stress the importance of early and meaningful engagement with coastal stakeholders—such as fishers, tourism operators, civil society, and environmental NGOs—to ensure that the development of offshore wind energy is both environmentally sustainable and socially equitable.

SIMERPE 3

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TALKS

Talk Speaker – *30:00'* || **Rui Coelho**

Rui Coelho is a Principal Researcher at the Portuguese Institute for the Ocean and Atmosphere (IPMA), where he co-coordinates the Highly Migratory Species research team. He graduated in Biology from the University of Lisbon (2000), holds a PhD in Fisheries Biology from the University of Algarve (2007), and an MSc in Statistical Modelling from the University of Évora (2013). From 2008 to 2010, he was a Post-Doctoral Fellow at the Florida Museum of Natural History, University of Florida (USA). His work focuses on data collection, population dynamics, stock assessments and scientific advice for the management of tuna, swordfish, and shark stocks in the Atlantic and Indian Oceans, as well as on interactions and mitigation of impacts on vulnerable species such as sea turtles and seabirds.
Rui's work is directly linked to the provision of scientific advice to tuna Regional Fisheries Management Organizations in the Atlantic (ICCAT) and Indian (IOTC) Oceans. He has held several leadership roles in the Scientific Committees of those bodies, including Chair of the IOTC Working Party on Ecosystems and Bycatch (2014–2017), Chair of the IOTC Working Party on Billfishes (2017–2019), Chair of the ICCAT Atlantic Swordfish Group (2015–2020), and Vice-President of the ICCAT Standing Committee on Research and Statistics (SCRS) (2018–2021). Since 2021, he has chaired the ICCAT Subgroups on Electronic Monitoring Systems and the Subgroup on Technical Fishing Gear Changes. Rui is the author or co-author of over 110 peer-reviewed scientific papers and has presented more than 250 technical papers to Regional Fisheries Management Organizations. He has supervised several MSc and PhD students and has led or participated in numerous national and international research projects.

TITLE: **Progress in data collection, fisheries assessment and management of large migratory pelagic species**

ABSTRACT

Large migratory pelagic species, such as tunas, swordfish, and pelagic sharks, present unique challenges for data collection, fisheries assessment, and management. Their oceanic, transboundary nature means they inhabit and are exploited in both national and international waters, often by multiple fleets operating under different jurisdictions. These species are managed by international, multi-governmental bodies, called tuna Regional Fisheries Management Organizations (t-RFMOs), such as the International Commission for the Conservation of Atlantic Tunas (ICCAT), which manages these species in the Atlantic.

ICCAT is responsible for a broad range of species, ranging from some of the most data-rich stocks globally (e.g., bluefin tuna) to some of the most data-limited (e.g., certain pelagic sharks and small tunas). Accordingly, a wide array of stock assessment methods has been used, from data-intensive, fully integrated models (e.g., stock synthesis) to simpler indicator-based and risk assessment approaches. In recent years, there has been a shift towards the use of Management Strategy Evaluation (MSE), a simulation-based framework that tests the performance of different Management Procedures (MPs) under a range of uncertainties, against the Management Objectives established by managers. While MSEs were initially applied to the more data-rich stocks (e.g., bluefin tuna), they are increasingly being considered for data-limited or data-moderate species (e.g., blue shark) and even multi-species complexes (e.g., tropical tunas). It can be argued that MSE is even more necessary in such data-limited situations, as the inherent uncertainties in those stocks are much larger, and therefore the risks of relying on single traditional stock assessments are also greater.

Progress in data collection has also been made in recent decades, although significant gaps and limitations remain for many fleets. Some of the most important recent advances include the adoption of minimum standards for Electronic Monitoring Systems (EMS). These systems have already started to be implemented for some larger industrial fleets, and simplified EMS standards are also being developed for smaller-scale fisheries that impact migratory species, and where traditional data collection systems (e.g., logbooks or onboard observers) are even more complicated to implement. These developments, including the ongoing improvements in data collection and harmonization, and the adoption of MSE frameworks, are helping to address both traditional and emerging challenges in the management of large migratory pelagic species.

Talk Speaker – *30:00'* || **Wendell Medeiros-Leal**

Wendell Medeiros-Leal is a fisheries scientist and PhD Candidate (FCT Fellow) at the University of the Azores and the National Institute of Aquatic Resources, Technical University of Denmark. His research focuses on improving the assessment and management of fish stocks, especially in data-limited and deep-sea fisheries. Over the past 10 years, he has worked on stock assessments and population dynamics of commercial species across diverse ecosystems, including the Azores, Skagerrak, Southern Africa, and the North and Northeast Brazilian shelf, as well as the Amazon.
He has contributed to numerous research projects and actively participates in ICES working groups (WGEF, WGDEEP, and WKLIFE), where he coordinates assessments for species such as blackspot seabream and kitefin shark. His recent work focuses on developing stock-specific Management Strategy Evaluation (MSE) frameworks to define harvest control rules for vulnerable fish stocks. His work also contributes to the development of ICES guidelines for the assessment and management of data-limited stocks.

TITLE: **Advancing Stock Assessment for Deep-Sea Fisheries Under Data-Limited Conditions**

ABSTRACT

Deep-sea fish and elasmobranch species are particularly vulnerable to overfishing due to their life-history traits. Assessing and managing these stocks is especially challenging under data-limited conditions. This presentation explores how empirical length-based indicators, combined with the Stochastic Surplus Production Model in Continuous Time (SPiCT), can improve stock assessments in such contexts.

The talk will also cover a Management Strategy Evaluation (MSE) framework designed to test alternative harvest control rules using real SPiCT-based assessments. This approach supports the identification of risk-averse and effective strategies for managing vulnerable deep-sea stocks under uncertainty.

Preliminary results from applying these methods to demersal fisheries along the coasts of Angola and Brazil will be presented, highlighting their potential to inform sustainable management in data-limited regions.

SESSION 3
Beyond Single Stock Assessment: Integrating Ecosystem Considerations into Fisheries Management

Talk Speaker – *30:00'* || **Margarita Rincón Hidalgo**

Margarita Rincón Hidalgo holds a degree in Mathematics from the National University of Colombia (Bogotá) and a PhD in Physics and Mathematics from the University of Granada.
Her doctoral research was focused on the mathematical-statistical modeling of the dynamics of commercially exploited fish populations. She has carried out postdoctoral research at the Spanish National Research Council (CSIC) and later became a senior scientist at the Spanish Institute of Oceanography (IEO-CSIC, Cádiz). Her work focuses mainly on the following research lines related to the sustainability of fisheries resources: Modeling the dynamics of fish populations incorporating the effect of fishing and the environment, stock assessment, development of tools for decision making and analysis of management strategies from an ecological and socio-economic point of view.
She has participated in multiple international and national projects (two as principal investigator), published widely, and contributed to more than 20 project deliverables. From 2019 to 2024 she served as national scientist in ICES working groups, specializing in anchovy stock assessment and mixed-fisheries modeling.
Currently, she works as a researcher for the European Commission, at the Joint Research Center in Ispra, Italy, advising on fisheries sustainability focused mainly on the Mediterranean Sea fisheries.

TITLE: **Multidimensional framework for implementing EBFM: social, economic, and environmental dimensions of the ecosystem**

ABSTRACT

Ecosystem-Based Fisheries Management (EBFM) is a holistic approach that considers the complex interactions between fish populations, their environment, and human activities. However, operationalizing EBFM in practice remains a significant challenge. This talk will outline a multidimensional framework for implementing EBFM, incorporating the social, economic, and environmental dimensions of the ecosystem. At the heart of this operationalization are two key components: the willingness of stock assessors to incorporate new information and indicators into their annual assessments, and the use of Management Strategy Evaluation (MSE) as a rigorous testing ground for evaluating the impact of different management strategies and ecosystem considerations. The stock assessor's output ultimately informs the quota-setting process, making their buy-in crucial for integrating EBFM principles into management decisions. Meanwhile, MSE provides a powerful tool for simulating the effects of different management scenarios, allowing managers to test the potential consequences of incorporating new factors, such as environmental variability, habitat impacts, or economic considerations, into the assessment process. By using MSE to evaluate the effectiveness of different management strategies and to identify key indicators and thresholds, we can build a robust case for incorporating new information into the stock assessment, and ultimately, into the quota-setting process. This talk will explore the interplay between these two components, and will provide practical examples and case studies to illustrate the challenges and opportunities of operationalizing EBFM, with a focus on the role of stock assessors and MSE in driving more sustainable and ecosystem-based fisheries management.

SIMERPE 3

Iberian Symposium on Modeling and Assessment of Fishery Resources

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ORAL COMMUNICATIONS

OC (25407) **EVALUATING THE IMPACT OF CHANGES IN MINIMUM LEGAL SIZE ON POPULATION DYNAMICS OF THE WEDGE CLAM (DONAX TRUNCULUS) IN THE GULF OF CÁDIZ USING AN INTEGRATED STOCK ASSESSMENT MODEL**

Mauricio Mardones (Spain)[1]; **Silva Luis** (Spain)[1]; **Ana Rodriguez-Rúa** (Spain)[1]; **Alejandro García** (Spain)[1]; **Marina Delgado** (Spain)[1]

1 - Instituto Español de Oceanografía

The wedge clam (*Donax trunculus*) is a fundamental resource within the socio-economic and cultural fabric of the Gulf of Cádiz and large areas of the Iberian Peninsula's coastline, supporting a traditional artisanal fishing activity of great importance to coastal communities. In this study, we assess the impact that modifying the minimum legal harvest size would have on the population dynamics and sustainable management of the wedge clam fishery. Using an integrated length-to-age stock assessment model implemented in Stock Synthesis, we analyze four selectivity scenarios based on different minimum legal sizes: 25 mm (current regulation), 24 mm, 23 mm, and 22 mm. The objective is to evaluate how variations in legal size thresholds affect estimates of recruitment, total biomass, and spawning stock biomass, and to determine the potential consequences for the sustainability of the fishery. Each scenario was modeled under consistent structural assumptions and input data, allowing for meaningful comparisons across population metrics. Model inputs were derived from an ongoing monitoring program for *D. trunculus*, which includes monthly data on population structure, fishing effort, landings, and environmental variables. This comprehensive dataset enhances the model's capacity to reflect realistic biological and fishery conditions. Preliminary results indicate that reducing the minimum legal size leads to a marked decrease in spawning biomass and alters recruitment dynamics, potentially increasing the risk of overexploitation. These outcomes underscore the biological sensitivity of *D. trunculus* to changes in fishery selectivity patterns and reinforce the importance of precautionary management measures. The findings suggest that, although relaxing size limits may increase yields in the short and medium term, such measures could compromise long-term stock viability and reproductive potential. We recommend maintaining current size limits or adopting more conservative thresholds to ensure sustainable harvest and preserve reproductive resilience.

Keywords: Donax trunculus, minimun legal size, selectivity, population dynamic, model-based, management

OC (25399) COMPARING TWO STOCK ASSESSMENT APPROACHES OF DEMERSAL SPECIES IN THE BALEARIC ISLANDS (WESTERN MEDITERRANEAN SEA): AGE-STRUCTURED VS. PRODUCTION MODELS

Beatriz Guijarro (Spain)[1]; **Núria Zaragoza** (Spain)[1]; **Marc Farré** (Spain)[1]; **Antoni Quetglas** (Spain)[1]; **Francesc Ordines** (Spain)[1]

1 - Spanish Institute of Oceanography (IEO-CSIC)

The enforcement of the Multiannual Plan for the fisheries exploiting demersal stocks in the western Mediterranean Sea (MAP) in 2020 has led to an increasing demand for robust assessments of the exploitation state of their target species. The main management measure included in the MAP is the implementation of a fishing effort regime to the bottom trawl fishery, involving a reduction of the fishing days of up to 40% of the average annual fishing days operated by the trawling fleet from the reference period 2015-2017. This reduction was progressively applied during the first five years of the MAP. Such a strong fishing effort reduction should give rise to an improvement of the exploitation state of the target species of the MAP: the fishes *Merluccius merluccius and Mullus barbatus*, and the crustaceans *Aristeus antennatus*, *Aristaeomorpha foliacea*, N*ephrops norvegicus and Parapenaeus longirostris*. During the last years, the demersal stocks of the Balearic Islands (GFCM–GSA05) have been assessed using age-structured models within the framework of GFCM and STECF working groups. However, the availability of long time series of landings and effort allows exploring different methodologies.

This work aimed to i) compare the outputs of stock assessments of demersal target species using two different methodologies, age-structured (XSA and a4a) and production (SpiCT) models; and ii) determine if the effects of the implementation of the effort regime are already detectable in the status of target species. The analyses included all MAP target species, except *A. foliacea* and *M. barbatus*, and *Mullus surmuletus* (the target *Mullus* species in the Balearic Islands). The advantages and disadvantages of each assessment methodology are discussed, taking into account the life-history traits and data availability of each stock. All the stocks showed a clear improvement in their state, with some of them already in sustainable exploitation. However, for certain stocks, both approaches revealed contrasting results between model estimates, highlighting the importance of accounting for the uncertainty associated with each methodology when providing management advice. This work may contribute to a better understanding of the performance and usefulness of different stock assessment approaches for demersal species in the western Mediterranean.

keywords: stock assessment, demersal species, age-structured models, production models, western Mediterranean, Balearic Islands

OC (25424) **ASSESSING NATURAL MORTALITY MODELS UNDER SIMULATIONS: IDENTIFYING THE MOST ROBUST NATURAL MORTALITY MODEL**

Amina Tifoura (Spain)[1]; **Marta Marta Cousido-Rocha** (Spain)[2]; **Santiago Cerviño** (Spain)[2]; **Encarnación García Rodriguez** (Spain)[3]; **Antonio Esteban** (Spain)[3]; **Miguel Vivas** (Spain)[3]; **Javier Delgado Alcaraz** (Spain)[3]; **Maria Grazia Pennino** (Spain)[4]

1 - Department of Marine Science and Applied Biology, University of Alicante, Alicante; **2** - Spanish Institute of Oceanography (IEO, CSIC), Vigo Oceanographic Center, Vigo; **3** - Spanish Institute of Oceanography (IEO, CSIC), Murcia Oceanographic Center, Murcia; **4** - Spanish Institute of Oceanography (IEO, CSIC), Madrid Oceanographic Center, Madrid

Accurately specifying natural mortality (M) is critical in fisheries stock assessments, yet the true value of M is often uncertain or unknowable. This study focuses on evaluating the robustness of alternative M models rather than attempting to identify the true value of M. Specifically, it aims to determine which candidate M model yields the most reliable outcomes under mis-specification, thereby supporting more robust management advice.

Using a simulation-testing framework based on the MSE FLR routine, a full factorial design will be applied to a suite of candidate M models for European hake (Merluccius merluccius) in GSA 6. Each M model will condition an operating model (OM), generating synthetic datasets for catch-at-age and abundance index datasets. These datasets will then be assessed using all other candidate M models, simulating scenarios of mis-specified natural mortality. Robustness will be evaluated primarily through the Root Mean Square Error (RMSE) in estimated reference points and time series trends for F and SSB relative to the OM. Additional performance metrics may be included to provide a comprehensive comparison. The goal is to identify “least wrong” models —those that produce stable and credible estimates across a range of mis-specification scenarios— thus enhancing the reliability of stock assessment advice under uncertainty.

Keywords: Natural mortality, simulations, model robustness, advice under uncertainty, operating model

OC (25411) **EXPLORING POTENTIAL BIASES IN CONVENTIONAL STOCK ASSESSMENTS: A SPATIALLY EXPLICIT SIMULATION-ESTIMATION EXPERIMENT FOR THE RED MULLET MULLUS BARBATUS IN THE NORTHWESTERN MEDITERRANEAN SEA**

Georgios Kerametsidis (Spain)[4]; **Daniel Goethel** (United States of America)[1]; **Gregoire Certain** (France)[2]; **Antonio Esteban** (Spain)[3]; **Encarnación García** (Spain)[3]; **Angélique Jadaud** (France)[2]; **Vincent Rossi** (France)[5]; **Miguel Vivas** (Spain)[3]; **Manuel Hidalgo** (Spain)[4]

1 - Auke Bay Lab, Alaska Fisheries Science Center, National Oceanic and Atmospheric Administration, Juneau, AK, USA; **2** - MARBEC, Univ Montpellier, CNRS, Ifremer, IRD, Sète, France; **3** - Spanish Institute of Oceanography (IEO, CSIC), Oceanographic Center of San Pedro del Pinatar, Lo Pagán, Murcia, Spain; **4** - Spanish Institute of Oceanography (IEO, CSIC), Balearic Oceanographic Center, Group of Ecosystem Oceanography (GRECO), Palma, Balearic Islands, Spain; **5** - Mediterranean Institute of Oceanography, CNRS, Aix Marseille Univ., Univ. Toulon, IRD, Marseille, France

Effective sustainable management of marine resources and biologically realistic assessments rely on accurately identifying stock structure, including not only its external boundaries but also the spatial complexity within. However, most commercially harvested marine species are assessed under the long-standing assumption of a "stock unit" within prescribed boundaries known as assessment units. This approach persists despite growing evidence of passive and active dispersal documented in a plethora of species across multiple spatiotemporal scales, within and across stock boundaries. The main challenges in developing spatially explicit stock assessment models are i) describing the most biologically plausible spatial stock structure and ii) obtaining robust, meaningful connectivity estimates, then determining how to effectively integrate these data to model spatial dynamics. While tagging is a valuable method for quantifying connectivity in adult stages, it has clear limitations for understanding passive early-life stage dispersal, despite the demonstrated controls it exerts on recruitment and spatial structure. We parameterised a spatially explicit simulation-estimation framework for the red mullet (*Mullus barbatus*) metapopulation system in the Northwestern Mediterranean Sea, which was conditioned on connectivity information from simulated larval dispersal, a primary driver of spatial dynamics for the species. The metapopulation system consisted of four interconnected subpopulations spanning two assessment units – GSA07 (Gulf of Lion) and GSA06 (Catalan Coast, Gulf of Valencia, Gulf of Alicante) – which are currently considered unconnected under the existing framework. Various assessment (estimation) models – each representing different connectivity and spatial stock structure assumptions – were fitted to simulated “observed” pseudo-data from the operating model under a range of underlying true spatial dynamics. The estimated parameters were subsequently compared to the true values used in the operating model, allowing us to evaluate the accuracy and potential biases of different assessment models. Across different model scenarios, recruitment estimates exhibited substantial bias when larval movement was ignored or stock structure was simplified compared to the OM . In the Gulf of Lion, recruitment was consistently underestimated by more than 50%, while in contrast, the Catalan Coast showed an equally high overestimation of recruitment. Our research highlights the importance of spatial stock assessment frameworks and early life history spatial dynamics, which remain largely under-represented in operational fisheries management.

Keywords: Mullus barbatus, Stock Structure, Connectivity, Spatially Explicit Stock Assessment, Larval Dispersal

OC (25431) THE RETROSPECTIVE PATTERN: A REVIEW OF THE CURRENT STATE OF THE PROBLEM AND FUTURE ACTIONS

Santiago Cerviño (Spain)[1]; **Marta Cousido** (Spain)[1]; **Anxo Paz** (Spain)[1]; **D. Miller** (Spain)[1]

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The retrospective pattern is a systematic change in estimates of population size, or other assessment-derived quantities, that occur as additional years of data are added to the assessment model. It causes a problem in the quality of our advice with strong implications for the population. If the advice is biased it can lead to overfishing, difficulties to achieve targets or loss of yield. The causes of this misbehavior can be wrong or incomplete data as well as model misspecification, particularly related with time varying process. The problem is not specific of any type of model and can be found from simple biomass dynamic models to more complex integrated models. Different indicators have used to quantify the problem although Mohn's Rho index is the most popular. The problem is well known from the 90s and there are not an extensive literature addressing the issue but a few good papers trying to understand the causes, consequences and ways to address it correcting the model or correcting the advice. ICES has identified this as a priority problem and is planning a near future workshop. In this work we will review the current state of knowledge about the retrospective problem and propose scientific actions to progress towards a better understanding of their causes, consequences and solutions.

Keywords: retrospective pattern, assessment models, biased advice

OC (25432) **USING MULTIVARIATE AUTOREGRESSIVE STATE-SPACE MODELS TO EXAMINE STOCK STRUCTURE OF HORSE MACKEREL IN THE NORTH ATLANTIC**

Adriana Nogueira (Spain)[1]; **Gersom Costas** (Spain)[1]; **José Cebrian** (Spain)[1]; **Francisco Velasco** (Spain)[1]; **Rosana Ourens** (United Kingdom)[2]; **Hugo Mendes** (Portugal)[3]; **Martin Lindegren** (Denmark)[4]; **Julio Úbeda** (Spain)[5]

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The horse mackerel (*Trachurus trachurus*) support an important fishery in the North East Atlantic. Horse mackerel is managed as three different stocks in the North East Atlantic: southern stock, western stock and North Sea stock. Here we examine the population structure of the different stocks through time and space to determine whether they are part of the same larger population or not and how fishing or environmental changes affect their dynamics. Specifically we will ask (1) if the population abundance data support the existing management boundaries or if there are alternative grouping that receive more support, (2) if the subpopulation (if they exist) experience independent environmental variability or correlated variability. For that we mathematically formulate different hypothesis about the population structure via different multivariate autoregressive state-space models (MARSS). Survey data from each region are used to evaluate data support for the different population structures.

Keywords: multivariate autoregressive state-space models, population structure, horse mackerel

OC (25449) **ESTIMATING THE SLIPPING MAGNITUDE IN THE PORTUGUESE PURSE SEINE FISHERY AND THE SURVIVAL RATES OF SARDINE**

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The purse-seine fishery is the most important Portuguese fishery, accounting for around 50% of total landings by weight. With the decline of the sardine stock (*Sardina pilchardus*) and the reduction of annual quotas, this fleet has supplemented its yields by targeting other pelagic species such as chub mackerel (*Scomber colias*), horse mackerel (*Trachurus trachurus*) and anchovy (*Engraulis encrasicolus*) for example. Behaviour changes have been observed in the fleet along the country, such as a search for new fishing grounds and species with more market value. In the last years and mainly in the north, an increase in anchovy catches and landings was also observed. The reduction of annual quotas and establishment of daily limit quotas led to the increase of sardine slipping among other species, creating larger differences between catches and landings.

Compared to typical discarding, slipping leads to lower fishing mortality rate as part of the catch is released alive. With the reduction of sardine quota, daily limits and long periods of sardine capture ban, it is likely that the frequency and volume of sardine slipped will increase as the fleet directs the fishing effort to other pelagic species that are found typically mixed with sardine.

An insight on the recent evolution of purse seine fishery in Portugal with a focus on its operational changes will be presented in this work. Two different approaches to estimate slipping rates using DCF's onboard data, Cochran' slipping ratios and Bayesian hierarchical modelling with RTBM package, will be discussed. This information could be important to improve the assessment of pelagic species.

Keywords: purse-seine, slipping, sardine, chub-mackerel, survival rates

OC (25397) A NEW POST-BENCHMARK EVALUATION OF THE MANAGEMENT PLAN OF BAY OF BISCAY ANCHOVY

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Anchovy in the Bay of Biscay has been managed according to an agreed management plan and subsequent revised versions for more than a decade since the reopening of the fishery. During the most recent benchmark for this stock in 2024, the assessment model transitioned from a two-stage biomass-based model to a statistical catch-at-age model implemented in Stock Synthesis. These methodological changes introduced new assumptions about population and fleet dynamics, leading to a revised perception of stock status and, consequently, prompting a re-evaluation of the management plan. With that aim in this work, we have implemented a full-feedback Management Strategy Evaluation (MSE) framework in FLBEIA. The conditioning of the operating model was based on the latest stock assessment model and incorporated various sources of uncertainty such as biological parameters, recruitment and catchability of the fleet. Furthermore, the effects of running a full-feedback MSE, which explicitly included the Stock Synthesis model, were compared to an MSE utilizing an emulator of the assessment model. For consistency with previous evaluations, the achievement of management objectives and compliance with ICES precautionary criterion was evaluated making use of several performance statistics that included biological risks, expected catches and stability of catches among others.

The implemented MSE was also used to test the escapement strategy that forms the basis of ICES advice for short-lived species with high natural mortality. According to this strategy, the advised yearly catches correspond to the estimated stock biomass in excess of a biomass threshold (Bescapement) constrained by a maximum fishing mortality (Fcap). While Bescapement was set equal to Bpa, Fcap was selected from a range of F values as the one that showed less than a 5% probability of SSB falling below B_{lim}. The resulting escapement strategy was compared with the agreed management plan in terms of the selected performance statistics.

The findings in this work provided valuable insights into the robustness and effectiveness of the current management plan under the new perspectives after the benchmark process. Furthermore, it highlights the importance of including the evaluation of existing management plans as a final step within the ICES benchmark process.

keywords: MSE, management plan, anchovy, uncertainty

OC (25435) **BLACKSPOT SEABREAM FISHERY RECOVERY PLAN IN THE STRAIT OF GIBRALTAR: A MANAGEMENT STRATEGY EVALUATION**

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The Blackspot seabream (*Pagellus bogaraveo*) is a species of great commercial value in the Strait of Gibraltar. The most recent assessments indicate that its spawning biomass is well below the biomass limit reference point so the stock is considered depleted and with a fishing mortality rate doubling the target one. In this context, the rebuilding of the exploited population requires the effective implementation of management measures based on up-to-date scientific information and the cooperation of national and international authorities. In 2024, a participatory process was launched for the Management Strategy Evaluation (MSE) to develop different management scenarios. Instead of undertaking a full MSE, the shortcut MSE-lite approach has been applied. It has proven to be an effective tool for decision-making through the performance of Harvest Control Rules (HCR) and rebuilding strategies. Three periods have been considered:

- the end of the GFCM management plan (year 2030),
- an intermediate period (2031-2040) for the evaluation of the performance of the recovery plan in 2035, and
- until 2045, for long-term sustainability objectives.

The HCRs includes different levels of fishing mortality rates in relation to the target (Ftarget), ranging from moderate reductions of 75% or 50% to more drastic reductions below 25%, including a complete closure of the fishery. The advantages and disadvantages of every scenarios have been evaluated in terms of the short-, medium-, and long-term objectives. Based on the results obtained for each of the measures considered, it is recommended consider only the most precautionary scenarios: in other words those that achieve a 50% probability that the population will recover above the biomass limit reference point (B_{lim}) by the end of 2030.

Keywords: Rebuilding plan, MSE, Blackspot seabream, Strait of Gibraltar

OC (25443) A FLEXIBILITY APPROACH TO ENHANCE EFFECTIVENESS OF QUOTA-BASED FISHERIES MANAGEMENT

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Traditional fisheries management usually relies on Total Allowable Catch (TAC) combined with vessel quotas which may or may not be tradeable. One of the main problems with this type of management is compliance with the established catch limits. Consequently, economists advocate incentive-adjusting mechanisms to enhance compliance. In this context, a slight modification to the traditional system of individual quotas has been proposed. According to this proposal, vessels that exceed their quotas would incur a tax that progressively increases with the degree of overharvesting, while those that do not meet their quotas would receive a reward. With this modification, individual quotas become an effective tool to complement quota-trading, potentially increasing economic efficiency while reducing the risk of resource depletion, especially when stock assessments are uncertain. To evaluate the impact of this flexible quota system on Norwegian mixed fisheries in the North Sea, we implemented the proposed tax/subsidy system into the profit structure of a management strategy evaluation model.

Under the assumption that fleets operate to maximise profits (adjusting effort and métier selection accordingly), we tested two alternative scenarios. The first allows for a known TAC overshoot, observable in stock assessments, while the second introduces an unknown overshoot, resulting in assessment bias. Both scenarios were examined with and without flexibility to assess the system's response across different tax/subsidy rates and quota-allocation levels.

The findings offer valuable insights into how flexible individual quotas could serve as a regulatory tool in fisheries management, balancing economic viability with sustainable resource use.

Keywords: management strategy evaluation, mixed fishery, fisheries management, taxation, profit maximisation

OC (25406) **SARTISANAL: A COMPREHENSIVE R PACKAGE FOR ANALYZING THE SWEPT AREA RATIO (SAR) OF ARTISANAL FISHING FLEETS**

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Small-scale fisheries play a fundamental role in coastal livelihoods and global food security, yet their spatial footprint and fishing pressure are often poorly quantified. The Swept Area Ratio (SAR) is a key indicator used to estimate the spatial and temporal impact of bottom-contact fishing gear. However, existing tools to calculate SAR are generally designed for industrial fleets and lack accessibility or adaptability for artisanal contexts. We present "SARtisanal," an open-source R package developed to facilitate standardized and reproducible estimation of SAR in small-scale fisheries. The "SARtisanal" package is designed to calculate SAR for artisanal fleets using data from the General Packet Radio Service/Global System for Mobile Communications (GPRS/GSM), also known as "green boxes," which monitor their fishing activities. The package includes functions to compute SAR as an indicator of fishing pressure, allowing users to assess the sustainability of fishing practices within specific temporal and spatial contexts. Additionally, it offers tools to incorporate and analyze other variables derived from green boxes, facilitating a better understanding of fishing activities and their impacts on marine ecosystems. It also features custom plotting functions to visualize SAR results, providing clear insights into fishing pressure over time and across different geographic areas. This initial version of "SARtisanal" (0.0.0.9000) is conceived as a flexible and extensible platform, whose development will continue to be informed and improved through feedback from the fisheries science community. By sharing and promoting transparent workflows and open access to reproducible methods, we believe this package contributes to data-driven management of benthic impacts in small-scale fisheries.

Keywords: Swept Area Ratio, R package, spatial analysis, data handling, green boxes, Small-scale fisheries

OC (25428) WHAT LENGTH-FREQUENCY DATA REVEALS ABOUT THE CURRENT STATUS OF AZOREAN FISH STOCKS

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The sustainable management of key demersal and pelagic fish species, including alfonsino (*Beryx decadactylus*), splendid alfonsino (*Beryx splendens*), European conger (Conger conger), blackbelly rosefish (*Helicolenus dactylopterus*), thornback ray (Raja clavata), parrotfish (*Sparisoma cretense*), and blackspot seabream (*Pagellus bogaraveo*) is essential for maintaining the ecological integrity of marine ecosystems and supporting fisheries-dependent communities in the Azores.

This study applies three length-based assessment models—Yield Per Recruit (YPR), Length-Based Indicators (LBI), and Length-Based Spawning Potential Ratio (LBSPR)—to evaluate the sustainability of 18 priority fish stocks in the region. The analysis is based on length-frequency data from commercial landings collected in the last years. Given the sensitivity of length-based models to life-history parameter estimates, a comprehensive sensitivity analysis was conducted to assess the influence of parameter variability on stock sustainability evaluations. This study strengthens the scientific basis for fisheries management decisions, aiding in the development of strategies that balance resource sustainability with the economic stability of the Azorean fishing sector.

Keywords: Small-scale fisheries, priority stocks, stock assessment, length-based methods

OC (25460) **CHARACTERIZATION OF NORWAY LOBSTER FISHERIES IN THE SOUTH OF GALICIA AND NORTH OF PORTUGAL: IMPLICATIONS FOR REDEFINING THE IBERIAN STOCK**

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Norway lobster (*Nephrops norvegicus*) is a valuable and important resource for the demersal fisheries operating in both Spanish and Portuguese waters. The species is mostly caught by the crustacean trawl fleets, although a portion of the landings originates from the artisanal creel fishery. Norway lobster inhabits muddy substrates, where they construct burrows, restricting its distribution, and consequently its fishing grounds, to areas with specific sediment conditions. In the Northeast Atlantic, including Iberian Waters, the species is assessed as individual stocks across 34 Functional Units (FUs), as defined by ICES. The Atlantic Iberian Eastern waters, including the western Galicia and northern Portugal correspond to FU26 and FU27. ICES assess both FUs together and has consistently advised zero catches for FU26-27 stock, as the estimated stock size has remained below the biomass limit reference point (B_{lim}) for more than 25 years, with no signs of recovery. Given that this is a data-limited stock, it is important to improve the understanding of the fisheries still catching Norway lobster in the area. Based on this need, the present study aims to characterize the Spanish and Portuguese fisheries capturing Norway lobster in FU27, where both trawl and creel fisheries operate. Logbook data and VMS data will be analysed to determine the spatial and temporal distribution of the catches. The results of this study will contribute to efforts aimed at redefining stock boundaries, as recent evidence indicates that landings are occurring in spatially distinct areas, off Galicia and between Peniche and Lisbon, suggesting potential spatial structuring of the stock.

Keywords: Nephrops norvegicus, fisheries, data-limited stock, stock boundaries

OC (25456) **THE ROLE OF ENVIRONMENTAL CONTROLS AND EXPLOITATION RATES ON POPULATIONS OF THREE COMMERCIALLY RELEVANT SPECIES ALONG THE PORTUGUESE COAST**

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In fisheries science, understanding the relationships between species abundance and exploitation rates and environmental variables is important. The present study unravels these relationships for three commercially important species along the Portuguese coast by assessing species abundance in relation to the instantaneous exploitation rate and several environmental variables. The selected species were: 1) *Diplodus vulgaris* in the Algarve region, 2) *Octopus vulgaris* in the Algarve region, and 3) *Carcinus maenas* in two distinct systems: the Ria de Aveiro and the Sado estuary. The environmental variables analysed include: 1) sea surface temperature, 2) river flow, 3) upwelling, 4) easterly winds, and 5) the Western Mediterranean Oscillation Index. These variables were chosen based on scientific literature that demonstrates their influence on a given species´ abundance. A generalized least squares (GLS) modelling approach was used to assess the relationships between species abundance and the exploitation rate and selected environmental variables. Additionally, lag periods were incorporated into the GLS models, corresponding to the time required for each species to reach maturity (i.e., fishing recruitment age). This approach is based on the hypothesis that species abundance depends on successful larval recruitment and the survival of juveniles into adulthood. The best GLS models revealed that the abundance of *D. vulgaris* and *O. vulgaris* was explained by a seasonal factor and lag effects corresponding to species maturation times: two years for *D. vulgaris* and one year for *O. vulgaris*. However, for C. maenas, despite a maturation time of six months, a one-year lag period better explained species abundance. No regional differences (between the Ria de Aveiro and Sado estuary) were found in the model that best explained C. maenas abundance. Moreover, sea surface temperature was the only environmental variable included in the best GLS models for all species. To ensure sustainable catch rates, the management of marine resources should consider species-specific maturation timings coupled with current exploitation rates and environmental conditions, given their impact on the future availability of extractable resources.

Keywords: Nephrops norvegicus, fisheries, data-limited stock, stock boundaries

OC (25401) **STOCK ASSESSMENT AND ENVIRONMENTAL EFFECTS ON THE POPULATION DYNAMICS OF SMALL PELAGIC FISH IN THE BALEARIC ISLANDS (WESTERN MEDITERRANEAN SEA)**

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The European sardine (*Sardina pilchardus*) and the European anchovy (*Engraulis encrasicolus*) are the most important target species of the purse-seine fleet in the Balearic Islands. However, due to the small size of this fleet (only five vessels), the biological information on these species is relatively scarce, and no acoustic survey data are available for the area. The landings trends of both species show opposite dynamics over time: while sardine landings were dominant from 1981 to 2011, those of anchovy remained low until they increased sharply in 2012. In the last three years, however, anchovy catches have declined again, whereas sardine catches have increased. In this work, we analyzed long-term landing (1981–2024) and CPUE (2000–2024) data from the purse-seine fleet of the Balearic Islands using data-limited assessment models. The objective was twofold: first, to assess the status of European sardine and European anchovy in the Balearic Islands using the SPiCT model, and second, to analyze the influence of environmental variables on the landings fluctuations of both species. The results contribute to a better understanding of the population dynamics of these key resources in the Balearic Sea and are useful to support the development of informed management advice for the local purse-seine fishery.

Keywords: Stock assessment, Engraulis encrasicolus, Sardina pilchardus, small pelagics, SPiCT, western Mediterranean

OC (25454) EVALUATING BIOMASS AND STOCK STATUS IN THE ALGARVE OCTOPUS FISHERY USING CATDYN AND RTMB MODELS

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The octopus fishery in the Algarve is one of the most important small-scale fisheries in Portugal. After the implementation of co-management for this fishery, a reliable assessment of this stock has become a priority for the stakeholders. In this work, landings and effort data from the Algarve polyvalent fleet are used to fit a generalized depletion model to estimate stock status and latent biomass. Auction market sampling data from the Portuguese implementation of the Data Collection Framework (DCF/PNAB) was used to estimate a mean body weight model for converting catch weights into numbers. Latent biomass, fishing mortality and exploitation rates were estimated with the R package CatDyn, in accordance with previous works using this methodology. Variations of the depletion model created with the R package RTMB are compared, and possibilities on further improvements in this approach and its potential for assessing this stock are discussed.

Keywords: octopus, assessment, Algarve, MAGD, catdyn

OC (25416) **DEVELOPING ALTERNATIVE CATCH RULES FOR IBERIAN COMMON SOLE USING A MANAGEMENT STRATEGY FRAMEWORK**

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A primary goal of fisheries management is to ensure the long-term sustainability of exploited resources. For data-limited data stocks, this objective is particularly challenging due to the scarcity of reliable information. To address this, the International Council for the Exploration of the Sea (ICES) has developed methods for providing catch advice in such contexts. One example is the so-called rfb-rule, which bases catch recommendations on recent catches, a "2 over 3" biomass index ratio, a length-based indicator comparing mean catch length to a proxy of MSY length, and a biomass safeguard.

Although the rfb-rule has been evaluated using a general management strategy evaluation (MSE), its practical implementation has raised concerns about its overly precautionary behavior. In the case of common sole (*Solea solea*) along the Iberian coast, its application led to consecutive reductions in catch advice—36% in 2021, 35% in 2023, and 9% in 2024—even though length-based assessments suggest that the stock is being exploited sustainably.

To address this discrepancy, an ad-hoc MSE framework was developed for Iberian common sole, following the approach used in the general MSEs[1,3] for the rfb rule. A key step was a comprehensive review of the available biological and fishery information to define a well-specified set of operating models (OMs). Within this framework, the current rfb-rule was tested and found not to effectively control the risk of the stock falling below Blim, despite the observed reduction in catch advice.

As an alternative, a new rule incorporating a spawning potential ratio (SPR)-based component was developed. This rule adjusts the previous year's advice by multiplying it by both the "2 over 3" biomass index ratio and the ratio of the most recent SPR estimate to a proxy SPR at F_{MSY}. Parameters for this rule were optimized using a genetic algorithm (GA[2]) to balance risk and yield.

The SPR-based rule resulted in long-term catches closer to MSY while maintaining acceptable risk levels regarding B_{lim}. The GA was also applied to optimize the current rfb-rule leading to acceptable risk, albeit with conservative catch outcomes. Further optimizations of both rules are ongoing to identify robust management alternatives.

[1] https://doi.org/10.1093/icesjms/fsaa054
[2] https://doi.org/10.1093/icesjms/fsab018
[3] https://doi.org/10.1093/icesjms/fsab169

Keywords: Empirical catch rules, Data-limited stocks, Management strategy evaluation (MSE), Spawning potential ratio (SPR), Optimization algorithms

OC (25451) **INTEGRATION OF FISHERIES AND ECOLOGICAL DATA TO SUPPORT SPATIAL MANAGEMENT: THE CASE OF BLACKSPOT SEABREAM (PAGELLUS BOGARAVEO) IN THE WESTERN MEDITERRANEAN SEA**

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Spatial measures are often used to support fisheries management. For instance the European Union (EU) has emphasized the importance of the spatial aspect to protect overfished stocks and to find a better approach to fisheries management. Nevertheless, the careful choice of marine areas to manage is essential to optimize their benefits. In this work, we estimated hot spots of aggregation using a Species Distribution Model developed with template model builder (sdmTMB) on density indices (number of individuals/km2 and number of individuals/1000 hooks) for two length ranges (< = 20 cm and > 20 cm) of a demersal species, Blackspot seabream (*Pagellus bogaraveo*). The model was applied to scientific bottom trawl surveys conducted in the Alboran Sea (MEDITS, western Mediterranean) and to a dataset of georeferenced commercial catches (CPUE, Catch Per Unit Effort) in the Strait of Gibraltar belnding the effects of oceanographic variables (Essential Oceanographic Variables, EOVs) on the distribution of species. The areas of high aggregation (hot spots) or low aggregation (cold spots) were identified using the local Getis-Ord index (Getis and Ord, 1992) applied to the prediction density results (bottom trawl survey dataset and CPUE data) for the two size classes considered, from 1994 to 2021 in northern Alboran Sea, from 2018 to 2021 in southern Alboran Sea and from 2005 to 2009 in the Strait of Gibraltar area. Identified persistent hot spots represent key ecological areas for the species that might be considered in future management plans. In the Northern Alboran Sea, 5 ecologically important areas were identified for smaller size individuals. The results confirm the ecological preferences of the species that were disentangled by Species Distribution Models (SDMs) as well as its useful contribution to support the management of this depleted stock in the Mediterranean sea.

Keywords: Blackspot seabream, Species Distribution Models, Essential Fish Habitat, bottom trawl surveys, Alboran Sea

OC (25447) **SPATIOTEMPORAL VARIATION OF SARDINE, SARDINA PILCHARDUS, RECRUITMENT IN THE NORTHEAST ATLANTIC AND WESTERN MEDITERRANEAN SEA: IMPLICATIONS FOR FISHERIES MANAGEMENT**

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This study examined common trends and variations in sardine recruitment across 13 areas in the northeast Atlantic Ocean and the western Mediterranean Sea over the past two decades. Data were obtained in acoustic surveys covering different seasons and areas. Generalised Linear or Additive Models were fitted to abundance as a function of age to estimate recruitment time series in each area. Exploratory analyses of recruitment time series were carried out to identify hotspot areas, changes in recruitment strength over time, and common trends between areas. Cross-correlation analysis examined the temporal variation between recruitment and the spawning stock biomass. Dynamic Function Analysis (DFA) was used to explore common trends between the areas and evaluate the influence of global environmental variables (NAO, AMO, SST, phytoplankton abundance).

Recruitment variability shifted from decreasing to increasing in 2014 in Centre Morocco, North Portugal, and Cadiz Gulf. In the Bay of Biscay (BoB), recruitment was low until 2005 and thereafter increased markedly, turning this area into a recruitment hotspot in recent years. The cross-correlation analysis indicated that BoB and the North of Portugal recruitments were opposed to one another. The recruitment time series of Catalonia and Alboran in the Mediterranean Sea were independent of each other and of any of the different study areas. Surprisingly, the English Channel time series was positively correlated with those of northern Spanish areas but not with the neighbouring BoB.

DFA indicated that recruitment variability from BoB to southern Morocco was well represented by two common trends. The first trend shifted from decreasing to increasing in 2014 and represented mainly recruitment variations in the north of Portugal, the Gulf of Cadiz, and Central Morocco. The second trend fluctuated at a low level until 2010 and thereafter increased markedly, representing mainly recruitment variation from BoB to northern Galicia. Winter NAO and the average annual AMO indices were positively correlated with recruitment in the northern areas, whereas summer NAO was mostly related to recruitment in central Morocco and South Portugal.

The differences in recruitment time series between areas may indicate different populations with different dynamics in agreement with studies using genetic, morphological, and chemical approaches, and point to the need to review the present definition of the species' stocks. To avoid the depletion of the less productive/resilient populations, the management approach could be separated per region, or spatial models may be incorporated into the assessment of the stocks of the European sardine.

Keywords: small pelagic fish, spatial recruitment variability, stock identification, fisheries management

OC (25440) IMPROVING CATCH DATA QUALITY TO BOOST PREDICTIVE MACKEREL DISTRIBUTION

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Predictive fishing distribution models that integrate catch data with environmental variables have become effective tools for reducing both the time and costs involved in searching for productive fishing grounds. These models can be trained using historical data and subsequently applied to forecast areas where fishing can be more efficient. Despite the implementation of rigorous data curation, previous studies have underscored the critical importance of the quality of the catch data to avoid introducing erroneous data and noise into the models. One of the main concerns is obtaining precise geographic location of the catches. The integration of logbook records with geospatial tracking data has been shown to significantly improve the precision and reliability of spatial fishing data.

The primary objective of this work is to lay the groundwork for supplying catch distribution models of the Northeast Atlantic mackerel (*Scomber scombrus*) with the most reliable and high-quality input data from the Spanish purse seine and handline fisheries operating in the southeastern Bay of Biscay. To achieve this objective, firstly, we completed an inventory of the available datasets, including catch records from logbooks and vessel positioning data from geospatial tracking systems corresponding to the period 2014-2024. Specifically, these datasets were processed for data cleaning and refinement, to obtain more precise mackerel fishing locations based on the geospatial performance of the vessels on the day of the catch. Secondly, based on the current scientific knowledge, more than thirty environmental variables describing the physical properties and productivity of the water column (6 depth levels) were compiled. Finally, from the combination of both data sources, the main environmental conditions of the areas where mackerel catches were registered were characterized. This allowed us to identify similarities and differences between purse seine and hand-line fisheries fishing grounds and their environmental conditions.

Keywords: mackerel, fisheries oceanography, catch distribution, environmental habitat, Bay of Biscay

OC (25436) **IDENTIFICATION OF KEY ENVIRONMENTAL VARIABLES TO PREDICT FUTURE DISTRIBUTION OF EUROPEAN HAKE**

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Climate change has altered the spatial distribution of many species, posing significant challenges for the management of commercial fish populations. These variations make it difficult to ensure both the biological sustainability of the populations and the socio-economic sustainability of fishing communities. Species Distribution Modelling (SDM) provides a framework where the distribution of species can be described based on environmental variables. European hake Merluccius merluccius is one of the most relevant commercial fish species in Europe and is present in a large extent of the North-East Atlantic ranging from Mauritania to Norway. While previous studies have highlighted its strong bathymetric preferences, the influence of other environmental factors on its distribution and abundance remains unclear. The purpose of this study is to identify key environmental variables that shape the spatial distribution of hake, enabling future projections under climate change scenarios.

We conducted a large spatio-temporal analysis comprising 10 different trawl surveys in the North-East Atlantic from 1993 to 2023, sourced from the DATRAS database. Environmental data characterizing physical and biochemical ocean conditions were obtained from the Copernicus Marine Service. SDMs were fitted separately for juveniles (<42 cm) and adults (>42 cm) using shape-constrained generalized additive models. Two different types of models were fitted, occurrence and abundance conditioned on the species being present. The results indicated that bottom water potential temperature, oxygen concentration, bottom seawater salinity, bottom phytoplankton concentration and sea water pH at total scale were significant explanatory variables for both the occurrence and abundance of hake. The fitted models can form the basis for projecting the distribution of hake under future climate change scenarios, offering crucial information for fisheries management.

Keywords: Northeast Atlantic, Species Distribution Modelling (SDM), Climate Change, European hake, Ecosystem-Based Fisheries Management (EBFM), distribution forecast

OC (25438) **AN ECOSYSTEM APPROACH ASSESSMENT OF THE EFFECTS OF THE IMPLEMENTATION OF THE MULTIANNUAL PLAN FOR THE FISHERIES EXPLOITING DEMERSAL STOCKS IN THE WESTERN MEDITERRANEAN SEA AND THE CLIMATE CHANGE IN THE BALEARIC ISLANDS**

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In recent years, the bottom trawl fleet operating in the Balearic Islands has considerably reduced its fishing effort due to a lower number of vessels and the progressive implementation of the effort regime included in the multiannual plan for exploiting demersal stocks in the western Mediterranean Sea (EU-MAP), which has reduced the number of fishing days since 2020. The effort regime had already involved a 40% reduction in fishing days in 2024. This decrease in fishing effort coincides with an increase in sea water temperature, which can affect exploited resources and ecosystems. This highlights the need to assess the effects of these changes using an ecosystem approach. This study presents the first mass-balanced ecosystem model for the Balearic Islands. The model was fitted with available time series of 18 demersal functional groups from 2003 to 2023.The long-term effects of different scenarios combining climate change (RCP 8.5) and fisheries management were assessed. These scenarios included: (1) no fishing, (2) fishing at the fishing mortality corresponding to the maximum sustainable yield (FMSY) for the EU-MAP target species, (3) F and fishing effort in 2019, before EU-MAP (4) F and fishing effort in 2022 (EU-MAP 2022), (5) F and fishing effort in 2023 (EU-MAP 2023), (6) F and fishing effort in 2024 (EU-MAP 2024), (7) increase in codend mesh size (selectivity improvement) and (8) EU-MAP 2024 plus selectivity improvement. The results showed that each resource required a different level of effort reduction and/or selectivity improvement in order to recover. While the MSY is not reached for European hake in the EU-MAP 2024 plus selectivity improvement scenario, the EU-MAP 2022 and pre-EU-MAP scenarios would sufficient for mullets and elasmobranchs.On the other hand, the deep-water rose shrimp stock would only require the implementation of 45 square mesh codend size, whereas the Norway lobster stock would require the reduction of fishing effort applied in 2024. The red shrimp stock would require EU-MAP 2024 plus a 50 square mesh codend selectivity improvement. Mediterranean fisheries are multispecific and multifleet, requiring ad-hoc measures to address differences in the exploitation of target and by-catch species, as well as between different regions. Therefore, this approach provides a valuable framework to forecast how the combination of climate change and EU-MAP regulation may affect the entire ecosystem, improving the knowledge necessary to make management decisions for the conservation of exploited ecosystems and stocks, and the sustainability of the fishing sector.

Keywords: Balearic Islands, EU-MAP regulation, Climate change, Ecosystem modelling approach, Ecopath with Ecosim

OC (25409) **MODELLING CUMULATIVE IMPACTS OF HUMAN ACTIVITIES ON MARINE BIODIVERSITY USING SPATIAL-TEMPORAL ECOSYSTEM MODELS FOR THE IBERIAN PENINSULA**

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The scientific understanding of the consequences of multiple management interventions to overcome the detrimental impacts of global change on marine ecosystems remains scarce. To fill this gap, we developed a comparative modelling framework to assess different management interventions in three regions of the Iberian Peninsula: the Bay of Biscay, the Portuguese Shelf and the Western Mediterranean Sea. Specifically, we used three spatial-temporal ecosystem models representing that take into consideration the cumulative impacts of fishing, shipping (collision of mammals and turtles), windfarms (negative and positive impacts of turbines on benthic species and collision on seabirds) and the impact of environmental change (temperature and primary production). We simulated eleven scenarios to assess the impact of fishing management measures (changes in fishing effort, and reductions of discards and bycatch), mitigation measures for shipping activity, restoration of habitat forming species, the implementation of Marine Protected Areas and climate change. These scenarios originated from downscaling two existing global narratives of alternative futures (Global Sustainability and National Enterprise) that accounted for contrasting SSP/RCP scenarios. Our results suggest that the implementation of Nature Based Solutions (protection and restoration), sustainable fisheries management, and mitigation measures for shipping activity (e.g. reducing traffic and/or the speed of vessels) and wind farms (e.g. reducing risk of collisions through vision-based collision mitigation measures) could play a vital role in mediating the future impacts of cumulative pressures on ecosystems. These results highlight that ecosystem-based management interventions are crucial and may shape the future ecological and socioeconomic status of European seas underpinning the significance of proactive management.

Keywords: Ecosystem modelling, Ecosystem-based management, Cumulative impact

OC (25419) **FROM ECOSYSTEM MODELS TO STOCK ASSESSMENT: THE ROLE OF CANNIBALISM IN ATLANTIC IBERIAN HAKE**

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Marine ecosystems are increasingly exposed to multiple stressors that can significantly influence fish stock dynamics, including climate change, nutrient availability, and fishing pressure. Improving our understanding of species-specific responses, as well as their interactions with other species and environmental drivers, is crucial to refining environmental management strategies and advancing Ecosystem-Based Fisheries Management. A persistent challenge in this context is balancing ecological realism with model simplicity, as overly complex approaches may introduce greater uncertainty.

The Multi-Species Size Spectrum Modelling package in R (Mizer) provides a flexible framework for incorporating key ecological processes, such as size-based predation and cannibalism, into fisheries assessment. In the Atlantic Iberian waters, the stock of European hake (*Merluccius merluccius*) is currently assessed using Stock Synthesis (SS), where cannibalism is implicitly represented through natural mortality.

In this study, we use Mizer to explore how hake stock dynamics differ when cannibalism is explicitly modeled, as opposed to being incorporated indirectly via total mortality. We evaluate the performance of both approaches under varying exploitation scenarios that reflect changes in stock recruitment. Furthermore, we compare the outcomes of the Mizer simulations with those from SS by estimating biological reference points derived from the production curves generated by each model.

Our results highlight the value of explicitly incorporating ecological interactions, such as cannibalism, into assessment models, particularly for improving predictive performance under changing environmental conditions. This approach can support the development of more robust and adaptive fisheries management strategies in response of long-term shifts in ecosystem productivity.

Keywords: Mizer, Natural Mortality, Cannibalism

OC (25412) **INCORPORATION OF ENVIRONMENT-DRIVEN PROCESSES INTO THE SIMULATION FRAMEWORK OF THE BASQUE PELAGIC INSHORE FISHERY**

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1 - AZTI

Many authors have advocated for a gradual transition toward the Ecosystem-based Fisheries Management (EBFM). This approach involves building upon existing fisheries models and progressively incorporating additional dimensions - such as environmental drivers, spatial dynamics, multispecies interactions or socio-economic impacts – with the final aim of enhancing model realism and supporting more holistic management strategies. In this work we describe how environment-driven productivity changes were incorporated into the management strategy evaluation (MSE) simulation framework developed for the basque pelagic inshore fishery operating in the Bay of Biscay. Specifically, we introduced three new submodels: an environment-driven stock-recruitment model and a density-dependent and temperature-driven growth model for Bay of Biscay anchovy, and a two-regime switching recruitment for Iberian sardine. Beyond the statistical analyses to find suitable models to condition the operating models, the process posed additional challenges like the environmental data preparation for the hindcast and projection periods or the prediction capability of the models. The results of the simulations showed that environment-driven recruitment for anchovy led to faster reduction in the mean age, while the two-regime switching recruitment for sardine ended up in higher abundances. The global warming combined with density-dependence growth effects for anchovy resulted into similar biomass levels. Overall, these effects were ameliorated when moving from monospecific separated simulations to the whole multispecies mixed-fishery.

Keywords: environment-driven process, density-dependence, growth, recruitment, pelagic inshore fishery, mixed-fishery model

OC (25420) **UNPACKING AZOREAN SMALL-SCALE FISHERIES: AN INTEGRATED STRUCTURAL, SOCIAL, AND ECONOMIC CHARACTERIZATION**

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Despite their relevance, there are relatively few integrated studies on European small-scale coastal fisheries which include both technical and socio-economic factors. This is particularly true in remote regions like the Azores, where fisheries are multispecies, gear-diverse, and deeply embedded in community identity. However, they are still poorly documented in terms of fleet structure, operational strategies, and socio-economic dynamics. The diversity of artisanal fisheries—shaped by local ecosystems, cultural practices, and economic conditions—results in a broad range of gear types, target species, landing patterns, and market routes. This complexity makes it difficult to monitor fleet operations and evaluate catch and revenue data consistently across regions. The lack of harmonized data and the complexity of local practices have limited efforts to characterize these systems holistically, constraining effective management and policy design.

This presentation provides a comprehensive overview of the structure and dynamics of Azorean small-scale fisheries by integrating multiple sources of empirical data. Daily landings records are analyzed to assess species composition, volume, and market value, while fleet characteristics reveal patterns in vessel types, fishing techniques, and operational strategies. Catch-per-unit-effort (CPUE) is used to examine fishing performance, and demographic and social data—drawn from prior interviews and community inquiries—offer insights into the socio-economic fabric of fishing communities, including their dependency on marine resources and historical ties to the sector. This integrated analysis highlights the Azorean fisheries as a complex socio-ecological system, where economic livelihoods, cultural identity, and ecological sustainability are deeply intertwined. The presentation will outline practical insights to guide more effective and fair management of Azorean small-scale fisheries, grounded in the social and operational dynamics of the sector.

Keywords: Artisanal Fishery; Fleet Characteristics; Socio-Economics; Fishing Dynamics; Azores Archipelago

OC (25402) **AN EVALUATION OF THE PRIOR STOCK STATUS AND THE ECOLOGICAL RISK ASSOCIATED WITH A NOVEL BOAT SEINE FISHERY**

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1 - CNIEO-CSIC

Boat seines are used exclusively to catch sand eels and gobies in Spain. The Mediterranean sand eel (*Gymnammodytes cicerelus*) fishery is located in shallow waters and, to the best of our knowledge, there is no information or scientific studies on the Mediterranean sand eel in Andalusia (southern Spain).

There is some uncertainty about key aspects of this new data-limited fishery in this geographical area. Productivity-Susceptibility Analysis (PSA) is a widely used data-limited method for assessing the relative vulnerability of species affected by fisheries and for ecological risk assessment of the effects of fishing. Length-based indicators (LBIs), based on the principle of 'let them spawn, let them grow and let the mega-spawners live', have been used in several fisheries management studies.

The main objectives of this study were to analyse the stock status and the ecological risk of the new Mediterranean sand eel fishery in an Andalusian fishing ground that is partly located in a marine protected area (Cabo de Gata-Níjar). Length frequency distributions, individual length-weight, sex and maturity were studied to gain a better understanding of the life cycle of the target species by determining growth parameters, length of reproductive period and size at first maturity.

Length-frequency indicators and Productivity-Susceptibility Analysis (PSA) were calculated to estimate prior stock status and to assess the relative vulnerability of data-limited target species and bycatch.

Our analysis of catches showed high selectivity, resulting in catches with little or no - non target species. The percentage by weight of by-catch species in relation to total sand eel catches was very low during the study period. Length-based indicators indicate a healthy spawning stock biomass for *Gymnammodytes cicerelus*. The analysis of productivity and vulnerability indicates low to moderate vulnerability and ecological risk for all species affected by the fishery. The results indicate that a fishery with a limited number of vessels and time would be sustainable.

Keywords: Artisanal fisheries, Mediterranean sand eel, Productivity-Susceptibility analysis, Length-based indicators., Gymnammodytes cicerelus

OC (25462) **OPTIMIZING EXPLOITATION PATTERNS: SELECTIVITY INDICATORS FOR SUSTAINABLE MANAGEMENT OF IBERIAN FISHERIES**

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Effective monitoring of fishing selectivity patterns represents a fundamental requirement for sustainable fisheries management within the ecosystem approach (EAFM). Our study examines the relative juvenile fishing mortality (Fjuv/Fapical) - defined as the ratio of mean fishing mortality on juveniles to maximum fishing mortality observed across age classes - as a robust selectivity indicator for several Iberian fish stocks. This innovative metric provides three critical advantages for management: (1) resilience to recruitment fluctuations, (2) independence from overall fishing pressure levels, and (3) direct alignment with EU Technical Measures Regulation objectives for juvenile protection. Importantly, Fjuv/Fapical maintains its diagnostic value regardless of selectivity curve shape or temporal variations in exploitation patterns.

Using stock assessment data from Iberian fisheries, we examine temporal trends in Fjuv/Fapical to evaluate historical shifts in selectivity patterns. To assess its management relevance, we investigate how this indicator performs in forward projections, particularly in quantifying trade-offs between sustainable yield and stock conservation. Drawing on these analyses, we propose a selectivity-based reference point—analogous to FMSY in traditional harvest control rules— derived from an optimal exploitation curve that maximizes long-term yield while maintaining stock productivity. This approach provides a practical framework for integrating selectivity objectives into ecosystem-based fisheries management.

Finally, we discuss the integration of Fjuv/Fapical into harvest control rules, highlighting its compatibility with existing biomass- and F-based reference points. This approach supports the transition toward balanced exploitation patterns that align with ecosystem objectives, such as reducing discards and safeguarding recruitment. Our results underscore the value of Fjuv/Fapical as a policy-relevant tool for advancing selectivity management in Iberian and other regional fisheries.

Keywords: fishing selectivity, ecosystem-based management, reference points, Iberian fisheries

OC (25457) **MODELING THE COASTAL ATMOSPHERE AND OCEAN OFF WESTERN IBERIA TO INFORM THE DEVELOPMENT OF OFFSHORE WIND FARMS**

Ricardo Fernandes (Portugal)[1]; **Ricardo Tomé** (Portugal)[1]; **Ana Teles-Machado** (Portugal)[1]; **Álvaro Peliz** (Portugal)[1]; **Alexandra Silva** (Portugal)[2]

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We present a comparative analysis of two five-year (2009–2013) dynamical downscaling simulations over the western Iberian margin using the Weather Research and Forecasting (WRF) regional model, both forced at the boundaries with ECMWF ERA5 reanalysis data. One simulation includes a wind farm parameterization (WFP) scheme, while the other does not. WFP scenarios are commonly applied in mesoscale models to estimate wind farm power production and assess their effects on local wind resources, while considering seasonal and interannual changes in the regional wind field. This study aims to explore the effects of wind farms on the local atmospheric conditions along the western Iberian margin by analyzing differences between the two WRF simulations. These atmospheric fields will also be used to force a regional ocean model (CROCO) to investigate potential effects on ocean circulation and coastal upwelling patterns. We will present preliminary results highlighting changes in atmospheric and oceanic fields associated with the inclusion of wind farm effects. This work contributes to understanding the coupled atmosphere–ocean response to wind energy extraction and aims to better characterize the physical processes driving changes in the coastal ocean.

Keywords: Offshore Wind Farms; Western Iberian Margin

OC (25448) **MODELLING THE SPATIAL DISTRIBUTION OF EUROPEAN ANGLERFISH SPECIES TO INFORM MARINE SPATIAL MANAGEMENT**

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Planning and managing marine spatial use is key essential for balancing competing ocean activities, particularly given the overlap between offshore wind farm expansion and marine protected areas (MPAs) and fisheries. Equitable solutions require ecological data to be integrated with fisheries socioeconomics, balancing conservation objectives with fishing impacts. Two species of anglerfish inhabit European Atlantic waters: the white anglerfish (*Lophius piscatorius*) and the black anglerfish (*Lophius budegassa*), which occupy a variety of depths and substrate types with overlapping but also distinct biogeographical patterns. To understand their mobility and complex life cycles, predictive tools are needed to inform spatial management strategies. Furthermore, both species are high-value commercial fish targeted by trawl and gillnet fisheries in north-west Spain. This study uses species distribution models (SDMs) in order to quantify the relationship between anglerfish occurrence and key environmental variables. By integrating both fishery-dependent and independent data together with high-resolution environmental variables, we can identify areas of high habitat suitability and predict how anglerfish distribution may change in the future due to climate change. The resulting spatial predictions provide actionable insights for marine spatial planning, highlighting areas of ecological importance and potential conflict with human activities, such as fishing and offshore wind farm development. Our findings demonstrate the value of knowledge of the spatial distribution of anglerfish species in supporting adaptive marine spatial management. This information enables managers and stakeholders to ensure sustainable fisheries and the conservation of biodiversity on a scientific basis.

Keywords: anglerfish, species distribution model, marine spatial planning, fisheries

OC (25459) **ASSESSING THE SOCIOECONOMIC IMPACT OF FISHING EXCLUSION ZONES: A PORTUGUESE CASE-STUDY**

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The creation of fishing exclusion zones is becoming increasingly common as marine spatial planning develops, giving way to marine protected areas (MPAs) and energy generation plants, like offshore wind farms, tidal energy and wave energy sites. This reduction in available fishing grounds, leads to the displacement of fisheries, impacting marine ecosystems and the local fishing industry. We present a spatiotemporal analysis of the potential effects of excluding fishing activity in given areas, using data inspired by a real-world dataset from trawling fishing logbooks between 2015 to 2023 in Portuguese continental waters. Four different hypothetical fishing exclusion zones were conceived, to evaluate how their placement influences the results. The analysis was made utilizing a marked log Gaussian Cox Process, a type of spatial point process, supported by a mixture of descriptive statistics, mapping and time series. This modelling support was generated for the number of fishing events, captured amount (in kg) and revenue (in euros), with the latter being used as response variable for the mark process. The model then predicted the intensity of fishing activity and associated revenue using environmental covariates and fishing vessel-trip data. This model class proved to be a key support for decision-making in marine spatial planning, providing knowledge regarding the effects of these areas and finding alternative fishing locations. By integrating ecological, economic, and spatiotemporal modelling approaches, our study offers critical insights for resource management, ensuring a balance between the creation of fishing exclusion zones and the sustainability of fisheries.

Keywords: Offshore renewable energy, Fisheries displacement, Fishing effort, Spatial-temporal analysis, Marine resource management

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POSTER PRESENTATIONS

PO (25408) INFLUENCE OF NATURAL MORTALITY AND SELECTIVITY ON THE CATCHABILITY OF SCIENTIFIC SURVEYS IN INTEGRATED ASSESSMENT MODELS: APPLICATION TO ANCHOVY (ENGRAULIS ENCRASICOLUS) IN THE GULF OF CÁDIZ

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Small pelagic species such as sardine and anchovy, characterized by short life spans and high productivity, are subject to recurrent scientific surveys aimed at estimating their abundance and supporting fishery management decisions. Integrated stock assessment models rely heavily on survey-derived abundance indices to estimate stock size and dynamics. However, the catchability of these indices can be sensitive to assumptions regarding natural mortality (M) and survey selectivity.

This study investigates how different configurations of age-specific natural mortality and survey selectivity influence the estimated catchability of abundance indices within an integrated assessment model—Stock Synthesis (SS3)—applied to the anchovy (*Engraulis encrasicolus*) stock in the gulf of Cádiz. The model is age-structured (ages 0–3) and quarterly, incorporating catch data and age composition from the commercial fleet alongside age-structured abundance indices derived from four acoustic surveys: *PELAGO* (spring), *ECOCADIZ* (summer), *ECOCADIZ-RECLUTAS* (autumn), and the DEPM-based *BOCADEVA* (summer).

Scenarios tested include three natural mortality configurations: constant, decreasing with age, and U-shaped. Variations in selectivity were also explored. Results showed that the U-shaped natural mortality configuration yielded better overall model fit and led to lower estimated catchability coefficients compared to the other configurations. This suggests that incorporating a more biologically realistic mortality pattern improves the model's ability to represent the population dynamics and the relationship between true abundance and observed survey indices.

This work was conducted within the framework of the ICES WKBANSP 2024 benchmark workshop and contributes methodological insights for interpreting the interaction between natural mortality, survey selectivity, and catchability in integrated assessment models. The approach is transferable to other short-lived small pelagic species, which are typically characterized by high recruitment variability and rapidly changing age structures.

Keywords: natural mortality, selectivity, catchability, surveys indices, Integrated Assessment Models, anchovy

PO (25415) ENHANCING STOCK ASSESSMENT ACCURACY: MICROSCOPIC MATURITY OGIVES FOR MACKEREL (SCOMBER SCOMBRUS)

Patrícia Gonçalves (Portugal)[1]; Gersom Costas (Spain)[2]; Dolores Garabana (Spain)[2]; Antonio Solla (Spain)[2]; Carmo Nunes (Portugal)[1]; Pedro Pechirra (Portugal)[1]; Cindy Van Damme (Netherlands)[3]

1 - IPMA; 2 - IEO-CSIC; 3 - WUR

The Northeast Atlantic mackerel (*Scomber scombrus*) stock is assessed and managed as a single entity, incorporating data from its three recognized components: the western, southern, and North Sea populations. An analysis of maturity by length revealed spatial variations, with the southern component reaching maturation at an earlier age. Macroscopic maturity classifications are often used to estimate the proportion of mature individuals by age, though these classifications are subjective and present some uncertainty, particularly at certain maturity stages. This study highlights the limitations of macroscopic maturity classification and proposes maturity-at-age and maturity-at-size ogives based on microscopic data for the southern component. The resulting maturity ogives were derived from integrated survey data collected along the Portuguese coast, northern Galicia, and the Cantabrian Sea. This study results suggest that microscopic ogives should be developed also for the other mackerel stock components to improve accuracy in the input maturity data used in this species stock assessment.

Keywords: Mackerel, Maturity ogive, Microscopic classification, Macroscopic classification, Stock assessment

PO (25422) ASSESSMENT OF BIOMASS ESCAPEMENT STRATEGY INCORPORATING EXPLOITATION CAPS FOR SMALL PELAGIC SPECIES USING FLBEIA: APPLICATION TO ANCHOVY IN THE GULF OF CÁDIZ

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Small pelagic fisheries, such as sardines and anchovies, are characterized by high recruitment variability, short life span, and high sensitivity to environmental conditions. These biological traits introduce considerable uncertainty, requiring robust and precautionary management strategies. Biomass Escapement Strategies (Bescapement strategies) have been promoted as appropriate tools to ensure a minimum spawning biomass after fishing, particularly for short-lived species. However, recent findings indicate that these strategies only meet precautionary criteria when complemented by an upper limit on fishing mortality (Fcap), which must be estimated through simulation within a Management Strategy Evaluation (MSE) framework.

In this context, the present work describes the development of an MSE for the anchovy (*Engraulis encrasicolus*) stock in the gulf of Cádiz, using the FLR framework and the FLBEIA platform. The simulations are structured by quarter and age class (ages 0 to 3), and the historical period (1989–2024) is conditioned on outputs from the most recent benchmark stock assessment. The model configuration incorporates key data inputs, including numbers-at-age, weight-at-age, natural mortality-at-age, and historical catch data.

The Bescapement strategy will be tested in combination with different values of Fcap, simulating future population trajectories under realistic exploitation scenarios. Performance metrics considered include: (i) the risk of spawning stock biomass (SSB) falling below B_{lim}, (ii) average yield, and (iii) interannual catch stability. The primary objective is to identify the Fcap value that maintains the probability of SSB falling below B_{lim} below 5%, in line with precautionary management principles for short-lived stocks.

This methodological framework provides a scientifically robust basis for designing management strategies tailored to the life-history traits of short-lived species. It is particularly relevant under conditions of high uncertainty and in the context of climate change.

Keywords: anchovy, golf of Cádiz, biomass escapement, FLBEIA, fishing mortality, management strategy evaluation

PO (25429)

COMBINING SPATIAL-TEMPORAL NURSERY DYNAMICS AND INTRA-STOCK CONNECTIVITY TO PROVIDE INSIGHT FOR ENHANCING THE ASSESSMENT AND MANAGEMENT OF FOUR-SPOT MEGRIM (LEPIDORHOMBUS BOSCII)

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Identifying recruitment areas as essential fish habitats is crucial for effective marine spatial planning and the sustainable management of exploited stocks. For the four-spot megrim (*Lepidorhombus boscii*), a key demersal species in trawl fisheries off the northern continental shelf of the Iberian Peninsula, understanding the spatiotemporal dynamics of nursery areas is particularly relevant for reducing recruitment mortality and improving stock assessment models. Using data from long-term bottom trawl surveys and Bayesian spatial models considering four environmental variables as potential predictors of recruit distribution, we identified four recruitment hotspots characterized by specific depth preferences—showing an optimal bathymetric range and a marked decrease in abundance at greater depths—as well as significant spatiotemporal variability, revealing a putative intra-stock structure in this stock. These findings highlight that static spatial management approaches may be insufficient, as nursery grounds can shift over time with environmental changes, potentially altering interactions with human activities.

To deepen our understanding in the persistence and dynamics of intra-stock connectivity and its implications for regional recruitment dynamics, we conducted an individual-based model (IBM) simulating the drift and development of eggs and larvae over a 100-day period following peak spawning in March. We also quantified trace element (^55Mn, ^85Rb, ^88Sr, ^138Ba) concentrations in otoliths of adult individuals collected across five subareas. Otolith chemical signatures revealed high classification success for specimens from the easternmost subarea, suggesting strong site fidelity, while low accuracy during early life stages indicates directional connectivity and certain spatial mixing during larval and post-settlement phases. IBM simulations, run annually from 1993 to 2021, revealed considerable interannual variability in larval dispersal and recruitment success across the study region, closely matching the shifting patterns of nursery distribution detected in survey data with coherent and distinct dynamics in the Galician (western) and Cantabrian (easter) areas of the stock. This convergence of modelling, empirical data, and chemical tracers provides robust evidence for the existence of intra-stock structuring partly driven by spatially heterogeneous recruitment dynamics.

By combining insights from spatial ecology, dispersal modelling, and otolith chemistry, our results underscore the importance of incorporating both spatiotemporal nursery dynamics and biological connectivity into current assessment frameworks. Recognizing intra-stock complexity and dynamic habitat use is essential to ensure the accuracy of scientific advice and the long-term sustainability of this valuable fishery, particularly in the face of environmental variability and changing oceanographic conditions.

Keywords: Four-spot megrim nurseries, spatial assessment and management, Bayesian models, otolith microchemistry, individual-based model, connectivity

PO (25433) LPUE STANDARDIZATION OF THE SPANISH TRAWL FLEET FOR HORSE MACKEREL IN ATLANTIC IBERIAN WATERS

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Fishery-dependent data are the most common source of information for stock assessment methods. In the case of southern horse mackerel (*Trachurus trachurus*), the stock is currently managed as a single stock unit in West Iberian and Portuguese waters. Standardized LPUE (Landings per Unit of Effort) indices derived from commercial fisheries can provide valuable information on trends in relative abundance. In this context, there is particular interest in developing an index that specifically targets older age groups within the mature population component, as it may better reflect long-term changes in spawning biomass. In this study, we tested different approaches to standardize LPUE for southern horse mackerel using fishery-dependent data from the Spanish trawl fleet operating in Atlantic Iberian waters.

Keywords: Landing per Unit of Effort standarization, Indices of relative abundance, stock assessment, models

PO (25437) ELECTRONIC MONITORING AS A NOVEL DATA SOURCE FOR FISHERIES ASSESSMENT

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Fisheries assessment is a key process to ensure the long-term sustainability of exploited stocks, as well as both commercial and non-commercial species. The assessment process largely depends on the availability of data and existing knowledge of each fishery. Catch data, along with biological data on species, technical data (hauls, fishing gear, duration of operations) and information on fishing vessel activity are essential for understanding the status of fish stocks and making informed decisions for sustainable management. Human observers aboard commercial vessels record basic scientific information to complement biological, ecological, and technical data. This is a robust data source that enables the collection of high-quality information. In the 21st century, the development of electronic fisheries monitoring (EM) technologies offers new methodological opportunities for fisheries research programs to improve knowledge of the status of fisheries stocks and the environmental health of marine ecosystems. New technologies complement data from onboard observers and expand monitoring across the fleet, providing information that enables better stock assessments. Within this framework, the present study aims to conduct trials using EM in Spanish national fishing grounds to collect data for scientific purposes, and explore their potential applications in stock assessment.

In the methodological approach of this study, two EM tools were tested to evaluate: (1) the electronic device iObserver, developed within the framework of the project, and (2) an electronic cameras system. These tools were applied in several case studies: demersal bottom trawling targeting demersal and pelagic fish, using the iObserver and the electronic cameras system for these fisheries, as well as trammel nets and purse seine. These experimental trials were conducted on board collaborative commercial vessels during regular fishing operations. For iObserver, machine learning and artificial intelligence software were used to detect individuals in the images, identify species, measure their size and estimate the total catch weight. For the electronic camera system, the videos were reviewed by expert analysts using VLC software following a standardized protocol to identify species, count retained and discarded individuals and estimate catch weight for purse seine operations.

The results indicate that iObserver has the potential to accurately record commercial species, individual sizes, total catch biomass and species abundance and also allowed for the estimation of average sizes and length distributions. Meanwhile, the electronic recording cameras proved effective in identifying retained and discarded species, along with their respective abundances and capture frequencies.

Keywords: Electronic monitoring, Data sources, Fisheries, Stock assessment, New technologies

PO (25444) EFFECT OF GEAR SELECTIVITY ON MEGRIMS (LEPIDORHOMBUS SPP) DISCARDS, ESSENTIAL INFORMATION IN THE FISHERIES ASSESSMENT FRAMEWORK

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The fishing selectivity, which describes the relationship between the age/size composition in a species stock and the one found in the fisheries, could be determined by a combination of underlying processes such as gear design or spatial-temporal distribution of the fishery and of the species under consideration. The knowledge of factors affecting the relationship between fishing mortality (F) and effort (f) may be useful to improve the scientific advice in mixed fisheries. This relationship is assumed to be constant in time, however some factors such as fish and fleet behaviour, dense-dependency, can affects its variability.

In order to achieve this aim, it is necessary to define the technical characteristics of the fishing gears, to test and to compare mesh configurations and selectivity devices that are more suitable.

North Spanish bottom trawl fishery is reported to have discards of megrims and round species as hake and blue whiting. Main reasons for discarding target species are the undersized individuals and quota restrictions. A selectivity trial program designed by the collaboration of scientists and fishers, was carried out with the aim of assess the selectivity of the regulatory trawl codends used by the commercial fleet for main commercial species. Selectivity trials have been conducted focused on mesh netting geometry and mesh size and the effect on four-spotted megrim (*Lepidorhombus boscii*) and megrim (*Lepidorhombus whiffiagonis*) captured in the Atlantic Iberian waters by bottom trawlers (ICES areas 8c and 9a).

Keywords: Discards, landing obligation, selectivity, technical measures

PO (25450) SARDINE (SARDINA PILCHARDUS) SURVIVAL AFTER SLIPPING IN THE PORTUGUESE PURSE SEINE FISHERY

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Under the scope of the Sardinha 2020 project, two slipping experiments were carried out to evaluate the survival of sardines (*Sardina pilchardus*) after the practice of slipping by purse-seiners. Slipping is the release of unwanted capture of live fish in purse seine fishery, by lowering the head rope of the net. Following a fishing set, fish were transferred from the net in the initial and final stages of slipping, respectively, to each of the floating net pens. One of the net pens was used as control and the other as slipping treatment. The two net pens were anchored in the open ocean where the fish were kept alive for 7-8 days after capture. The experiments took place at different times of the year (spring and summer of 2021) off the South coast of Portugal. In both experiments, the results did not reveal the existence of an impact of the slipping practice on the survival rate of sardines, as survival was reduced either in the control as in the slipping treatment. A survival rate of 34% in the slipping treatment and 33% in the control net pen was observed in both net pens in the first experiment. In the second experiment, 6.4% survival rate was observed in the slipping treatment compared to 19.4% in the control. In addition to sardines, blue jack mackerel (*Trachurus picturatus*) were accidentally placed inside the net pens in the second experiment. A high survival rate of 72.5% was observed in the slipping treatment compared to 95% in the control, suggesting that slipping activity for this species does not seem to have a large impact. In this study, the condition factor and caudal index were also evaluated, as well as the physical conditions of the individuals collected during the experiments. It was found that, in general, for both species and in both the control and slipping treatments, dead individuals showed greater deterioration in body condition compared to survivors.

Keywords: purse-seine, slipping, survival, sardine

PO (25453) UNDERSTANDING THE BYCATCH OF SKATES AND RAYS (RAJIDAE) IN GALICIA WATERS

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Rajidae species are an important marine resource in the fisheries of Northwestern Spain and in particular for the otter bottom trawl and trammel net fleets. Several skate and ray species are wide distributed in European Atlantic waters but many aspects still remain unknown: stock structure, species dynamics, migration movements and spawning areas. Rays are vulnerable to overfishing and are bycatch species in the bottom fisheries in European waters of the International Council for the Exploration of the Sea (ICES). At least eight species of skate and rays inhabit northwestern Iberian waters. In offshore waters of the continental shelf, the most abundant is the thornback ray, Raja clavata, followed by R. montagui and Leucoraja naevus. In shallower waters, the most abundant species are R. undulata, R. microocellata and R. brachyura. Skates and rays are usually discarded due to their small sizes, low value, lack of fishing quota or be prohibited species. Discard rates of skate and rays by bottom trawling in north Iberian waters (ICES Divisions 8c and 9a) are of 30% for the most important commercial species, undulate ray and thornback ray. DESCARSEL project carried out a tagging program and survival rate estimation assess of discarded skates and rays caught by commercial trawlers and trammel netters operating in northwestern Atlantic Spanish waters. Our results indicated that 66.8% and 100% of sampled rays caught by bottom trawlers and trammel nets, respectively, survive fishing and handling operations on board. A tagging program has been carried out to improve knowledge of the status and spatial ecology from recapture data and implication in fisheries interactions. Between 2018 and 2024, a total of 1498 rays and skates have been tagged and released in different trials carried out onboard fishing and oceanographic vessels in NW Spain. A total of 38 recaptures of four species have been made in Galician waters. The most recaptured species was the Thornback ray, which was the most released. Understanding the patterns of discarding and survivability rates could be used to reduce the fishing impact on skate and ray stocks and a better fishing management.

Keywords: discards, skates, rays, survivability, tagging

PO (25455) CATCH COMPOSITION OF THE SMALL-SCALE BOTTOM FIXED NET FISHERY IN GALICIA: DISCARD AND BYCATCH CHARACTERIZATION

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Galicia stands out as one of the European regions dependent on fishing, with an artisanal fishing sector comprised of 3,711 vessels, approximately a third of which use fixed bottom nets. This study conducted a study of the catch, discards, and bycatch of the fishing fleet using two sources of information: landings and on-board observer data.

The gillnet fishery uses single-net gear (gillnets) and two- or three-net gear (trammel nets), depending on various technical factors and the target species. A characterization of fixed gillnets was carried out using existing data, information collected in ports and on board, and a wide variety of net rigging was found, which can be included in the following categories: betas, volantines, volantas, rascos, raeiras, trasmallos, miños and xeito. The type of gear and fishing strategy determine the target species, which can be fisheries directed at fish, crustaceans and/or cephalopods.

Catch composition and relative species importance (in weight and number of individuals) were analyzed from on-board sampling of fishing vessels using fixed bottom nets in Galicia. A total of 57 species were caught, mostly commercial species. A significant proportion of these species represented less than 5% of the total catch in weight and number. These fisheries have a high species diversity in their catches, with some of the main species caught being: European hake, sole, pout, skates and rays, spider crab, seabream, ballam grasse, sea bass, gurnards and cuttlefish. The study obtained the catch profile of various gears on 7 boats during 303 fishing sets. Discard rates were low, and catches of unwanted species (including protected bycatch species) were infrequent. The association of fish species accessible to bottom fixed nets in the study area is discused.

Keywords: discards, fisheries management, landing obligation, selectivity, technical measures

PO (25458) UNDERSTANDING TEMPORAL CHANGES IN SIZE AT MATURITY: THE CASE OF SOUTHERN EUROPEAN HAKE STOCK

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Fisheries management relies on long-term monitoring of life history traits, particularly those related to reproduction. A key reproductive parameter is L50—the length at which 50% of individuals in a population are sexually mature. Accurate estimates of L50 are essential for determining spawning stock biomass (SSB), supporting stock assessments, and informing measures such as minimum conservation reference sizes (MCRS). However, L50 is not static. In exploited stocks, L50 often declines over time due to size-selective harvesting, where larger, mature individuals are removed, promoting earlier maturation in smaller individuals. These trends may result from phenotypic plasticity or evolutionary responses to fishing and environmental changes. The southern European hake stock is particularly interesting for verifying decadal L50 changes, with long-term fluctuations in SSB, following a period of overexploitation and subsequent recovery to safe biological limits after the implementation of a Recovery Plan drawn up by the European Commission (EC). This study analyses 3500 European hake samples collected between 2000-2023, with both microscopic and macroscopic maturity data. Since macroscopic staging has difficulties in identifying immature and resting individuals, histological data – although more resource-intensive – provide more accurate and objective maturity classification. Using binomial generalized linear models (GLMs), we estimate L25, L50, and L95 compare the staging methods, and develop a measurement-error model to correct macroscopic estimates. To assess long-term variation, size at maturity is modelled over time using Generalized Additive Models (GAMs), incorporating environmental (e.g., North Atlantic Oscillation, Atlantic Multidecadal Oscillation, sea surface temperature), fishing pressure and density-dependent variables (e.g., biomass, SSB) to evaluate their relative importance and effects on changes in maturity. Understanding temporal changes in size at maturity enhances stock assessment models and supports the development of adaptive, biologically informed fisheries management.

Keywords: Size at Maturity (L50), European Hake, Fisheries Management, Maturity Assessment Methods

PO (25461) STOCK ASSESSMENT OF THE BLUE AND RED SHRIMP (ARISTEUS ANTENNATUS) IN THE ALBORAN SEA (WESTERN MEDITERRANEAN), USING AN AGE-STRUCTURED STATISTICAL MODEL (A4A) AND A PRODUCTION MODEL (SPICT)

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Blue and red shrimp (Aristeus antennatus) is the most important resource of slope bottom in the GSA1 (Northern Alboran Sea) and is targeted by the largest vessels of the deep water trawl fleet segment. The bottom otter trawl fleet catch red shrimp on the slope on muddy bottoms between depths of 400 to 800 m. A total of 57 vessels (35 with catches greater than 1 tonne in 2023) had fishing activities directed towards the blue and red shrimp in the GSA 1 fishing ground. This segment fleet, catches about 113 tonnes of red shrimp per year (average 2021-2023), 145 tons in 2022. The assessment was carried out using a4a (Jardim and Millar, 2014), an age structure stock assessment model, and SPiCT (Pedersen and Berg, 2017)., a production stock assessment model

The assessment was carried out using official landings and data on the size composition of otter bottom trawl catches for the years 2002-2023 in GSA 1. Also, abundance index series from MEDITS trawl surveys and effort data (fishing days) were used in SPiCT scenarios. For a4a, catch-at-length data were converted into catch-at-age data by cohort slicing procedures (R software). Length-weight relationship and maturity ogive comes from Spanish DCF and Natural mortality vector was estimated using PRODBIOM (Abellaeet al., 1997).

The SPiCT model showed overall better fit than SCCA (a4a) model, including acceptable retrospective diagnostic and the Hindcasting cross-validation showed a MASE below the treshold of 1. The stock trajectories estimated are considered reasonable. Furthermore, an extensive sensitivity analysis was carried out on the prior used. Also, different scenarios regarding adding nominal CPUE were tested. All the tests showed consistent trends. Finally, the final scenario was using MEDITS time series equal to catches time series (2002-2023) due to the uncertainty in the model for the historical catches estimated by the model when using MEDITS data since 1994.

Keywords: Blue and Red shrimp SPIct a4a

PO (25414)

BIOMETRICS AND BODY CONDITION OF DEMERSAL FISH IN SÃO TOMÉ: IMPLICATIONS FOR SUSTAINABLE MANAGEMENT

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This study presents key biometric parameter insights—length–weight relationships (LWRs), sex ratios, and Fulton's condition factor (K)—for ten demersal fish species in the coastal waters of southern São Tomé Island: *Dentex macrophthalmus, Dentex congoensis, Pagrus caeruleostictus, Lethrinus atlanticus, Lutjanus fulgens, Lutjanus goreensis, Lutjanus agennes, Apsilus fuscus, Pomadasys rogiri,* and *Paranthias furcifer*. Specimens were collected by artisanal fishers between March 2019 and February 2020 from eight nearshore sites using various handline techniques, including horizontal and vertical longlines and single-hook artificial lures. A total of 1,417 individuals were measured and analyzed. The estimated LWR slope values (b) ranged from 2.122 to 3.515, with negative allometric growth observed in most species, suggesting a tendency towards elongation with growth rather than a proportional increase in girth. Statistically significant differences in growth patterns between sexes were identified in several species, indicating possible sexual dimorphism. Sex ratio analysis revealed male-biased populations in *D. macrophthalmus*, *P. rogiri*, and *P. furcifer*, while *D. congoensis*, *L. fulgens*, and *L. goreensis* showed female-biased ratios. Fulton's condition factor (K), used as an indicator of fish well-being, ranged from 0.468 to 1.525. Notably, *A. fuscus* displayed consistently low K values, which may reflect suboptimal habitat conditions or feeding limitations. Additionally, this study documents a new maximum total length for P. furcifer, contributing to the biological knowledge of the species. This research represents the first biometric dataset for these demersal species in São Tomé and Príncipe, providing valuable reference points for regional fisheries science. The findings are especially relevant for guiding sustainable management of artisanal fisheries, offering baseline biological indicators critical to future stock assessments, population monitoring, and the development of species-specific conservation strategies in the Gulf of Guinea.

Keywords: length-weight relationship; condition factor; sex ratio; artisanal fisheries; São Tomé Island

PO (25417) COMPLEMENTARY APPROACHES FOR DATA-LIMITED STOCK ASSESSMENT: SURPLUS PRODUCTION AND LENGTH-BASED MODELS APPLIED TO PARAPENAEUS LONGIROSTRIS IN A WEST AFRICAN FISHING GROUND

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The deepwater rose shrimp *Parapenaeus longirostris* has been the main shrimp resource exploited by the Spanish fleet in the EZZ of Guinea-Bissau, since the 90s. Assessments are carried out within the scientific collaborative framework provided by the Fishery Committee for the Eastern Central Atlantic (CECAF). Traditionally, the stock assessment of this species within the CECAF has been conducted using Biodyn, which is a surplus production model adopted by CECAF for data limited stocks. More recently, the SPiCT model (Surplus Production in Continuous Time) has been used as a complementary approach to validate the results of Biodyn. Both models require time series of catches and abundance indices. Although these models seem adequate in the data – limited context of this stock, alternative approaches are recommended to be explored. This study combined two modeling approaches: surplus production models (SPiCT and Biodyn) and a length – based model, the LBPA (Length-Based Pseudocohort Analysis). SPiCT and Biodyn were fit to a time series from 1999 to 2023. Results from the SPiCT model estimated biomass in 2023 at 141% of B_{MSY} and fishing mortality at 24% of FMSY. Similarly, Biodyn estimated a biomass at 151% of BMSY and fishing mortality at 20% of F_{MSY}. Both models indicate that the stock is in a healthy state: biomass levels are well above the reference target and current fishing pressure is low. In contrast, the LBPA model was applied using only length – frequency data collected between 2011 and 2021. LBPA estimated a current Spawning Potential Ratio (SPR) of 58%, which represents the proportion of reproductive potential retained relative to the unfished state. This value is above the commonly used precautionary threshold of 40% of the unfished spawning stock biomass (SPRtar). The estimated fishing mortality was 57% of Ftar, with Ftar = 0.7, defined as the fishing mortality required to maintain the SPR at 40%. While SPR is not directly comparable to biomass relative to BMSY, it is widely used in length – based assessments as the stock's reproductive capacity under fishing pressure, particularly in data – limited contexts. Although the models differ in their assumptions and data inputs, their diagnoses are consistent. This work suggests that LBPA can be a valid complementary approach in data – limited contexts, providing consistent stock status diagnoses with those derived from dynamic production models, and reinforcing its value as a complementary tool for management recommendations of fisheries with limited data availability.

Keywords: Parapenaeus longirostris, stock assessment, SPiCT, Biodyn, LBPA, data – limited fisheries, Guinea – Bissau, CECAF, demersal resources, spawning potential ratio, surplus production model

PO (25418) CONSERVATION OF ELASMOBRANCHS IN KEY GLOBAL FISHING AREAS THROUGH DNA BARCODING AND MORPHOMETRIC ANALYSIS

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Elasmobranchs globally declined in recent decades due to overfishing (Smith et al., 2012). Within this group, rays are recognized for following a distinctive life strategy known as the K-strategy, which is characterized by large size, slow growth, and low fecundity (Stevens et al., 2000). This strategy, in turn, makes them more susceptible to exploitation, which can have serious and lasting consequences for marine ecosystems (Myers et al., 2007). Furthermore, the similar morphology and coloration patterns exhibited by ray species often lead to misidentification of specimens, further complicating fisheries management (Ward et al., 2016). Therefore, accurate species identification methods are crucial. In this study, a combination of methodologies was employed for the precise identification of 17 species of Rajiformes, captured in three areas globally recognized for their fishing importance: The Grand Banks of Newfoundland and Flemish Cap, and the Great Sole Bank. Several species examined in the study are classified as endangered by the International Union for Conservation of Nature (IUCN, 2020), including *Dipturus batis* and *Dipturus intermedius*, previously considered as a species complex (Iglesias et al., 2010), as well as the species *Bathyraja spinicauda*, classified as near threatened (Jensen, 1914). To achieve reliable identification, we conducted well-established analyses of DNA barcoding (Hebert et al., 2003; Hebert et al., 2004; and Barrett, 2005), as well as morphometric analysis following procedures previously described (Orlov et al., 2004; Geniz et al., 2007; and Iglesias et al., 2010). Additionally, a neural network model was developed to assign species to each morphotype, which constitutes a novel contribution to the field of ray identification. The results indicate that the combination of both methodologies effectively identifies species. Integrating these methods with traditional modelling in fisheries management can prevent identification errors and improve elasmobranch population assessments. Furthermore, the neural network model developed in this study is a valuable tool for future research in this field.

Keywords: neural network model, mitochondrial DNA, genetic diversity, management, rays

PO (25421) **MAINTAINING THE HEALTH OF COMMERCIAL STOCKS: THE ROLE OF BIOLOGICAL TRAITS AND EXTERNAL FACTORS**

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The health of stocks is crucial not only for the survival of the species but also for the balance of the marine ecosystems. Biological traits, such as reproduction capacity, growth, and natural mortality rate, are among the critical factors that can affect health stock. These intra-specific traits characterize and drive the distribution and abundance of every stock into the functionality and ecosystem health. However, external factors such as fishing pressure definitely impact not only the exploited stocks and ecosystems but also the ecological and economic efficiency of the fisheries that target them. Overfishing, in particular, can lead to a decline in the size and abundance of the stock, which can have long-term consequences for the ecosystem. Therefore, managing fishing pressure and considering biological traits is vital when developing strategies that focus to maintain healthy stocks.

Recently, a list of potential indicators is being developed as part of the Good Environmental Status (GES) assessment to be used under the EU Marine Strategy Framework Directive (MSFD). These indicators permit to establish thresholds that determine a healthy stock in those cases in which full analytical assessments and reference points are not available.

The present work discusses the suitability of the different potential indicators to achieve that objective. In particular, the need of setting operational or target levels applicable to develop exploitation strategies ensuring long-term sustainability.

Keywords: Healthy stocks, MSFD, fishing and ecosystem management, Good Environmental Status (GES), Indicators

PO (25423) ASSESSMENT OF SCOMBER COLIAS AND SARDINELLA AURITA IN THE CANARY ISLANDS USING DATA-LIMITED APPROACHES

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In recent years, a declining trend has been observed in the landings of key small pelagic species in the Canary Islands. This study focuses on two of notable economic relevance to the local artisanal fleet: *Scomber colias* and *Sardinella aurita*. In the absence of fishery-independent abundances (i.e. acoustic scientific surveys), the available information on stock biomass is limited to CPUE (Catch Per Unit Effort) derived from landing data. Despite de limitations of the time series, catch and CPUE records from 2007 to 2024 provide a valuable basis for the analysis.

The lack of adequate biological information and long-term comprehensive records on both catches and fishing effort restricts the application of conventional stock assessment methods. As an alternative, data-limited models are applied. Specifically, this study uses four approaches: Length-Based Bayesian (LBB), dynamic version of the Schaefer model (Biodyn), Bayesian Surplus Production Model (BSM), and Stochastic Surplus Production Model in Continuous Time (SPiCT). These models are based on official landings (first sale reports), CPUE indices, and length-frequency data collected at-sea, in port and in the laboratory.

The results highlight the utility of data-limited approaches for evaluating the status of these species under data-constrained conditions of the Canary Islands.

Keywords: Small pelagics, Scomber colias, Sardinella aurita, stock assessment, data-poor methods, artisanal, Canary Islands

PO (25445) **SPATIO-TEMPORAL DYNAMICS OF COMMON OCTOPUS (OCTOPUS VULGARIS) IN A HIGHLY EXPLOITED COASTAL AREA (NE ATLANTIC): ECOLOGICAL AND MANAGEMENT IMPLICATIONS**

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Common octopus (*Octopus vulgaris*) is a cephalopod species of high socioeconomic importance along its distribution range which has gained great popularity in recent years with increasing demands in international markets. This species has a rapid turnover due to its short life cycle that includes a planktonic phase before settlement and fast growth to maturity. It is targeted by bottom trawlers but typically caught by small-scale fleets mainly using several types of traps given its coastal affinity and hiding behavior. However, despite its importance, a good understanding of its population dynamics has been elusive due, in part, to the adversities of sampling the larval phase and properly monitoring recruits and adults, and the difficulties for routinely recording the age of the individuals. Overall, these facts, among others, hinders the assessment and management of the stocks, that, with some exceptions, is mainly based on monitoring catches and effort during specific fishing seasons and zones. Galician waters (NW Iberian peninsula) has a very long tradition in exploiting common octopus sustaining a large artisanal fleet and numerous accessory employments and industries. However, the species is currently facing apparent signs of decline. Using a dataset collected by onboard observers in the creel fishery over more than two decades which sampled roughly 200000 individuals, we investigated the spatio-temporal distribution of the species by sex and size group. Additionally, we explored the influence of the environmental conditions and management measures on the dynamics of the relative abundance of the species also by sex and size group. Finally, two catch-based stock assessment models, a state-space Bayesian method (CMSY++) and a generalized depletion model (CatDyn), were used to evaluate the status of the octopus population in Galician waters. The spatio-temporal models revealed distinct distributions for the species varying by sex and size group, which further differed among subregions of the Galician coast. Relative abundance indices showed a strong seasonal pattern related to the presence of recruits and the closed fishing season in summer. Management measures implemented during the last decades have left an imprint on the standardized abundance trends. The results of the assessment models suggested that the stock was overexploited from 2010 to 2019 (F > FMSY), and a maximum sustainable yield (MSY) was estimated at 2860 tonnes (90% CI: 2610-3140 tonnes). Overall, our study suggests that the current management measures for this resource should be reconsidered.

Keywords: Octopus vulgaris, spatio-temporal modelling, management, assessment

PO (25446) THE ROLE OF THE SURVEYS IN NORTH GALICIA NEPHROPS STOCK ASSESSMENT AND MANAGEMENT

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The role of the surveys in North Galicia *Nephrops* stock assessment and management

Norway lobster (*Nephrops norvegicus*) is a key species in the demersal ecosystem that lives in burrows between 150 and 650 meters depth in North Galician waters (NW Spain). *Nephrops* is fished by the bottom trawling fleet and has a very high economic value in the market. However, the population of this stock has experienced a dramatic decrease over the last decades.

The status of this stock is assessed using multiple sources of information including landings and discard data available from the fishing vessels sales notes and logbooks by trip, regular bottom trawling surveys performed by the Spanish Institute of Oceanography (IEO) in Galician and Cantabrian waters (SPGFS-WIBTS-Q4) since the 1980s, and IEO occasional sentinel surveys performed in professional trawlers. Moreover, in recent years, *Nephrops* density, biomass and abundance data are further obtained from the IEO *Nephrops* underwater images survey (ISUNEP25) in the North of Galicia. Hence, in this work, we collated all available information to develop spatio-temporal statistical models in order to better understand the changes in the population and evaluate the importance of several environmental variables. In addition, a stochastic Surplus Production model in Continuous Time (SPiCT) was further fitted to the North Galicia *Nephrops* stock using for the first time a standardized SPGFS-WIBTS-Q4 survey *Nephrops* yield index resulting from the spatio-temporal statistical models.

The spatio-temporal model revealed slight changes in the distribution of the species along years. Moreover, the relative abundance of Norway lobster showed a non-linear relationship with the percentage of fine fraction of the sediment and depth. The temporal decline of the population was evident though certain stabilization was also apparent during the last decade. The outputs of the SPiCT model were compared to the information from the ISUNEP25 survey and to the maximum sustainable yield (MSY) biomass and fishing mortality reference points. Both, SPiCT and ISUNEP25 information showed an extremely low biomass in North Galicia *Nephrops* stock.

Keywords: Nephrops, SPiCT, bottom trawl survey, UWTV survey, assessment, spatio-temporal model

PO (25413) SIMULATING CHANGES IN NATURAL MORTALITY OVER TIME: A CASE STUDY WITH THE IBERIAN SARDINE STOCK

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The Iberian sardine is a vital resource in the Portuguese and Spanish fishing industries, contributing significantly to livelihoods, food security, and economic growth. This stock, jointly managed by Portugal and Spain, is distributed across both countries' waters. Understanding ecosystem dynamics is key to advancing ecosystem-based fisheries management (EBFM), yet bridging the gap between ecosystem models and traditional stock assessments remains a challenge. In this work, we extract ecologically meaningful information, specifically natural mortality (M), from the Ecopath with Ecosim (EwE) model for the Iberian sardine (*Sardina pilchardus*) stock and incorporate it into the Stock Synthesis (SS3) model currently used for stock assessment.

Using EwE, we explore time-varying natural mortality by simulating ecosystem-level predator-prey interactions and energy flows. These estimates have a capacity to capture variability in M related to ecological drivers, rather than assuming it as a fixed parameter. We then integrate these dynamic M values into the SS3 framework, comparing outputs against current scenarios.

By linking ecosystem and single-species models we intend to evaluate the potential added value of this integration to improve the ecological realism and robustness of stock assessments. This integrative approach supports the development of more precautionary and adaptive management strategies for the Iberian sardine—a species with strong ecological and socioeconomic relevance in Iberian waters.

This poster highlights challenges and benefits of integrating ecosystem information from EwE outputs into SS3 using the Iberian Sardine stock case study.

Keywords: Iberian Sardine, Ecosystem-Based Fisheries Management (EBFM), Natural Mortality (M), \ Ecopath with Ecosim (EwE), Stock Synthesis (SS3)

PO (25410)

ASSESSING ENVIRONMENTAL AND PREDATOR IMPACTS ON ANTARCTIC KRILL (EUPHAUSIA SUPERBA) POPULATION DYNAMICS FROM AN INTEGRATED LENGTH-TO-AGE ASSESSMENT MODEL PERSPECTIVE

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Understanding the population dynamics of Antarctic krill (*Euphausia superba*) is critical for achieving sustainable and ecosystem management objectives for the Commission for the Conservation of Antarctic Marine Living Resources. In this study, we implemented an integrated length-to-age model that not only allows the integration of diverse data sources related to krill population dynamics in the Western Antarctic Peninsula, but also enables the evaluation of ecosystem influences—specifically environmental variability and predation—on recruitment, biomass, and stock status. We explored four scenarios that accounted (or not) for ecosystem influences on krill population dynamics, yielding results that align with the expected behavior of a stock assessment framework tailored sensitive species. Performance analyses reveals systematic biases in models that omit ecosystem information, resulting in overestimated fishing mortality and spawning stock biomass levels. In contrast, scenarios incorporating predator and environmental data yield more precautionary and biologically realistic outcomes, aligning more closely with observed ecosystem variability. Despite ongoing challenges related to the availability, resolution, and integration of ecological data, we argue that environmental and trophic drivers should be embedded directly into the state-space structure of assessment models rather than treated as exogenous factors. Overlooking these drivers may obscure keys population processes and compromise the reliability of management advice. Our results underscore the potential of ecosystem-informed, integrated modeling frameworks to support robust, precautionary management strategies for Antarctic krill that align with CCAMLR's conservation objectives, while also highlighting the continued need for methodological development and interdisciplinary data collection efforts in the Southern Ocean.

Keywords: Antarctic krill, length-to-age model, ecosystem variables, performance model, population dynamics, CCAMLR

PO (25403) INFLUENCE OF METEOCEAN FACTORS ON A BOAT SEINE CATCHES OF MEDITERRANEAN SAND EEL

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Research on environmental factors influencing the abundance of Mediterranean sandeels is limited. The well-documented characteristics of the seabed habitat of sandeels and environmental factors are widely recognized. However, there is a lack of knowledge regarding the factors influencing the distribution and abundance of *Gymnammodytes cicerelus* in Mediterranean areas. In order to enhance comprehension and prediction of fisheries and to provide a better basis for spatially and temporally oriented ecosystem-based management further information is required.

Multiple binomial GAM models were run using several meteorological and oceanographic (metocean) variables and Mediterranean sandeel absence/presence data. From the exploratory analysis, the metoceoan variables and the absence/presence of target fish in the hauls that best fitted the response variable were used as explanatory variables.

The GAM model explained up to 29% of the total variance and demonstrated a non-linear relationship between catch and oceanographic variables. Wave height and temperature are key factors that must be taken into consideration when explaining variations in the catch area of the Mediterranean sand eel. The use of GAMs as an analytical tool has the potential to enhance our understanding and sustainable management of these Mediterranean sand eel fisheries. This analysis will support future stock assessment models of Mediterranean sandeel.

Keywords: Data limited artisanal fisheries, Mediterrenean sand eel, Generalised Additive Model, stock assessment, meteocean factors, Gymnammodytes cicerelus

PO (25430) ADVANCING BOTTOM TRAWL EFFICIENCY: IMPLEMENTATION OF SEMI-PELAGIC DOORS IN THE CANTABRIAN-NORTHWEST FISHERY

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Spanish bottom trawl fishery operating in the North Iberian fishing, target demersal (hake, anglerfish, megrims) and some pelagic species (blue-whiting mackerel and horse-mackerel) despite being one of the most productive fishing methods with significant socio-economic importance,exerts substantial environmental pressure and contributes notably to CO_2 emissions.

The REDIPESCA Project—led by the Spanish Institute of Oceanography (IEO) in collaboration with the OPP-7 Burela Fisheries Producers' Organisation—aimed to implement technological innovations in bottom trawling that would reduce seabed disturbance and fuel consumption. To this end, a series of experimental trials were carried out to evaluate the improvements brought about by the use of semi-pelagic trawl doors that operate without direct contact with the seabed, compared to conventional bottom trawl doors. Three experimental campaigns were carried out on a representative trawler under real fishing conditions, with scientific observers on board. A total of 68 hauls were conducted in 2023 and 97 in 2024, using both electronic and physical observers to assess gear performance, catch composition, and fuel consumption.

The trials demonstrated the operational feasibility of using bottom trawl gears with semi-pelagic doors. Furthermore, the results obtained with the new net showed that catch rates for the main target species (*Scomber scombrus*) which accounted for 98.3% of the total catch, were practically identical when using both door types (~6,800 kg/haul), while the average instantaneous fuel consumption was significantly reduced when using the semi-pelagic doors, from 143.8 to 115.5 l/h. This improvement in efficiency was mainly attributed to the elimination of seabed contact by the doors and the shorter towing cable length required to achieve the same horizontal net opening (423.3 m compared to an average of 622.7 m). These results on the technical openings of the nets suggest that the use of pelagic doors could increase the swept area and thus contribute to an increase in the actual fishing effort exerted in fishing operations. This effect could have an impact on the CPUE.

The results obtained indicate that the use of semipelagic doors could introduce improvements in hydrodynamic efficiency and reduce seabed erosion in without compromising catch yields. This would help, on the one hand, reduce the environmental impact on the seabed and, on the other, reduce fuel consumption.

Keywords: Trawling, Selectivity, Fishing technology, Discards, Bottom-trawl

PO (25439) ANALYSIS OF THE INFLUENCE OF A SAC ON FISHING EFFORT INSIDE AND OUTSIDE ITS BOUNDARIES. CASE STUDY: SACS BAY OF ESTEPONA AND SALADILLO PUNTA DE BAÑOS.

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Special Areas of Conservation (SACs) play a vital role in protecting vulnerable marine habitats. The SACs "Fondos Marinos de la Bahía de Estepona" and "Saladillo Punta de Baños," located off the coast of Estepona (Málaga), were designated in 2016 to safeguard shallow benthic ecosystems, including Posidonia oceanica meadows, kelp forests (Laminaria ochroleuca, Phyllariopsis purpurascens), and vulnerable species such as the coral Astroides calycularis, the mollusk Charonia lampas, and the sea urchin Centrostephanus longispinus.

In accordance with Order AAA/1366/2016, the use of bottom-contact fishing gear is prohibited in areas containing sensitive habitats, aiming to reduce fishing pressure in zones traditionally exploited by small-scale artisanal fleets. This study assesses artisanal fishing effort in the region prior to the designation of the SACs (2015) and nine years after their implementation (2024), with a particular focus on the spatial distribution of fishing effort within and beyond SAC boundaries. Vessel positioning data ("green boxes") were utilized for analysis.

The study area was defined by a polygon extending from Manilva to Marbella, encompassing both Special Areas of Conservation (SACs) and adjacent unprotected zones. To differentiate fishing activity from transit movements, an algorithm was developed based on vessel speed and spatial location. Gear type was identified through landings data recorded in official sales slips. These datasets were integrated to estimate fishing effort, quantified as the number of fishing positions per unit area. Using a spatial grid (C-square 0.005º), temporal changes in fishing effort intensity and its redistribution across the study area were assessed for both years.

Preliminary results indicate a slight reduction in fishing effort within the SACs following their designation, coupled with a heightened concentration of activity in adjacent areas. This pattern suggests a potential relocation of artisanal fleets in response to restrictions aimed at protecting sensitive habitats. The study examines the implications of these shifts for fisheries management, as well as the long-term efficacy of conservation measures.

This work presents a replicable methodology for evaluating the impact of conservation measures on small-scale fisheries and underscores the importance of integrating habitat mapping into assessments of fishing effort within Marine Protected Areas.

PO (25441) POTENTIAL ENVIRONMENTAL FACTORS AFFECTING THE BIOMASS OF CALLISTA CHIONE IN THE ALBORAN SEA (WESTERN MEDITERRANEAN): A SPATIAL PERSPECTIVE

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The smooth clam (*Callista chione*) is a venerid bivalve of high commercial value in the northern Alboran sea (SW Spain), located in the western Mediterranean. It is primarily harvested by the mechanised artisanal dredging fleet. In recent years, the species has been exploited across the Mediterranean, with catch levels exhibiting a sustained decline over the past few decades, most notably in the Alboran Sea. Since 2014, these fisheries have been regulated by a management plan designed to ensure that biomass extraction remains below established biological reference points. In parallel, incorporating environmental variables into resource assessment models has become an increasingly common approach, aiming to evaluate their potential impacts on marine resources. The objective of this study is to assess fluctuations in total biomass in relation to environmental variables. Sampling was conducted within the species distribution area in the Alboran Sea using 20-minute trawls operated parallel to the coastline, with the dredges positioned at the bow. The study area was divided into two areas according to oceanographic features: The western area (W), extending from Línea de la Concepción to Calaburras is characterised by strong Atlantic influence and almost constant upwelling, while the eastern area (E), which extends from Calaburras to Nerja, experiences reduced influence from the western anticyclonic gyre and exhibits Mediterranean water features. To analyze the environmental differences between these two areas, temperature, salinity, dissolved oxygen, and chlorophyll-a (Chla) data were collected in situ using a CTD (Rinko, ASTD 102) during three consecutive assessment surveys (EVALBICs: 2022–2024). Generalised Additive Models (GAMs) were applied to evaluated the influence of environmental factors on the *C. chione* biomass at spatial scale (both vertical and horizontal scales), considering both areas. Preliminary results suggest significant effects for location, dissolved oxygen and depth, with zone-specific nonlinear responses. Biomass levels were significantly lower in E compared to W area. These findings highlight the importance of incorporating environmental variability into fisheries assessments. Understanding how such environmental variables affect the distribution of commercially exploited species is essential for the integrated and effective assessment and management of fisheries, especially in highly dynamic systems such as the Alboran Sea.

Keywords: Callista chione, Alboran Sea, Enviromental factors, Dredging fleet, GAM, EVALBIC

PO (25442) ENVIRONMENTAL AND SPATIAL DYNAMICS OF THE CHAMELEA GALLINA FISHERY

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In the northern Alboran Sea (Western Mediterranean), the venerid *Chamelea gallina* is targeted by small-scale fisheries using mechanised dredges. Since 2014, these fisheries have been regulated by a management plan to ensure biomass extraction remains below established biological reference points. Incorporating environmental variables into resource assessment models has become increasingly common to better understand ecological drivers. The objective of this study is to assess how adults (shell length; >25 mm) and juvenils (<25 mm) biomass fluctuates in relation to abiotic factors. Sampling was carried out in the distribution area of the natural C. gallina shoals using 5-minute trawls operated parallel to the coastline with the dredges positioned astern. The study area was divided into two areas based on oceanographic features: the western area (W), extending from Línea de la Concepción to Calaburras, is characterised by strong Atlantic influence and almost constant upwelling, while the eastern area (E), which extends from Calaburras to Nerja, experiences reduced influence from the western anticyclonic gyre and exhibits Mediterranean water features. To analyse the environmental differences between the two areas, data on temperature, salinity, dissolved oxygen and chlorophyll-a was collected "*in situ*" using a CTD (Rinko, ASTD 102) during three consecutive assessment surveys (2022–2024). A generalized additive model (GAM) was used to evaluate the influence of environmental variables on biomass at spatial (vertical and horizontal scales), considering both zones. Preliminary results show spatial differences, i.e. while the biomass of juveniles is higher in the E area, the biomass of adults is higher in the W. The model revealed significant effects on location, depth and all analysed environmental variables on adult biomass. For juveniles, the results were largely consistent with those observed for adults, with the exception of the non-significative salinity influence on their biomass. These findings underscore the key role of spatial and environmental conditions in shaping the biomass distribution patterns. Understanding how environmental conditions affect commercially important species is essential for the integrated and effective assessment and management of fisheries. Shifts in these conditions can led to alter the biology, distribution, and abundance of species, ultimately influencing fishery dynamics.

Keywords: Chamelea gallina, Alboran Sea, Enviromental factors, GAM

PO (25400) **FILLING SPATIAL AND TEMPORAL GAPS IN PORTUGUESE SURVEY DATA BY INTEGRATING COMMERCIAL FISHERIES DATA**

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In fisheries management, catches and biological data are collected from multiple sources. A key and reliable input for stock assessment is the abundance estimates from fisheries-independent surveys. However, such surveys often face spatial and/or temporal gaps due to logistical, temporal, or meteorological constraints, compromising data-series interpretation and management decisions. To address these limitations, we investigated whether fisheries-dependent data can fill observational gaps and help identify biases in independent abundance estimates. A short time-series of selected demersal species from the Portuguese continental coast was analyzed using fisheries-dependent data sources, including official logbooks and landings from the bottom-trawl fleet, along with catch and length composition data collected by scientific observers at sea and onshore. Logbook and at-sea data were standardized to catch per unit effort (kg/h) and compared both spatially and temporally within each year against data from the Portuguese Autumn Groundfish Survey. The study aims to evaluate the complementarity of fisheries-dependent and independent data, assessing their integration potential to enhance survey coverage, improve the robustness of stock assessments, and provide a more comprehensive understanding of species distribution, ultimately supporting more informed and effective fisheries management.

Keywords: data gaps, survey data, logbook data, spatial-temporal analysis, Portuguese coast

PO (25452) THE IMPACT OF SEMI-PELAGIC LONGLINING TARGETING HAKE ON VULNERABLE MARINE ECOSYSTEMS (VMES) IN THE WATERS OF THE WESTERN EUROPEAN ATLANTIC

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In 2022, it came into force the the closure of 87 areas designated by the European Commission where vulnerable marine ecosystems (VMEs) are known to occur or are likely to occur. These areas closed to bottom fishing comply with the provisions of Regulation 2016/2336, which establishes specific conditions applicable to fishing for deep-sea stocks in the Northeast Atlantic. In this sense, the semi-pelagic hake longline is used in shelf-edge areas on bottoms exceeding 400m and spatially coincide with several of the areas designated by the EC as prohibited areas for bottom fishing, so this prohibition impacts fishing activity in these areas.

A study of the interactions on the seabed of longline fishery targeting European hake was carried out with the aim of providing scientific evidence on the impact of this fishing gear on bottom species. Two sampling methods were used: observation by human observers on board fishing vessels and electronic fishing monitoring. Based on the systematic review of the recordings of longline vessels equipped with an electronic monitoring system with video cameras in its usual fishing activity, the degree of incidence on vulnerable species was evaluated.

A total of 430 fishing sets were monitored onboard 8 longline vessels in 2024 with 1.6M hooks observed. European hake is the target species of the fishery and accounted for 85% of the catch retained in the observed trips.

The semi-pelagic longline method is one of the most productive and has great socio-economic importance, supporting the social and productive structure of the professional fishing sector, so that today its contribution is irreplaceable. Thus, there is a need to obtain scientific evidence on the impact of this fishing gear on marine ecosystems that allows the maintenance of this activity in balance with the conservation of EMVs.

Keywords: VME, MPA, impact, longline, selectivity

PO (25373) DEVELOPING ELECTRONIC MONITORING AND ARTIFICIAL INTELLIGENCE FOR DATA COLLECTION OF FISHERIES LANDINGS IN PORTUGUESE PORTS /

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Fisheries management is fundamentally based on analyzing data on fishing activity and biological data on species, with the length of individuals being the main biological variable collected. The automation of species identification and individual length measurement allows improving and complementing data collection with traditional in situ manual methods. In a collaboration between IPMA and the Portuguese company Fishmetrics, the automation of species identification and measurement, namely through electronic monitoring and artificial intelligence (AI) are currently being developed. In a first case study, we manually measured a series of species on digital Fishmetrics images to identify the advantages and limitations of the method and setup; and moreover during the COVID-19 pandemic we used the obtained data as replacement / complement to data from traditional in situ sampling. In a second case study, we implemented manual measurements on digital Fishmetrics images of a series of morphometric measurements that can be used as proxies for total length (when not available) in a set of bony fishes and elasmobranchs. In a third case study, we manually measured a set of four bony fishes in a single fishing port and developed (including training, validation and testing) single-species AI models for measurement, and multi-species AI models for species identification and measurement. Further work is being developed, based on images from a series of fishing ports, which includes the testing of the previously developed AI models, and the development of AI models for those species as well as for a series of others.

Keywords: Offshore renewable energy, Fisheries displacement, Fishing effort, Spatial-temporal analysis, Marine resource management

PO (25427) UNCOVERING GENDER BIAS IN FISHERIES SCIENCE: A DECADE OF PARTICIPATION IN RFMO ASSESSMENT GROUPS

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The role of women in fisheries science has gained increasing attention in recent years, yet gender disparities in decision-making and technical bodies remain understudied. This study assesses historical gender bias in participation within scientific assessment groups of Regional Fisheries Management Organizations (RFMOs) over the past decade.

We conducted a systematic review of public reports from major RFMOs to compile data on the composition of expert groups responsible for stock assessments and scientific advice. For each group and year, we recorded the number of women participants, their institutional affiliations and countries of origin, and whether they held leadership roles such as Chair.

Our analysis explores trends in women's representation, both in absolute terms and as a proportion of total group members, and examines patterns across RFMOs, regions, and organization types (e.g., governmental, academic, NGO). Preliminary findings indicate persistent gender imbalances, especially in leadership positions and in groups focusing on high-value commercial species.

These results highlight structural barriers that may limit gender equity and inclusiveness in fisheries science and governance. This work contributes to broader discussions on diversity in marine science, providing a baseline for monitoring institutional change and proposing actionable recommendations to increase women's participation and leadership in RFMO scientific bodies.

Keywords: Gender equity, fisheries science, RFMO, scientific assessments, diversity

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